TOYODENKI

μGPCsx

Series

User's Manual
Hardware

IGE010A

Read the “Safety Notice” carefully before using the product, and use it properly.

The levels of the matters on which safety notice is given are classified into “Danger” and “Caution” herein, each of which has the following meaning.

Danger : Mishandling may cause death or serious injury.

Caution : Mishandling may cause intermediate bodily injury, minor injury or damage to property.

Note that the matter described with Caution may cause serious results depending on the circumstances.

Each of the above describes important contents, which must strictly be observed.

Matters requiring special attention are given below, which are also indicated by the above mark in the text of this manual.

Danger

- Do not touch live parts such as terminals etc. while electricity is on. Failure to observe this may cause electric shock.
- Mounting, dismantling, wiring work, maintenance and inspection must be made with electric power supply shut off without fail.
  Work while power is activated may cause electric shock, a malfunction or a fault.
- Emergency stop circuit, interlock circuit etc. must be configured outside of the PC.
  Failure to observe this may result in breakage in machines or accidents caused by a fault of the PC.
- Batteries must not be connected with +- placed backward, charged, dismantled, pressurized or distorted, thrown into fire, or short-circuited.
  Failure to observe this may cause bursting or set the batteries on fire.
- If any distortion, leakage of liquid or other abnormality has been found in batteries, do not use them.
  Failure to observe this may cause bursting or set the batteries on fire.
- Never make the FG terminal open while short-circuiting LG - FG. (Ground the wire without fail.)
  Failure to observe this may cause electric shock.

Safety Notice

⚠ Caution

- Do not use an article damaged or distorted at the time of unpacking. Failure to observe this may cause a fire, a malfunction or a fault.
- Do not give shock to the product by letting it drop or fall down. Failure to observe this may cause breakage or a fault of the product.
- The product must be installed in accordance with the contents described in the operating instructions and manuals. Any improper installation may cause a drop, malfunction or fault of the product.
- It must be used with the rated voltage and current that are indicated in the operating instructions and manuals. Its use with values other than the rated ones may cause a fire, a malfunction or a fault.
- It must be used (stored) under the environment that is indicated in the operating instructions and manuals. Its use (storage) under environments of high temperatures, high humidity, condensation, dusts, corrosive gasses, oil, organic solvent, and in particular of great vibrations and shock may be the cause of electric shock, a fire, a malfunction or a fault at the time of use.
- Electric wires of a size fit for the voltage to be applied and the current to be input must be selected and must be tightened with specified torque.
  Any improper wiring or tightening may cause a fire or a drop, a malfunction or a fault of the product.
- Construction work must be done so that no foreign matter such as trash, debris of electric wires, iron powder etc. gets into the inside of equipment.
  Failure to observe this may cause a fire, an accident, a malfunction or a fault of the product.
- After wiring is over, trash prevention paper in modules/units must be removed without fail.
  Operation without removing the trash prevention paper may cause a fire, an accident, a malfunction or a fault of the product.
- Grounding terminals must be grounded without fail. Failure to ground them may cause electric shock or a malfunction.
- Screws for terminals and screws for installation must be checked at regular intervals to ensure that they are securely tightened.
  Their use while in a loosened state may cause a fire or a malfunction.
- Unused connectors must be covered with the connector covers enclosed.
  Failure to observe this may cause a malfunction or a fault.
- Terminal blocks must be covered with terminal covers without fail. Failure to observe this may cause electric shock or a fire.
- Change of a program, forced output, start, stop etc. while in operation must be made after making sure that safety has been secured.
  Failure to observe this may cause breakage in machines or an accident as a result of functioning of machines by misoperation.
- Loader connectors must be inserted in the proper direction. Failure to observe this may cause a malfunction.
- Before making contact with the PC, static electricity retained on the human body etc. must be discharged by touching grounded metals etc. Excessive static electricity may cause a malfunction or a fault.
- Wiring must securely be made in accordance with the contents described in the operating instructions and manuals. Erroneous wiring may cause a fire, an accident or a fault.
- When a plug is taken out from a socket, do not pull the cord.
  Failure to observe this may cause a fire or a fault as a result of breakage in wires.
- Do not change the system (attaching or detaching I/O modules etc.) with power turned on. Change in the system while being activated may cause a malfunction or a fault.
- Repairing of the product must never be made at the site. If repairing is needed, ask our company and request of repair should be made.
  Also, replacement of batteries must be made paying full attention not to cause erroneous connections of connectors, etc.
  Failure to observe this may cause a fire, an accident or a fault.
- When cleaning, power must be turned off, and then use towels wet with warm water, etc.
  Use of thinner or the like, or other organic solvent my cause a melting on the surface of equipment or change in color.
- Do not modify or dismantle the product. Failure to observe this may cause a fault.
- When discarding the product, it should be handled as industrial waste.
- The product described in this manual is not designed or manufactured intending a use in equipment or a system that may affect human life.
- If the product described in this manual is considered to be used for special uses such as for controlling atomic energy, for aviation and aerospace, for medicine, for transportation equipment, for vehicles for travelling, or for systems of these, etc., please consult it with the contact point of our sales.
- If the product described in this manual is applied to equipment that is expected to affect human life or generate serious losses as a result of a fault of the product, safety devices must be installed without fail.
- External power supply (DC 24V power supply etc.) to be connected with DC I/O must use power supply having strengthened insulation from AC-based power supply. (Use of power supply in compliance with EN60950 is recommended.) Failure to observe this may cause an accident or a fault.

* Manual number is indicated at the right side of the bottom of the cover sheet of this manual.

Printed date	* Manual number	Contents of revision
May, 2001	IGJ060A	Printing of the First Edition (Temporary Edition)

Chapter 1 Outline

Table of contents

1-1 Model system

<Code classification according to the module type>

NP □ □ □□□□-□

Code representing the specifications of each module (refer to each module)

Symbol	Module mode code
1	Module, unit
2	Unit to be installed separately
4	Software package
8	Auxiliaries and others

Symbol	Module type code
A	Analog module
B	Baseboard
C	Cable
F	Function module
H	Programming tool
L	Communications module
P	CPU module
S	Power supply module
N	Software package, extension FB
V	Auxiliaries and others
W	I/O mixed module
X	Input module
Y	Output module

TD: Power supply, CPU, base module
NP: Modules other than above

1-1-1CPU module

TD1P □ □□

Symbol	CPU type
S	CPU

Symbol	Number of program steps
117R	Capacity: Built-in 117 K steps
74	Capacity: Built-in 74 K steps
32	Capacity: Built-in 32 K steps

1-1-2Baseboard

TD1B □ □□

	Symbol	Base type
*	P	Processor bus extension type
	S	Standard type[Note)]

Symbol	Number of slots
06	Number of slots: 6
08	Number of slots: 8
11	Number of slots: 11
13	Number of slots: 13

* Processor bus extension is available in the 13-slot product only.

Note) Refer to “3-4 Baseboard specifications” for the positions of the slots that have the processor bus.

1-1-3Power supply module

TD1S- □ □

Symbol	Power supply specifications
2	AC100/200 V
4	DC 24 V
9	AC 100 V (Under development)

Symbol	Number of occupied slots
2	2 Slots
1	1 Slot

1-1-4SX bus extension cable

NP1C- □□

Symbol	Cable length
P3	Cable length: 300 mm
P6	Cable length: 600 mm
P8	Cable length: 800 mm
02	Cable length: 2,000 mm
05	Cable length: 5,000 mm
10	Cable length: 10,000 mm
25	Cable length: 25,000 mm

1-1-5Auxiliaries and others

NP8 □-□□

Symbol	Type
B-BP	SX bus loop back plug
B-TB	SX bus T-branch unit
X-SW	Trial input switch, 16 pcs.
P-BT	Battery for data backup
P-KY	Operation mode switching key for CPU
V-JP1CC	OPCN-1 connector
V-JP1RT	OPCN-1 terminal resistor

Symbol	Type
V-CN1	External connector for connector type module (soldering type)
B-ST	Fixing hardware for baseboard (for installation onto DIN rail)

1-1-6Digital input module

NP1X □□ □□ -□

Symbol	Number of input points
08	Number of input points:8
16	Number of input points: 16
32	Number of input points: 32
64	Number of input points: 64

Symbol	Input voltage specifications
02	DC5-12 V
04	DC12-24 V
06	DC24 V
10	AC 100 V
11	AC 200 V

Symbol	Detailed specifications
A	High-speed input
W	No polarity

1-1-7Digital output module (Common part)

NP1Y □□ □ □□-□

Code representing the detailed specifications of each output type: in accordance with (1) through (3).

Symbol	Number of output points
06	Number of output points: 6
08	Number of output points: 8
16	Number of output points: 16
32	Number of output points: 32
64	Number of output points: 64

Symbol	Output classification
R	Relay (Ry) output
S	Triac (SSR) output
T	Transistor (Tr) sync output
U	Transistor (Tr) source output

(1) Ry output module (refer to above for ■.)

NP1Y ■■ R □□

Symbol	Common specifications
04	Common for 4 points
08	Common for 8 points

(2) Tr output module (refer to above for ■.)

NP1Y ■■ T/U □□ □□ -□

Symbol	Output voltage
09	DC12-24 V

Symbol	Output current capacity
P1	Current capacity: 0.1 A
P6	Current capacity: 0.6 A
02	Current capacity: 2 A

Symbol	Detailed specifications
A	Built-in pulse set output

(3) SSR output module (refer to above for ■.)

NP1Y ■■ S

1-1-8Digital I/O mixed module

NP1W □□□□ -□

Symbol	Number of I/O points
16	DI: 8 points+DO: 8 points
32	DI: 16 points+DO: 16 points

Symbol	Input voltage specifications
06	DC 24 V

Symbol	Sync/source classification
T	Source input + sync output
U	Sync input + source output

1-1-9Analog module

NP1A □□□ -□□

Symbol	I/O - number of channels
X04	10-bit resolution input: 4 channels
X08	10-bit resolution input: 8 channels
XH4	14-bit resolution high-speed input: 4 channels
YO2	10-bit resolution output: 2 channels
YH2	14-bit resolution output: 2 channels

Symbol	I/O specifications
MR	Multi-range
PT	Temperature measuring resistor
TC	Thermocouple

1-1-10 Function module

- Function module related unit

NP1F □□□

Symbol	Type
HC2	High-speed counter: 2 channels/500 kHz
HC8	High-speed counter: 8 channels/50 kHz
MA2	Analog combination: 2 channels
MP2	Pulse set combination: 2 channels
HP2	Pulse set output: 2 channels/250 kHz
MM1	Memory card interface module: 1 channel
PC2	PC card interface module: 2 channels
DMY	Dummy module

NP2F □□□

Symbol	Type
LEV	Signal converter

1-1-11 Communications module

NP1L □□□

Symbol	Type
JP1	OPCN-1 master module: 1 channel
RJ1	OPCN-1 interface module
RS1	Versatile communications module (RS-232C/RS-485): 1 channel each
RS2	Versatile communications module (RS-232C): 1 channel
RS4	Versatile communications module (RS-485): 1 channel
FL1	FL-net (OPCN-2) module: 1 channel
DN1	DeviceNet master module: 1 channel
OL1	SX bus optical link module

NP2L □□□

Symbol	Type
OE1	SX bus optical converter

1-2 Model list

1-2-1Hardware

Description	Model	Outlined specifications	Accessories	
			Description	No.
High performance CPU module	TD1PS-32	Basic instruction: 20 ns Program memory: 32 K steps Number of I/O control points: maximum 8192	Operating instructions Battery for data backup SX bus loop back plug	1 1 set 2
	TD1PS-74	Basic instruction: 20 ns Program memory: 74 K steps Number of I/O control points: maximum 8192	CPU mode switching key Screwdriver	1 1
Baseboard	TD1BP-13	Number of slots: 13 for 10 slots of processor bus	Operating instructions Baseboard installation hardware	1 1
	TD1BS-06	Number of slots: 6 for 4 slots of processor bus	Station number setting seal	1
	TD1BS-08	Number of slots: 8 for 3 slots of processor bus		
	TD1BS-11	Number of slots: 11 for 3 slots of processor bus		
	TD1BS-13	Number of slots: 13 for 3 slots of processor bus		
Power supply module	TD1S-22	AC 100/200 V input power supply Output capacity 35 W (2 slots wide)	Operating instructions Connector for ALM contact Short-circuiting strip for switching power supply voltage Note) LG-FG short-circuiting strip	1 1 set 1 1
	TD1S-42	DC 24 V input power supply Output capacity 35 W (2 slots wide)	Operating instructions Connector for ALM contact LG-FG short-circuiting strip	1 1 set 1
	TD1S-91	AC 100 V input power supply Output capacity 12 W (1 slot wide)	Operating instructions	1
SX bus increasing cable	NP1C-P3	Cable length: 300 mm	Operating instructions	-
	NP1C-P6	Cable length: 600 mm		
	NP1C-P8	Cable length: 800 mm		
	NP1C-02	Cable length: 2,000 mm		
	NP1C-05	Cable length: 5,000 mm		
	NP1C-10	Cable length: 10,000 mm		
	NP1C-25	Cable length: 25,000 mm		

(Continued on the next page)

Note) The short-circuiting strip for switching power supply voltage is delivered in a state of being installed onto the module.

(1-2-1 Model list, continued)

Description		Model	Outlined specifications	Accessories	
				Description	No.
Auxiliaries and others	SX bus loop back plug	NP8B-BP	For SX bus loop back (standard accessory for CPU module)	-	-
	SX bus T-branch unit	NP8B-TB	For connecting SX bus T-branch	Operating instructions SX bus loop back plug	1 1
	Trial input switch	NP8X-SW	16-point trial input switch	Cable for power supply connection Cable for power supply interruption	1 1
	Battery for data backup	NP8P-BT	Lithium primary battery (5 years at 25°C) (standard accessory for CPU module)	Seal for indication of effective period	1 set
	Mode switching key for CPU	NP8P-KY	For switching CPU operation mode (standard accessory for CPU module)	-	-
	I/O connector	NP8V-CN	I/O, connector for positioning module, soldering type socket, connector cover (Manufactured by Fujitsu)	-	1 set
	Fixing hardware for DIN rail	NP8B-ST	For installing DIN rail (1 set consisting of 2 pcs.)	-	-
Digital input module		NP1X1606-W	DC 24 V, 16 points, 7 mA, 1 - 100 ms variable, screw terminal type	Operating instructions	1
		NP1X3206-W	DC 24 V, 32 points, 4 mA, 1 - 100 ms variable, connector type	Terminal cover	1
		NP1X6406-W	DC 24 V, 64 points, 4 mA, 1 - 100 ms variable, connector type	Terminal name entry sheet Note 1) Note 2)	1
		NP1X3202-W	DC 5V - 12 V, 32 points, 3 mA (5 V), 9 mA (12 V), 1 - 100 ms variable, connector type		
		NP1X0810	AC 100/120 V, 8 points, 10 mA, 10 ms screw terminal type		
		NP1X1610	AC 100/120 V, 16 points, 10 mA, 10 ms screw terminal type		
		NP1X0811	AC 200/240 V, 8 points, 10 mA, 10 ms screw terminal type		
		NP1X3206-A	DC 24V, 32 points, 4 mA, connector type high-speed input (with pulse catch) port 1 - 8: 20 μs (without filter) port 9 - 32: 100 μs (without filter) 0.1 ms - 100 ms variable		

(Continued on the next page)

Note 1) Terminal cover and terminal name entry sheet are supplied together only with the screw terminal type module.

Note 2) Connector for external connection is not supplied with the connector type module.
See “4-4-3 Input and output wiring” for applicable connectors.

(1-2-1 Model list, continued)

Description	Model	Outlined specifications	Accessories	
			Description	No.
Digital output module	NP1Y08T0902	Tr sync, DC 12 - 24 V, 8 points, 2.4 A/point, 8 A/common, screw terminal type	Operating instructions	1
	NP1Y16T09P6	Tr sync, DC 12 - 24 V, 16 points, 0.6 A/point, 4 A/common, screw terminal type	Terminal cover	1
	NP1Y32T09P1	Tr sync, DC 12 - 24 V, 32 points, 0.12 A/point, 3.2 A/common, connector type	Terminal name entry sheet	1
	NP1Y32T09P1-A	Tr sync, DC 12 - 24 V, 32 points, 0.12 A/point, 3.2 A/common, connector type, pulse set output function	Note 1) Note 2)	
	NP1Y64T09P1	Tr sync, DC 12 - 24 V, 64 points, 0.12 A/point, 3.2 A/common connector type		
	NP1Y08U0902	Tr source, DC 12 - 24 V, 8 points, 2.4 A/point, 8 A/common, screw terminal type		
	NP1Y16U09P6	Tr source, DC 12 - 24 V, 16 points, 0.6 A/point, 4 A/common, screw terminal type		
	NP1Y32U09P1	Tr source, DC 12 - 24 V, 32 points, 0.12 A/point, 3.2 A/common, connector type		
	NP1Y64U09P1	Tr source, DC 12 - 24 V, 64 points, 0.12 A/point, 3.2 A/common, connector type		
	NP1Y06S	Triac, AC 100/240 V, 6 points, 2.2 A/point, 4 A/common, screw terminal type		
	NP1Y08S	Triac, AC 100/240 V, 8 points, 2.2 A/point, all points independent, screw terminal type		
	NP1Y08R-04	Ry, DC 110 V, AC 240 V, 8 points, DC 30 V/AC 264 V, 4 A/common, screw terminal type		
	NP1Y16R-08	Ry, DC 110 V, AC 240 V, 16 points, DC 30 V/AC 264 V, 2.2A/point, 8 A/common, screw terminal type		
Digital I/O mixed module	NP1W1606T	DC 24 V, 8 points source input, Tr sync, DC 12 - 24 V, 8 points output, screw terminal type	Operating instructions	1
	NP1W1606U	DC 24 V, 8 points source input, Tr source, DC 12 - 24 V, 8 points output, screw terminal type	Terminal cover	1
	NP1W3206T	DC 24 V, 16 points source input, Tr sync, DC 12 - 24 V, 16 points output, connector type	Terminal name entry sheet	1
	NP1W3206U	DC 24 V, 16 points sync input, Tr source, DC 12 - 24 V, 16 points output, connector type	Note 1) Note 2)	
Analog input module	NP1AXH4-MR	High-speed multi-range input 4 channels, resolution 14 bits	Operating instructions	1
			Terminal cover	1
	NP1AX04-MR	Standard multi-range input 4 channels, resolution 10 bits	Terminal name entry sheet	1
	NP1AX08-MR	Standard multi-range input 8 channels, resolution 10 bits	Operating instructions	1
			Terminal cover	1
			Terminal name entry sheet	1
			Resistor for current input	8
	NP1AXH4-PT	Platinum temperature measuring resistor input 4 channels	Operating instructions	1
			Terminal cover	1
	NP1AXH4-TC	Thermocouple input 4 channels	Operating instructions	1
			Terminal cover	1

(Continued on the next page)

Note 1) Terminal cover and terminal name entry sheet are supplied together only with the screw terminal type module.

Note 2) Connector for external connection is not supplied with the connector type module.
See “4-4-3 Input and output wiring” for applicable connectors.

(1-2-1 Model list, continued)

Description		Model	Outlined specifications	Accessories	
				Description	No.
Analog output module		NP1AYH2-MR	High-speed multi-range output 2 channels, resolution 14 bits	Operating instructions Terminal cover	1 1
		NP1AY02-MR	Standard multi-range input 2 channels, resolution 10 bits	Terminal name entry sheet	1
Function module	High-speed counter module	NP1F-HC2	500 kHz × 2 channels, 90 degrees phase difference 2-phase signal, pulse+direction signal, forward pulse + reverse pulse	Operating instructions Note 1)	1
	Analog combination positioning module	NP1F-MA2	2-axis analog instruction positioning combination module output +-10 V feedback pulse 500 kHz		1
	Pulse set combination-positioning module	NP1F-MP2	2-axis pulse set instruction positioning combination module feedback pulse 500 kHz output 250 kHz (forward + reverse)		1
	Pulse set output-positioning module	NP1F-HP2	Pulse set instruction 250 kHz × 2 channels forward pulse+reverse pulse		1
	PC card interface module	NP1F-PC2	Versatile PC card, versatile PC memory card (RAM card (5 V product)) each 1 channel	Operating instructions Hardware for fixing card cover	1 1 1
	Memory card interface module	NP1F-MM1	Versatile PC memory card (RAM card (5 V product)) 1 channel	Operating instructions Hardware for fixing card cover	1 1 1
	Dummy module	NP1F-DMY	-	Operating instructions	1
Signal converter		NP2F-LEV	Signal level conversion open collector (Tr) signal ⇔ RS-485	Operating instructions Connector for output Connector for input	1 1 set 1 set
Communications module	Versatile communications module	NP1L-RS1	Versatile communications RS-232C, RS-485X each 1 channel	Operating instructions	1
		NP1L-RS2	Versatile communications RS-232CX 1 channel		
		NP1L-RS4	Versatile communications RS-485X 1 channel		
	OPCN-1 master module	NP1L-JP1	OPCN-1 masterX 1 channel	Operating instructions OPCN-1 connector	1 1 set
	OPCN-1 interface module	NP1L-RJ1	Interface module for increasing OPCN-1	Operating instructions OPCN-1 connector SX bus loop back plug	1 1 set 2 pcs

(Continued on the next page)

Note 1) Connector for external connection is not supplied with the module.
See “4-4-3 Input and output wiring” for applicable connectors.

Model list

Description		Model	Outlined specifications	Accessories	
				Description	No.
Communications module/unit	FL-net (OPCN-2) module[Note 2)]	NP1L-FL1	FL-net (OPCN-2) × 1 channel (10BASE5 or 10BASE-T)	Operating instructions Power supply cable for 10BASE5	1 1 set
	DeviceNet master module	NP1L-DN1	DeviceNet master × 1 channel	Operating instructions Connector	1 1
	SX bus optical converter	NP2L-OE1	SX bus optical transmission inter-station maximum 800 m (25°C)	Operating instructions SX bus loop back plug	1
	SX bus optical link module	NP1L-OL1		Operating instructions SX bus loop back plug	1
Support tool connection cable		NP4H-CA2[Note 1)]	Connection cable for TDsxEditor 2 m	-	-
		NP4H-CNV	Connection cable for TDsxEditor 2 m with converter (ME777A-FSP)	Operating instructions Converter	1

Note 1) In addition, a converter of BLACK BOX made (model: ME777A-FSP) is required.

Note 2) FL-net (OPCN-2) is called FL-net for short in this manual.

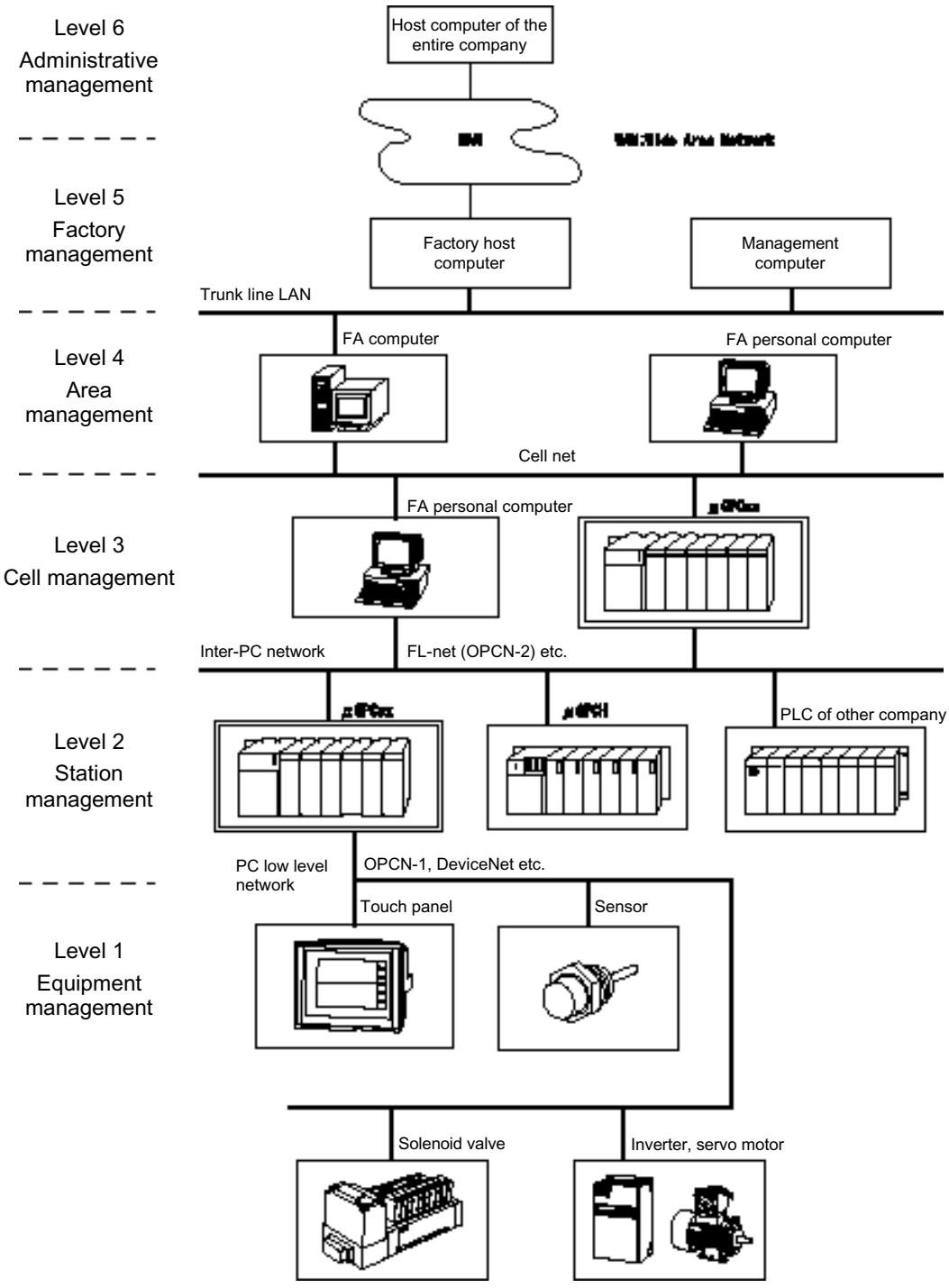
Chapter 2
System Configuration

Table of contents

2-1 Outline of system configuration

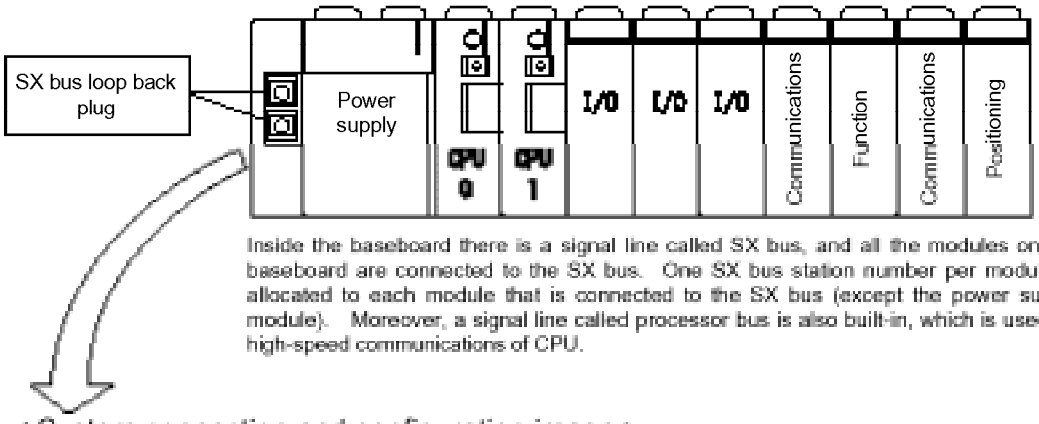
2-1-1 Placement in CIM stages

μGPCsx is a component placed in the equipment management of Level 1 through the cell management of Level 3 in the levels of 6 stages of CIM.



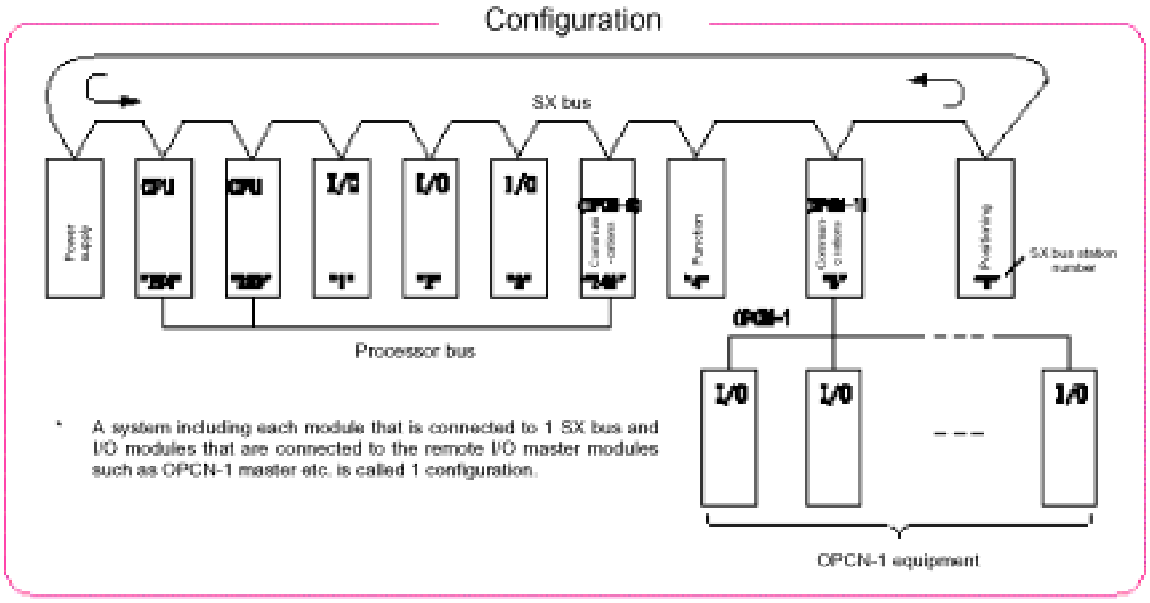
2-1-2Outline of the system configuration of GPCsx

The system is configured by mounting onto the baseboard each of the modules of power supply, CPU, I/O, positioning, function and communications.



Inside the baseboard there is a signal line called SX bus, and all the modules on the baseboard are connected to the SX bus. One SX bus station number per module is allocated to each module that is connected to the SX bus (except the power supply module). Moreover, a signal line called processor bus is also built-in, which is used for high-speed communications of CPU.

< System connection and configuration image >



What is SX bus?

High-speed data bus dedicated to the μGPCsx series of transmission rate: 25 Mbps, total extended distance: 25 m, maximum number of stations connected: 254 stations. It has a loop structure as shown in the above illustration. Therefore, SX bus loop back plugs need to be installed on both ends of the SX bus (baseboard).

What is processor bus?

High-speed data bus of transmission rate: 25 Mbps (8 pcs. of busses) connected to CPU modules on 1 baseboard. It is not connected to CPU modules on the other baseboard even if they are contained in the same configuration. It is used for data communications between CPU-CPU.

Key points

SX bus station numbers (station 1 - 254) are automatically allocated to all the modules except the power supply module.

Station numbers are allocated to CPU modules in reverse order (from station 254), and allocated to the other modules from station 1.

<Relation between CPU number and SX bus station number>

CPU modules and FL-net modules are given the SX bus station numbers automatically by means of the input of the system configuration definition. 0 - 7 of the CPU numbers are used for CPU modules and 8, 9 are for FL-net.

CPU number	SX bus station number	
0	254	For CPU modules
1	253	
2	252	
3	251	
4	250	
5	249	
6	248	
7	247	

CPU number	SX bus station number	
8	246	For processor link modules
9	245	
A	244	Spare
B	243	
C	242	
D	241	
E	240	
F	239	

2-1-3Number of units connected to each module

The number of units connected to each module is as follows.

(1) Number of modules that can be connected onto the SX bus

Maximum 248 units (except the power supply module, SX bus T-branch unit and baseboard)

(2) Number of modules/units that can be connected to 1 configuration (including the remote I/O as well)

Maximum 254 units (except the power supply module, SX bus T-branch unit and baseboard)

(3) Restriction on the number of units connected to 1 configuration

Module type	Maximum number of units connected
Power supply module	There is no restriction in the number of units connected to the power supply module.
CPU module	8 units
Processor link module	Total 2 units including FL-net modules
Touch panel directly connected to the SX bus	8 units
Module of classification A	8 units (remote I/O master modules)
Module of classification B	Processor link modules, POD directly connected to the SX bus
Module of classification C	238 units including the connected modules of classifications A, B

<Classification of modules>

Module of classification A	Module of classification B	Module of classification C
• OPCN-1 master module (NP1L-JP1) • DeviceNet master module (NP1L-DN1)	• FL-net module (NP1L-FL1) • Versatile communications module (NP1L-RS1/RS2/RS4) • PC card IF module (NP1F-PC2)Note) • Memory card IF module (NP1F-MM1) • Touch panel directly connected to the SX bus	• All the modules except the modules of classifications A, B

Note) The maximum number of PC card IF modules in 1 configuration is 4 units.

Number of connected units

<Restriction on the number of units of remote I/O master modules>

There are restrictions as given below on the remote I/O master modules of which product version number is smaller than 10** (hardware version: smaller than 10).

When using the remote I/O master modules, a system must be configured that satisfy the following formula concerning the number of units of CPU modules in 1 configuration, number of units of remote I/O master modules, and number of units of I/O modules that are directly connected to the SX bus.

2043 word > (Number of units of CPU) ×

{ Σ (Maximum station number of each remote I/O line + I/O size of the maximum station number + 2) + 6.5 }

+ Number of units of modules on the SX bus other than CPU modules × 1.5

+ Total I/O size of the I/O modules that are directly connected Note) to the SX bus

Note) The I/O size (number of occupied words) of the I/O modules that are directly connected to the SX bus is 2 words even in the case of I/O modules of 8 points, 16 points.

[Quick reference list]

○: No restriction

Δ: Restricted. Give notice to the data size used, referring to the calculation formula.

		Remote master							
		1 unit	2 unit	3 unit	4 unit	5 unit	6 unit	7 unit	8 unit
CPU	1 unit	○	○	○	○	○	○	○	○
	2 unit	○	○	○	○	○	○	○	○
	3 unit	○	○	○	○	○	○	○	○
	4 unit	○	○	○	Δ	Δ	Δ	Δ	Δ
	5 unit	○	○	Δ	Δ	Δ	Δ	Δ	Δ
	6 unit	○	Δ	Δ	Δ	Δ	Δ	Δ	Δ
	7 unit	○	Δ	Δ	Δ	Δ	Δ	Δ	Δ
	8 unit	○	Δ	Δ	Δ	Δ	Δ	Δ	Δ

To give examples:

There is no restriction on 8 units of remote master when the number of CPU units is 3 or less.

There is no restriction on 3 units of remote master when the number of CPU units is 4 or less.

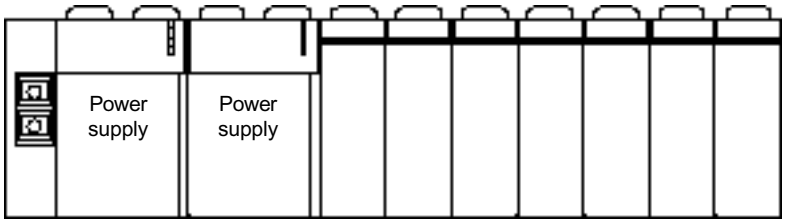
2-1-4Mounting each module onto the baseboard

(1) Power supply module

The power supply module that has the size of 2 slots can be mounted from the left-most side, up to a maximum of 3 modules.

<Example of multiple use>

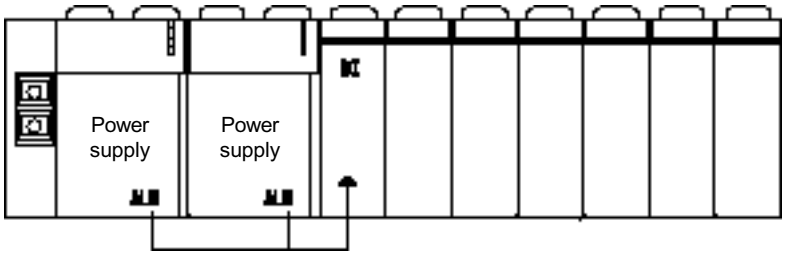
- An example of 2 power supply modules being mounted.



<Caution against the parallel use of power supply modules >

The use of multiple units (up to a maximum of 3 units) of power supply modules on 1 baseboard is called a parallel use, and even when 1 unit out of the power supply modules of a parallel use, if there is enough room for withstanding the load, the other power supply module(s) will supply electric power. Therefore, CPU modules cannot recognize any fault (abnormality) of power supply modules.

In order that CPUs are notified of any abnormality, ALM contacts (b-contacts) of power supply modules should be wired to a digital input module. Refer to “4-4 Wiring” for details.



Key points

- At the left-most end of the baseboard is a slot dedicated to the power supply module. Other modules such as CPU, I/O etc. cannot be mounted. (They will not work even when mounted.)
- As for additional power supply of a parallel use, there is no restriction on its mounting position on the baseboard.

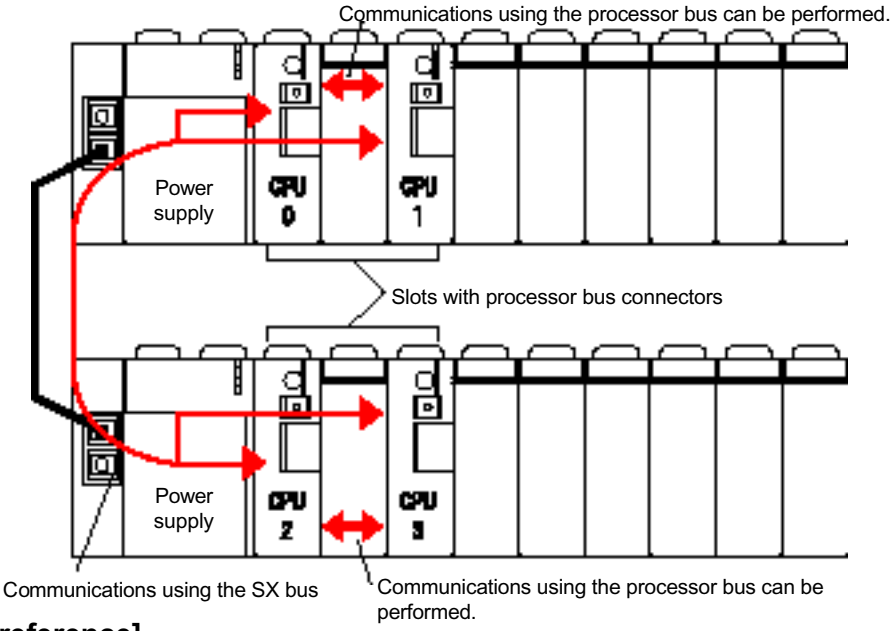
(2) CPU module

Up to a maximum of 8 units can be mounted in 1 µGPCsx system (1 configuration) connected to the SX bus.

Key points

- In µGPCsx, multiple CPU modules can be mounted on 1 system, thereby enabling the construction of a multi-CPU system in which each function is processed by CPU (high performance CPU only). Refer to "2-2-6 Multi-CPU system" for details.
- CPU modules cannot be mounted on a slot that has no processor bus connector.

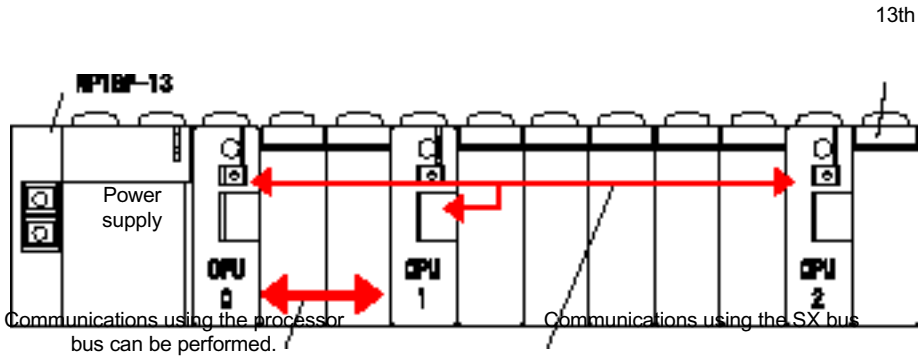
A case in which multiple units are used on 2 baseboards



[For reference]

When total 3 units or more CPU modules or FL-net modules are used on 1 baseboard, a baseboard that has processor bus connectors for use for 10 slots (TD1BP-13) should be used.

Note, however, that the 13th slot has no processor bus connector. So a CPU module cannot be mounted here.



(3)FL-net module

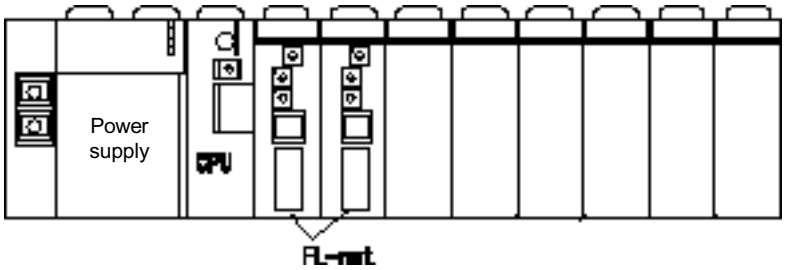
Up to total 2 units of FL-net modules can be mounted in a μGPCsx system (1 configuration) connected by the SX bus cable.

Key points

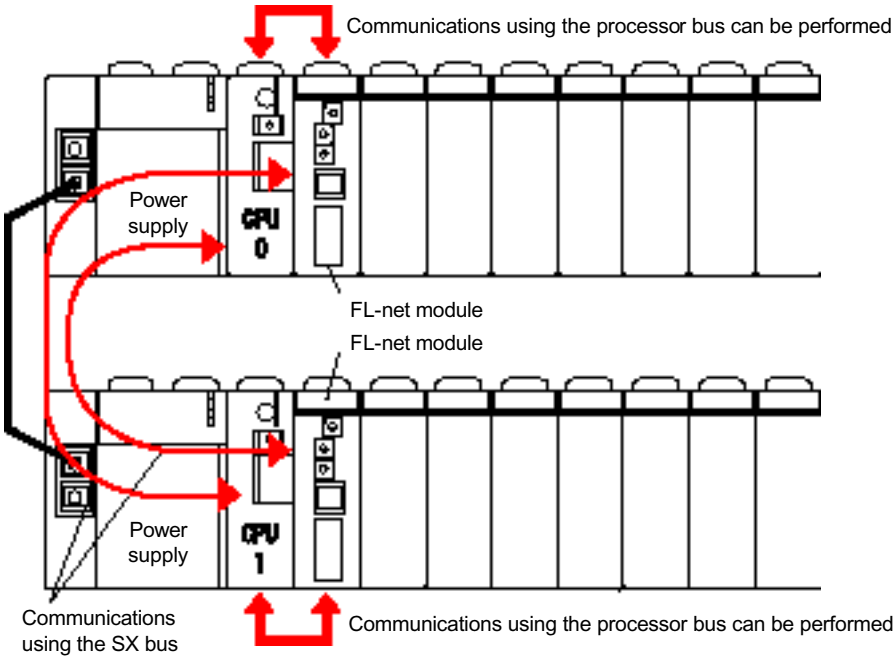
- FL-net modules and CPU modules should be mounted on slots that have processor bus connectors. They cannot be mounted on slots that do not have processor bus connectors.
- FL-net modules can only be mounted on a configuration that is configured with high performance CPU.

< Example of 2 units being used >

A case of being used on 1 baseboard



- A case of 2 units being used on 2 baseboards



In the example of the above illustration, high-speed data communications can be performed between CPU0 - FL-net modules, and between CPU1 - FL-net modules that are on the same processor bus.

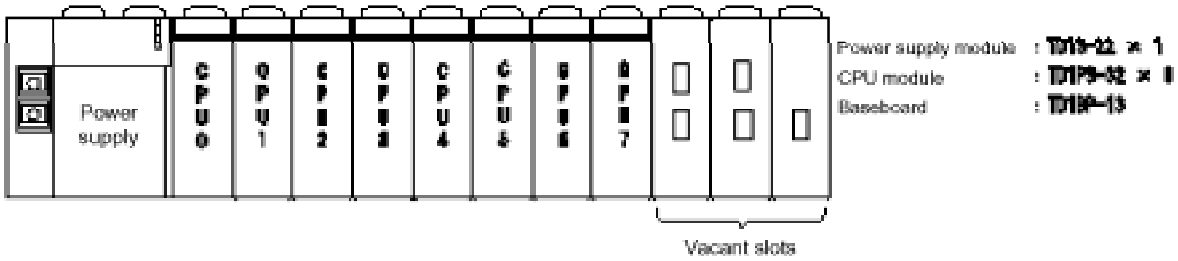
(4) I/O modules and other modules

Digital I/O modules, analog I/O modules and other modules can be mounted on any slots except those for power supply modules.

(5) Number of units of mounted modules and output current of power supply

Power consumption of each module must be considered when mounting modules. In the case of a configuration as shown below, the output current of power supply is not enough.

[1] When 8 units of CPU modules are connected to a 13-slot baseboard

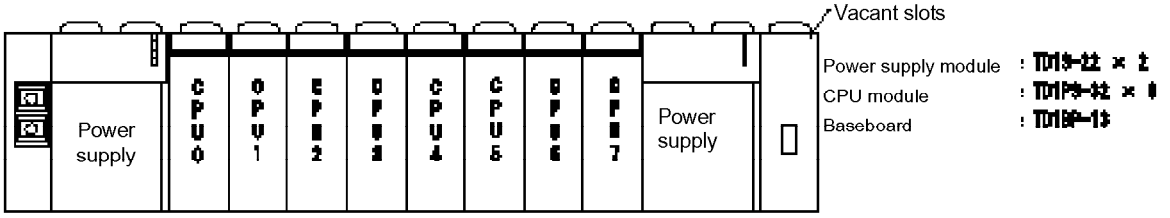


In the case of the configuration as shown above, the total current will exceed the output current that can be supplied by the power supply module (DC 24 V, 1.46 A).

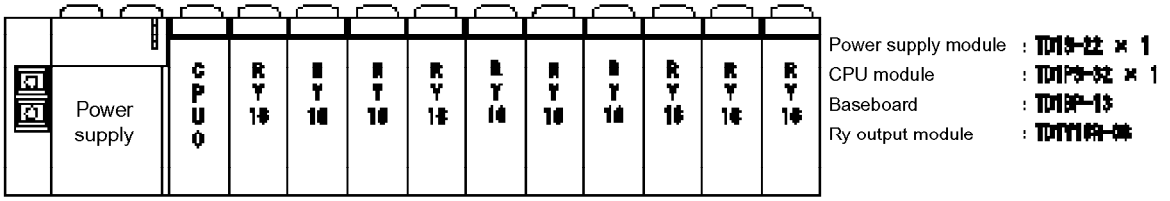
200 mA 8 + 70 mA 1 = 1670 mA

< Countermeasures >

Power supply modules should be added to the vacant slots.



[2] When 1 unit of CPU module and 10 units of Ry output 16-point modules are connected to a 13-slot baseboard



In the case of the above configuration, when all the Ry output is turned ON, the total current will exceed the output current that can be supplied by the power supply module (DC 24 V, 1.46 A).

200 mA + 70 mA + 145 mA 10 = 1720 mA

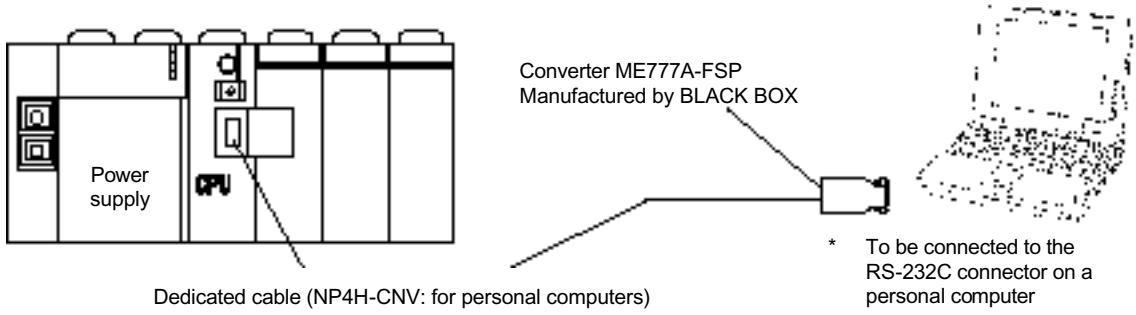
< Countermeasures >

2 units of Ry output modules should be removed.

200 mA + 70 mA + 145 mA 8 = 1430 mA.

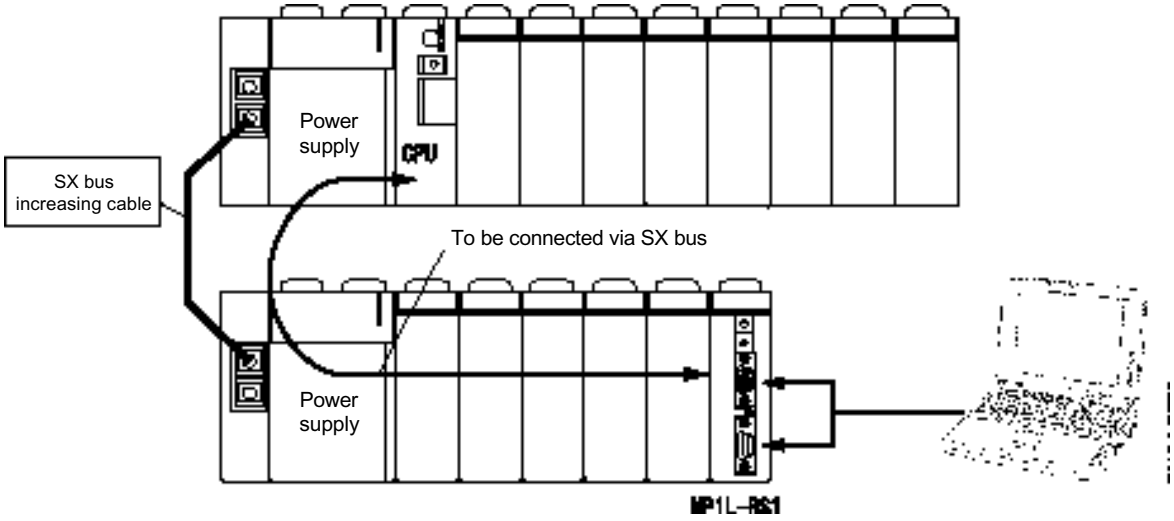
2-1-5Connection of TDsxEditor

(1) How to connect to TDsxEditor connector on a CPU module



(2) Connection via a versatile communications module

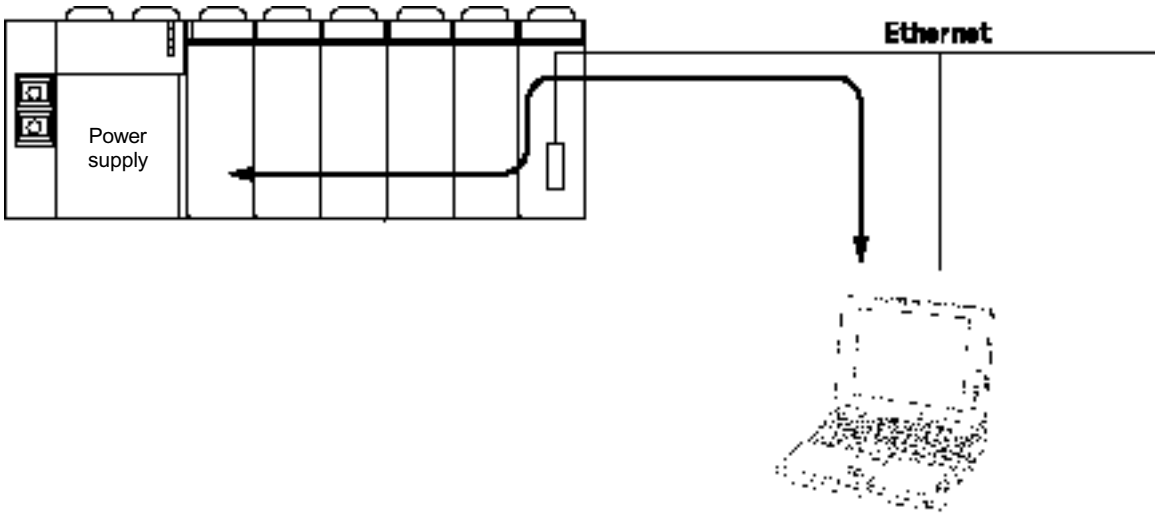
Access to a CPU module can be obtained by means of a connection to the versatile communications port of a versatile communications module that is mounted on a baseboard.



Refer to the “Versatile Communications Module-User’s Manual” for the details of TDsxEditor connection by means of versatile communications modules.

(3) Remote connection using PC card interface modules

Remote operations (remote programming, monitoring) can be made by mounting PC card interface modules on the baseboard and connecting an Ethernet card.



* Personal computer connected to the Ethernet

Refer to the “User’s Manual-PC Card Interface Module” and “User’s Manual-TDsxEditor Operation Part” for the details of TDsxEditor connection by means of PC card interface modules.

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

2-2 Various system configurations

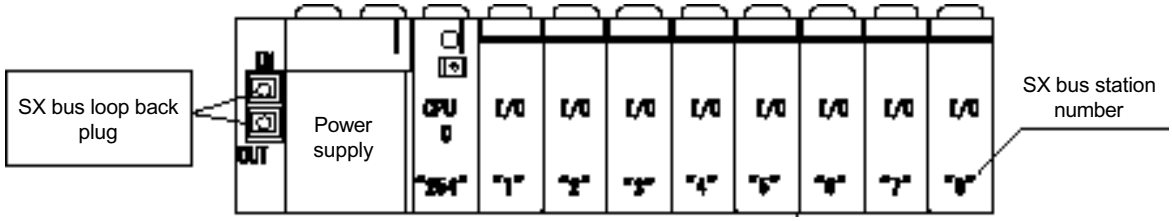
In a μGPCsx system, various systems are constructed that are suited to the controlled object.

System description	Outline
Individual system	A system configured with 1 unit of CPU module, power supply module, I/O, function modules etc. on 1 unit of baseboard.
SX bus increasing system	A system in which multiple baseboards are connected by means of an SX bus increasing cable. Excepting power supply modules, up to a maximum of 254 stations of modules can be connected.
SX bus T-branch increasing system	A system can be constructed in which the SX bus is branch connected by means of a branching unit.
SX bus optical increasing system	A dispersed, increased system can be constructed in which the SX bus is made fit for optical transmission by means of an SX bus optical converter and an SX bus optical link module.
Multi-CPU system	This is a system that uses multiple CPUs, with each CPU doing its share of the control work divided by each function.
Redundant system of CPU	This is a system to achieve higher reliability by preparing a CPU to work as a backup for another operating CPU (doubling).
FL-net link system	This is an open FA network system aiming at data communications between the SX series configurations and with a PC of other manufacturer that supports FL-net.
Ethernet communications system	This is used when carrying out communications with a personal computer placed on the upper stage of CIM or a PC of other manufacturer.
OPCN-1 system	An OPCN-1 system can be constructed that is an open remote I/O network by mounting an OPCN-1 master module on the baseboard.
DeviceNet system	A DeviceNet system can be constructed that is an open remote I/O network by mounting a DeviceNet master module on the baseboard.

2-2-1Individual system

This is a basic system in which 1 unit of CPU module, power supply module, I/O module etc. are mounted on 1 unit of baseboard.

(1) Example of system configuration



Note) SX bus loop back plugs should be installed on both ends of the SX bus even in a system having only 1 unit of baseboard.

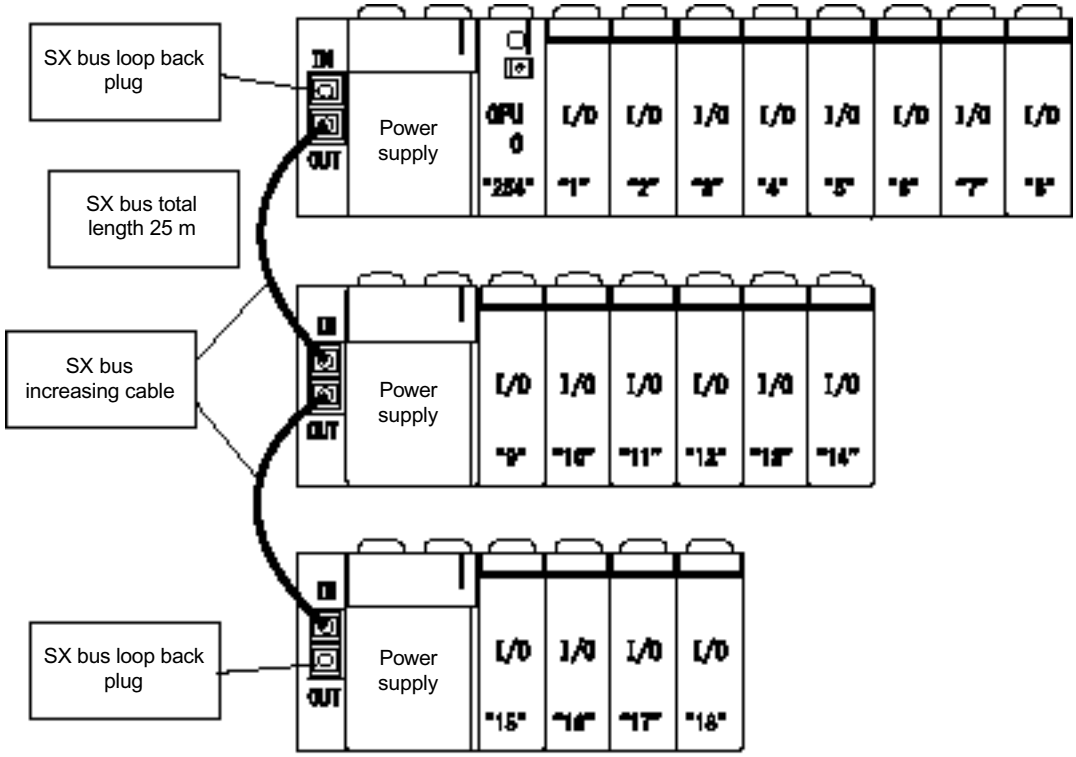
(2) Allocation of the SX bus station number

The SX bus station number on a baseboard is usually allocated from the right of CPU0 as 1, 2, 3 ... in order automatically. Note, however, that the station number of the CPU module (CPU0) is always “station 254” wherever it is located.

2-2-2SX bus increasing system

This is a system in which multiple baseboards are connected by means of an SX bus increasing cable.

(1) Example of system configuration



Note) The cable taken from OUT must be connected to IN without fail. Communications cannot be performed with a connection like OUT-OUT or IN-IN.

(2) Allocation of the SX bus station number

The SX bus station number on a baseboard is usually allocated from the right of CPU0 as 1, 2, 3 ... in order automatically. Note, however, that the station number of the CPU module (CPU0) is always “station 254” wherever it is located.

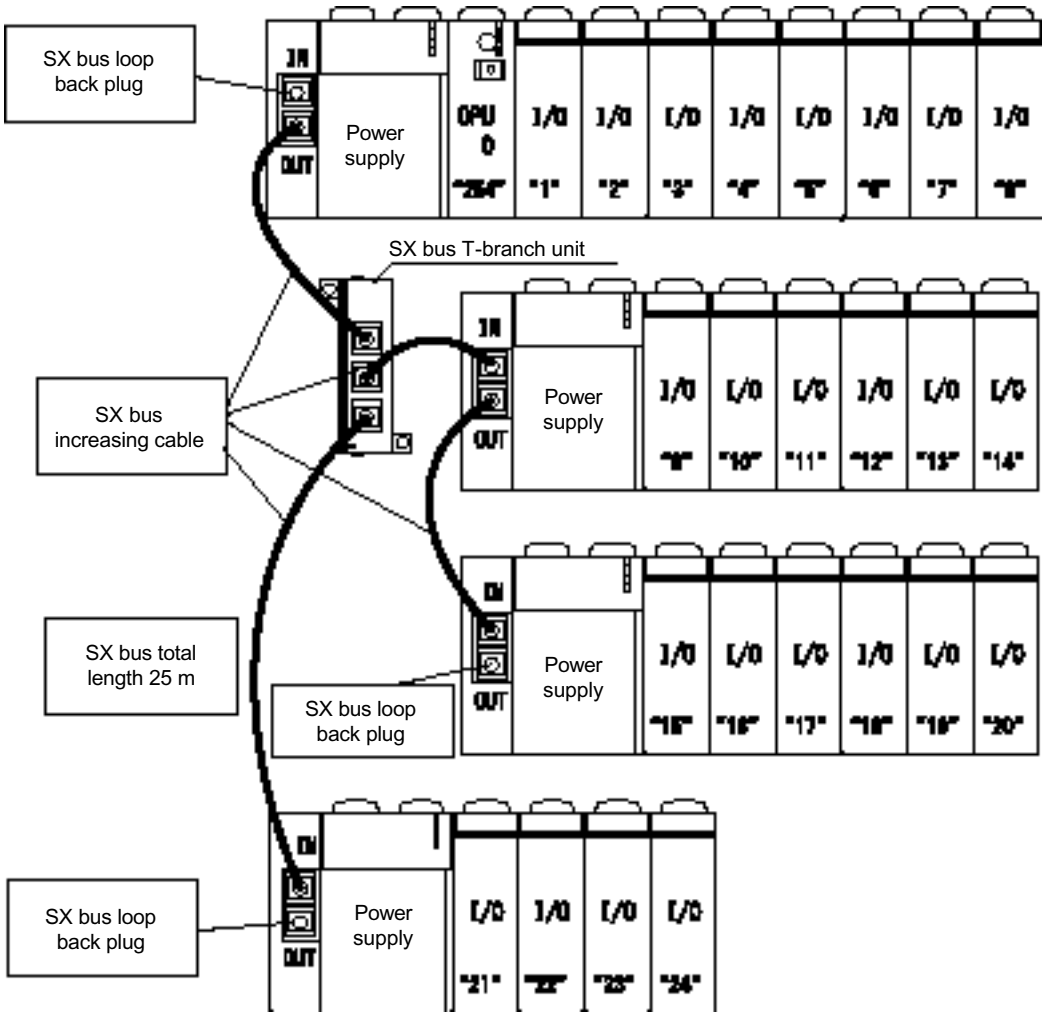
Key points

- At the left side of each baseboard, a power supply module must always be mounted and in addition, at least 1 unit of module other than the power supply module must be mounted.
- The number of units that can be connected to a baseboard is up to 25 units. Although the system works even when 26 units or more are connected, there will be an extreme decrease in the reliability of the SX bus. It should always be used with 25 units or less being connected.
- The base (power supply) of 1 configuration should be powered on at one time as a general rule. However, in such a case as an application requires a certain number of bases (power supplies) to be turned OFF, then such number should be up to a maximum of 3 units in succession in 1 configuration.

2-2-3SX bus T-branch increasing system

A branch connection can be configured by connecting an SX bus T-branch unit (NP8B-TB).

(1) Example of system configuration



(2) Allocation of the SX bus station number

The SX bus station number on a baseboard is usually allocated from the right of CPU0 as 1, 2, 3 ... in order automatically. And the station number after branching is allocated in order as above.

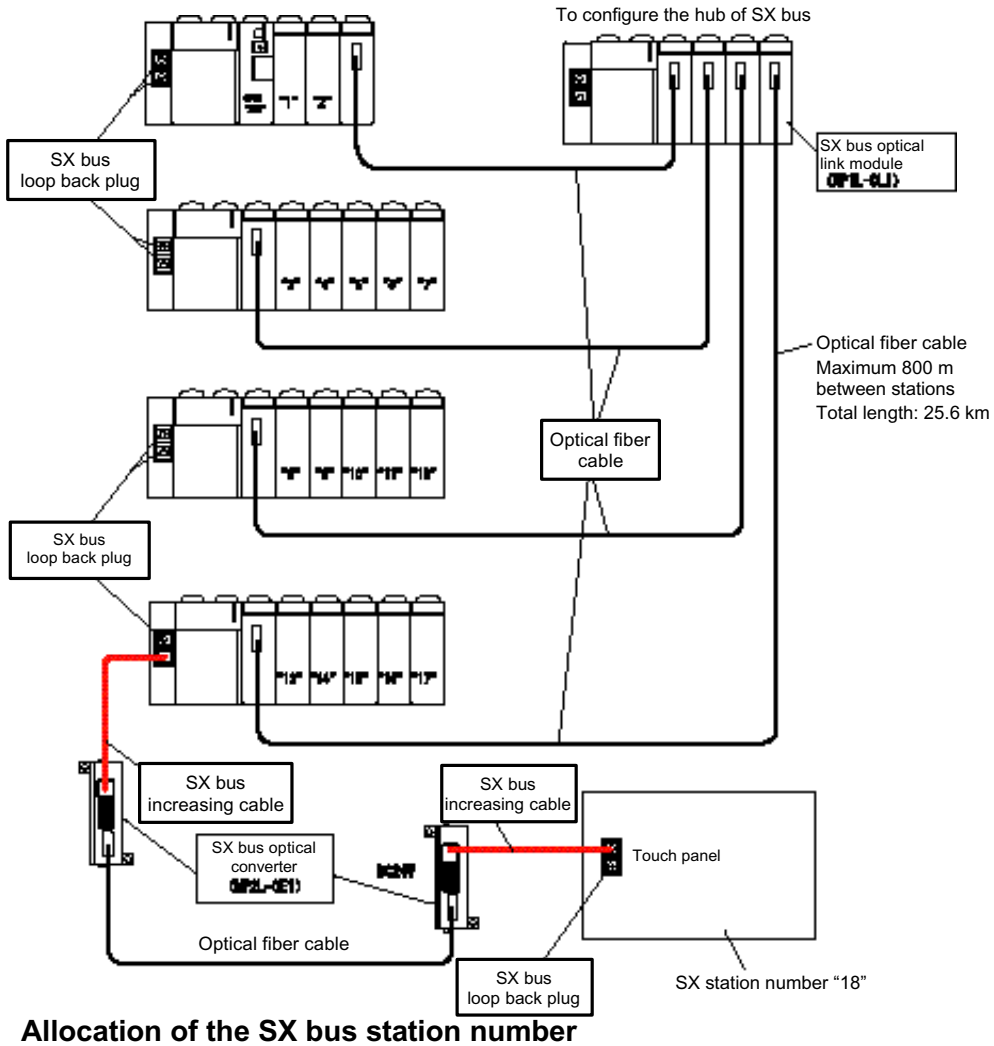
Key points

- The number of SX bus T-branch units that can be connected is up to 25 units including the baseboard. Although the system works even when 26 units or more are connected, there will be an extreme decrease in the reliability of communications. It should always be used with 25 units or less being connected.
- The base (power supply) of 1 configuration should be powered on at one time as a general rule. However, in such a case as an application requires a certain number of bases (power supplies) to be turned OFF, then such number should be up to a maximum of 3 units in succession in 1 configuration.

2-2-4SX bus optical increasing system

A dispersed long-distance system of SX bus can be constructed by converting the SX bus into optical transmission signals by means of an SX bus optical link module (NP1L-0L1) and an SX bus optical converter (NP2L-0E1).

(1) Example of system configuration



(2) Allocation of the SX bus station number

The SX bus station number on a baseboard is usually allocated from the right of CPU0 as 1, 2, 3 ... in order automatically. In the case of being branched by means of an SX optical link module it is allocated in order as above.

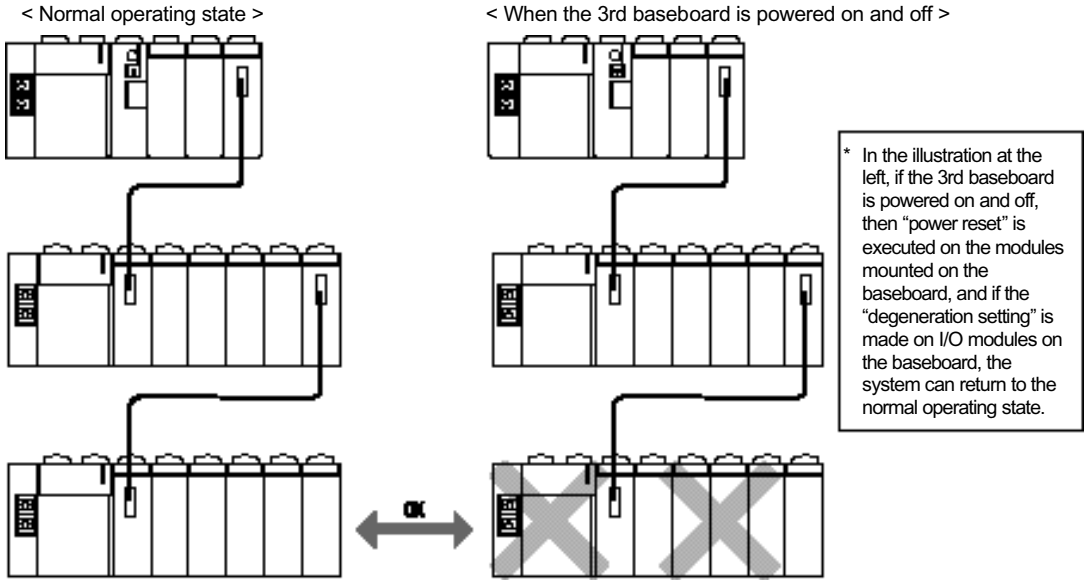
Key points

- The number of SX bus optical link modules and SX bus optical converters that can be connected is up to a maximum of 64 units/1 configuration.
- The transmission distance of optical fiber (PCF) is maximum 800 m between stations (25°C), and the maximum extension of the system is 25.6 km.
- Refer to “3-8 Communications modules specifications” for the specifications and handling of SX bus optical link modules and SX bus optical converters.

(3) Powering the SX bus optical increasing system on and off partially

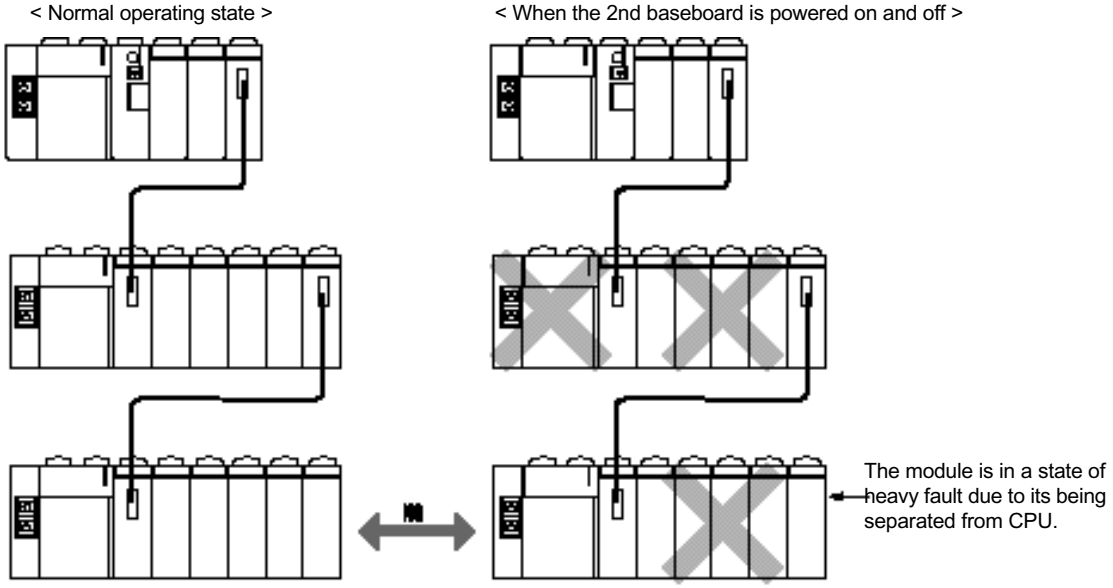
The setting of degeneration must be effective to carry out the partial powering on and off by means of μGPCsx. However, if partial powering on and off has been performed in a system that employs SX bus optical link equipment, the system may not return to its normal state depending on the system configuration, even if a "degeneration setting" is made on it.

[1] Example of a normal degeneration operation capable of being made



* In the illustration at the left, if the 3rd baseboard is powered on and off, then "power reset" is executed on the modules mounted on the baseboard, and if the "degeneration setting" is made on I/O modules on the baseboard, the system can return to the normal operating state.

(2) Example of a normal degeneration operation incapable of being made



* In the above illustration, if the 2nd baseboard is powered off, then the module is separated from CPU, resulting in the state of heavy fault. Therefore, the system will not be restarted even when the 2nd baseboard is re-powered.
In order to release the heavy fault state, the 3rd baseboard and the 2nd baseboard should be reset simultaneously, or else the 2nd baseboard should be powered on, followed by the resetting of the baseboard on which CPU modules are mounted.

(4) Restriction on the redundant system

In the redundant system, “dispersive arrangements of CPU modules via an optical link system cannot be made.”

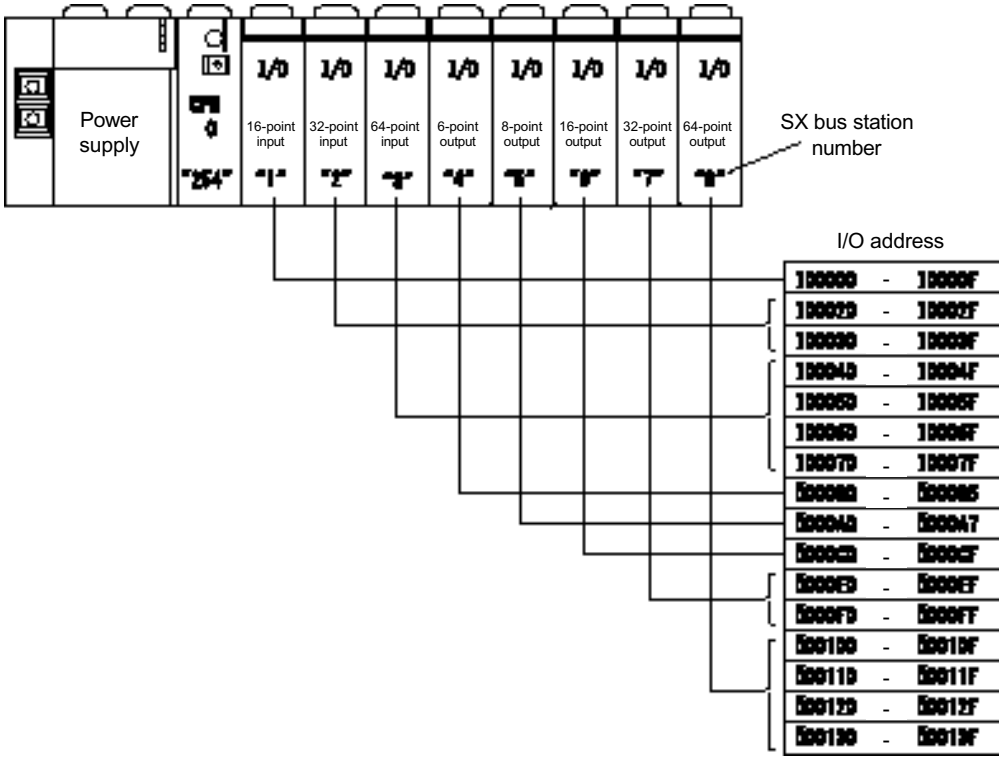
<Reason>

When breakage occurs in optical fiber cables, the optical link equipment (SX bus optical converter and SX bus optical link module) bypasses SX bus signals inside the optical link equipment. In the event that breakage occurs in an optical fiber cable in a system that connects the operating CPU and standby CPU by means of the optical fiber cable, since SX bus signals are bypassed inside the optical link equipment, 2 systems of SX bus loops are formed. At this time, each CPU recognizes that the other CPU has dropped, and each operates as an “operating CPU” in each SX bus loop. Next, if the system is recovered from the breakage in optical fiber cables without resetting the system, then it means that 2 units of operating CPUs exist in 1 SX bus loop, and hence the operation of the system cannot be guaranteed.

Note) Refer to “2-2-7 Redundant system of CPU” for the redundant system.

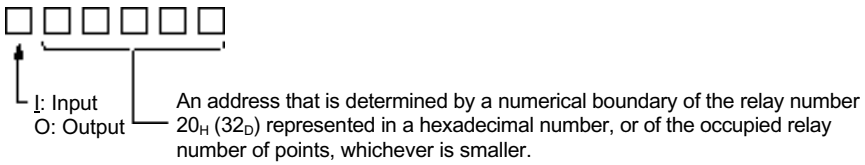
2-2-5Allocation of I/O addresses

Explanations of allocation of I/O addresses are given herein using an example of system configuration shown in the illustration below.



<Rules of the allocation of addresses>

In μGPCsx, I/O addresses are allocated following the rules as indicated below.



Key points

- In the case of a representation in word or double word, no designation of bit address is required.
- A double word representation cannot be used for an I/O module of 16 points or less.
- When a double word representation is used for an I/O module of 64 points or less, it shall be done as follows.

  (Examples) In the case of an input module of 64 in the 3rd slot of the system in the above illustration:

  iw0004 → 32 bits of 100040 - 10005F

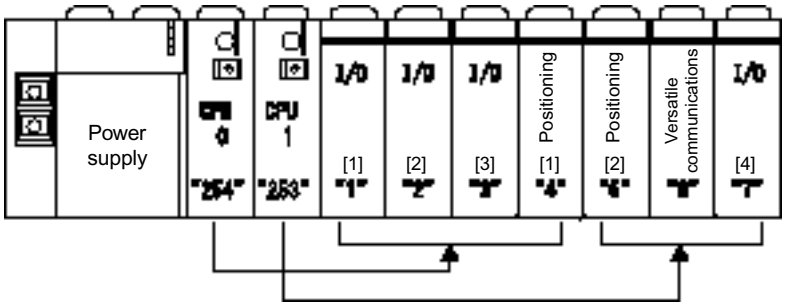
  iw0006 → 32 bits of 100060 - 10007F

2-2-6Multi-CPU system (high performance CPU only)

In the μGPCsx series, a system can be constructed in which multiple CPU modules are connected to the processor bus and 1 SX bus. Up to a maximum of 8 units of CPU modules can be connected.

(1) Example of system configuration

CPU0 can control I/O [1], [2], [3] and positioning [1], and CPU1 can control positioning [2], versatile communications and I/O [4].



(2) Allocation of CPU module numbers

The CPU numbers are set in order from 0 by means of a setting switch at the front of the CPU module.

(3) Allocation of SX bus station numbers

The SX bus station numbers are usually allocated from the right side of CPU0 in order as 1, 2, 3..... automatically, and the CPU modules are allocated as follows in accordance with the number of the CPU number setting switch.

<Relation between CPU numbers and SX bus station numbers>

0 - 7 of the CPU numbers are used for CPU modules and 8, 9 are for FL-net.

CPU number	SX bus station number	
0	254	For CPU modules
1	253	
2	252	
3	251	
4	250	
5	249	
6	248	
7	247	

CPU number	SX bus station number	
8	246	For FL-net modules
9	245	
A	244	Spare
B	243	
C	242	
D	241	
E	240	
F	239	

Key points

- CPU0 (a CPU module of which CPU number is set at “0”) is essential both in a single CPU system and in a multi-CPU system.
- The setting of CPU numbers is also required in CPU modules, FL-net modules and standby CPU modules in the case of a double CPU system.

2-2-7Redundant system of CPU

In a control system, improving the safety and reliability of a system by doubling the equipment used is called making redundant. In the μGPCsx series, it is possible to make power supply modules redundant and to make CPU modules redundant.

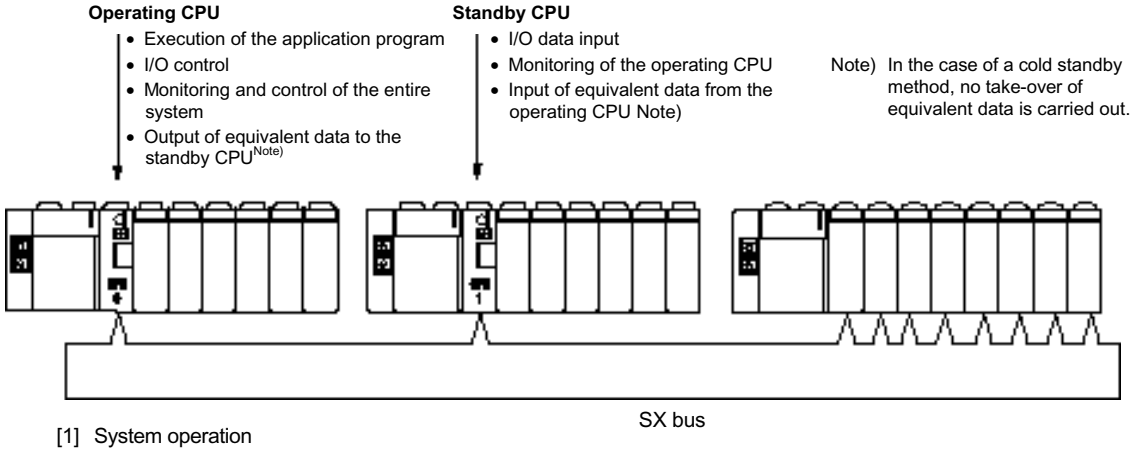
Explanations are given herein of making CPU modules redundant.

In μGPCsx, making CPU redundant can be subdivided into 1:1 redundancy and N:1 redundancy.

(1) 1:1 redundancy

It is a system to achieve redundancy by means of 1 unit of standby CPU against 1 unit of operating CPU. Each of CPU0-CPU1, CPU2-CPU3, CPU4-CPU5 and CPU6-CPU7 makes up a operating-standby pair. The same application program is to be used.

< Example of configuration of 1 pair of 1:1 redundancy >



[1] System operation

When the system is powered on, operation is started with CPU modules having even CPU numbers being made operating CPUs, and with CPU modules having odd CPU numbers being made standby CPUs. (In the case of the above configuration example, CPU0 operates and CPU1 is in standby.) If abnormality occurs in the operating CPU and its operating is stopped, then the standby CPU starts operation.

Also, there are 2 methods in 1:1 redundancy, warm standby in which the standby CPU takes over the data of the operating CPU, and cold standby in which the taking over of the data is not performed. The data taken over in the warm standby method is called equivalent data, and its range is designated in the system definition.

[2] Replacement of CPUs having faults

In the case of the above system configuration example, there are no modules other than the power supply module on the baseboard on which each CPU is mounted, and therefore, when there is abnormality in CPU0 it is also possible to replace CPU0 while CPU1 is operating as the operating CPU.

The procedure to be followed in the replacement is: Turn off the power supply on the CPU0 side → Replace CPU0 → Turn on the power supply on the CPU0 side. The recovered CPU0 will become the standby CPU as it is.

When both systems of the redundant system (operating CPU, standby CPU) have abnormality, both systems should be powered off and then restarted.

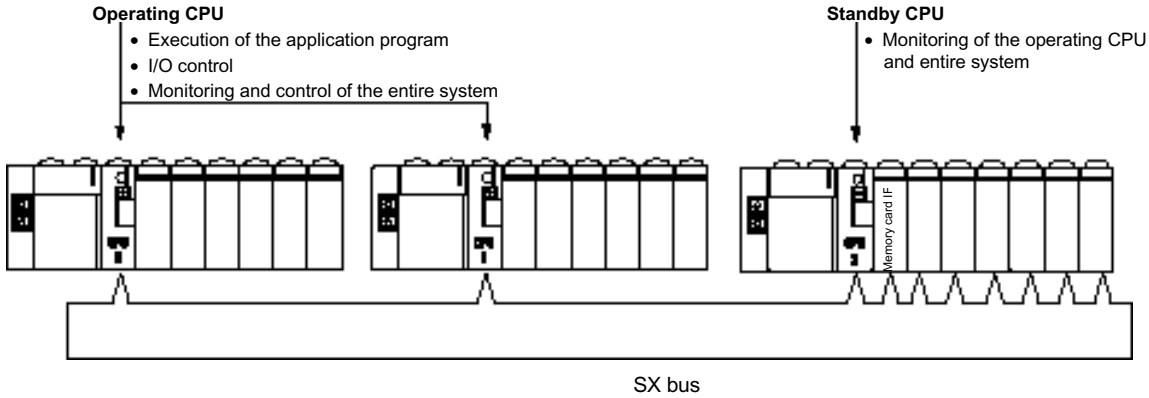
Key points

- The operating CPU and the standby CPU load the same application program.
- In both cases of employing the warm standby method and the cold standby method, I/O data is to be taken over.
- Standby/Operation can be switched by means of a loader operation.

(2) N:1 redundancy

This is a system to make multiple (2 units - 7 units) operating CPUs redundant by means of 1 unit of standby CPU. Up a maximum of 2 pairs of N:1 redundant groups can be defined in 1 configuration. A CPU module having the largest CPU number in the registered group becomes the standby CPU.

< Example of configuration of 1 pair of 2:1 redundancy >



[1] System operation

When the system is powered on, a CPU module having the largest CPU number in the N:1 redundant group becomes the standby CPU, and operation is started. (In the case of the above system configuration, CPU0 and CPU1 operate and CPU2 is in the standby state.

If there is abnormality in CPU0 or CPU1 and it is impossible to carry out operation, the standby CPU downloads from the memory card interface module the program of CPU that has had abnormality, and then starts operation.

There is only the cold standby method in N:1 redundancy. It is not possible to take over the data of the operating CPU.

[2] Replacement of CPUs having faults

In the case of the above system configuration example, no modules other than the power supply module are mounted on the baseboard on which each CPU is mounted, and therefore, when there is abnormality in CPU1 it is possible to replace CPU while CPU2 is operating as the operating CPU.

The procedure to be followed in the replacement is: Turn off the power supply on the CPU1 side → Replace CPU1 → Turn on the power supply on the CPU1 side. Note, however, that the recovered CPU module is in the standby state, waiting for the switching instruction to be given by the loader, or the power reset of the entire system.

This state is not a state of N:1 redundancy.

Key points

- Application programs for use for N units (for use for operating CPUs) need to be stored in the memory card interface module.
- There is only the cold standby method in N:1 redundancy. It is not possible to take over the internal data and I/O data.
- Standby/Operation can be switched by means of a loader operation.

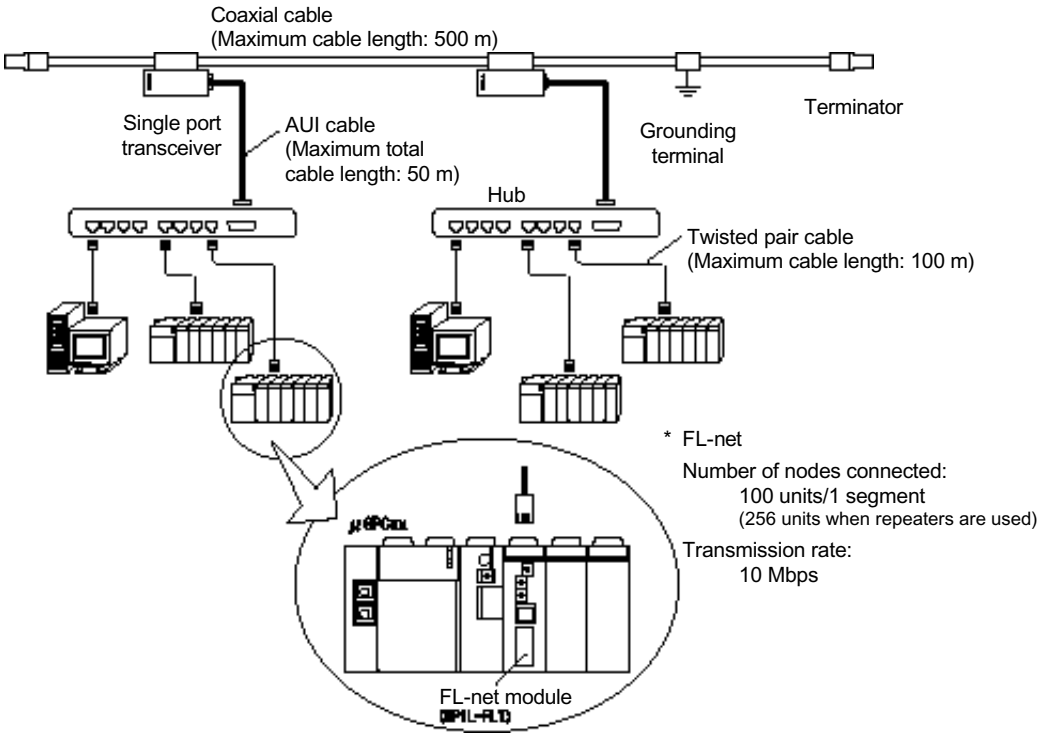
Also, when a CPU having a fault has been replaced, switching the operating CPU is required.

- In an N:1 redundancy system, the use of reading/writing operation of programs by means of the switch on the front of the memory card I/F module is prohibited. Do not use the memory card, if module for storing application programs for N:1 redundancy at the same time for the file memory for file data read/write access from the CPU's application programs. A separate memory card I/F module should be used for the file data read/write. If the memory card I/F module is used at the same time for this purpose as well, then access conflict will occur, which may disable the switching of the operating/standby of redundancy.

2-2-8FL-net (OPCN-2) system

The FL-net system is an open network system to connect various FA controllers such as Programmable Controllers (PCs), Computer Numerical Controllers (CNCs) and personal computers made by different manufacturers, thereby realizing the control/monitoring of the system.

(1) Example of basic system configuration



(2) Allocation of SX bus station numbers

In the same way as in the case of CPU modules, CPU numbers are allocated to FL-net modules by means of the switch on the front of the module. Depending on the thus allocated numbers, SX bus station numbers are allocated as follows.

< Relation between CPU numbers and SX bus station numbers >

0 - 7 of the CPU numbers are used for CPU modules and 8, 9 are for FL-net.

CPU number	SX bus station number	
0	254	For CPU modules
1	253	
2	252	
3	251	
4	250	
5	249	
6	248	
7	247	

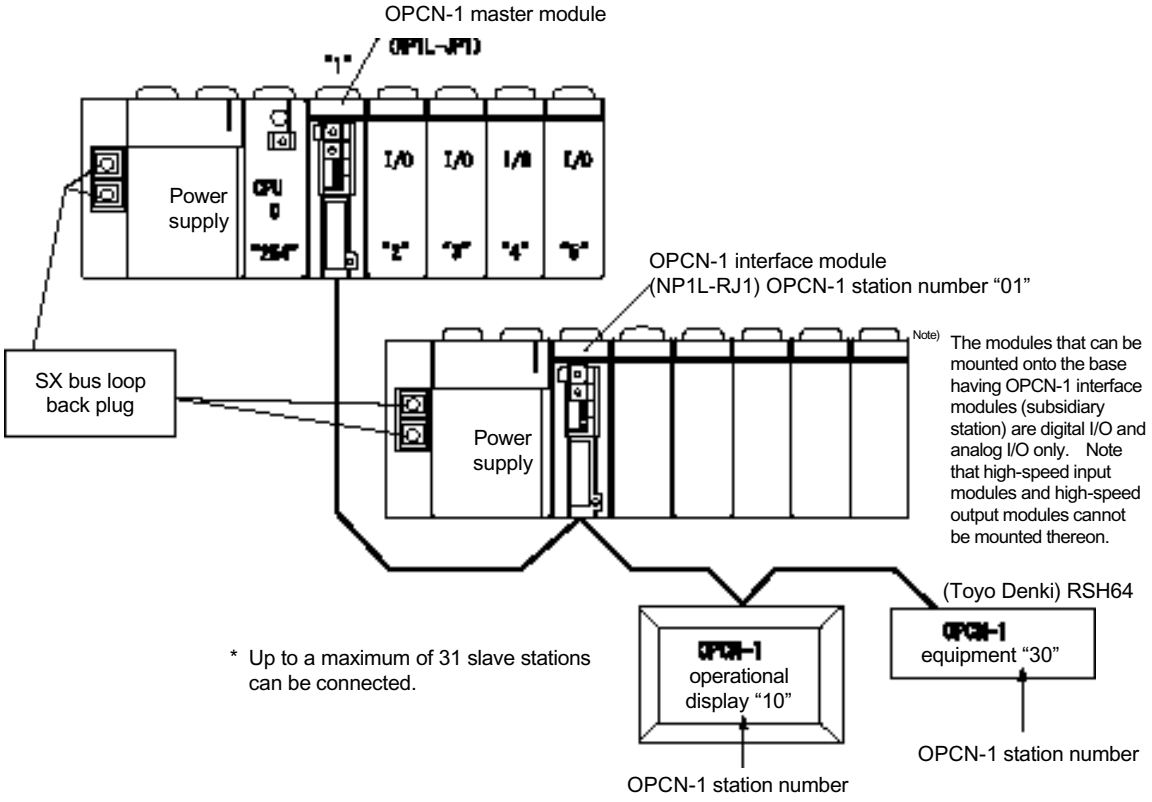
CPU number	SX bus station number	
8	246	For FL-net modules
9	245	
A	244	Spare
B	243	
C	242	
D	241	
E	240	
F	239	

Refer to the "μGPCsx Series/FL-net Modules-User's Manual" for the detailed specifications and usage of the FL-net system.

2-2-9OPCN-1 system

By installing an OPCN-1 master module onto the SX bus (onto the baseboard), an OPCN-1 system can be constructed as a master station of OPCN-1.

(1) Example of system configuration



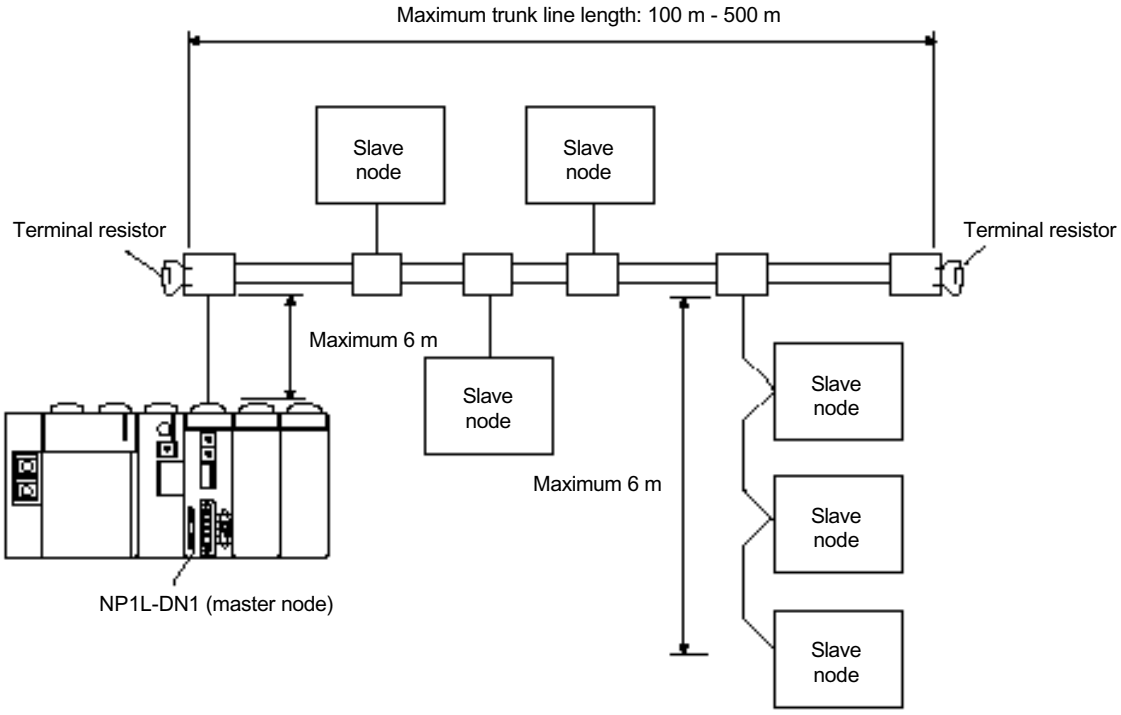
(2) Allocation of SX bus station numbers

The SX bus station numbers are usually allocated from the right of CPU0 in order of 1, 2, 3..... automatically.

Refer to the "μGPCsx Series/OPCN-1 Master Modules-User's Manual" for the detailed specifications and usage of the OPCN-1 system.

2-2-10 DeviceNet system

(1) Example of system configuration



Note) The maximum distance of the trunk line depends on the transmission rate and type of cables used.
(500 m: 125 kbps, 250 m: 250 kbps, 100 m: 500 kbps)

(2) Allocation of SX bus station numbers

The SX bus station numbers are usually allocated from the right of CPU0 in order of 1, 2, 3..... automatically. Note, however, that no SX bus station numbers are allocated to the slave nodes of DeviceNet.

Refer to the "μGPCsx Series/DeviceNet Master Modules" for the detailed specifications and usage of the DeviceNet system.

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Chapter 3 Specifications

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3-1 General Specifications

Item		Specifications
Physical environment	Operating ambient temperature	0 - 55°C
	Storage temperature	-25 - +70°C
	Relative temperature	20 - 95% RH without any condensation. (5 - 95% RH without any condensation during transport.)
	Contamination degree	Contamination degree 2[Note 1)]
	Anti-corrosiveness	There should not be corrosive gasses. There should not be any attachment of organic solvent.
	Altitude used	2000 m or less above sea level (Atmospheric pressure during transport should be 70 kPa or more.)
Mechanical working conditions	Antivibration	Half amplitude: 0.15 mm, Fixed acceleration: 19.6 m/s^2 2 hours to each direction, total 6 hours[Note 2)]
	Shock resistance	Peak acceleration: 147 m/s^2 3 times for each direction[Note 2)]
Electric working conditions	Antinoise	Noise simulator method, Startup time: 1 ns Pulse width: 1 μs, 1.5 kV
	Antistatic, discharge resistance	Contact discharge method: ± 6 kV, Air discharge method: ± 8 kV
	Antiradiation, electromagnetic resistance	10V/m (80MHz – 1000MHz)
Structure		Panel built-in type IP3
Cooling method		Natural cooling
Insulation characteristics		Dielectric strength and insulation resistance are indicated on each module
Internal current consumption		Indicated on each module or unit
Weight		Indicated on each module or unit
Outer specifications		Indicated in Section 3-10

Note 1) Contamination degree 2: Usually in the state of no electrically conductive contamination. It is specified, however, that it is a state in which in some cases electrical conductivity may be generated temporarily due to condensation.

Note 2) It is a state in which a unit is fixed onto the control panel by means of fixing screws. There should be neither vibration nor shock when installed onto a DIN rail.

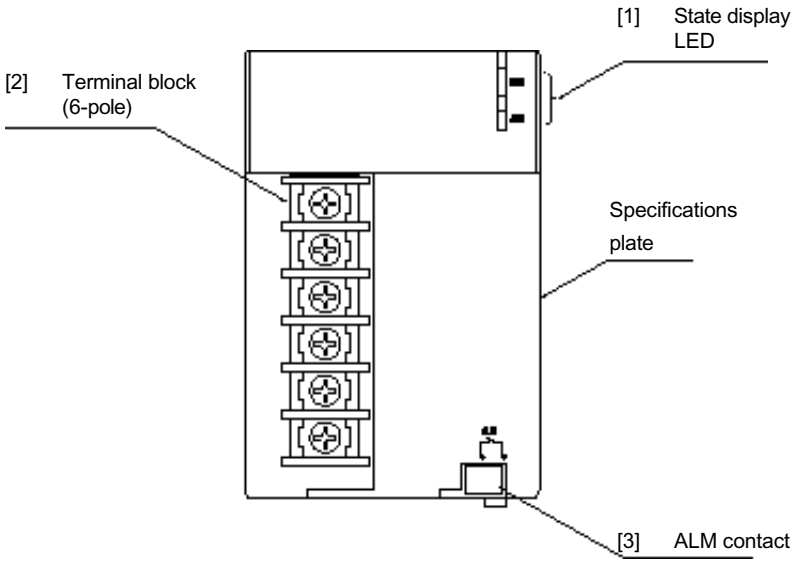
3-2 Power Supply Module Specifications

3-2-1Power supply specifications

Item	Specifications		Remarks
Model	TD1S-22	TD1S-42	
Rated input voltage (Allowable range of input voltage)	AC 100/240 V (AC 85 - 132 V) (AC 170 - 264 V)	DC 24 V (DC 19.2 - 30 V)	
Rated frequency	50/60 Hz	-	
Allowable range of frequency	47 - 63 Hz	-	
Allowable instantaneous blackout time	1 cycle or less Note)	10 ms or less	Note that the interval of instantaneous blackout is 1 second or more.
Waveform distortion ratio	5% or less	-	
Allowable ripple ratio	-	Three-phase full-wave rectified waveform 5% or less	
Leakage current	0.25 mA or less		Between the input terminals collected together and the FG IEC 950 Class II equipment
Rush current	22.5 A_{O-P} or less (Ta = 25°C non-repetition)	150 A_{O-P} or less 2 ms or less	
Power consumption	110 VA or less	45 W or less	Rated input voltage Maximum load
Rated output voltage (Fluctuation range of output voltage)	DC 24 V (DC 22.8 - 26.4 V)		TD1S-22, TD1S-42 are capable of being used in parallel.
Output current	0.01 - 1.46 A		
Insulation method	Insulation by means of a transformer		
Dielectric strength	AC 2900 Vrms for 1 second Between the power supply input terminal collected together and the grounding	AC 560 V for 1 minute Between the power supply input terminal collected together and the grounding	
Insulation resistance	10 MΩ or more when measured with DC 500 V insulation resistance tester		
Number of occupying slots	2 slots		
Alarm output	Existent (monitoring of output voltage DC 24 V, 0.3 A or less)		Relay normally closed contact (b-contact) output
Weight	Approx. 330 g	Approx. 360 g	

Note) The indicated value is the one when the voltage is goes down from the rated voltage to 0 V, the phase is the full phase, and the load is within the range of rated values.

3-2-2Name of each part and its function



Note) The above illustration shows the state of the terminal cover having been removed for the purpose of explanations.

[1] State display LED

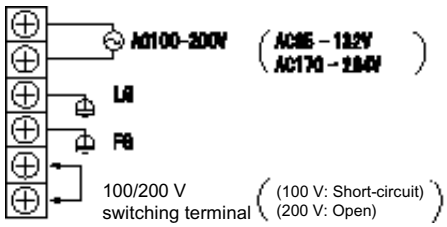
Symbol	Display color	Lighting conditions
PWR	Green	Lights on when the output voltage is within the range of rated values. Lights off when it is outside the range of rated values.
ALM	Red	Lights on when the output voltage is outside the range of rated values.

[2] Terminal block (6-pole)

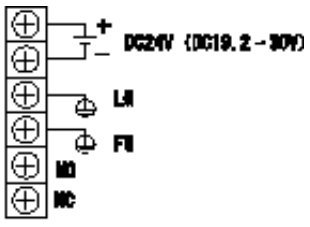
It is a terminal block of M4 × 6-pole. Allocation of terminals is as follows.

(Tightening torque: 1.2 N-m, Applicable wire size: 2 mm^2)

< TD1S-22 (AC power supply product) >



< TD1S-42 (DC power supply product) >



[3] ALM contact

The ALM contact is a normally closed contact (b-contact), which is OFF (the contact is open) when the power supply module is in the state of normal operation (the output voltage is within the range of 19.2 - 26.4 V), and is otherwise ON (the contact is closed). The rated voltage is DC 24 V and rated current is 0.3 A.

3-3 CPU Module Specifications

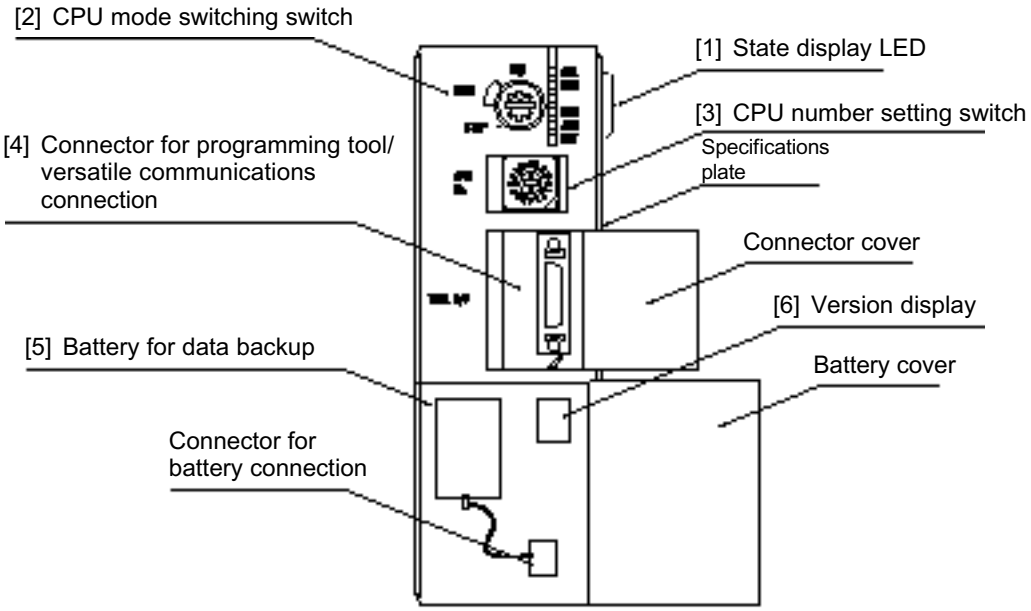
3-3-1Performance specifications list

CPU (TD1PS-32/TD1PS-74)

Item			Specifications	
Model			TD1PS-32	TD1PS-74
Execution control method			Stored program cyclic scan method	
I/O connection method			Directly connected I/O method (SX bus), Remote I/O method	
I/O control method			On SX bus: Tact synchronous refreshing	
CPU			32 bit OS processor, 32 bit execution processor	
Memory type			Program memory, data memory, temporary	
Programming language			GPC language (data flow form)	
Instruction execution time		Sequence instruction	20 - 520 ns/instruction	
		Application instruction	40 ns/instruction	
Program memory capacity			Approx. 200 pages	Approx. 400 pages
Data memory	Input and output memory (I/O)		512 words (maximum 8192 points) (fixed)	
	Global memory		6144 words	30719 words
	Local memory		4 K words (0.5 K words × 8 subprograms)	16 K words (0.5 K words × 32 subprograms)
	Instance memory Retain memory Trace back memory Total size		4 K words	16 K words
	System FB memory		16 K words	65 K words
	System memory		512 words (fixed)	
Number of task units			2 units	2 units
Number of subprograms			8	32
Diagnosis function			Self-diagnosis (memory check, ROM sum check, CPU basic operation check), system configuration monitoring, module fault monitoring	
Secrecy function			password	
Calendar function			Time range: up to 23:59:59 on December 31, 2069. Accuracy ± 27 seconds/month (25°C) With time setting function at the time of the multi-CPU system	
Backup of application programs			Range of backup by means of the CPU module built-in flash ROM: Application programs, system definitions, ZIP files	
Backup of data memory			Range of backup: Retain memory, retain attribute memory (present values of the counter, etc.), calendar IC memory Battery used: Lithium primary battery	
		Backup time	5 years (at ambient temperature: 25°C)	1.3 years (at ambient temperature: 25°C)
Number of occupied slots			1 slot	
Internal current consumption			DC 24 V 200 mA or less	DC 24 V 200 mA or less
Weight			Approx. 200 g	Approx. 200 g

3-3-2Name of each part

(1) CPU TD1PS-32/TD1PS-74



[1] State display LED

<table>
<tr><th>Symbol</th><th>Display color</th><th>Explanations</th></tr>
<tr><td>ONL
ERR</td><td>Green
Red</td><td>It displays the state of its own CPU module.
< Lighting on pattern >
<table>
<tr><th>ONL</th><th>ERR</th><th>State of its own CPU module</th></tr>
<tr><td>Light off</td><td>Light off</td><td>In the state of power supply being OFF, being reset or being initialized</td></tr>
<tr><td>Flash</td><td>-</td><td>In the state of establishing the SX bus</td></tr>
<tr><td>Light on</td><td>Light off</td><td>Its own CPU module is under normal operation</td></tr>
<tr><td>Light on</td><td>Light on</td><td>Its own CPU module is under operation with minor faults</td></tr>
<tr><td>Light off</td><td>Light on</td><td>Its own CPU module is stopped due to serious faults</td></tr>
</table></td></tr>
<tr><td>RUN
ALM</td><td>Green
Red</td><td>It displays the state of the system controlled by its own CPU module.Note)
< Lighting on pattern >
<table>
<tr><th>RUN</th><th>ALM</th><th>State of the system</th></tr>
<tr><td>Light off</td><td>Light off</td><td>In the state of power supply being OFF, or application programs being stopped</td></tr>
<tr><td>Light on</td><td>Light off</td><td>System under normal operation</td></tr>
<tr><td>Light on</td><td>Light on</td><td>System under operation with minor faults</td></tr>
<tr><td>Light off</td><td>Light on</td><td>System stopped due to serious faults</td></tr>
</table></td></tr>
<tr><td>BAT</td><td>Orange</td><td>It lights on when the voltage of the battery for data backup is decreased, or gone.</td></tr>
</table>

Note) The system includes its own CPU.

[2] Key switch

The operations of CPU modules are set by means of a key switch.

Key position	Operation of CPU and communications with the loader
RUN	• When switched from the STOP position or TERM position to the RUN position, the CPU module starts operation. • When in this position, monitoring and reading operations can be made from the loader. (Operation of read/write can be made for the data.)
TERM	• To keep the previous state. When switched from the STOP position to the TERM position, the CPU module keeps the stop state. When switched from the RUN position to the TERM position, the CPU module keeps the running state. If the switch is in the TERM position when powering on, the CPU module will be in the running state (default). Also, it can be put into the previous state of operation by means of a setting of the system definition. • When in this position, monitoring and read/write operations can be made from the loader.
STOP	• When switched from the RUN position or TERM position to the STOP position, the CPU module stops. • When in this position, monitoring and reading operations can be made from the loader. (Operation of read/write can be made for the data.)

[3] CPU number setting switch

It sets the CPU number. In the case of a system consisting of 1 unit of CPU module, it must always be set to “0”.

In the case of a system consisting of multiple CPU modules (multi-CPU system), it should be set from “0” in order.

Note) Do not change the setting while running. Failure to observe this may cause a stop of the system.

[4] Connector for programming tool versatile communications connection

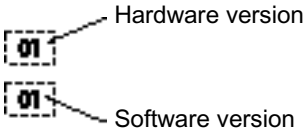
It connects TDsxEditor or versatile communications external equipment.

[5] Battery for data backup

It is a battery for the backup of the retained data at the time of blackout inside the CPU module (retain memory, calendar, etc.)

[6] Version display

It displays the version of the CPU module.



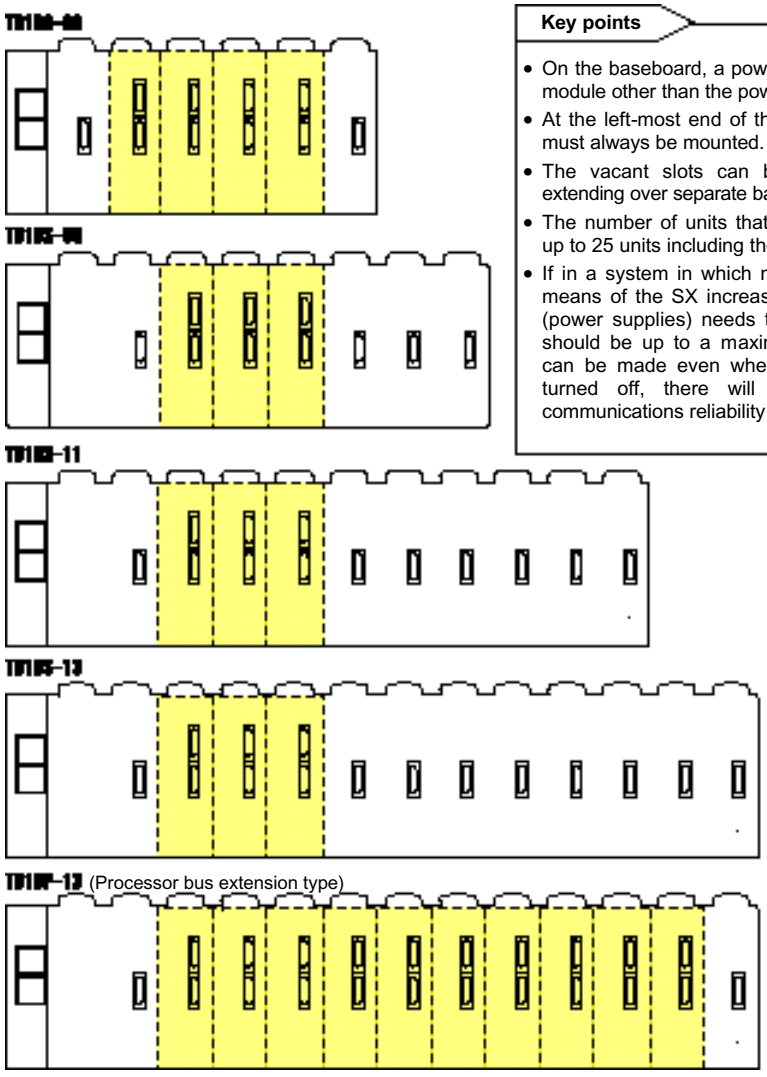
3-4 Baseboard Specifications

3-4-1Specifications list

Item	Specifications				
Model	TD1BS-06	TD1BS-08	TD1BS-11	TD1BS-13	TD1BP-13
Number of slots	6 slots	8 slots	11 slots	13 slots	13 slots
Number of processor busses	For 4 slots	For 3 slots	For 3 slots	For 3 slots	For 10 slots
Internal current consumption DC 24 V	45 mA or less	50 mA or less	60 mA or less	70 mA or less	70 mA or less
Weight	Approx. 420 g	Approx. 540 g	Approx. 720 g	Approx. 840 g	Approx. 840 g

Note) Refer to “3-10 Outer Specifications” for outer dimensions.

< Processor bus connection slot >

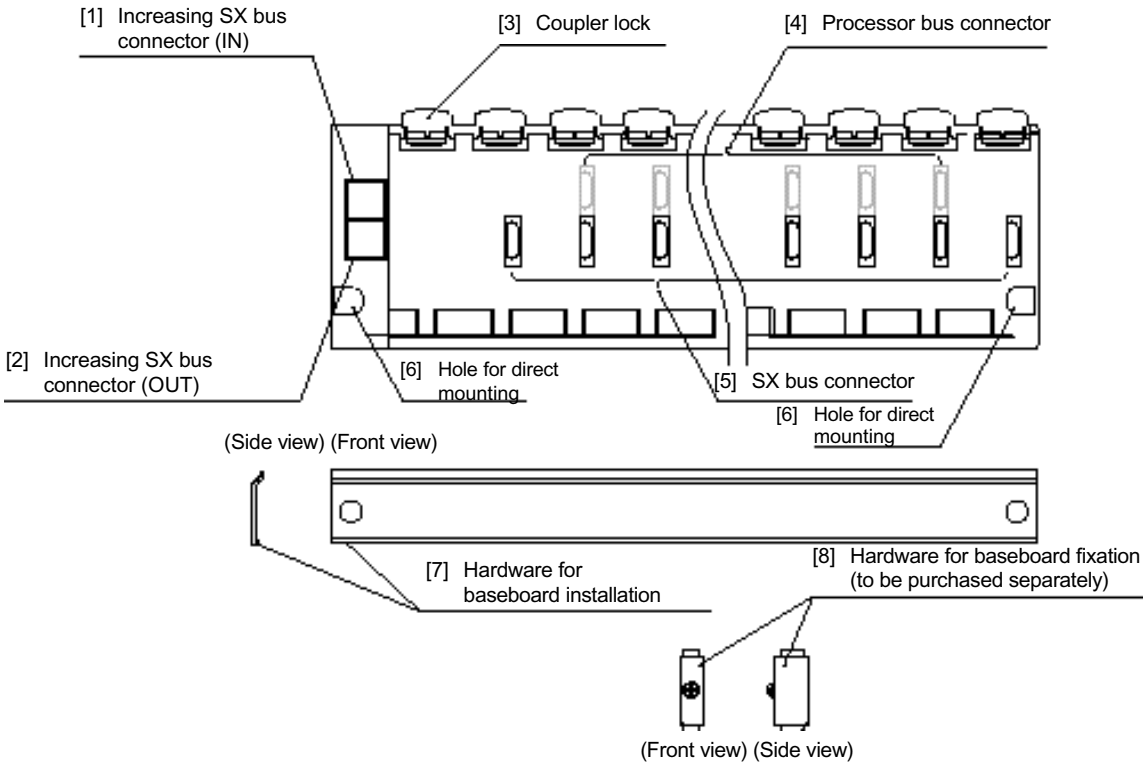


Key points

- On the baseboard, a power supply module and at least 1 unit of module other than the power supply module must be mounted.
- At the left-most end of the baseboard, a power supply module must always be mounted.
- The vacant slots can be provided up to 10 slots without extending over separate baseboards.
- The number of units that can be connected to a baseboard is up to 25 units including the SX bus T-branch unit (NP8B-TB).
- If in a system in which multiple baseboards are connected by means of the SX increasing cable, a certain number of bases (power supplies) needs to be turned OFF, then such number should be up to a maximum of 3 units. (Although operation can be made even when 4 units or more in succession are turned off, there will be an extreme decrease in the communications reliability of the SX bus.

The slot indicated with ⋮⋮ is a slot with a processor bus connector.

3-4-2Name of each part and its function



[1] Increasing SX bus connector (IN)

[2] Increasing SX bus connector (OUT)

It is a connector for increasing SX bus. The cable taken from OUT must always be connected to IN.

[3] Coupler lock

It is a coupler used to fix the module.

[4] Processor bus connector

It is a connector for being connected to the processor bus that is used for carrying out high-speed data communications between CPU modules, and between CPU module processor link modules.

[5] SX bus connector

It is a connector for connecting each module to the SX bus.

[6] Hole for direct mounting

[7] Hardware for baseboard installation

[8] Hardware for baseboard fixation NP8B-ST (to be purchased separately)

It is hardware for baseboard fixation that is used for installing a baseboard to a DIN rail. Its 1 pair consists of 2 pcs.

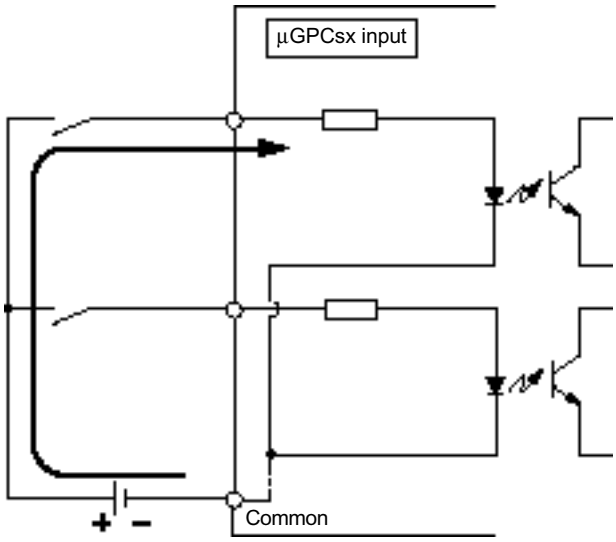
Refer to “Chapter 4 Installation and Wiring” for its usage.

3-5 Input and Output Specifications

3-5-1 Definition of sync, source

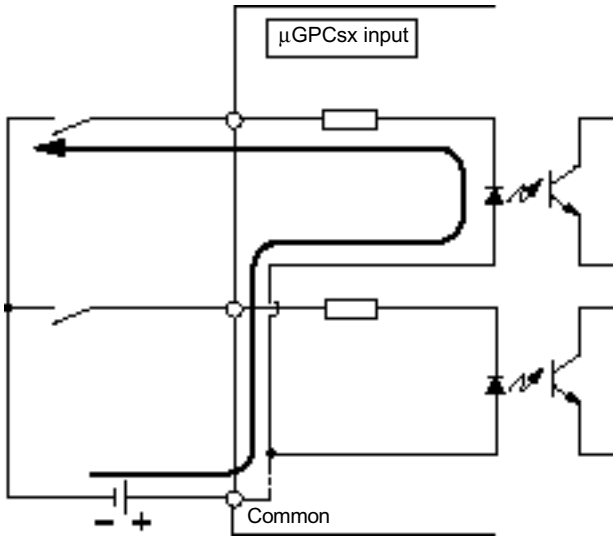
(1) Sync input

The input in which signal current flows in a signal terminal in the input module of PC is called sync input.



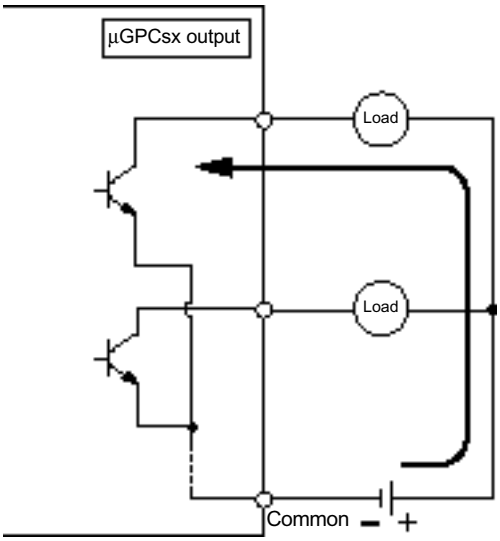
(2) Source input

The input in which signal current flows out from a signal terminal in the input module of PC is called source input.



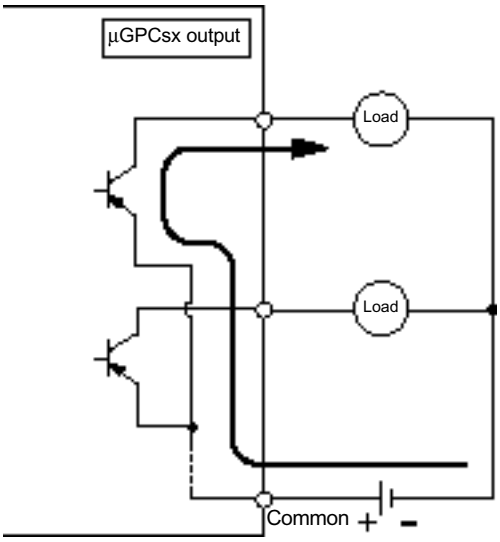
(3) Sync output

The output in which signal current flows in a signal terminal in the output module of PC is called sync output.



(4) Source output

The output in which signal current flows out from a signal terminal in the output module of PC is called source output.



3-5-2Life of relay

(1) Life curve of relay

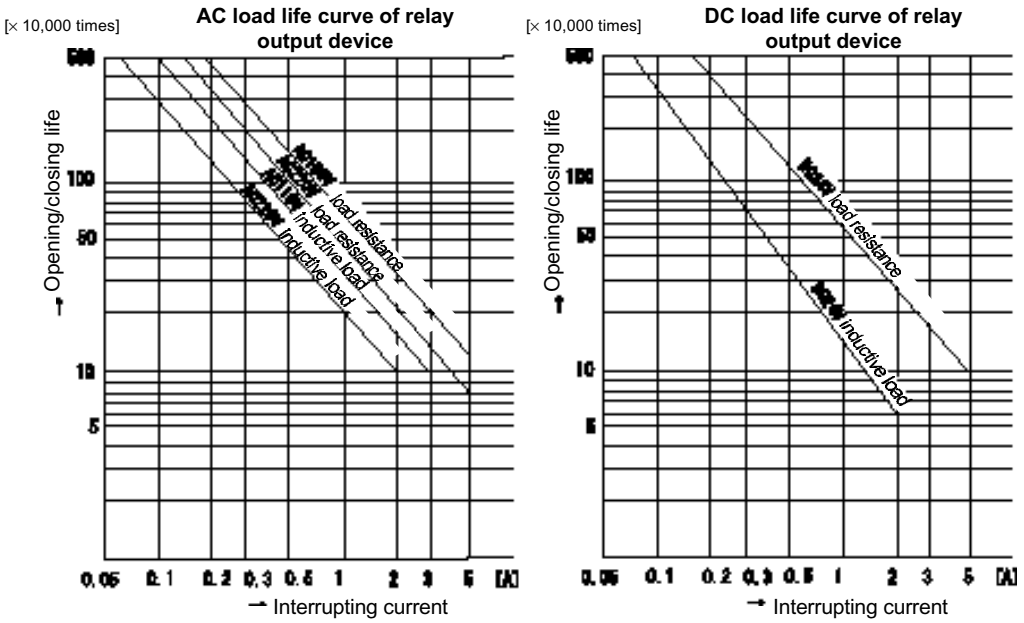
The life of a contact in a relay depends on the voltage, current, connected load at the contact.

In the case of a use requiring frequent opening/closing operations, there will be a problem in relay output because of its life, and therefore it is recommended to employ triac output instead.

Please study the life of a contact and time of replacement of a module in your system, referring to the figures below.

< Testing conditions >

Opening/closing frequency 1,800 times/hour, activation rate 40%, in the case of inductive load, time constant L/R=15 ms



(2) Type of load and its rush current

The type of load and its rush current characteristics greatly affect the contact. The rush current, in particular, becomes the factor to cause deposition of the contact, and therefore rush current values should also be considered in addition to the steady current.

- Motor, electromagnetic contactor, solenoid loads ...

With these loads there is a rush current equaling 3 - 10 times of steady state current. Also, in the case of a rush current lasting for a relatively long time as with the motor load, an interrupting in the state of a rush current may cause contact deposition, and hence it must not be done.

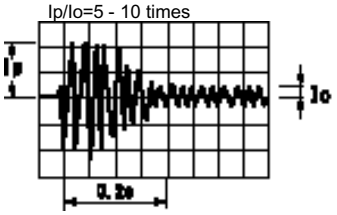
- Lamp load ...

With the lamp load there is a rush current equaling 5 - 15 times of steady state current. This rush current may cause contact deposition, and therefore if opening/closing of a lamp with a large capacity is to be made, it is recommended that verification test with an actual load should be carried out beforehand. The figures below show an example of current waveform in relation to time with each load. (Ip: rush current, Io: steady state current)

[Current waveform of load in relation to time]

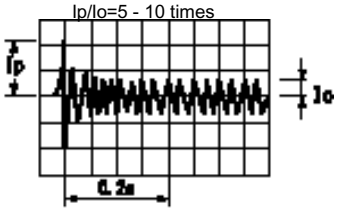
- Motor load

Ip/Io=5 - 10 times



- Halogen lamp load

Ip/Io=5 - 10 times

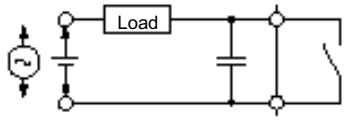
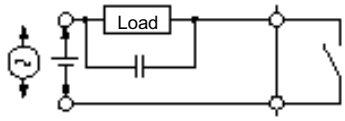
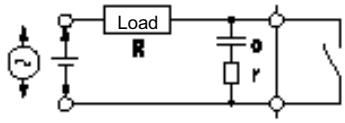
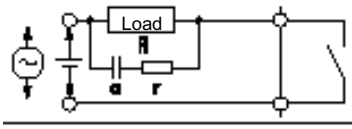
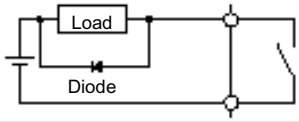
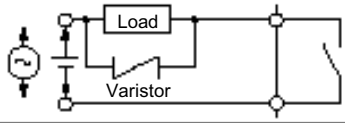


(3) Contact protection

When inductive loads such as motor, clutch, solenoid etc. are interrupted, several hundred to several thousand volts of counter electromotive force is generated, which may substantially shorten the contact life. This is because when inductive loads are interrupted, $1/2Li^2$ (L is the inductance of the coil) of the energy that has been stored in the coil is consumed by the electric discharge between the contacts, and therefore it is recommended that a contact protection circuit should be employed to absorb the counter electromotive force.

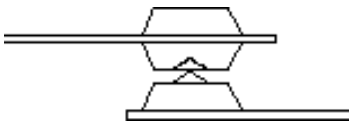
The illustration below shows its major methods, and in each method a separate usage may be required depending on its application to AC or DC. Also, the contact protection circuit may somewhat prolong the time required for recovery, and these should be considered in employing it.

[Contact protection circuit]

Example of circuit	Judgment	Notice on its use
	×	(1) The contact deposition tends to be caused when closing the contact. (2) In the case of AC, leakage voltage is applied to the load.
	×	(1) The contact deposition tends to be caused when closing the contact.
	○	(1) c = 0.1 - 1 μF, r ≈ R (2) When used with AC, • If the impedance of the load (R) is larger than the impedance of c, r: × • If the impedance of the load (R) is sufficiently less than the impedance of c, r: ○
	○	(1) c = 0.1 - 1 μF, r ≈ R (2) It can be applied both to AC and to DC.
	○	(1) It can be used with DC (dedicated to DC). (2) Not to be applied to AC.
	○	(1) It can be applied both to AC and to DC.

(4) Transition phenomena of the contact

The transition phenomena of the contact is that one of the two contacts is melted or vaporized as a result of the opening/closing with a direct current load, and makes a transit to the other contact, thereby creating unevenness on the surface as the number of times of opening/closing increases, and eventually the uneven surfaces become locked with each other, being seemingly in the state of contact deposition. This transition phenomena of the contact may occur even when the relay contact is working within the range of rated values. In the case of performing the opening/closing of a contact with a load including a capacitor, these phenomena are likely to occur, and therefore a resistor etc. should be used for controlling the rush current.



I/O Malfunctions and countermeasures

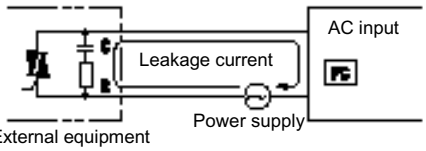
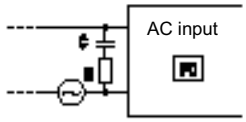
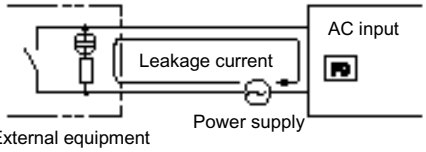
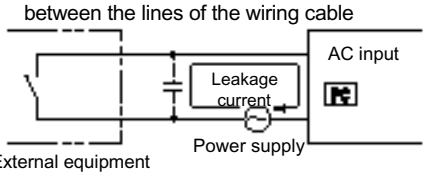
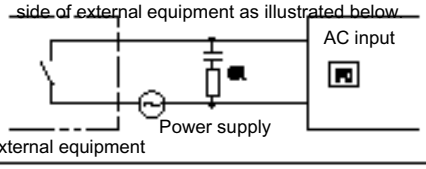
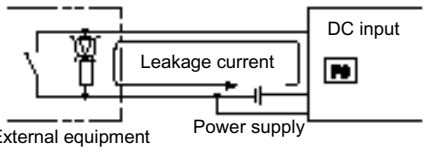
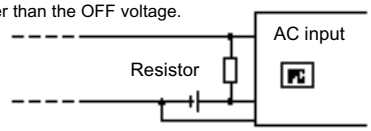
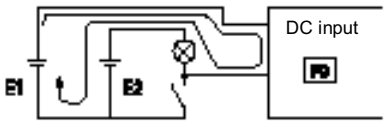
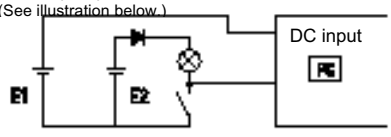
One-point advice

Examples of malfunctions in the I/O circuit and their countermeasures are presented herein.

When digital I/O is used, some malfunctions in the I/O circuit may occur such as while external input equipment (sensors etc.) is off, the input of PC remains ON, or even when the output of PC becomes OFF, external input equipment (lamps etc.) remains ON, etc.

Causes and countermeasures of malfunctions are given below, which should be considered at the time of designing hardware.

(1) Examples of malfunctions in the input circuit and their countermeasures

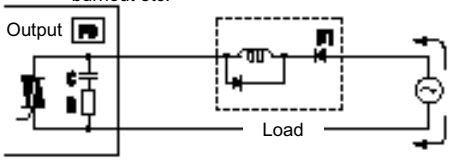
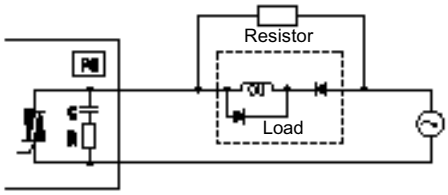
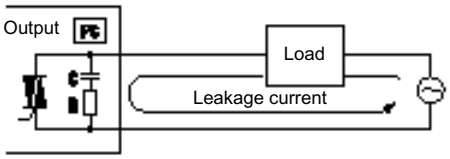
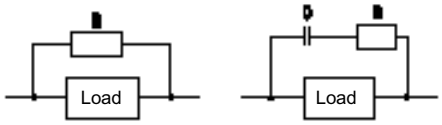
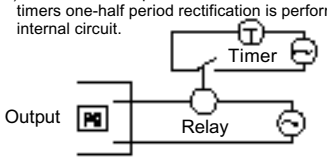
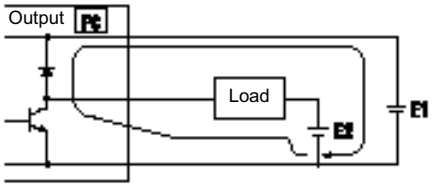
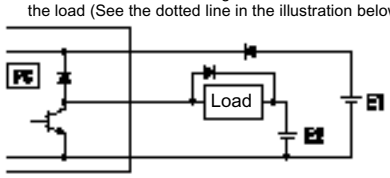
Phenomenon	Cause	Countermeasure
- Example 1 - Input signal will not become OFF	• Leakage current of external equipment (Driving by means of proximity switches etc.) 	• An appropriate resistor and capacitor should be connected to make the voltage between terminals of the input module less than the recovery voltage value. (A resistor only may suffice depending on the circuit.) 
- Example 2 - Input signal will not become OFF (In some cases the neon lamp remains lighted on)	• Leakage current of external equipment (Driving by means of a limit switch with a neon lamp) 	• The CR value depends on the current value. Recommended value C: 0.1 - 0.47 μF R: 47 - 120 Ω (1/2 W) • Provide a separate display circuit being independent of the present circuit.
- Example 3 - Input signal will not become OFF	• Leakage current resulting from the capacity between the lines of the wiring cable 	• Same as Example 1 • Otherwise, power supply should be installed at the side of external equipment as illustrated below. 
- Example 4 - Input signal will not become OFF	• Leakage current of external equipment (Driving by means of a switch with an LED display) 	• An appropriate resistor should be connected as illustrated below, so that the voltage between the terminal and the common of the input module becomes lower than the OFF voltage. 
- Example 5 - Input signal will not become OFF	• Snake path as a result of using 2 power sources  • A snake path is generated when E1 > E2.	• The 2 power sources should be replaced by 1 power source. • A snake path prevention diode should be connected. (See illustration below.) 

I/O Malfunctions and countermeasures

One-point advice

★ Continued from the previous page

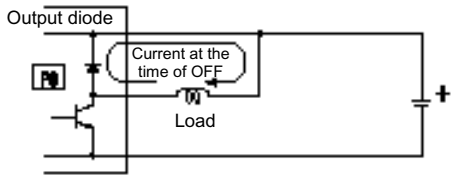
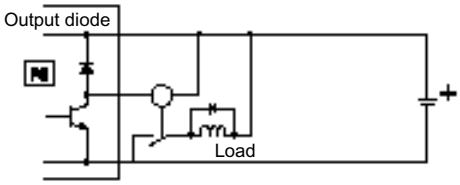
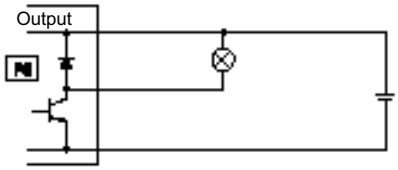
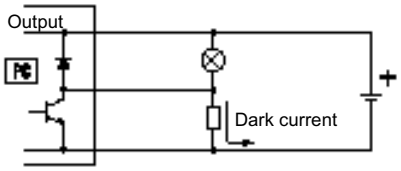
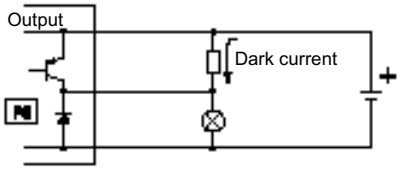
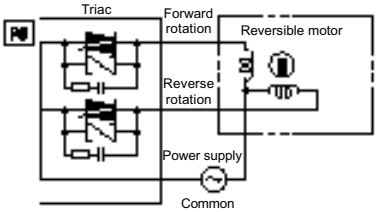
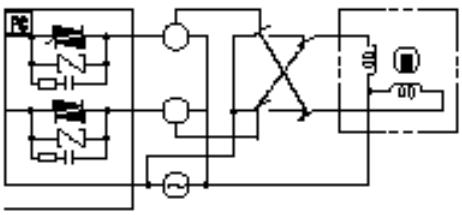
(2) Examples of malfunctions in the output circuit and their countermeasures

Phenomenon	Cause	Countermeasure
- Example 1 - Excessive voltage is applied to the load when the output is OFF	• The load undergoes one-half period rectification internally (such is the case of some solenoids.) • When the polarity of power source is like (1), C is charged, and when the polarity is like (2), the charged voltage and power supply voltage is added to be then applied to both ends of D1. The maximum value of voltage is about $2\sqrt{2E}$. Note) If it is used like this, there is no problem in the output device, but the diode built in the load (D1) may be deteriorated, causing burnout etc. 	• A resistor of several scores of kΩ - several hundred kΩ should be connected in parallel with the load. 
- Example 2 - The load will not become OFF.	• Leakage current caused by a surge absorption circuit that is connected in parallel with the output device. 	• A resistor of about several scores of kΩ or C and R that give equivalent impedance should be connected in parallel with the load. Note) If the wiring distance from the output card to the load is long, caution is required not to cause leakage of current resulting from the capacity between the lines. 
- Example 3 - When the load is a C-R type timer, the timing is not correct.	Same as Example 2	• The C-R type timer should be derived via a relay. • A device other than the C-R type timer should be used. Note) Caution of Example 1 should be taken because in some timers one-half period rectification is performed in the internal circuit. 
- Example 4 - The load will not become OFF (for direct current)	• Snake path as a result of using 2 power sources  • A snake path is generated when E1 < E2. • A snake path is also generated when E1 is made OFF (E2 is ON).	• The 2 power sources should be replaced by 1 power source. • A snake path prevention diode should be connected. Note) If the load is a relay etc., a diode for absorbing the counter electromotive voltage should be connected to the load (See the dotted line in the illustration below.) 

I/O Malfunctions and countermeasures

One-point advice

★ Continued from the previous page

Phenomenon	Cause	Countermeasure
- Example 5 - The OFF response time of the load is excessively long.	• Transient current at the time of being OFF. A large current inductive load (the one having large time constant L/R) such as a solenoid has been driven directly by the transistor output.  • When the transistor output is OFF, since the current flows through the diode, there may be a delay of 1 second or more depending on the load.	• A mini-control relay or magnet contactor that has a small time constant should be inserted as illustrated below, and the load should be driven by its contact.  • An output module that has no flywheel diode should be used, and a countermeasure against surges should be taken for the load.
- Example 6 - The output transistor gets broken. (transistor output)	• Rush current of an incandescent lamp  • At the instant that it is lighted on, there may be a rush current of 10 times or more of the rush current.	• To suppress the rush current, a dark current equaling about 1/3 - 1/5 of the rated current of the incandescent lamp should be caused to flow through the circuit.  In the case of a sync-shaped transistor output  In the case of a source-shaped transistor output
- Example 7 - The output triac gets broken. (SSR output)	• An excessive voltage is applied to the output device.  • When the output on the forward rotation coil side is ON, a voltage is induced in the reverse rotation coil, and an excessive voltage (induced voltage + power supply voltage) is applied to the output on the reverse rotation coil side. And vice versa in some cases. • A voltage of nearly twice the power supply voltage may be applied. • The surge absorber may be burnt out prior to the breakage in the triac.	• The load should be driven with the output device being mediated by a relay, magnet contactor etc.  • It is desirable to provide an interlock externally.

I/O Malfunctions and countermeasures

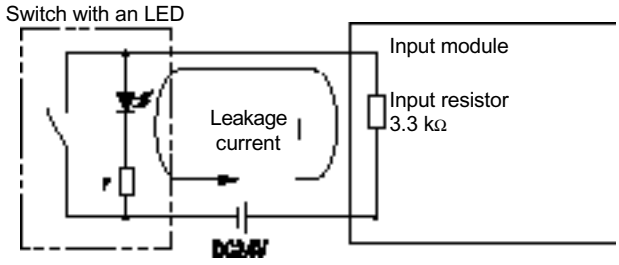
One-point advice

★ Continued from the previous page

(3) Example of calculations of a bleeder resistor

An example of calculations of a bleeder resistor is given herein as a countermeasure against an input malfunction caused by a leakage current in an LED circuit.

[1] Example of a malfunction



Assuming that r = 2.6 kΩ, the leakage current I becomes:

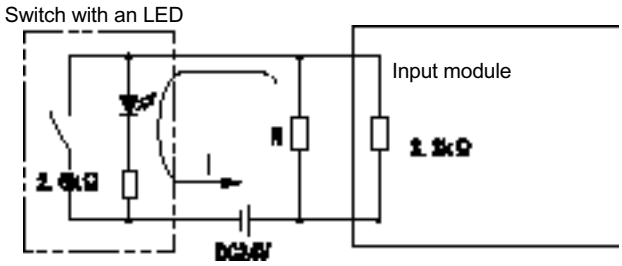
$$I = \frac{24}{(2.6+3.3) \times 10^3} \fallingdotseq 4.1 \times 10^{-3}\ (A) \quad (=4.1mA)$$

In this case, a voltage of:

$$4.1 \times 10^{-3} \times 3.3 \times 10^4 \fallingdotseq 14\ (V)$$

is applied between the input terminals of the input module, and it exceeds the OFF voltage: 5.0 V of the input module (NP1X1606-W etc.), with the result that even if the switch with an LED is “OFF”, the input module will be in the state of “ON”.

[2] Countermeasure



A bleeder resistor R should be inserted between the input terminals of the input module, thereby lowering the voltage applied between the input terminals to 5.0 V or less.

I/O Malfunctions and countermeasures

One-point advice

★ Continued from the previous page

(3) Example of calculations

- In the illustration on the previous page, if the voltage applied between ıe input terminals is assumed to be 5.0 V, then the current that flows ırough there will be as follows.

$$I=\frac{24-5.0}{2.6\times10^{3}}=7.3\times10^{-3}\ (A)\quad(=7.3mA)$$

- Then R is to be obtained considering the shunted current of the input ėsistor and bleeder resistor.

$$\frac{5.0}{R}>7.3\times10^{-3}-\frac{5.0}{3.3\times10^{3}}\ \Rightarrow\ R<880\ (\Omega)$$

- Assuming that the resistor value R=820 (Ω), the power capacity P of ıe bleeder resistor is to be obtained.

Since DC 24 V is applied to the bleeder resistor when the switch with an LED is turned ON:

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

The resistor value usually needs room of 3 to 4 times of the steady state value, and hence the power capacity should be set at 3 W.

Result: A bleeder resistor of 820 Ω/3 W should be connected.

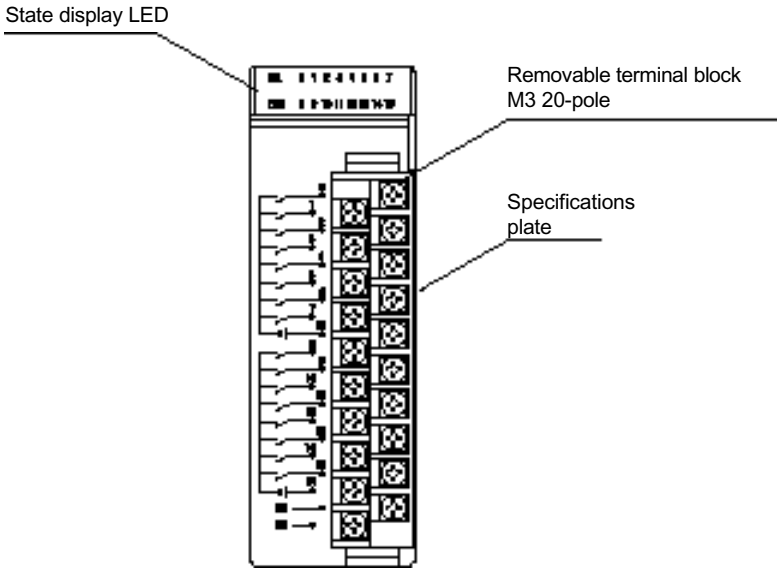
3-5-3Individual specifications of the digital input module

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

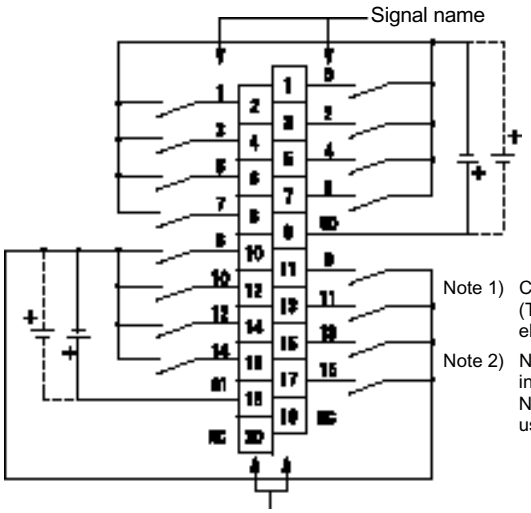
Item			Specifications
Model			NP1X1606-W
Number of input points (common configuration)			16 points (8 points/common 2 circuits)
Input signal conditions	Rated voltage		DC 24 V
	Maximum allowable voltage		DC 30 V
	Allowable ripple ratio		5% or less
Characteristics of input circuit	Input form		Used by source/sync in common
	Rated current		7 mA (at DC 24 V)
	Input impedance		3.3 kΩ
	Standard operating range	OFF → ON	15 - 30 V
		ON → OFF	0 - 5 V
	Input delay time	OFF → ON	0.7 ms (hard filter time) + (soft filter time)
		ON → OFF	The soft filter time is variable collectively depending on the setting of parameters. (OFF → ON) - (ON → OFF): 1 - 1 ms, 3 - 3 ms (Default), 3 - 10 ms, 10 - 10 ms, 30 - 30 ms, 100 - 100 ms
	Input type		DC type 1
Connection	External connection		Removable terminal block M3 screw 20-pole
	Applicable wire size		AWG #22-18[Note)]
Input signal display			LED lights on when each point becomes ON At the logic side ONL: when normal (green LED), ERR: when abnormal (red LED)
Insulation method			Photocoupler insulation
Dielectric strength			AC 1500 V 1 minute Between the input terminals collected together and the FG
Insulation resistance			10 MΩ or more when measured with DC 500 V insulation resistance tester Between the input terminals collected together and the FG
Dilating conditions			Simultaneous ON ratio: Maximum 100% (at DC 26.4 V/55◦C) Simultaneous ON ratio: Maximum 75% (at DC 30 V/55◦C)
External supply voltage			DC 24 V: for signals
Internal current consumption			DC 24 V 35 mA or less (when all points are ON)
Number of occupied words			In the case of the SX bus being connected directly: 2 words, In the case of being on the remote I/O link: 1 word
Weight			Approx. 150 g

Note) The applicable wire size depends on the crimp-style terminals used. Refer to “4-4-3 Input and output wiring” for details.

< Name of each part >



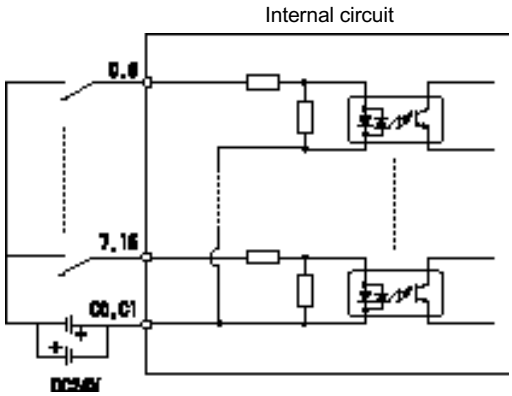
< External connection >



Note 1) Common C0, C1 (Terminal number 9, 18) are electrically separation insulated.

Note 2) NC depicts a terminal to which an internal circuit is not connected. Note, however, that it should not be used as a repeating terminal etc.

< Circuit configuration >

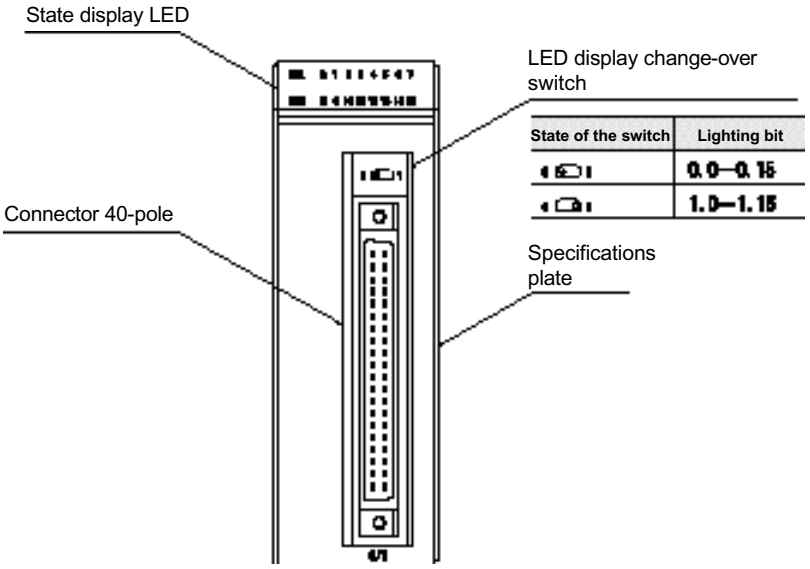


(2) DC 24 V input 32 points (NP1X3206-W)

Item			Specifications
Model			NP1X3206-W
Number of input points (common configuration)			32 points (32 points/common 1 circuit)
Input signal conditions	Rated voltage		DC 24 V
	Maximum allowable voltage		DC 30 V
	Allowable ripple ratio		5% or less
Characteristics of input circuit	Input form		Used by source/sync in common
	Rated current		4 mA (at DC 24 V)
	Input impedance		5.6 kΩ
	Standard operating range	OFF → ON	15 - 30 V
		ON → OFF	0 - 5 V
	Input delay time	OFF → ON	0.7 ms (hard filter time) + (soft filter time)
		ON → OFF	The soft filter time is variable collectively depending on the setting of parameters. (OFF → ON) - (ON → OFF): 1 - 1 ms, 3 - 3 ms (Default), 3 - 10 ms, 10 - 10 ms, 30 - 30 ms, 100 - 100 ms
	Input type		DC type 1
Connection	External connection		40-pole connector (FCN-365P040-AU) 1 piece
	Applicable wire size		AWG #23 or less (at the time of using a soldering type connector)Note)
Input signal display			LED lights on when each point becomes ON At the logic side ONL: when normal (green LED), ERR: when abnormal (red LED)
Insulation method			Photocoupler insulation
Dielectric strength			AC 1500 V 1 minute Between the input terminals collected together and the FG
Insulation resistance			10 MΩ or more when measured with DC 500 V insulation resistance tester Between the input terminals collected together and the FG
Dilating conditions			Simultaneous ON ratio: Maximum 100% (at DC 26.4 V/55°C) Simultaneous ON ratio: Maximum 75% (at DC 30 V/55°C)
External supply voltage			DC 24 V: for signals
Internal current consumption			DC 24 V 50 mA or less (when all points are ON)
Number of occupied words			2 words
Weight			Approx. 130 g

Note) The applicable wire size depends on the connector used. Refer to “4-4-3 Input and output wiring” for details.

< Name of each part >



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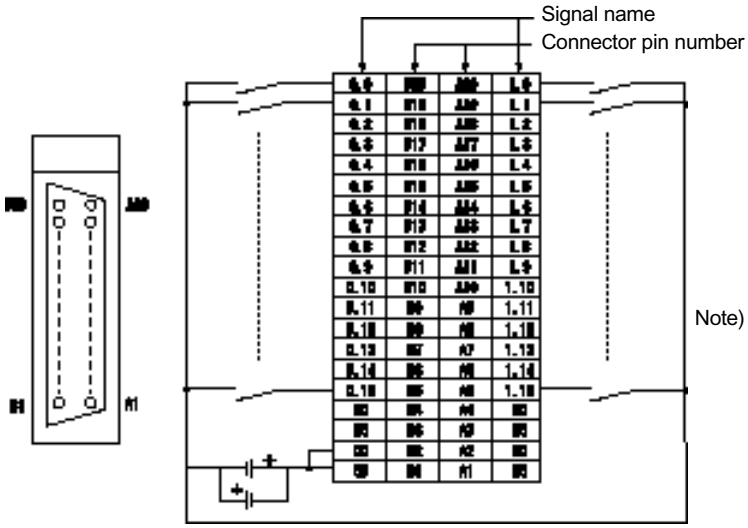
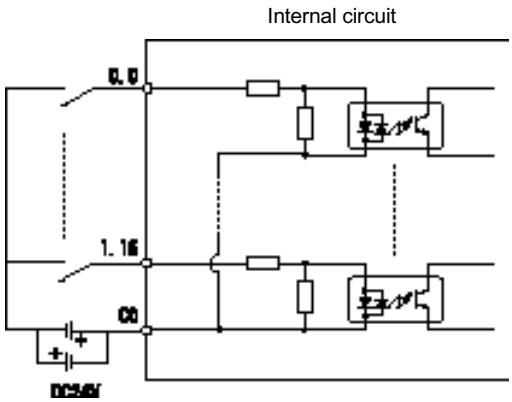


Note) NC depicts a pin to which an internal circuit is not connected. Note, however, that it should not be used as a repeating pin etc.

<Circuit configuration>

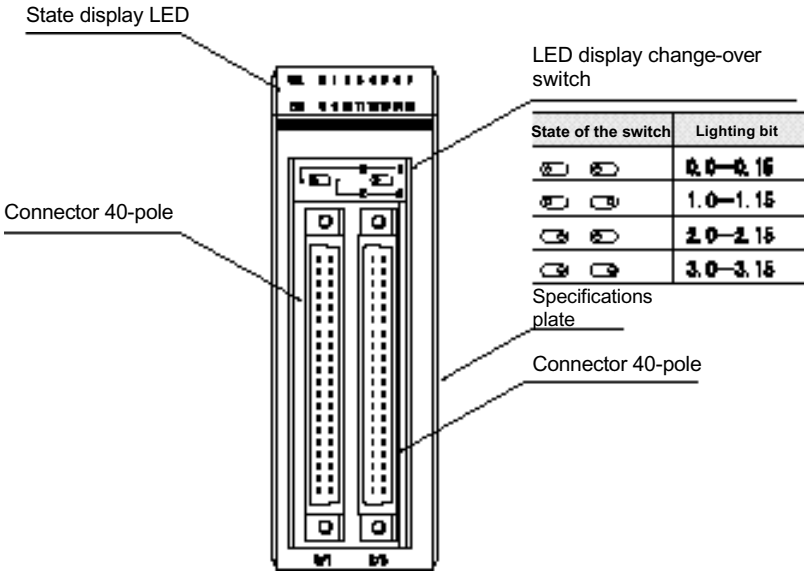


(3) DC 24 V input 64 points (NP1X6406-W)

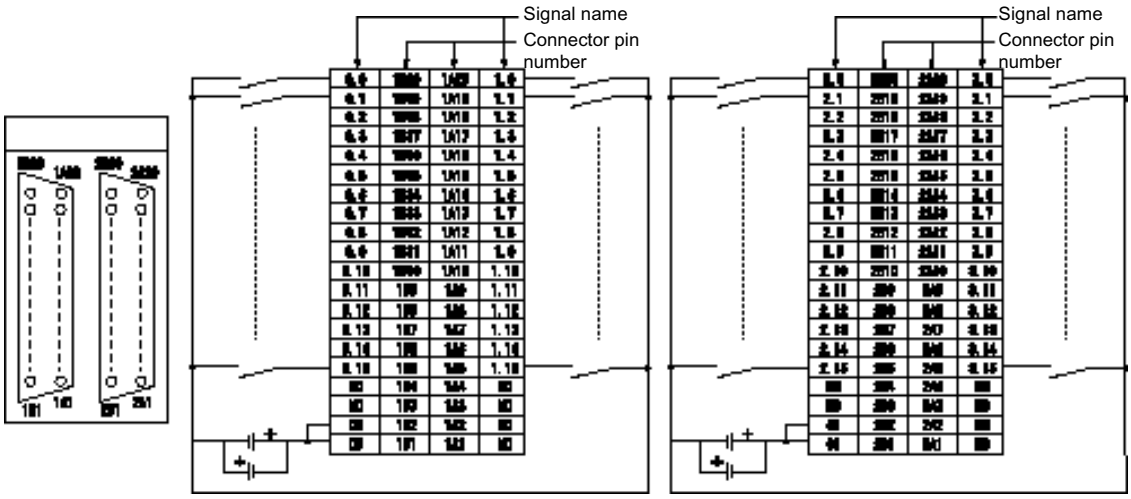
Item			Specifications
Model			NP1X6406-W
Number of input points (common configuration)			64 points (32 points/common 2 circuits)
Input signal conditions	Rated voltage		DC 24 V
	Maximum allowable voltage		DC 30 V
	Allowable ripple ratio		5% or less
Characteristics of input circuit	Input form		Used by source/sync in common
	Rated current		4 mA (at DC 24 V)
	Input impedance		5.6 kΩ
	Standard operating range	OFF → ON	15 - 30 V
		ON → OFF	0 - 5 V
	Input delay time	OFF → ON	0.7 ms (hard filter time) + (soft filter time)
		ON → OFF	The soft filter time is variable collectively depending on the setting of parameters. (OFF → ON) - (ON → OFF): 1 - 1 ms, 3 - 3 ms (Default), 3 - 10 ms, 10 - 10 ms, 30 - 30 ms, 100 - 100 ms
	Input type		DC type 1
Connection	External connection		40-pole connector (FCN-365P040-AU) 2 pcs.
	Applicable wire size		AWG #23 or less (at the time of using a soldering type connector)Note)
Input signal display			LED lights on when each point becomes ON by a change-over of the switch At the logic side ONL: when normal (green LED), ERR: when abnormal (red LED)
Insulation method			Photocoupler insulation
Dielectric strength			AC 1500 V 1 minute Between the input terminals collected together and the FG
Insulation resistance			10 MΩ or more when measured with DC 500 V insulation resistance tester Between the input terminals collected together and the FG
Dilating conditions			Simultaneous ON ratio: Maximum 60% (at DC 26.4 V/55◦C) Simultaneous ON ratio: Maximum 45% (at DC 30 V/55◦C)
External supply voltage			DC 24 V: for signals
Internal current consumption			DC 24 V 85 mA or less (when all points are ON)
Number of occupied words			4 words
Weight			Approx. 180 g

Note) The applicable wire size depends on the connector used. Refer to “4-4-3 Input and output wiring” for details.

< Name of each part >



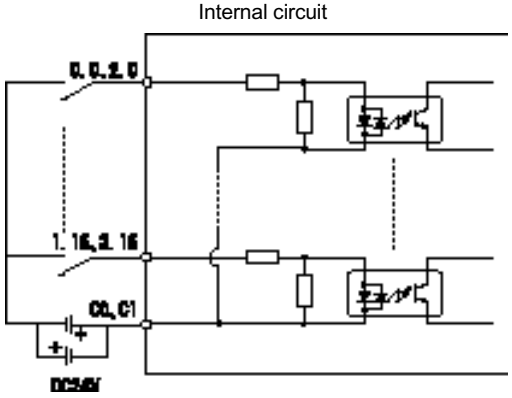
< External connection >



Note 1) Common pin C0, C1 are electrically separation insulated.

Note 2) NC depicts a pin to which an internal circuit is not connected. Note, however, that it should not be used as a repeating pin etc.

< Circuit configuration >

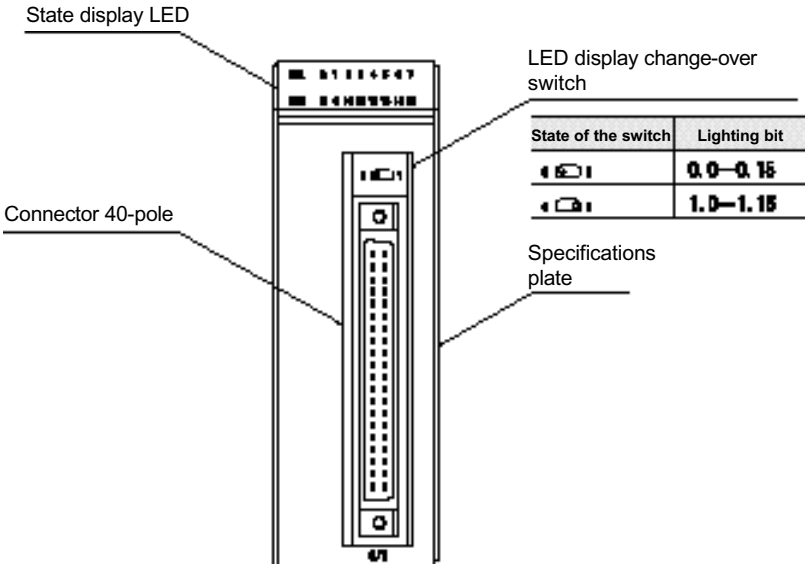


(4) DC 5 - 12 V input 32 points (NP1X3202-W)

Item			Specifications
Model			NP1X3202-W
Number of input points (common configuration)			32 points (32 points/common 1 circuits)
Input signal conditions	Rated voltage		DC 5 - 12 V
	Maximum allowable voltage		DC 13.2 V
	Allowable ripple ratio		5% or less
Characteristics of input circuit	Input form		Used by source/sync in common
	Rated current		3 mA (at 5 V), 9 mA (at 12 V)
	Input impedance		1.2 kΩ
	Standard operating range	OFF → ON	3.5 - 13.2 V
		ON → OFF	0 – 1 V
	Input delay time	OFF → ON	0.7 ms (hard filter time) + (soft filter time)
		ON → OFF	The soft filter time is variable collectively depending on the setting of parameters. (OFF → ON) - (ON → OFF): 1 - 1 ms, 3 - 3 ms (Default), 3 - 10 ms, 10 - 10 ms, 30 - 30 ms, 100 - 100 ms
	Input type		DC type 1
Connection	External connection		40-pole connector (FCN-365P040-AU) 1 piece
	Applicable wire size		AWG #23 or less (at the time of using a soldering type connector)Note)
Input signal display			LED lights on when each point becomes ON by a change-over of the switch At the logic side ONL: when normal (green LED), ERR: when abnormal (red LED)
Insulation method			Photocoupler insulation
Dielectric strength			AC 1500 V 1 minute Between the input terminals collected together and the FG
Insulation resistance			10 MΩ or more when measured with DC 500 V insulation resistance tester Between the input terminals collected together and the FG
Dilating conditions			Simultaneous ON ratio: Maximum 100% (at DC 13.2V/55°C) Simultaneous ON ratio: Maximum 75% (at DC 15 V/55°C)
External supply voltage			DC 5 - 12 V: for signals
Internal current consumption			DC 24 V 50 mA or less (when all points are ON)
Number of occupied words			2 words
Weight			Approx. 130 g

Note) The applicable wire size depends on the connector used. Refer to “4-4-3 Input and output wiring” for details.

< Name of each part >



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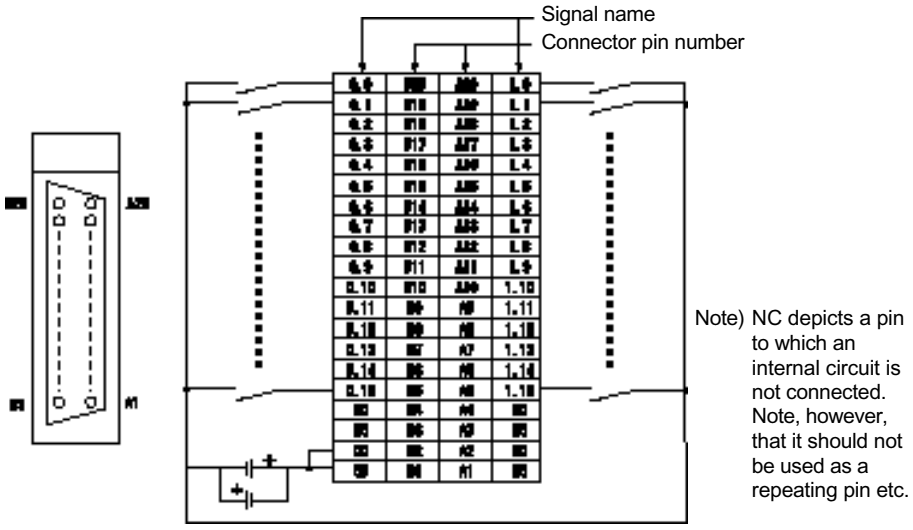
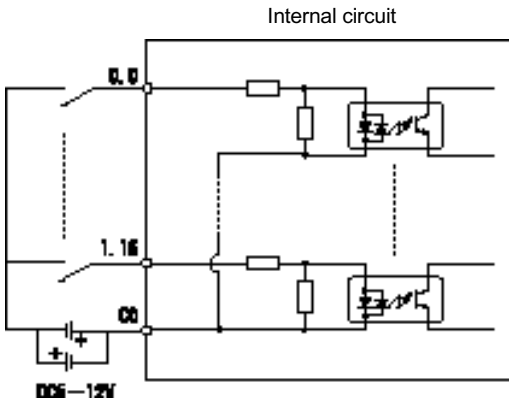


<Circuit configuration>

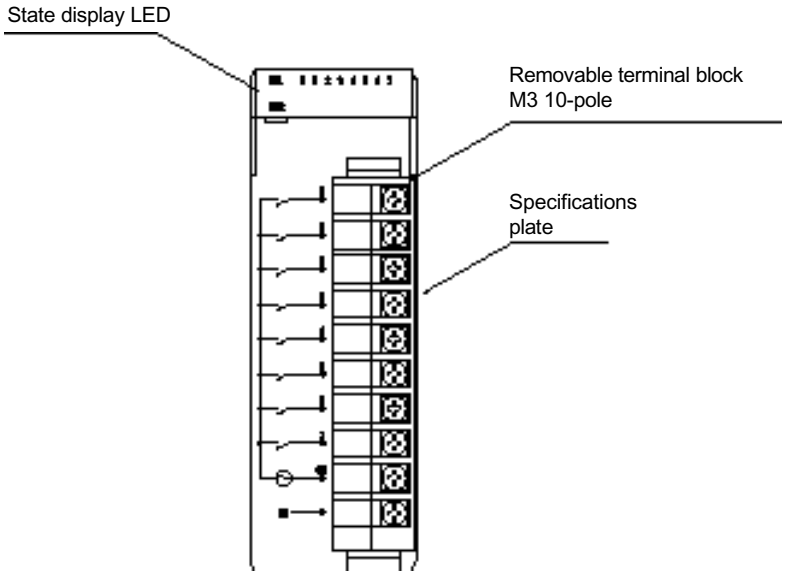


(5) AC 100 V input 8 points (NP1X0810)

Item			Specifications
Model			NP1X0810
Number of input points (common configuration)			8 points (8 points/common 1 circuit)
Input signal conditions	Input form		AC input
	Rated voltage		AC100 - 120 V
	Maximum allowable voltage		AC 132 V
	Waveform distortion ratio		5% or less
	Rated frequency		50/60 Hz
	Allowable range of frequency		47 - 63 Hz
	Rush current		Maximum 150 mA
Characteristics of input circuit	Rated current		10 mA
	Input impedance		10 kΩ (50 Hz), 9 kΩ (60 Hz)
	Standard operating range	OFF → ON	80 - 132 V
		ON → OFF	0 - 20 V
	Input delay time	OFF → ON	Approx. 10 ms
		ON → OFF	Approx. 10 ms
	Input type		AC type 1
Connection	External connection		Removable terminal block M3 screw 10-pole
	Applicable wire size		AWG #22-18 Note)
Input signal display			LED lights on when each point becomes ON At the logic side ONL: when normal (green LED), ERR: when abnormal (red LED)
Insulation method			Photocoupler insulation
Dielectric strength			AC 1500 V 1 minute Between the input terminals collected together and the FG
Insulation resistance			10 MΩ or more when measured with DC 500 V insulation resistance tester Between the input terminals collected together and the FG
Dilating conditions			None
External supply voltage			AC 100 - 120 V: for signals
Internal current consumption			DC 24 V 35 mA or less (when all points are ON)
Number of occupied words			In the case of the SX bus being connected directly: 2 words, In the case of being on the remote I/O link: 1 word
Weight			Approx. 130 g

Note) The applicable wire size depends on the crimp-style terminals used. Refer to “4-4-3 Input and output wiring” for details.

< Name of each part >



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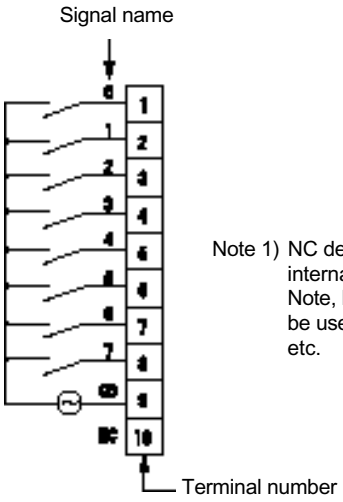
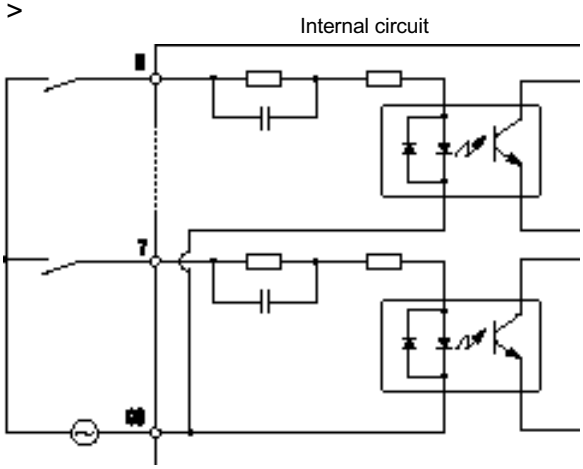


Note 1) NC depicts a terminal to which an internal circuit is not connected. Note, however, that it should not be used as a repeating terminal etc.

< Circuit configuration >

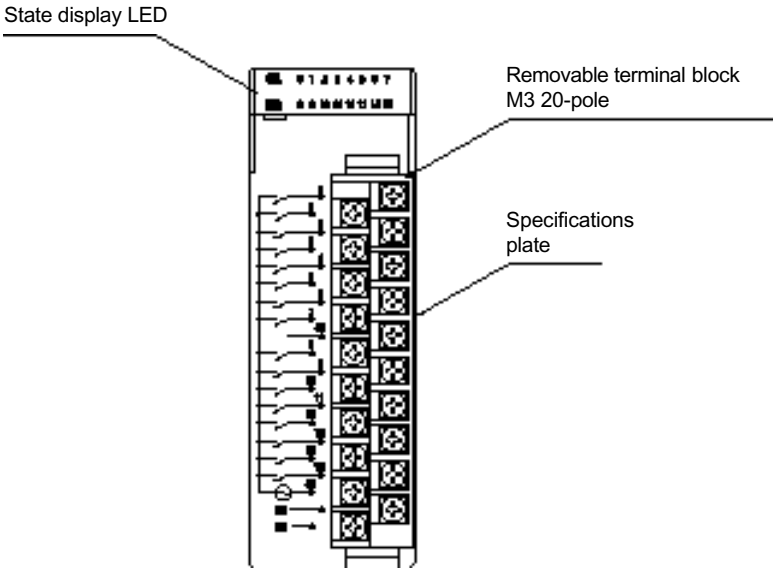


(6) AC 100 V input 16 points (NP1X1610)

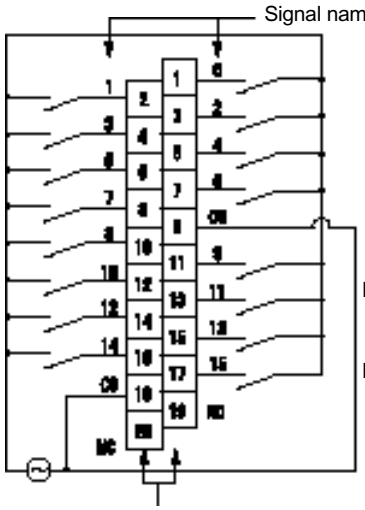
Item			Specifications
Model			NP1X1610
Number of input points (common configuration)			16 points (16 points/common terminal 2 pcs)
Input signal conditions	Input form		AC input
	Rated voltage		AC100 - 120 V
	Maximum allowable voltage		AC 132 V
	Waveform distortion ratio		5% or less
	Rated frequency		50/60 Hz
	Allowable range of frequency		47 - 63 Hz
	Rush current		Maximum 150 mA
Characteristics of input circuit	Rated current		10 mA/points (AC 100/120 V)
	Input impedance		10 kΩ (50 Hz), 9 kΩ (60 Hz)
	Standard operating range	OFF → ON	80 - 132 V
		ON → OFF	0 - 20 V
	Input delay time	OFF → ON	Approx. 10 ms
		ON → OFF	Approx. 10 ms
	Input type		AC type 1
Connection	External connection		Removable terminal block M3 screw 20-pole
	Applicable wire size		AWG #22-18[Note)]
Input signal display			LED lights on when each point becomes ON At the logic side ONL: when normal (green LED), ERR: when abnormal (red LED)
Insulation method			Photocoupler insulation
Dielectric strength			AC 1500 V 1 minute Between the input terminals collected together and the FG
Insulation resistance			10 MΩ or more when measured with DC 500 V insulation resistance tester Between the input terminals collected together and the FG
Dilating conditions			Simultaneous ON ratio: Maximum 80% (at AC 100 V/55°C) Simultaneous ON ratio: Maximum 60% (at AC 132 V/55°C)
External supply voltage			AC 100 - 120 V: for signals
Internal current consumption			DC 24 V 40 mA or less (when all points are ON)
Number of occupied words			In the case of the SX bus being connected directly: 2 words, In the case of being on the remote I/O link: 1 word
Weight			Approx. 170 g

Note) The applicable wire size depends on the crimp-style terminals used. Refer to “4-4-3 Input and output wiring” for details.

< Name of each part >



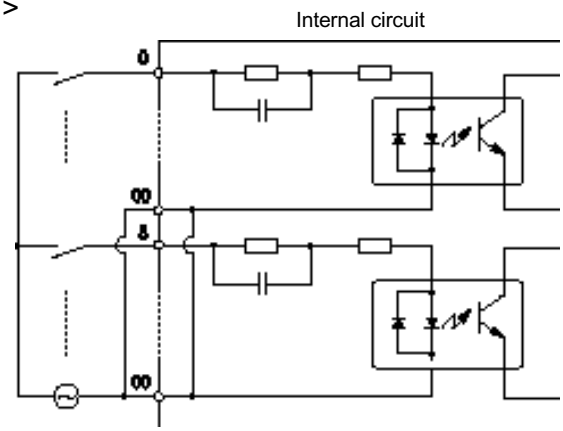
< External connection >



Note 1) Common terminals (terminal number 9, 18) are connected internally.

Note 2) NC depicts a terminal to which an internal circuit is not connected. Note, however, that it should not be used as a repeating terminal etc.

< Circuit configuration >

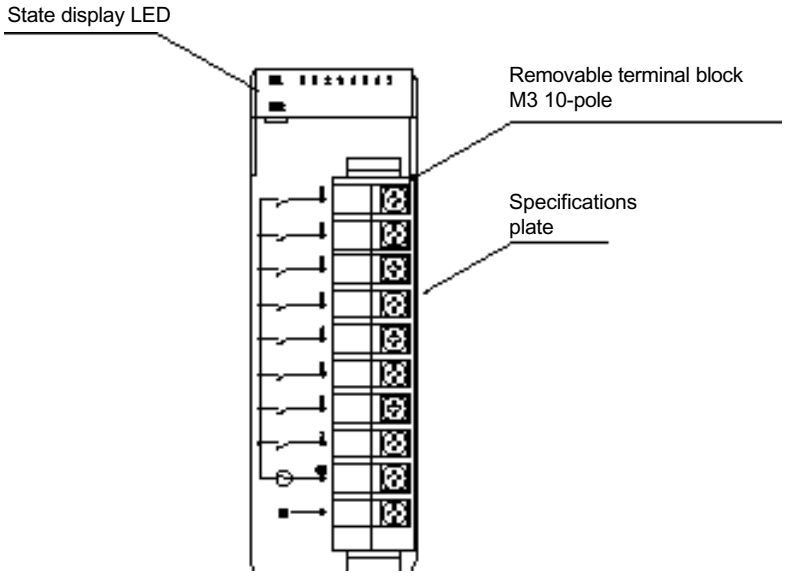


(7) AC 200 V input 8 points (NP1X0811)

Item			Specifications
Model			NP1X8011
Number of input points (common configuration)			8 points (8 points/common 1 circuit)
Input signal conditions	Input form		AC input
	Rated voltage		AC200 - 240 V
	Maximum allowable voltage		AC 264 V
	Waveform distortion ratio		5% or less
	Rated frequency		50/60 Hz
	Allowable range of frequency		47 - 63 Hz
	Rush current		Maximum 300 mA
Characteristics of input circuit	Rated current		10 mA/points (AC 200/240 V)
	Input impedance		22 kΩ (50 Hz), 18 kΩ (60 Hz)
	Standard operating range	OFF → ON	160 - 264 V
		ON → OFF	0 - 40 V
	Input delay time	OFF → ON	Approx. 10 ms
		ON → OFF	Approx. 10 ms
	Input type		AC type 1
Connection	External connection		Removable terminal block M3 screw 10-pole
	Applicable wire size		AWG #22-18[Note)]
Input signal display			LED lights on when each point becomes ON At the logic side ONL: when normal (green LED), ERR: when abnormal (red LED)
Insulation method			Photocoupler insulation
Dielectric strength			AC 2830 V 1 minute Between the input terminals collected together and the FG
Insulation resistance			10 MΩ or more when measured with DC 500 V insulation resistance tester Between the input terminals collected together and the FG
Dilating conditions			None
External supply voltage			AC 200 - 240 V: for signals
Internal current consumption			DC 24 V 35 mA or less (when all points are ON)
Number of occupied words			In the case of the SX bus being connected directly: 2 words, In the case of being on the remote I/O link: 1 word
Weight			Approx. 130 g

Note) The applicable wire size depends on the crimp-style terminals used. Refer to “4-4-3 Input and output wiring” for details.

< Name of each part >



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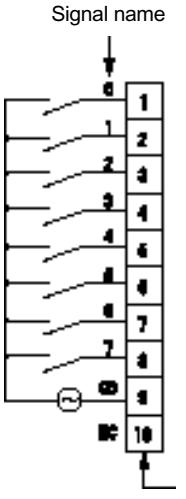
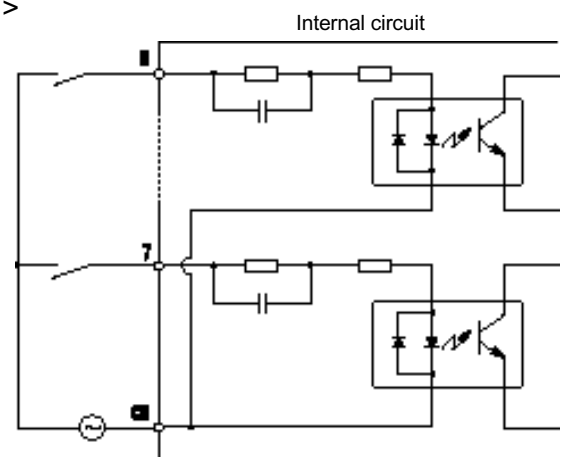


Note 1) NC depicts a terminal to which an internal circuit is not connected. Note, however, that it should not be used as a repeating terminal etc.

< Circuit configuration >



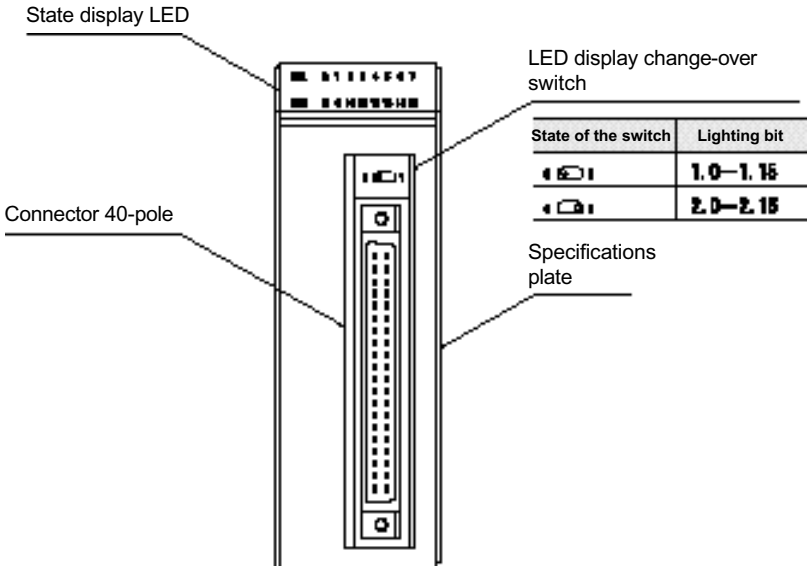
(8) DC 24 V high-speed input 32 points (NP1X3206-A)

Item			Specifications
Model			NP1X3206-A
Number of input points (common configuration)			32 points (32 points/common 1 circuit)
Input signal conditions	Rated voltage		DC 24 V
	Maximum allowable voltage		DC 30 V
	Allowable ripple ratio		5% or less
Characteristics of input circuit	Input form		Source input
	Rated current		4 mA (at DC 24 V)
	Input impedance		5.6 kΩ
	Standard operating range	OFF → ON	15 - 30 V
		ON → OFF	0 - 5 V
	Input delay time	OFF → ON	(hard filter time) + (soft filter time)[Note 1)]
		ON → OFF	The soft filter time is variable collectively depending on the setting of parameters. (OFF → ON) - (ON → OFF): None, 0.1 – 0.1ms, 1 - 1 ms, 3 - 3 ms (Default), 3 - 10 ms, 10 - 10 ms, 30 - 30 ms, 100 - 100 ms
	Input type		DC type 1
Connection	External connection		40-pole connector (FCN-365P040-AU) 1 piece
	Applicable wire size		AWG #23 or less (at the time of using a soldering type connector)[Note 2)]
Input signal display			LED lights on when each point becomes ON by a change-over of the switch At the logic side ONL: when normal (green LED), ERR: when abnormal (red LED)
Insulation method			Photocoupler insulation
Dielectric strength			AC 1500 V 1 minute Between the input terminals collected together and the FG
Insulation resistance			10 MΩ or more when measured with DC 500 V insulation resistance tester Between the input terminals collected together and the FG
Dilating conditions			Simultaneous ON ratio: Maximum 100% (at DC 26.4 V/55◦C) Simultaneous ON ratio: Maximum 75% (at DC 30 V/55◦C)
External supply voltage			DC 24 V: for signals
Internal current consumption			DC 24 V 50 mA or less (when all points are ON)
Number of occupied words			14 words (input: 9 words/output: 5 words)
Weight			Approx. 130 g

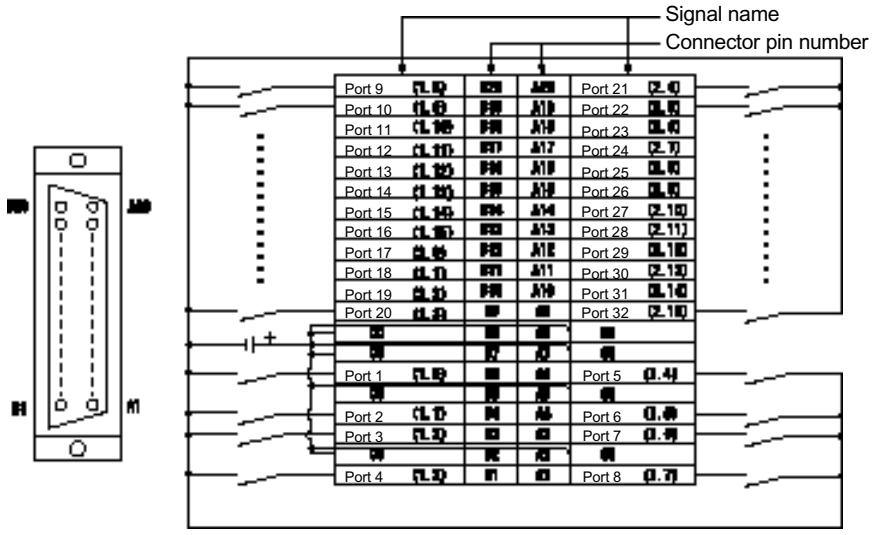
Note 1) The duration of the hard filter time depends on the port used. It is 20 μs for ports 1 through 8, and 100 μs for ports 9 through 32.

Note 2) The applicable wire size depends on the connector used. Refer to “4-4-3 Input and output wiring” for details.

< Name of each part >



< External connection >



Note 1) All the common pins: C0 are connected internally.

Note 2) The figures in the parentheses: ( ) in the signal name column shows the offset address and bit position.

Note 3) For the detailed specifications of this module and its handling, refer to a manual dedicated to it (FH211).

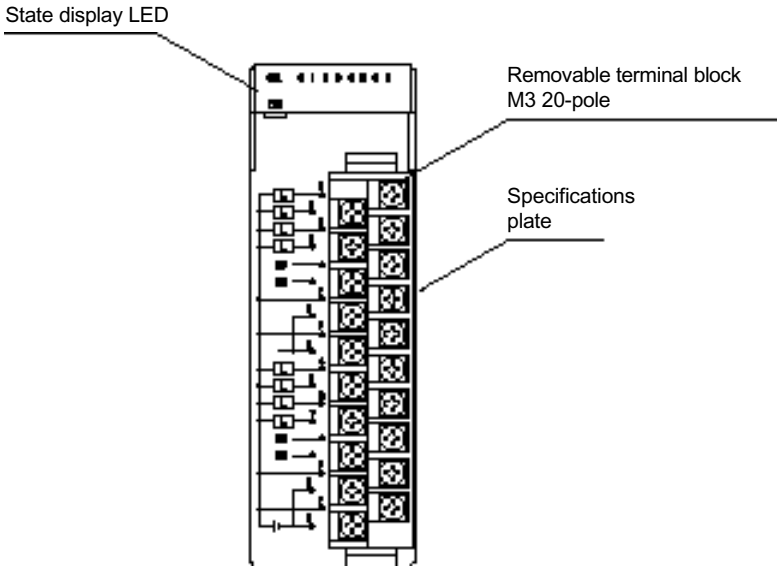
3-5-4Individual specifications of the digital output module

(1) Transistor sync output 8 points (NP1Y08T0902)

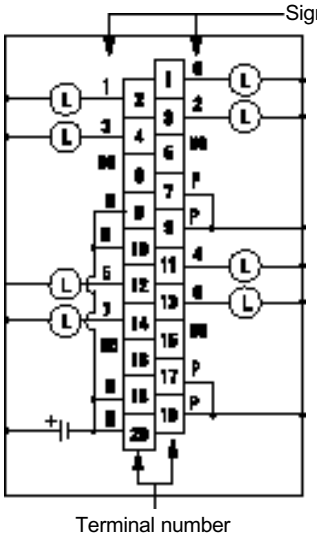
Item			Specifications
Model			NP1Y08T0902
Number of output points (common configuration)			8 points (8 points/common 1 circuit) With 4 pcs. each of P, M common terminals
Output power conditions	Rated voltage		DC 12 - 24 V
	Maximum allowable voltage		DC 10.2 - 30 V
Characteristics of output circuit	Output form		Sync output
	Maximum load current		2.4 A/point, 8 A/common
	Output voltage drop		2 V or less (at 2.4 A)
	Output delay time	OFF → ON	1 ms or less
		ON → OFF	1 ms or less
	Leakage current at the time of OFF		Maximum 0.1 mA
	Output type		Transistor output
	Withstand surge current		9 A 10 ms
Output protection form	Built-in fuse		125 V 15 A × 2 (The replacement of fuses cannot be performed by users.)
	Surge suppression circuit		Varistor
	Other output protection		None
Maximum opening/closing frequency			1800 times/hour (This is a restriction at the time of an induced load. There is no restriction at the time of a resistance load.)
Connection	External connection		Removable terminal block M3 screw 20-pole
	Applicable wire size		AWG #22-18[Note)]
Output signal display			LED lights on when each point becomes ON at the logic side ONL: when normal (green LED), ERR: when there is abnormality or the fuse has been blown (red LED)
Insulation method			Photocoupler insulation
Dielectric strength			AC 1500 V 1 minute Between the output terminals collected together and the FG
Insulation resistance			10 MΩ or more when measured with DC 500 V insulation resistance tester Between the output terminals collected together and the FG
Dilating conditions			Simultaneous ON ratio: Maximum 100% (at DC 26.4 V/55◦C) Simultaneous ON ratio: Maximum 85% (at DC 30 V/55◦C)
External power supply			DC 12 - 24 V 33 mA: for driving transistors
Internal current consumption			DC 24 V 20 mA or less (when all points are ON)
Number of occupied words			In the case of the SX bus being connected directly: 2 words, In the case of being on the remote I/O link: 1 word
Weight			Approx. 150 g

Note) The applicable wire size depends on the crimp-style terminals used. Refer to “4-4-3 Input and output wiring” for details.

< Name of each part >



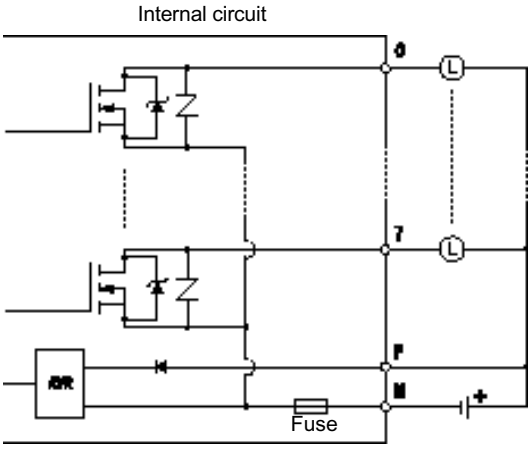
< External connection >



Note 1) Internal connections are made for each of the common terminals (Terminal numbers P: 7, 9, 17, 19, M: 8, 10, 18, 20).

Note 2) NC depicts a terminal to which an internal circuit is not connected. Note, however, that it should not be used as a repeating terminal etc.

< Circuit configuration >

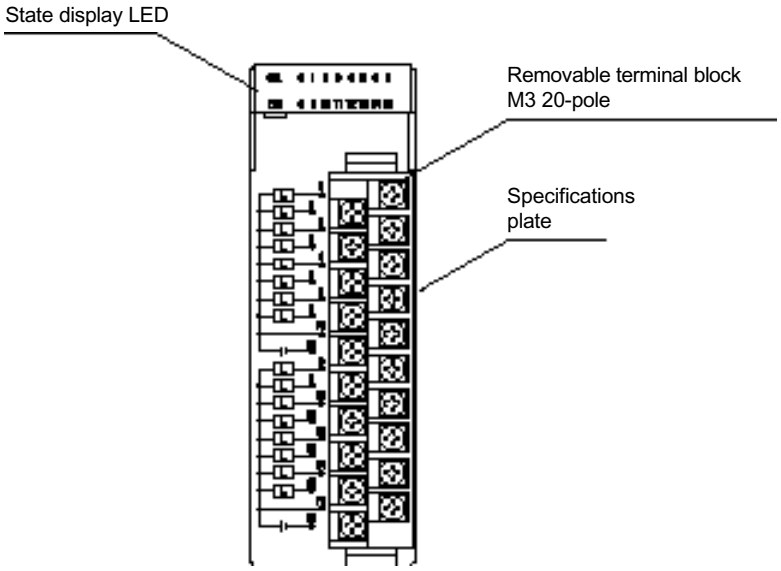


(2) Transistor sync output 16 points (NP1Y16T09P6)

Item			Specifications
Model			NP1Y16T09P6
Number of output points (common configuration)			16 points (8 points/common 2 circuits)
Output power conditions	Rated voltage		DC 12 - 24 V
	Maximum allowable voltage		DC 10.2 - 30 V
Characteristics of output circuit	Output form		Sync output
	Maximum load current		0.6 A/point, 4 A/common
	Output voltage drop		1.5 V or less (at 0.6 A)
	Output delay time	OFF → ON	1 ms or less
		ON → OFF	1 ms or less
	Leakage current at the time of OFF		Maximum 0.1 mA
	Output type		Transistor output
	Withstand surge current		2 A 10 ms
Output protection form	Built-in fuse		125 V 7 A × 2 (The replacement of fuses cannot be performed by users.)
	Surge suppression circuit		Varistor
	Other output protection		None
Maximum opening/closing frequency			1800 times/hour (This is a restriction at the time of an induced load. There is no restriction at the time of a resistance load.)
Connection	External connection		Removable terminal block M3 screw 20-pole
	Applicable wire size		AWG #22-18Note)
Output signal display			LED lights on when each point becomes ON At the logic side ONL: when normal (green LED), ERR: when there is abnormality or the fuse has been blown (red LED)
Insulation method			Photocoupler insulation
Dielectric strength			AC 1500 V 1 minute Between the output terminals collected together and the FG
Insulation resistance			10 MΩ or more when measured with DC 500 V insulation resistance tester Between the output terminals collected together and the FG
Dilating conditions			Simultaneous ON ratio: Maximum 100% (at DC 26.4 V/55°C) Simultaneous ON ratio: Maximum 85% (at DC 30 V/55°C)
External power supply			DC 12 - 24 V 30 mA: for driving transistors
Internal current consumption			DC 24 V 42 mA or less (when all points are ON)
Number of occupied words			In the case of the SX bus being connected directly: 2 words, In the case of being on the remote I/O link: 1 word
Weight			Approx. 160 g

Note) The applicable wire size depends on the crimp-style terminals used. Refer to “4-4-3 Input and output wiring” for details.

< Name of each part >



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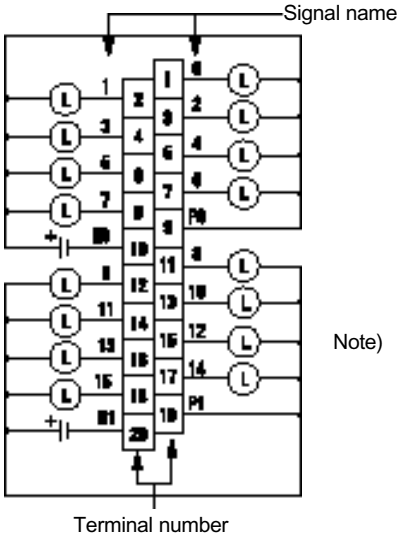
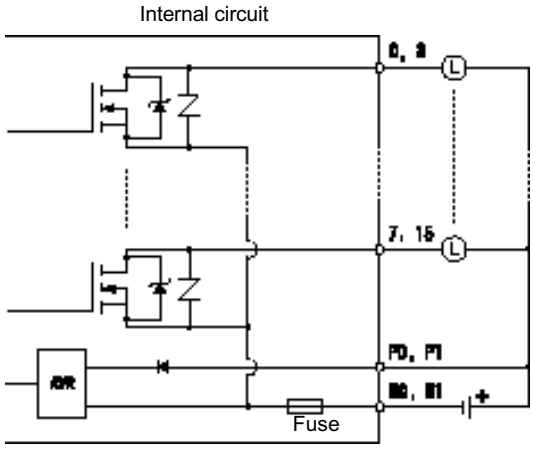


Note) Common terminals P0, P1 (Terminal numbers 9, 19) and M0, M1 (Terminal numbers 10, 20) are electrically separation insulated.

< Circuit configuration >

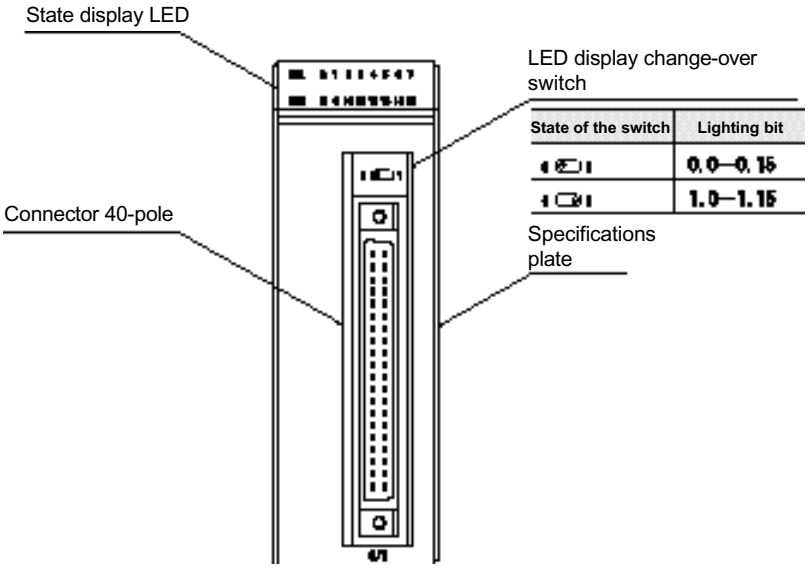


(3) Transistor sync output 32 points (NP1Y32T09P1)

Item			Specifications
Model			NP1Y32T09P1
Number of output points (common configuration)			32 points (32 points/common 1 circuit)
Output power conditions	Rated voltage		DC 12 - 24 V
	Maximum allowable voltage		DC 10.2 - 30 V
Characteristics of output circuit	Output form		Sync output
	Maximum load current		0.12 A/point, 3.2 A/common
	Output voltage drop		1.5 V or less (at 0.12 A)
	Output delay time	OFF → ON	1 ms or less
		ON → OFF	1 ms or less
	Leakage current at the time of OFF		Maximum 0.1 mA
	Output type		Transistor output
	Withstand surge current		0.3 A 10 ms
Output protection form	Built-in fuse		125 V 5 A (The replacement of fuses cannot be performed by users.)
	Surge suppression circuit		Zener diode
	Other output protection		None
Maximum opening/closing frequency			3600 times/hour (This is a restriction at the time of an induced load. There is no restriction at the time of a resistance load.)
Connection	External connection		40-pole connector (FCN-365P040-AU) 1 piece
	Applicable wire size		AWG #23 or less (at the time of using a soldering type connector)Note)
Output signal display			LED lights on when each point becomes ON At the logic side ONL: when normal (green LED), ERR: when there is abnormality or the fuse has been blown (red LED)
Insulation method			Photocoupler insulation
Dielectric strength			AC 1500 V 1 minute Between the output terminals collected together and the FG
Insulation resistance			10 MΩ or more when measured with DC 500 V insulation resistance tester Between the output terminals collected together and the FG
Dilating conditions			None
External supply voltage			DC 12 - 24 V 52 mA: for driving transistors
Internal current consumption			DC 24 V 45 mA or less (when all points are ON)
Number of occupied words			2 words
Weight			Approx. 130 g

Note) The applicable wire size depends on the connector used. Refer to “4-4-3 Input and output wiring” for details.

< Name of each part >



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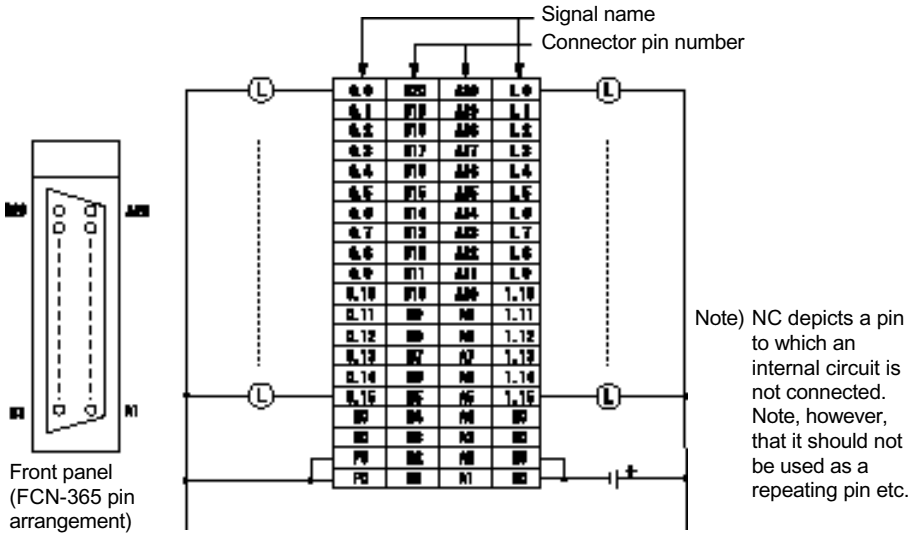

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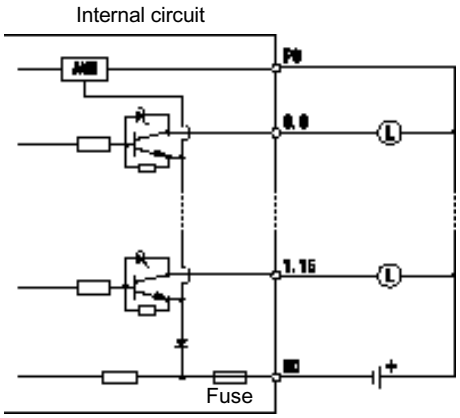
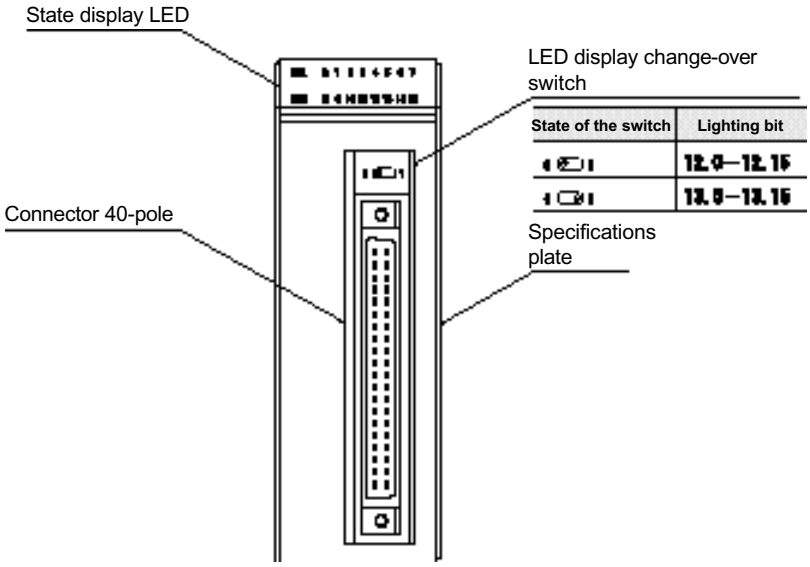


(4) Transistor sync output with a pulse output function 32 points (NP1Y32T09P1-A)

Item			Specifications
Model			NP1Y32T09P1-A
Number of output points (common configuration)			32 points (32 points/common 1 circuit)
Output power conditions	Rated voltage		DC 12 - 24 V
	Maximum allowable voltage		DC 10.2 - 30 V
Characteristics of output circuit	Output form		Sync output
	Maximum load current		0.12 A/point, 3.2 A/common
	Output voltage drop		1.5 V or less (at 0.12 A)
	Output delay time	OFF → ON	Ports 1 through 8: 20 μs or less (when the load current exceeds 20 mA) 25 μs (when the load current is 10 - 20 mA) Ports 9 through 32: 1 ms or less
		ON → OFF	
	Leakage current at the time of OFF		Maximum 0.1 mA
	Output type		Transistor output
	Withstand surge current		0.3 A 10 ms
Output protection form	Built-in fuse		125 V 5 A (The replacement of fuses cannot be performed by users.)
	Surge suppression circuit		Zener diode
	Other output protection		None
Maximum opening/closing frequency			3600 times/hour (This is a restriction at the time of an induced load. There is no restriction at the time of a resistance load.)
Connection	External connection		40-pole connector (FCN-365P040-AU) 1 piece
	Applicable wire size		AWG #23 or less (at the time of using a soldering type connector)Note)
Output signal display			LED lights on when each point becomes ON At the logic side ONL: when normal (green LED), ERR: when there is abnormality or the fuse has been blown (red LED)
Insulation method			Photocoupler insulation
Dielectric strength			AC 1500 V 1 minute Between the output terminals collected together and the FG
Insulation resistance			10 MΩ or more when measured with DC 500 V insulation resistance tester Between the output terminals collected together and the FG
Dilating conditions			Simultaneous ON ratio: Maximum 80% (at DC 24 V/55◦C) Simultaneous ON ratio: Maximum 75% (at DC 26.4 V/55◦C) Simultaneous ON ratio: Maximum 65% (at DC 30 V/55◦C)
External supply voltage			DC 12 - 24 V 40 mA: for driving transistors
Internal current consumption			DC 24 V 50 mA or less (when all points are ON)
Number of occupied words			14 words (input: 6 word/output 8 word)
Weight			Approx. 200 g

Note) The applicable wire size depends on connector used. Refer to “4-4-3 Input and output wiring” for details.

< Name of each part >



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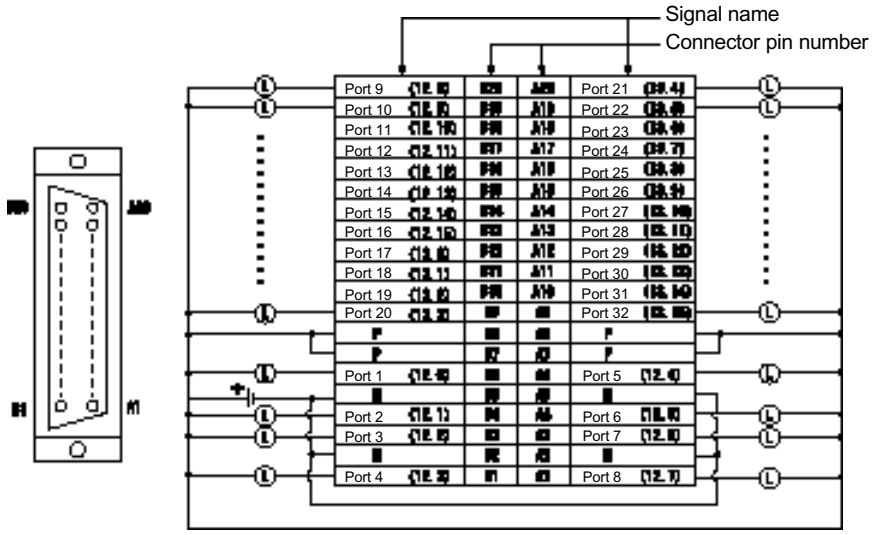


Note 1) The figures in the parentheses: ( ) in the signal name column shows the offset address and bit position.

Note 2) Ports 1 through 8 are at the same time used for the pulse set output as well.

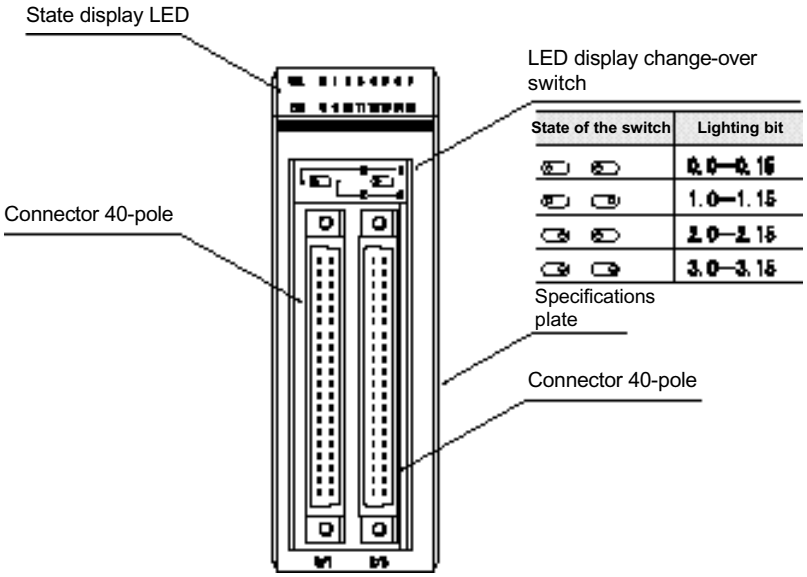
Note 3) For the detailed specifications of this module and its handling, refer to a manual dedicated to it (FH212).

(5) Transistor sync output 64 points (NP1Y64T09P1)

Item			Specifications
Model			NP1Y64T09P1
Number of output points (common configuration)			64 points (32 points/common 2 circuits)
Output power conditions	Rated voltage		DC 12 - 24 V
	Maximum allowable voltage		DC 10.2 - 30 V
Characteristics of output circuit	Output form		Sync output
	Maximum load current		0.12 A/point, 3.2 A/common
	Output voltage drop		1.5 V or less (at 0.12 A)
	Output delay time	OFF → ON	1 ms or less
		ON → OFF	1 ms or less
	Leakage current at the time of OFF		Maximum 0.1 mA
	Output type		Transistor output
	Withstand surge current		0.3 A 10 ms
Output protection form	Built-in fuse		125 V 5 A × 2 (The replacement of fuses cannot be performed by users.)
	Surge suppression circuit		Zener diode
	Other output protection		None
Maximum opening/closing frequency			3600 times/hour (This is a restriction at the time of an induced load. There is no restriction at the time of a resistance load.)
Connection	External connection		40-pole connector (FCN-365P040-AU) 2 pcs
	Applicable wire size		AWG #23 or less (at the time of using a soldering type connector)Note)
Output signal display			LED lights on when each point becomes ON At the logic side ONL: when normal (green LED), ERR: when there is abnormality or the fuse has been blown (red LED)
Insulation method			Photocoupler insulation
Dielectric strength			AC 1500 V 1 minute Between the output terminals collected together and the FG
Insulation resistance			10 MΩ or more when measured with DC 500 V insulation resistance tester Between the output terminals collected together and the FG
Dilating conditions			Simultaneous ON ratio: Maximum 90% (at DC 24 V/55◦C) Simultaneous ON ratio: Maximum 85% (at DC 26.4 V/55◦C) Simultaneous ON ratio: Maximum 85% (at DC 30 V/55◦C)
External supply voltage			DC 12 - 24 V 80 mA: for driving transistors
Internal current consumption			DC 24 V 90 mA or less (when all points are ON)
Number of occupied words			4 words
Weight			Approx. 180 g

Note) The applicable wire size depends on the connector used. Refer to “4-4-3 Input and output wiring” for details.

< Name of each part >



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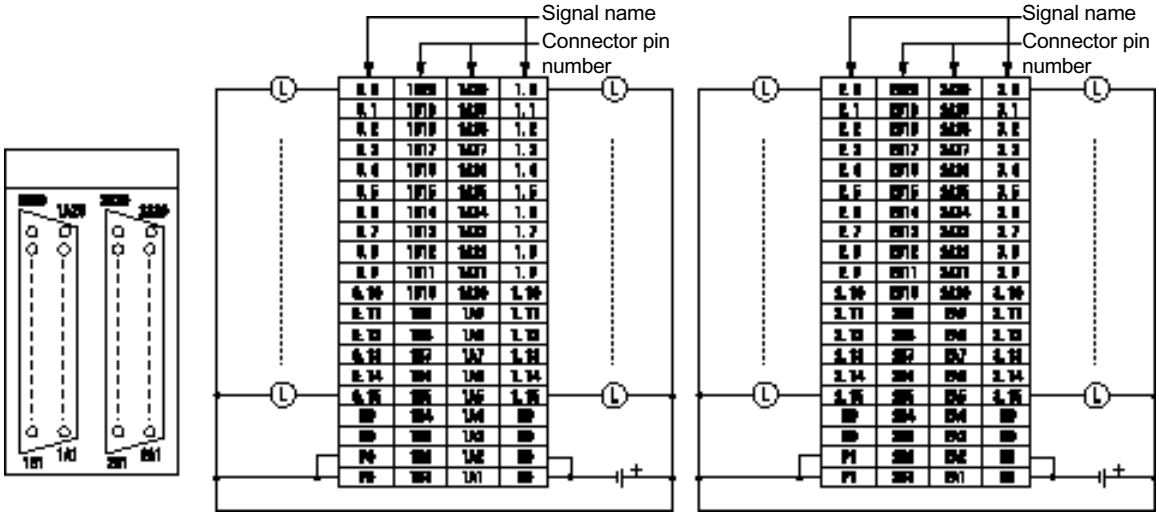
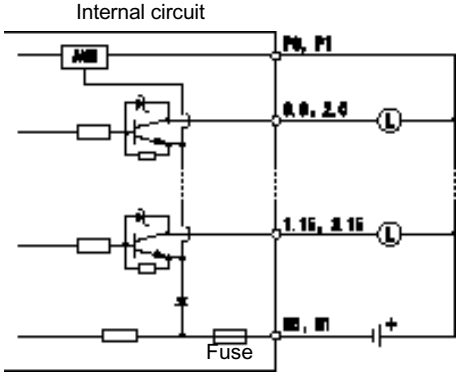


Note 1) Common terminals P0, P1 and M0, M1 are electrically separation insulated.

Note 2) NC depicts a pin to which an internal circuit is not connected. Note, however, that it should not be used as a repeating pin etc.

<Circuit configuration>

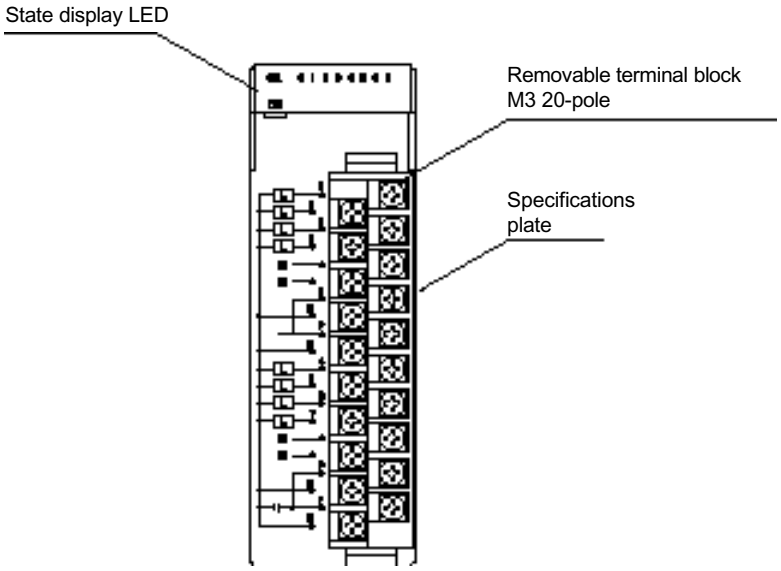


(6) Transistor source output 8 points (NP1Y08U0902)

Item			Specifications
Model			NP1Y08U0902
Number of output points (common configuration)			8 points (8 points/common 1 circuit) With 4 pcs. each of P, M common terminals
Output power conditions	Rated voltage		DC 12 - 24 V
	Maximum allowable voltage		DC 10.2 - 30 V
Characteristics of output circuit	Output form		Source output
	Maximum load current		2.4 A/point, 8 A/common
	Output voltage drop		2 V or less (at 2.4 A)
	Output delay time	OFF → ON	1 ms or less
		ON → OFF	1 ms or less
	Leakage current at the time of OFF		Maximum 0.1 mA
	Output type		Transistor output
	Withstand surge current		6 A 10 ms
Output protection form	Built-in fuse		125 V 15 A × 2 (The replacement of fuses cannot be performed by users.)
	Surge suppression circuit		Varistor
	Other output protection		None
Maximum opening/closing frequency			1800 times/hour (This is a restriction at the time of an induced load. There is no restriction at the time of a resistance load.)
Connection	External connection		Removable terminal block M3 screw 20-pole
	Applicable wire size		AWG #22-18[Note)]
Output signal display			LED lights on when each point becomes ON At the logic side ONL: when normal (green LED), ERR: when there is abnormality or the fuse has been blown (red LED)
Insulation method			Photocoupler insulation
Dielectric strength			AC 1500 V 1 minute Between the output terminals collected together and the FG
Insulation resistance			10 MΩ or more when measured with DC 500 V insulation resistance tester Between the output terminals collected together and the FG
Dilating conditions			Simultaneous ON ratio: Maximum 100% (at DC 26.4 V/55°C) Simultaneous ON ratio: Maximum 85% (at DC 30 V/55°C)
External power supply			DC 12 - 24 V 33 mA: for driving transistors
Internal current consumption			DC 24 V 20 mA or less (when all points are ON)
Number of occupied words			In the case of the SX bus being connected directly: 2 words, In the case of being on the remote I/O link: 1 word
Weight			Approx. 150 g

Note) The applicable wire size depends on the crimp-style terminals used. Refer to “4-4-3 Input and output wiring” for details.

< Name of each part >



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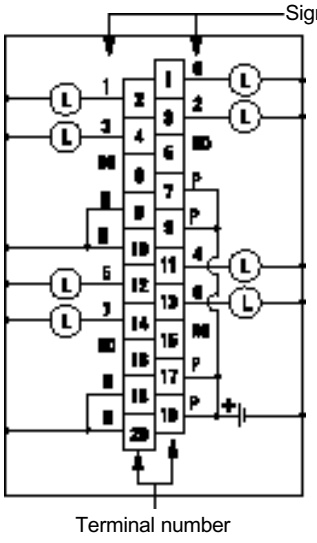
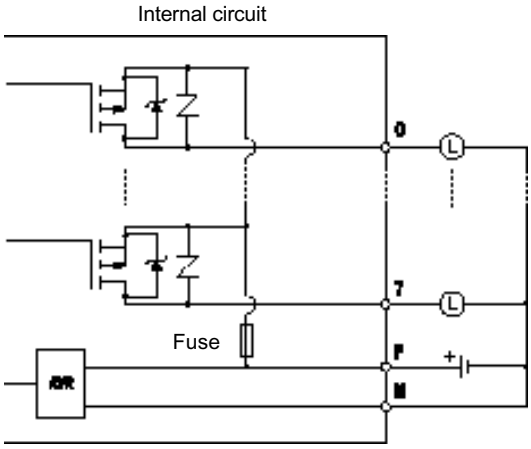


Note 1) Internal connections are made for each of the common terminals (Terminal numbers P: 7, 9, 17, 19, M: 8, 10, 18, 20).

Note 2) NC depicts a terminal to which an internal circuit is not connected. Note, however, that it should not be used as a repeating pin etc.

< Circuit configuration >

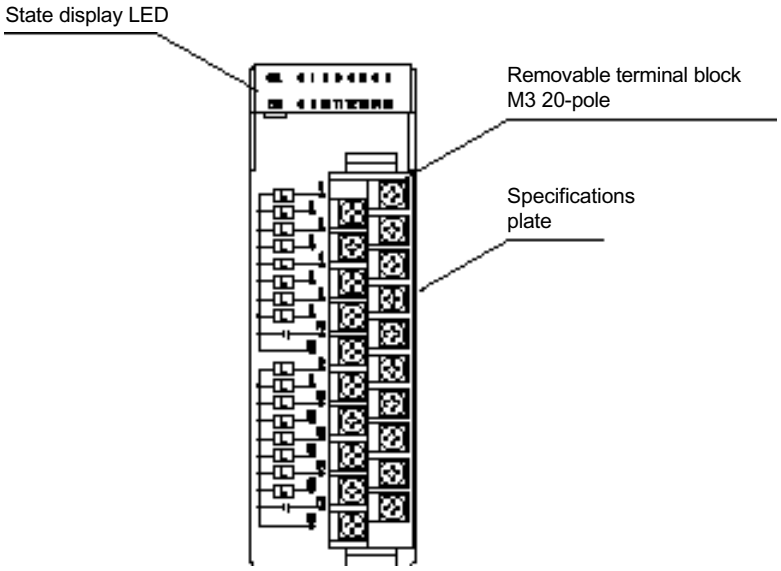


(7) Transistor source output 16 points (NP1Y16U09P6)

Item			Specifications
Model			NP1Y16U09P6
Number of output points (common configuration)			16 points (8 points/common 2 circuits)
Output power conditions	Rated voltage		DC 12 - 24 V
	Maximum allowable voltage		DC 10.2 - 30 V
Characteristics of output circuit	Output form		Source output
	Maximum load current		0.6 A/point, 4 A/common
	Output voltage drop		1.5 V or less (at 0.6 A)
	Output delay time	OFF → ON	1 ms or less
		ON → OFF	1 ms or less
	Leakage current at the time of OFF		Maximum 0.1 mA
	Output type		Transistor output
	Withstand surge current		3 A 10 ms
Output protection form	Built-in fuse		125 V 7 A × 2 (The replacement of fuses cannot be performed by users.)
	Surge suppression circuit		Varistor
	Other output protection		None
Maximum opening/closing frequency			1800 times/hour (This is a restriction at the time of an induced load. There is no restriction at the time of a resistance load.)
Connection	External connection		Removable terminal block M3 screw 20-pole
	Applicable wire size		AWG #22-18[Note)]
Output signal display			LED lights on when each point becomes ON At the logic side ONL: when normal (green LED), ERR: when there is abnormality or the fuse has been blown (red LED)
Insulation method			Photocoupler insulation
Dielectric strength			AC 1500 V 1 minute Between the output terminals collected together and the FG
Insulation resistance			10 MΩ or more when measured with DC 500 V insulation resistance tester Between the output terminals collected together and the FG
Dilating conditions			Simultaneous ON ratio: Maximum 100% (at DC 24 V/55◦C) Simultaneous ON ratio: Maximum 90% (at DC 26.4 V/55◦C) Simultaneous ON ratio: Maximum 75% (at DC 30 V/55◦C)
External power supply			DC 12 - 24 V 43 mA: for driving transistors
Internal current consumption			DC 24 V 30 mA or less (when all points are ON)
Number of occupied words			In the case of the SX bus being connected directly: 2 words, In the case of being on the remote I/O link: 1 word
Weight			Approx. 160 g

Note) The applicable wire size depends on the crimp-style terminals used. Refer to “4-4-3 Input and output wiring” for details.

< Name of each part >



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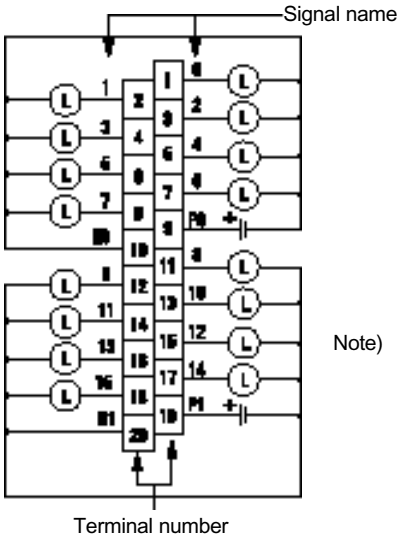
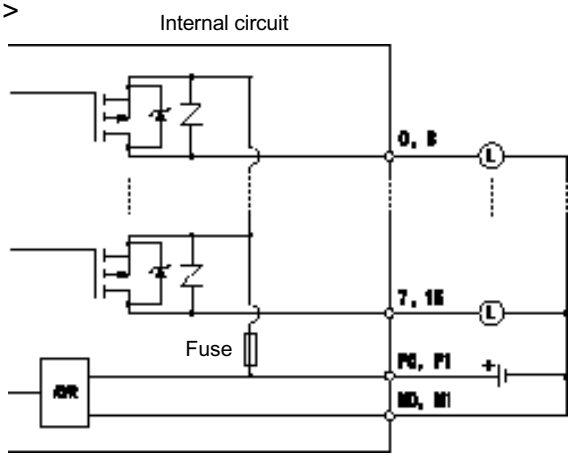


Note) Common terminals P0, P1 (Terminal numbers 9, 19) and M0, M1 (Terminal numbers 10, 20) are electrically separation insulated.

< Circuit configuration >

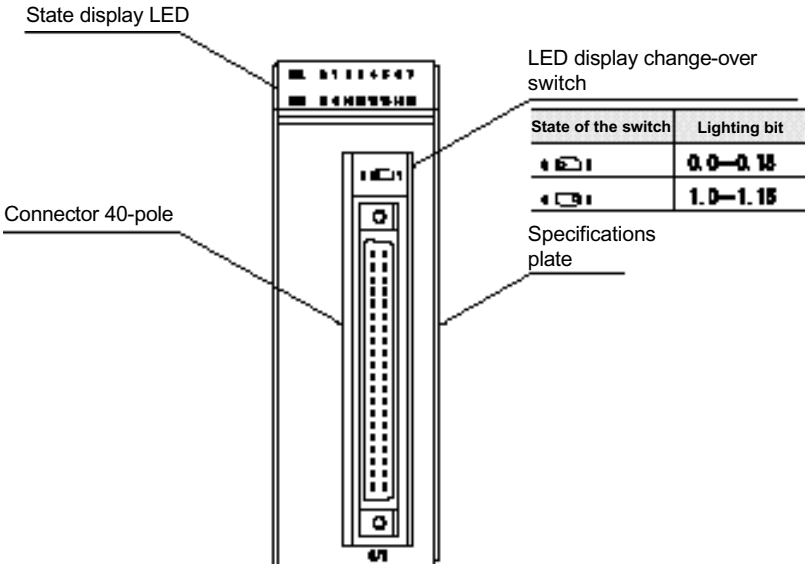


(8) Transistor source output 32 points (NP1Y32U09P1)

Item			Specifications
Model			NP1Y32U09P1
Number of output points (common configuration)			32 points (32 points/common 1 circuit)
Output power conditions	Rated voltage		DC 12 - 24 V
	Maximum allowable voltage		D 10.2 - 30 V
Characteristics of output circuit	Output form		Source output
	Maximum load current		0.12 A/point, 3.2 A/common
	Output voltage drop		1.5 V or less (at 0.12 A)
	Output delay time	OFF → ON	1 ms or less
		ON → OFF	1 ms or less
	Leakage current at the time of OFF		Maximum 0.1 mA
	Output type		Transistor output
	Withstand surge current		0.8 A 10 ms
Output protection form	Built-in fuse		125 V 2.5 A × 2 (The replacement of fuses cannot be performed by users.)
	Surge suppression circuit		Zener diode
	Other output protection		None
Maximum opening/closing frequency			3600 times/hour (This is a restriction at the time of an induced load. There is no restriction at the time of a resistance load.)
Connection	External connection		40-pole connector (FCN-365P040-AU) 1 piece
	Applicable wire size		AWG #23 or less (at the time of using a soldering type connector)[Note)]
Output signal display			LED lights on when each point becomes ON At the logic side ONL: when normal (green LED), ERR: when there is abnormality or the fuse has been blown (red LED)
Insulation method			Photocoupler insulation
Dielectric strength			AC 1500 V 1 minute Between the output terminals collected together and the FG
Insulation resistance			10 MΩ or more when measured with DC 500 V insulation resistance tester Between the output terminals collected together and the FG
Dilating conditions			None
External supply voltage			DC 12 - 24 V 40 mA: for driving transistors
Internal current consumption			DC 24 V 45 mA or less (when all points are ON)
Number of occupied words			2 words
Weight			Approx. 140 g

Note) The applicable wire size depends on connector used. Refer to “4-4-3 Input and output wiring” for details.

< Name of each part >



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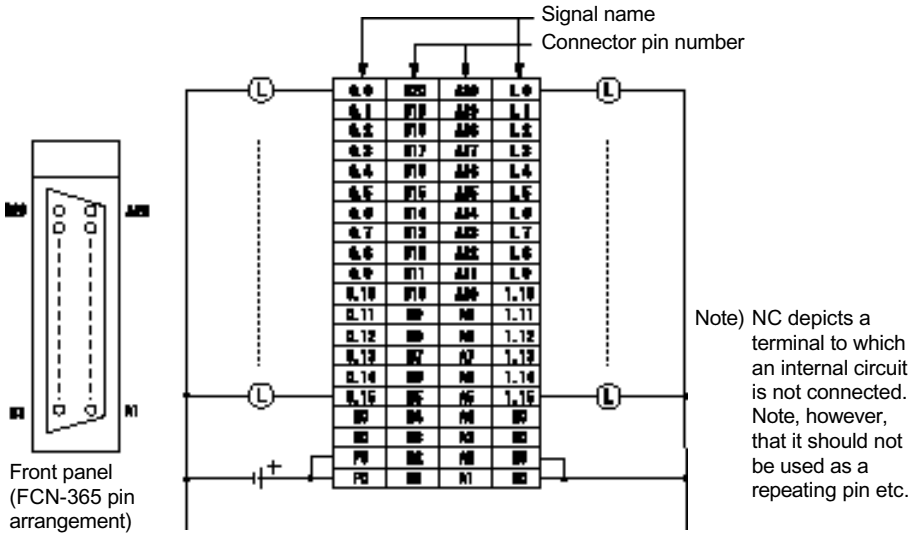

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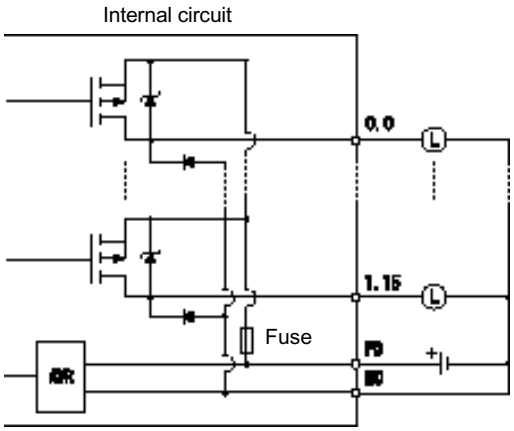
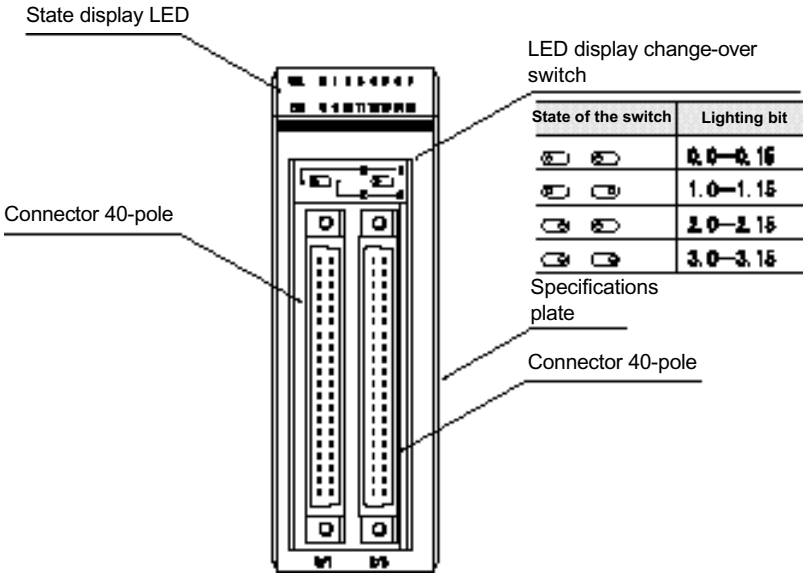


(9) Transistor source output 64 points (NP1Y64U09P1)

Item			Specifications
Model			NP1Y64U09P1
Number of output points (common configuration)			64 points (32 points/common 2 circuits)
Output power conditions	Rated voltage		DC 12 - 24 V
	Maximum allowable voltage		DC 10.2 - 30 V
Characteristics of output circuit	Output form		Source output
	Maximum load current		0.12 A/point, 3.2 A/common
	Output voltage drop		1.5 V or less (at 0.12 A)
	Output delay time	OFF → ON	1 ms or less
		ON → OFF	1 ms or less
	Leakage current at the time of OFF		Maximum 0.1 mA
	Output type		Transistor output
	Withstand surge current		0.8 A 10 ms
Output protection form	Built-in fuse		125 V 2.5 A × 2 (The replacement of fuses cannot be performed by users.)
	Surge suppression circuit		Zener diode
	Other output protection		None
Maximum opening/closing frequency			3600 times/hour (This is a restriction at the time of an induced load. There is no restriction at the time of a resistance load.)
Connection	External connection		40-pole connector (FCN-365P040-AU) 2 pcs
	Applicable wire size		AWG #23 or less (at the time of using a soldering type connector)Note)
Output signal display			LED lights on when each point becomes ON at the logic side ONL: when normal (green LED), ERR: when there is abnormality or the fuse has been blown (red LED)
Insulation method			Photocoupler insulation
Dielectric strength			AC 1500 V 1 minute Between the output terminals collected together and the FG
Insulation resistance			10 MΩ or more when measured with DC 500 V insulation resistance tester Between the output terminals collected together and the FG
Dilating conditions			Simultaneous ON ratio: Maximum 90% (at DC 24 V/55◦C) Simultaneous ON ratio: Maximum 85% (at DC 26.4 V/55◦C) Simultaneous ON ratio: Maximum 85% (at DC 30 V/55◦C)
External supply voltage			DC 12 - 24 V 80 mA: for driving transistors
Internal current consumption			DC 24 V 90 mA or less (when all points are ON)
Number of occupied words			4 words
Weight			Approx. 180 g

Note) The applicable wire size depends on the connector used. Refer to “4-4-3 Input and output wiring” for details.

< Name of each part >



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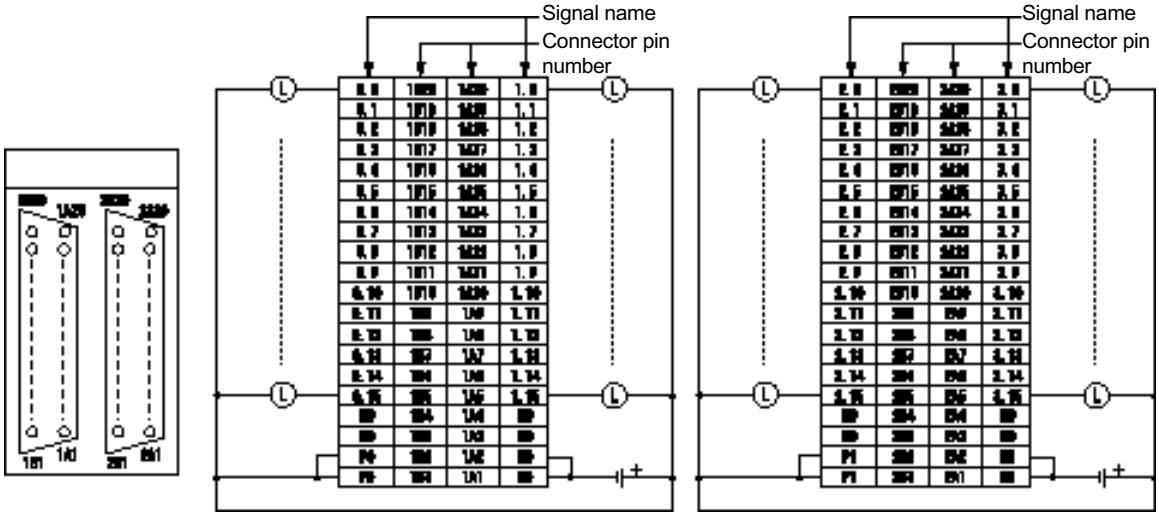
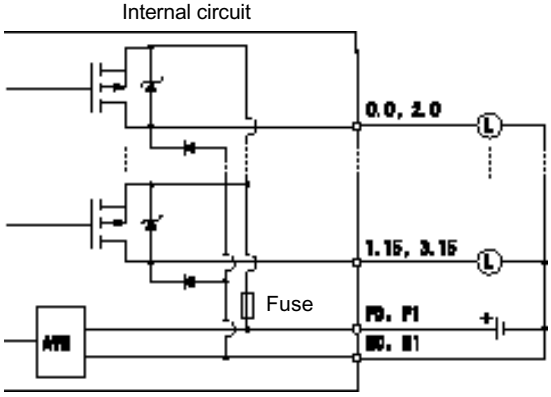


Note 1) Common terminals P0, P1 and M0, M1 are electrically separation insulated.

Note 2) NC depicts a pin to which an internal circuit is not connected. Note, however, that it should not be used as a repeating terminal etc.

<Circuit configuration>

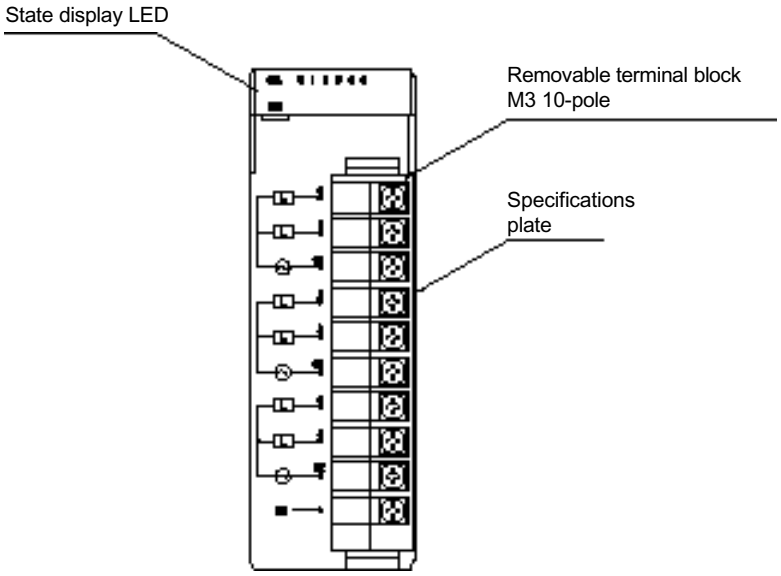


(10) SSR output 6 points (NP1Y06S)

Item			Specifications
Model			NP1Y06S
Number of output points (common configuration)			6 points (2 points/common 3 circuits)
Output power conditions	Rated voltage		AC 100 - 240 V
	Maximum allowable voltage		AC 85 - 264 V
	Rated frequency		50/60 Hz
	Maximum allowable frequency		47 - 63 Hz
Characteristics of output circuit	Output form		AC output
	Maximum load current		2.2 A/point, 4.4 A/common
	Output voltage drop		2 V or less (at 2.2 A)
	Output delay time	OFF → ON	10 ms or less
		ON → OFF	10 ms or less
	Leakage current at the time of OFF		Approx. 1 mA (at AC 200 V 60 Hz)
	Minimum opening/closing current		10 mA/AC 100 V
	Output type		Triac output
	Withstand surge current		20 A 1 cycle
Output protection form	Surge suppression circuit		CR Absorber + Varistor
	Other output protection		None
Maximum opening/closing frequency			1800 times/hour
Connection	External connection		Removable terminal block M3 screw 10-pole
	Applicable wire size		AWG #22-18[Note)]
Output signal display			LED lights on when each point becomes ON At the logic side ONL: when normal (green LED), ERR: when there is abnormality or the fuse has been blown (red LED)
Insulation method			Photocoupler insulation
Dielectric strength			AC 2830 V 1 minute Between the output terminals collected together and the FG
Insulation resistance			10 MΩ or more when measured with DC 500 V insulation resistance tester Between the output terminals collected together and the FG
Dilating conditions			Simultaneous ON ratio: Maximum 33% (at AC 132 V/55◦C) Simultaneous ON ratio: Maximum 16% (at AC 264 V/55◦C)
External supply voltage			AC 100 - 240 V: for signals
Internal current consumption			DC 24 V 60 mA or less (when all points are ON)
Number of occupied words			In the case of the SX bus being connected directly: 2 words, In the case of being on the remote I/O link: 1 word
Weight			Approx. 190 g

Note) The applicable wire size depends on the crimp-style terminals used. Refer to “4-4-3 Input and output wiring” for details.

< Name of each part >



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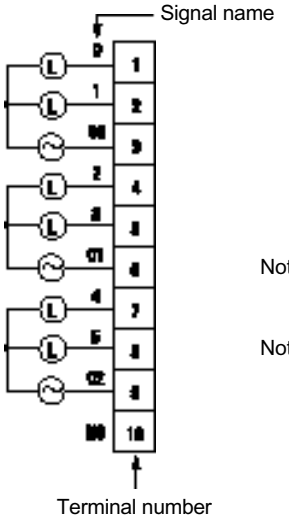
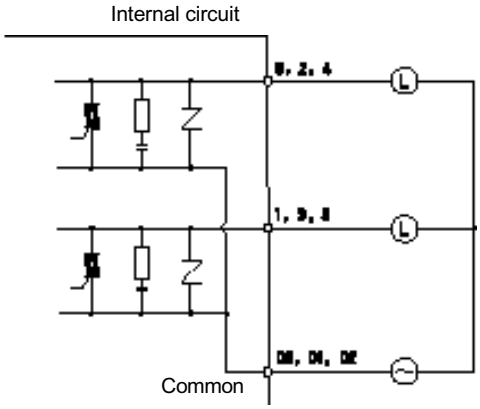


Note 1) Common terminals (Terminal numbers 3, 6, 9) are electrically separation insulated.

Note 2) NC depicts a terminal to which an internal circuit is not connected. Note, however, that it should not be used as a repeating terminal etc.

< Circuit configuration >

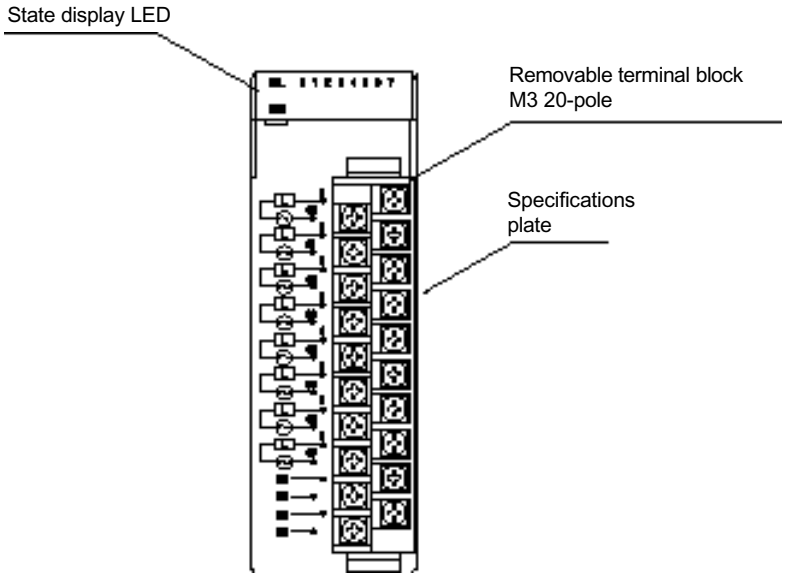


(11) SSR output 8 points (NP1Y08S)

Item			Specifications
Model			NP1Y08S
Number of output points (common configuration)			8 points (independent contacts)
Output power conditions	Rated voltage		AC 100 - 240 V
	Maximum allowable voltage		AC 85 - 264 V
	Rated frequency		50/60 Hz
	Maximum allowable frequency		47 - 63 Hz
Characteristics of output circuit	Output form		AC output
	Maximum load current		2.2 A/point
	Output voltage drop		2 V or less (at 2.2 A)
	Output delay time	OFF → ON	10 ms or less
		ON → OFF	10 ms or less
	Leakage current at the time of OFF		Approx. 1 mA (at AC 200 V 60 Hz)
	Minimum opening/closing current		10 mA/AC 100 V
	Output type		Triac output
	Withstand surge current		20 A 1 cycle
Output protection form	Surge suppression circuit		CR Absorber + Varistor
	Other output protection		None
Maximum opening/closing frequency			1800 times/hour
Connection	External connection		Removable terminal block M3 screw 20-pole
	Applicable wire size		AWG #22-18[Note)]
Output signal display			LED lights on when each point becomes ON At the logic side ONL: when normal (green LED), ERR: when there is abnormality or the fuse has been blown (red LED)
Insulation method			Photocoupler insulation
Dielectric strength			AC 1500 V 1 minute Between the output terminals collected together and the FG
Insulation resistance			10 MΩ or more when measured with DC 500 V insulation resistance tester Between the output terminals collected together and the FG
Dilating conditions			Simultaneous ON ratio: Maximum 25% (at AC 132 V/55◦C) Simultaneous ON ratio: Maximum 12% (at AC 264 V/55◦C)
External supply voltage			AC 100 - 240 V: for signals
Internal current consumption			DC 24 V 80 mA or less (when all points are ON)
Number of occupied words			In the case of the SX bus being connected directly: 2 words, In the case of being on the remote I/O link: 1 word
Weight			Approx. 200 g

Note) The applicable wire size depends on the crimp-style terminals used. Refer to “4-4-3 Input and output wiring” for details.

< Name of each part >



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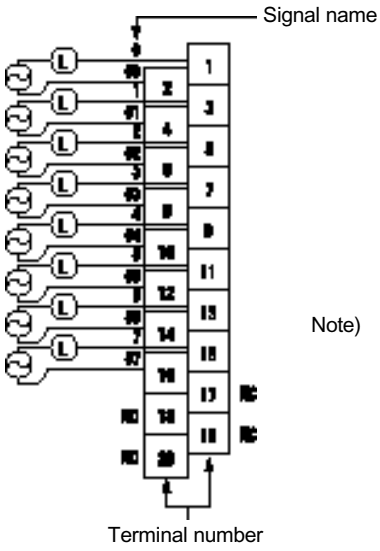
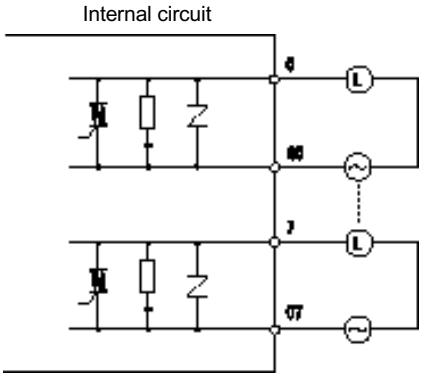


Note) NC depicts a terminal to which an internal circuit is not connected. Note, however, that it should not be used as a repeating terminal etc.

< Circuit configuration >

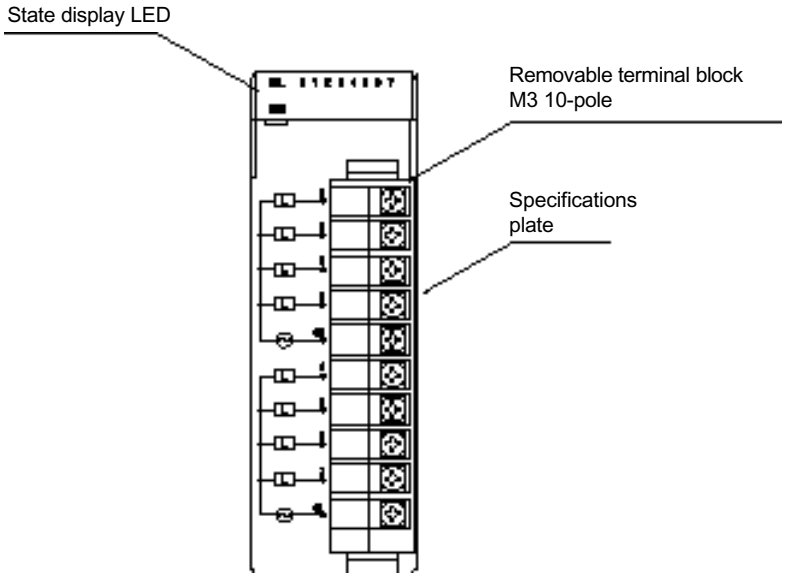


(12) Relay output 8 points (NP1Y08R-04)

Item			Specifications
Model			NP1Y08R-04
Number of output points (common configuration)			8 points (4 points/common 2 circuit)
Output power conditions	Rated voltage		AC 240 V DC 110 V
	Maximum allowable voltage		AC 264 V or less, DC 140 V or less
	Rated frequency		-
	Maximum allowable frequency		-
Characteristics of output circuit	Maximum load current		DC 30 V/AC 264 V: 2.2 A/point, 4 A/common DC 110 V: 0.2 A/point, 0.8 A/common
	Minimum opening/closing voltage and current		DC 5 V 1 mA
	Output delay time	OFF → ON	Approx. 10 ms
		ON → OFF	Approx. 10 ms
	Leakage current at the time of OFF		Maximum 0.1 mA (at AC 200 V 60 Hz)
Output protection form	Built-in fuse		None
	Output type		Relay output (used both for AC and DC)
	Surge suppression circuit		Varistor
	Other output protection		None
Maximum opening/closing frequency			1800 times/hour
Connection	External connection		Removable terminal block M3 screw 10-pole
	Applicable wire size		AWG #22-18[Note)]
Output signal display			LED lights on when each point becomes ON At the logic side ONL: when normal (green LED), ERR: when there is abnormality or the fuse has been blown (red LED)
Insulation method			Relay insulation, photocoupler insulation
Dielectric strength			AC 2830 V 1 minute Between the output terminals collected together and the FG
Insulation resistance			10 MΩ or more when measured with DC 500 V insulation resistance tester Between the output terminals collected together and the FG
Dilating conditions			None
External supply voltage			AC 240 V, DC 110 V: for signals
Internal current consumption			DC 24 V 80 mA or less (when all points are ON)
Number of occupied words			In the case of the SX bus being connected directly: 2 words, In the case of being on the remote I/O link: 1 word
Weight			Approx. 150 g

Note) The applicable wire size depends on the crimp-style terminals used. Refer to “4-4-3 Input and output wiring” for details.

< Name of each part >



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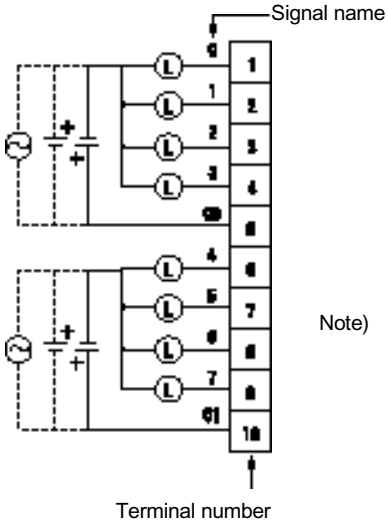
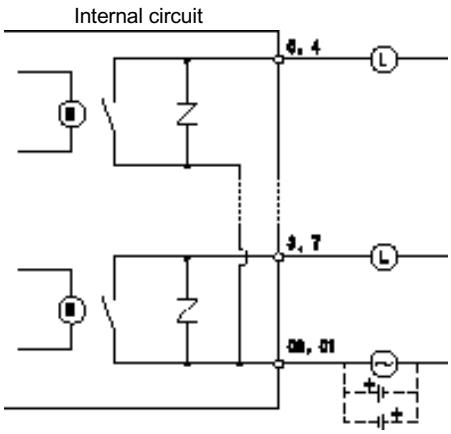


Note) Common terminals C0, C1 (Terminal numbers 5, 10) are electrically separation insulated.

< Circuit configuration >

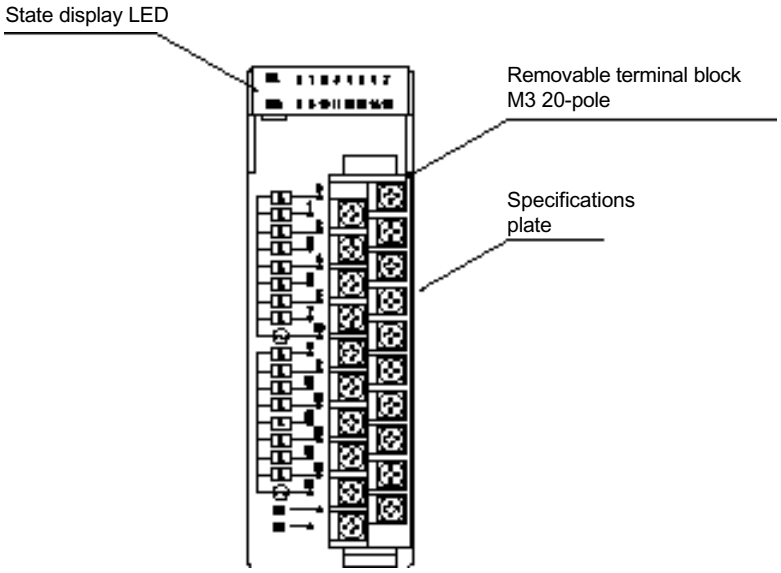


(13) Relay output 16 points (NP1Y16R-08)

Item			Specifications
Model			NP1Y16R-08
Number of output points (common configuration)			16 points (8 points/common 2 circuit)
Output power conditions	Rated voltage		AC 240 V DC 110 V
	Maximum allowable voltage		AC 264 V or less, DC 140 V or less
	Rated frequency		-
	Maximum allowable frequency		-
Characteristics of output circuit	Output form		Relay output
	Maximum load current		DC 30 V/AC 264 V: 2.2 A/point, 8 A/common DC 110 V: 0.2 A/point, 1.6 A/common
	Minimum opening/closing voltage and current		DC 5 V 1 mA
	Output delay time	OFF → ON	Approx. 10 ms
		ON → OFF	Approx. 10 ms
	Leakage current at the time of OFF		Maximum 0.1 mA (at AC 200 V 60 Hz)
Output protection form	Built-in fuse		None
	Output type		Relay output (used both for AC and DC)
	Surge suppression circuit		Varistor
	Other output protection		None
Maximum opening/closing frequency			1800 times/hour
Connection	External connection		Removable terminal block M3 screw 20-pole
	Applicable wire size		AWG #22-18Note)
Output signal display			LED lights on when each point becomes ON At the logic side ONL: when normal (green LED), ERR: when there is abnormality or the fuse has been blown (red LED)
Insulation method			Relay insulation, photocoupler insulation
Dielectric strength			AC 1500 V 1 minute Between the output terminals collected together and the FG
Insulation resistance			10 MΩ or more when measured with DC 500 V insulation resistance tester Between the output terminals collected together and the FG
Dilating conditions			None
External supply voltage			AC 240 V, DC 110 V: for signals
Internal current consumption			DC 24 V 176 mA or less (when all points are ON)
Number of occupied words			In the case of the SX bus being connected directly: 2 words, In the case of being on the remote I/O link: 1 word
Weight			Approx. 190 g

Note) The applicable wire size depends on the crimp-style terminals used. Refer to “4-4-3 Input and output wiring” for details.

< Name of each part >



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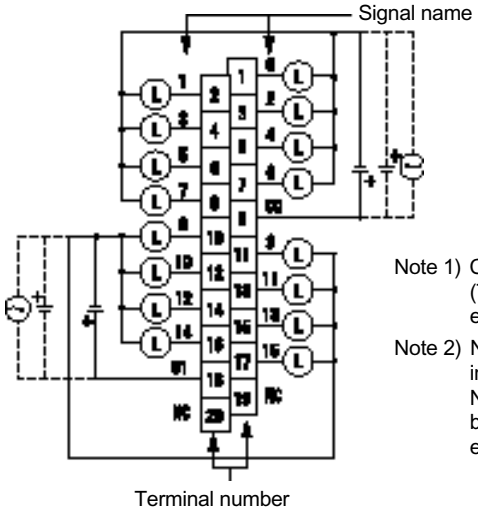
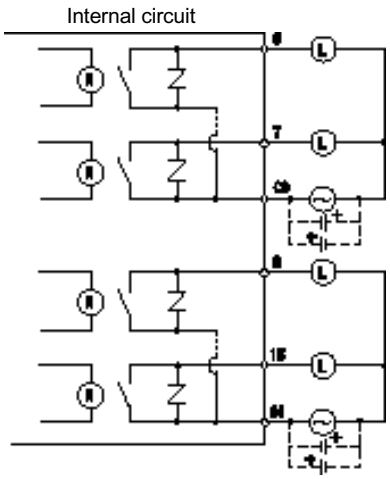


Note 1) Common terminals C0, C1 (Terminal numbers 9, 18) are electrically separation insulated.

Note 2) NC depicts a terminal to which an internal circuit is not connected. Note, however, that it should not be used as a repeating terminal etc.

< Circuit configuration >



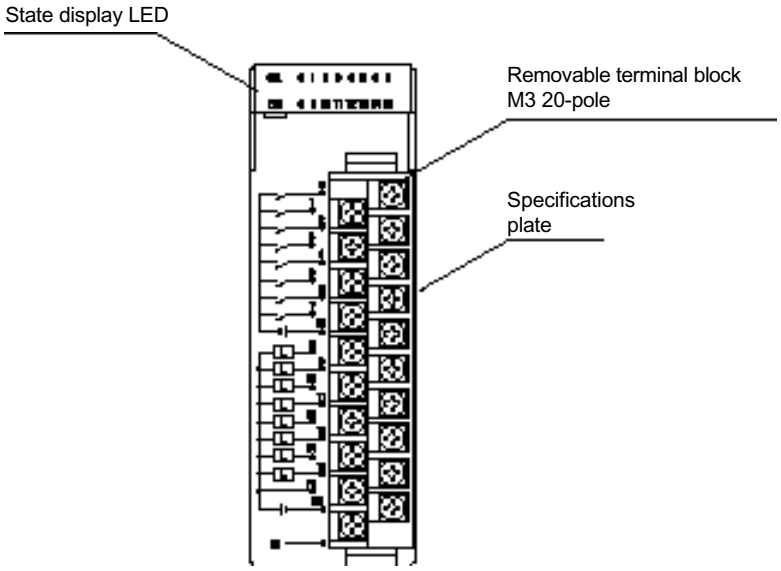
3-5-5Individual specifications of the digital I/O mixed module

(1) DC 24 V source input 8 points/transistor sync output 8 points (NP1W1606T)

Item			Specifications
Model			NP1W1606T
Number of input points (common configuration)			8 points (8 points/common 1 circuit)
Input signal conditions	Rated voltage		DC 24 V
	Maximum allowable voltage		DC 30 V
	Allowable ripple ratio		5% or less
Characteristics of input circuit	Input form		Source input
	Rated current		7 mA (at DC 24 V)
	Input impedance		3.3 kΩ
	Standard operating range	OFF → ON	15 - 30 V
		ON → OFF	0 - 5 V
	Input delay time	OFF → ON	0.7 ms (hard filter time) + (soft filter time)
		ON → OFF	The soft filter time is variable collectively depending on the setting of parameters. (OFF → ON) - (ON → OFF): 1 - 1 ms, 3 - 3 ms (Default), 3 - 10 ms, 10 - 10 ms, 30 - 30 ms, 100 - 100 ms
	Input type		DC type 1
Number of output points (common configuration)			8 points (8 points/common 1 circuit)
Output power conditions	Rated voltage		DC 12 - 24 V
	Maximum allowable voltage		DC 10.2 - 30 V
Characteristics of output circuit	Output form		Sync output
	Maximum load current		0.6 A/point, 4 A/common
	Output voltage drop		1.5 V or less
	Output delay time	OFF → ON	1 ms or less
		ON → OFF	1 ms or less
	Leakage current at the time of OFF		Maximum 0.1 mA
	Output type		Transistor output
	Withstand surge current		2 A 10 ms
Output protection form	Built-in fuse		125 V 7 A (The replacement of fuses cannot be performed by users.)
	Surge suppression circuit		Varistor
	Other output protection		None
Maximum opening/closing frequency			1800 times/hour (This is a restriction at the time of an induced load. There is no restriction at the time of a resistance load.)
Connection	External connection		Removable terminal block M3 screw 20-pole
	Applicable wire size		AWG #22-18[Note)]
I/O signal display			LED lights on when each point becomes ON At the logic side ONL: when normal (green LED), ERR: when there is abnormality or the fuse has been blown (red LED)
Insulation method			Photocoupler insulation
Dielectric strength			AC 1500 V 1 minute Between the I/O terminals collected together and the FG
Insulation resistance			10 MΩ or more when measured with DC 500 V insulation resistance tester Between the I/O terminals collected together and the FG
Dilating conditions			Simultaneous ON ratio: Maximum 100% (at DC 26.4 V/55◦C) Simultaneous ON ratio: Maximum 75% (at DC 30 V/55◦C)
External supply voltage			DC 24 V: for input signals, DC 12 - 24 V 20 mA: for driving transistors
Internal current consumption			DC 24 V 35 mA or less (when all points are ON)
Number of occupied words			2 words
Weight			Approx. 150 g

Note) The applicable wire size depends on the crimp-style terminals used. Refer to “4-4-3 Input and output wiring” for details.

< Name of each part >



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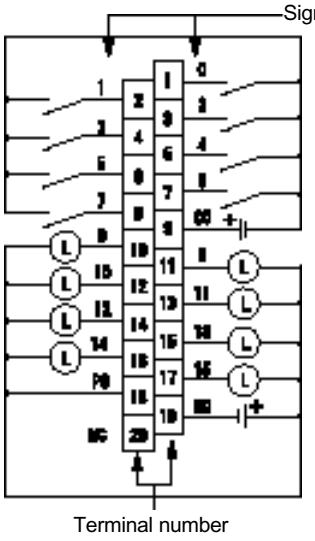
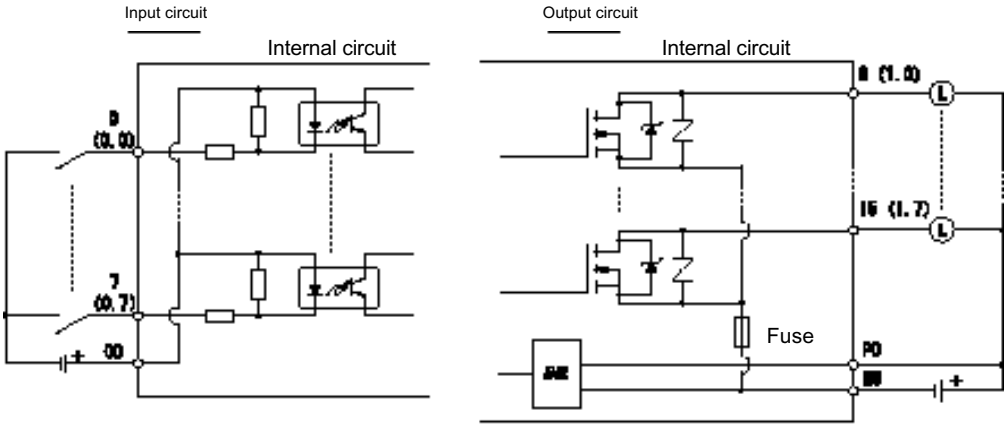


Note) NC depicts a terminal to which an internal circuit is not connected. Note, however, that it should not be used as a repeating terminal etc.

< Circuit configuration >

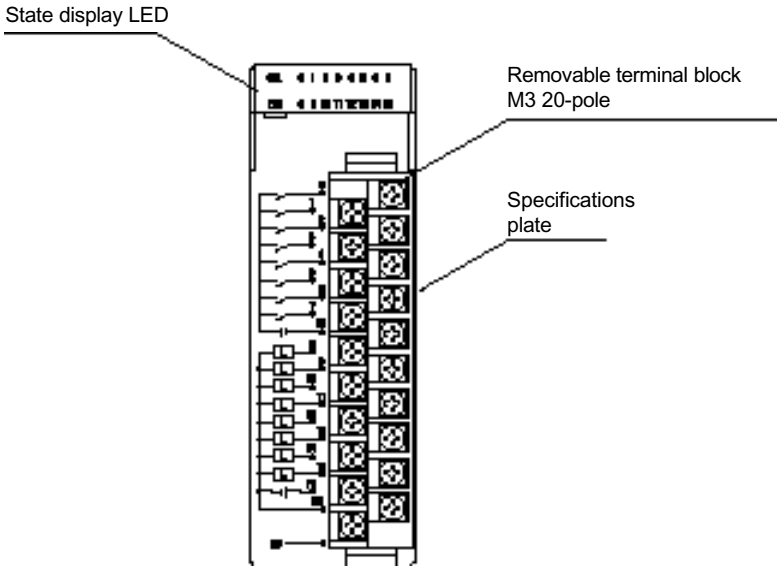


(2) DC 24 V sync input 8 points/transistor source output 8 points (NP1W1606U)

Item			Specifications
Model			NP1W1606U
Number of input points (common configuration)			8 points (8 points/common 1 circuit)
Input signal conditions	Rated voltage		DC 24 V
	Maximum allowable voltage		DC 30 V
	Allowable ripple ratio		5% or less
Characteristics of input circuit	Input form		Sync input
	Rated current		7 mA (at DC 24 V)
	Input impedance		3.3 kΩ
	Standard operating range	OFF → ON	15 - 30 V
		ON → OFF	0 - 5 V
	Input delay time	OFF → ON	0.7 ms (hard filter time) + (soft filter time) The soft filter time is variable collectively depending on the setting of parameters. (OFF → ON) - (ON → OFF): 1 - 1 ms, 3 - 3 ms (Default), 3 - 10 ms, 10 - 10 ms, 30 - 30 ms, 100 - 100 ms
		ON → OFF	
	Input type		DC type 1
Number of output points (common configuration)			8 points (8 points/common 1 circuit)
Output signal conditions	Rated voltage		DC 12 - 24 V
	Maximum allowable voltage		DC 10.2 - 30 V
Characteristics of output circuit	Output form		Source output
	Maximum load current		0.6 A/point, 4 A/common
	Output voltage drop		1 V or less
	Output delay time	OFF → ON	1 ms or less
		ON → OFF	1 ms or less
	Leakage current at the time of OFF		Maximum 0.1 mA
	Output type		Transistor output
	Withstand surge current		3 A 10 ms
Maximum opening/closing frequency			1800 times/hour (This is a restriction at the time of an induced load. There is no restriction at the time of a resistance load.)
Output protection form	Built-in fuse		125 V 7 A (The replacement of fuses cannot be performed by users.)
	Surge suppression circuit		Varistor
	Other output protection		None
Connection	External connection		Removable terminal block M3 screw 20-pole
	Applicable wire size		AWG #22-18[Note)]
I/O signal display			LED lights on when each point becomes ON At the logic side ONL: when normal (green LED), ERR: when there is abnormality or the fuse has been blown (red LED)
Insulation method			Photocoupler insulation
Dielectric strength			AC 1500 V 1 minute Between the I/O terminals collected together and the FG
Insulation resistance			10 MΩ or more when measured with DC 500 V insulation resistance tester Between the I/O terminals collected together and the FG
Dilating conditions			Simultaneous ON ratio: Maximum 100% (at DC 24 V/55°C) Simultaneous ON ratio: Maximum 90% (at DC 26.4 V/55°C) Simultaneous ON ratio: Maximum 75% (at DC 30 V/55°C)
External supply voltage			DC 24 V: for input signals, DC 12 - 24 V 20 mA: for driving transistors
Internal current consumption			DC 24 V 35 mA or less (when all points are ON)
Number of occupied words			2 words
Weight			Approx. 150 g

Note) The applicable wire size depends on the crimp-style terminals used. Refer to “4-4-3 Input and output wiring” for details.

< Name of each part >



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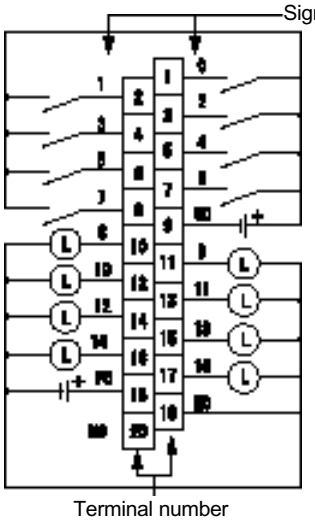
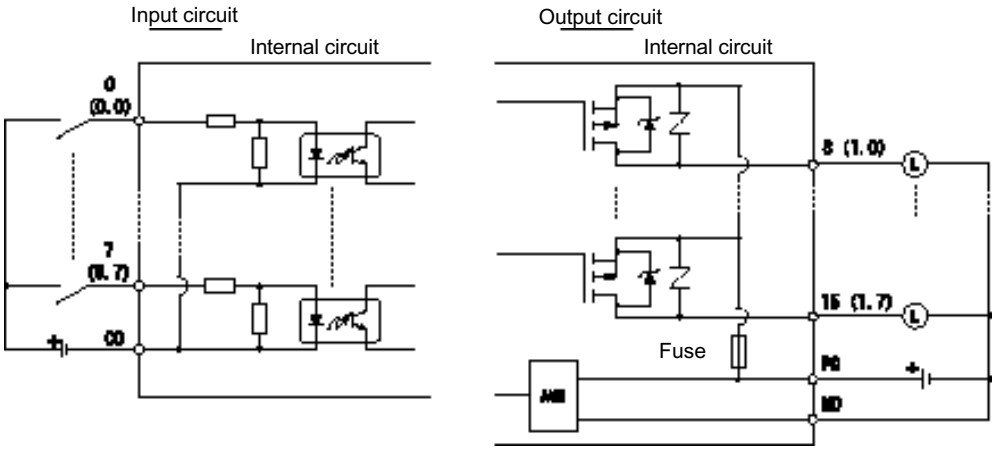


Note) NC depicts a terminal to which an internal circuit is not connected. Note, however, that it should not be used as a repeating terminal etc.

< Circuit configuration >

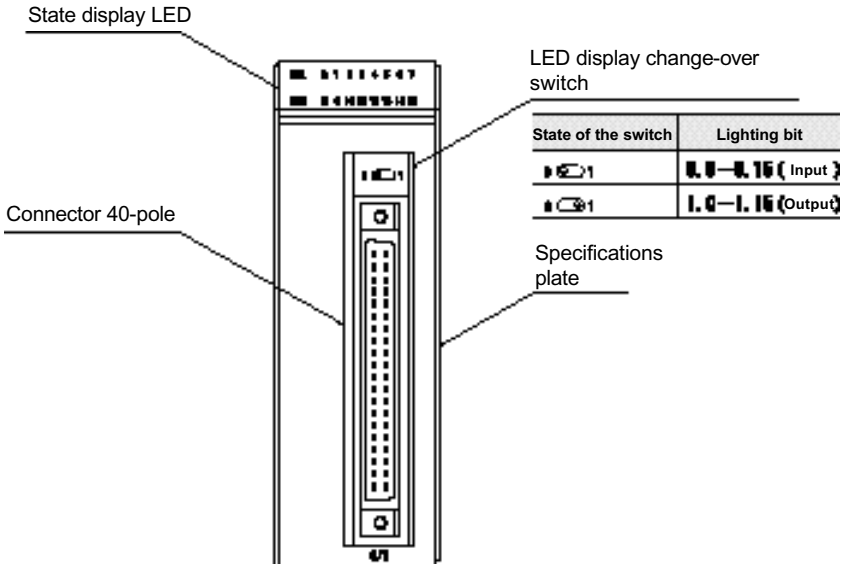


(3) DC 24 V source input 16 points/transistor sync output 16 points (NP1W3206T)

Item			Specifications
Model			NP1W3206T
Number of input points (common configuration)			16 points (16 points/common 1 circuit)
Input signal conditions	Rated voltage		DC 24 V
	Maximum allowable voltage		DC 30 V
	Allowable ripple ratio		5% or less
Characteristics of input circuit	Input form		Source input
	Rated current		4 mA (at DC 24 V)
	Input impedance		5.6 kΩ
	Standard operating range	OFF → ON	15 - 30 V
		ON → OFF	0 - 5 V
	Input delay time	OFF → ON	0.7 ms (hard filter time) + (soft filter time) The soft filter time is variable collectively depending on the setting of parameters. (OFF → ON) - (ON → OFF): 1 - 1 ms, 3 - 3 ms (Default), 3 - 10 ms, 10 - 10 ms, 30 - 30 ms, 100 - 100 ms
		ON → OFF	
	Input type		DC type 1
Number of output points (common configuration)			16 points (16 points/common 1 circuit)
Output power conditions	Rated voltage		DC 12 - 24 V
	Maximum allowable voltage		DC 10.2 - 30 V
Characteristics of output circuit	Output form		Sync output
	Maximum load current		0.12 A/point, 1.6 A/common
	Output voltage drop		1.5 V or less
	Output delay time	OFF → ON	1 ms or less
		ON → OFF	1 ms or less
	Leakage current at the time of OFF		Maximum 0.1 mA
	Output type		Transistor output
	Withstand surge current		0.3 A 10 ms
Output protection form	Built-in fuse		125 V 2.5 A (The replacement of fuses cannot be performed by users.)
	Surge suppression circuit		Zener diode
	Other output protection		None
Maximum opening/closing frequency			3600 times/hour (This is a restriction at the time of an induced load. There is no restriction at the time of a resistance load.)
Connection	External connection		40-pole connector (FCN-365P040-AU) 1 piece
	Applicable wire size		AWG #23 or less (at the time of using a soldering type connector)[Note)]
I/O signal display			LED lights on when each point becomes ON At the logic side ONL: when normal (green LED), ERR: when there is abnormality or the fuse has been blown (red LED)
Insulation method			Photocoupler insulation
Dielectric strength			AC 1500 V 1 minute Between the I/O terminals collected together and the FG
Insulation resistance			10 MΩ or more when measured with DC 500 V insulation resistance tester Between the I/O terminals collected together and the FG
Dilating conditions			Simultaneous ON ratio: Maximum 100% (at DC 26.4 V/55◦C) Simultaneous ON ratio: Maximum 75% (at DC 30 V/55◦C)
External supply voltage			DC 24 V: for input signals, DC 12 - 24 V 20 mA: for driving transistors
Internal current consumption			DC 24 V 50 mA or less (when all points are ON)
Number of occupied words			2 words
Weight			Approx. 140 g

Note) The applicable wire size depends on the connector used. Refer to “4-4-3 Input and output wiring” for details.

< Name of each part >



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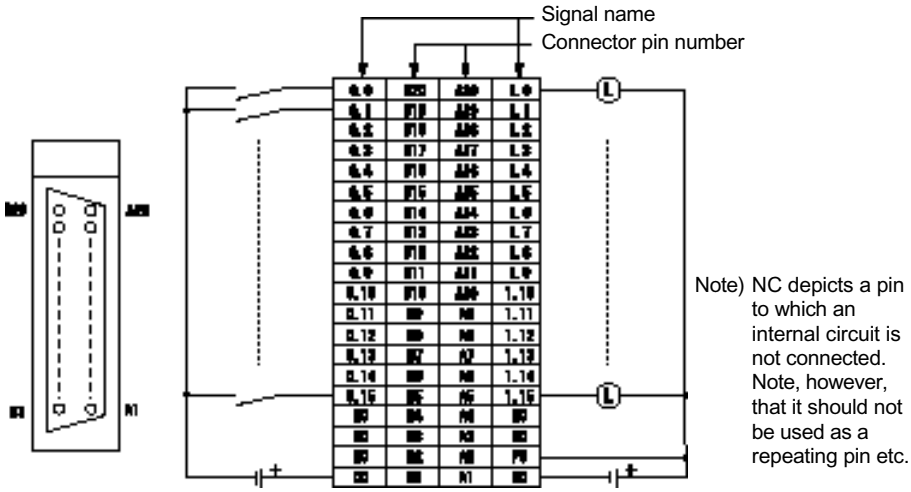

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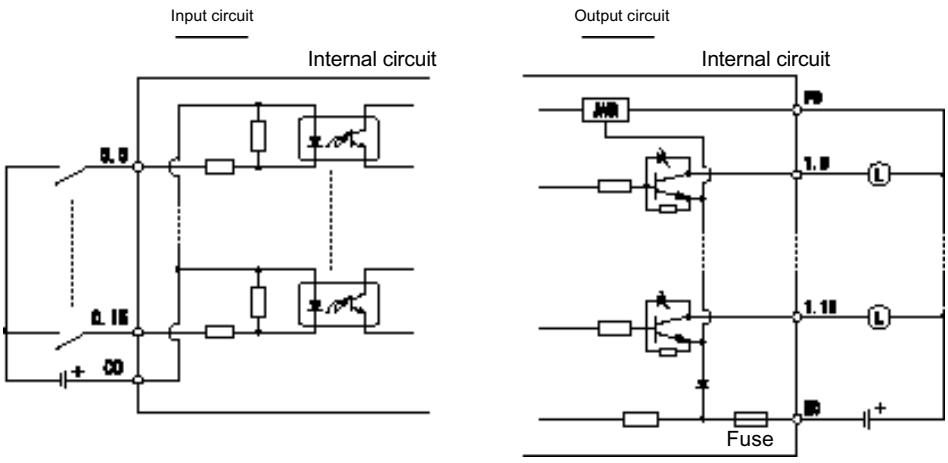
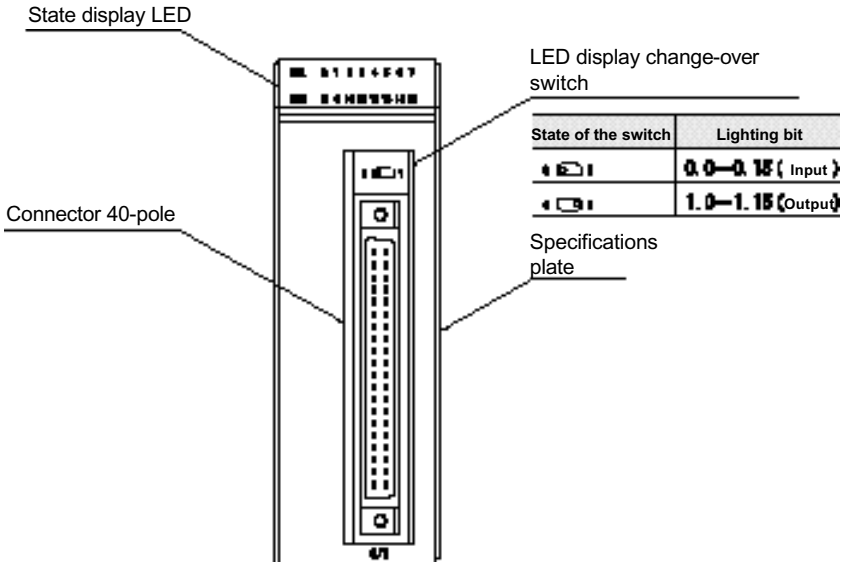


(4) DC 24 V sync input 16 points/transistor source output 16 points (NP1W3206U)

Item			Specifications
Model			NP1W3206U
Number of input points (common configuration)			16 points (16 points/common 1 circuit)
Input signal conditions	Rated voltage		DC 24 V
	Maximum allowable voltage		DC 30 V
	Allowable ripple ratio		5% or less
Characteristics of input circuit	Input form		Sync input
	Rated current		4 mA (at DC 24 V)
	Input impedance		5.6 kΩ
	Standard operating range	OFF → ON	15 - 30 V
		ON → OFF	0 - 5 V
	Input delay time	OFF → ON	0.7 ms (hard filter time) + (soft filter time) The soft filter time is variable collectively depending on the setting of parameters. (OFF → ON) - (ON → OFF): 1 - 1 ms, 3 - 3 ms (Default), 3 - 10 ms, 10 - 10 ms, 30 - 30 ms, 100 - 100 ms
		ON → OFF	
	Input type		DC type 1
Number of output points (common configuration)			16 points (16 points/common 1 circuit)
Output power conditions	Rated voltage		DC 12 - 24 V
	Maximum allowable voltage		DC 10.2 - 30 V
Characteristics of output circuit	Output form		Source output
	Maximum load current		0.12 A/point, 1.6 A/common
	Output voltage drop		1.5 V or less
	Output delay time	OFF → ON	1 ms or less
		ON → OFF	1 ms or less
	Leakage current at the time of OFF		Maximum 0.1 mA
	Output type		Transistor output
	Withstand surge current		0.8 A 10 ms
Maximum opening/closing frequency			3600 times/hour (This is a restriction at the time of an induced load. There is no restriction at the time of a resistance load.)
Output protection form	Built-in fuse		125 V 2.5 A (The replacement of fuses cannot be performed by users.)
	Surge suppression circuit		Zener diode
	Other output protection		None
Connection	External connection		40-pole connector (FCN-365P040-AU) 1 piece
	Applicable wire size		AWG #23 or less (at the time of using a soldering type connector)Note)
I/O signal display			LED lights on when each point becomes ON At the logic side ONL: when normal (green LED), ERR: when there is abnormality or the fuse has been blown (red LED)
Insulation method			Photocoupler insulation
Dielectric strength			AC 1500 V 1 minute Between the I/O terminals collected together and the FG
Insulation resistance			10 MΩ or more when measured with DC 500 V insulation resistance tester Between the I/O terminals collected together and the FG
Dilating conditions			Simultaneous ON ratio: Maximum 100% (at DC 26.4 V/55◦C) Simultaneous ON ratio: Maximum 75% (at DC 30 V/55◦C)
External supply voltage			DC 24 V: for input signals, DC 12 - 24 V 20 mA: for driving transistors
Internal current consumption			DC 24 V 50 mA or less (when all points are ON)
Number of occupied words			2 words
Weight			Approx. 140 g

Note) The applicable wire size depends on the connector used. Refer to “4-4-3 Input and output wiring” for details.

< Name of each part >



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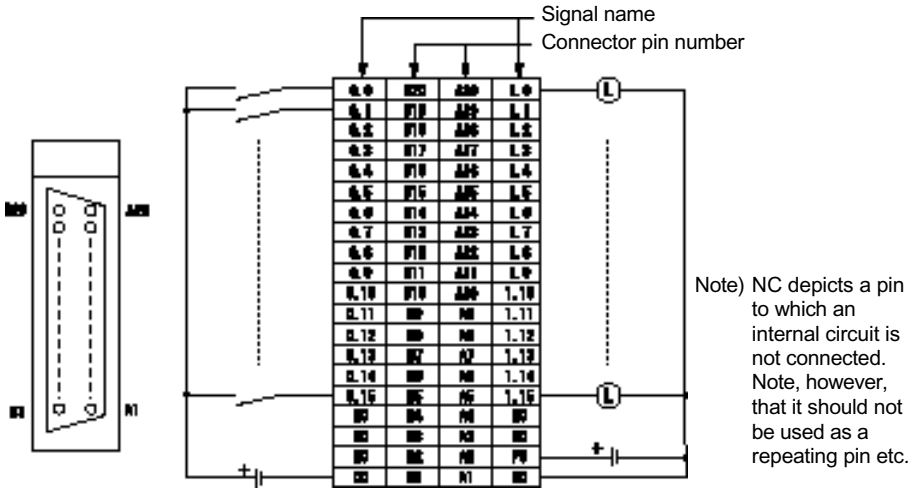

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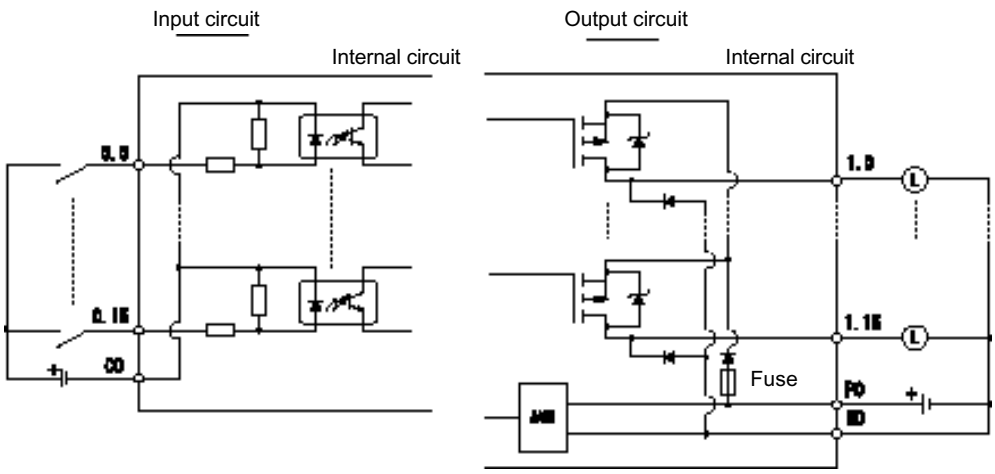


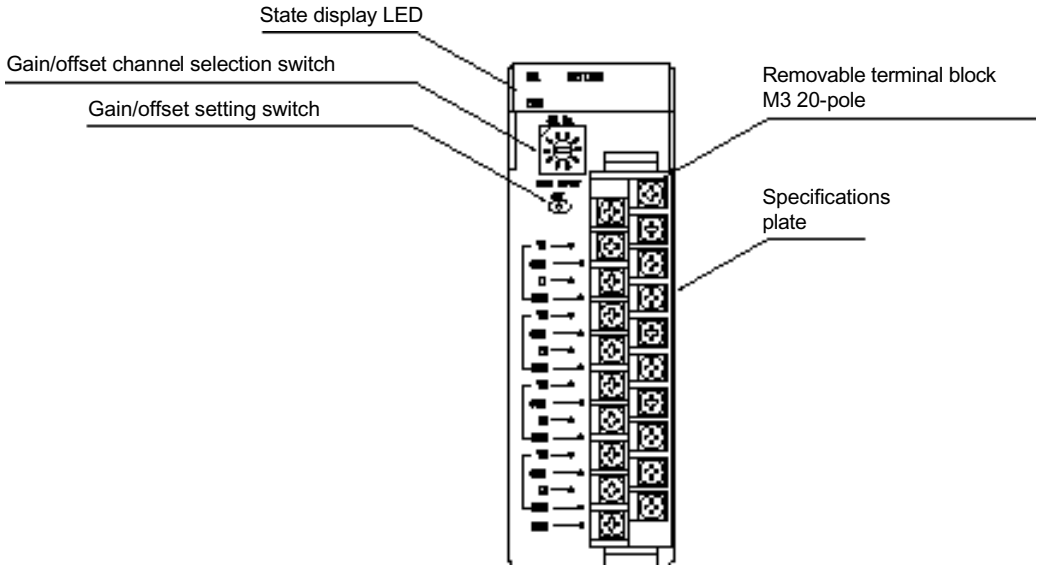
3-5-6Individual specifications of the Analog I/O module

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

Item		Specifications
Model		NP1AXH4-MR
Number of input channels		4 Channels
Input impedance		Voltage input: 1 MΩ, current input: 250 Ω
Maximum allowable input		Voltage input: ± 15 V, current input: ± 30 mA
Input conversion characteristics		<table><tr><th>Input</th><th>Analog input range</th><th>Converted digital value:</th></tr><tr><td>Voltage (V)</td><td>-10 -10, -5 -5, 1 - 5, 0 - 5, 0 - 10</td><td rowspan="2">-8000 - 8000 or 0 - 16000</td></tr><tr><td>Current (mA)</td><td>0 - 20, 4 - 20, -20 -20</td></tr></table>
Resolution		14 bits
Total accuracy (against full-scale)		± 0.1% or less (25°C), ± 1.0% or less (0 - 55°C)
Form of converted digital values		INT form (integer form)
Sampling time		1 ms/4 channels
Input filter time		47 μs
Input delay times		1 ms + tact time
Connection	External connection	Removable terminal block M3 screw 20-pole
	Applicable wire size	AWG #22 - 18[Note)]
Signal display		ONL: lights on when normal (green LED), ERR: lights on when abnormal (red LED), SETTING: lights on or flashes at the time of setting (green LED)
Insulation method		Photocoupler insulation Except that between channels being uninsulated
Dielectric strength		AC 500 V 1 minute Between the I/O terminals collected together and the FG
Insulation resistance		10 MΩ or more when measured with DC 500 V insulation resistance tester Between the I/O terminals collected together and the FG
Internal current consumption		DC 24 V 120 mA or less (when all channels are used)
Number of occupied words		10 words (input: 8 words, output: 2 words)
Weight		Approx. 200 g

Note) The applicable wire size depends on the crimp-style terminals used. Refer to “4-4-3 Input and output wiring” for details.

< Name of each part >

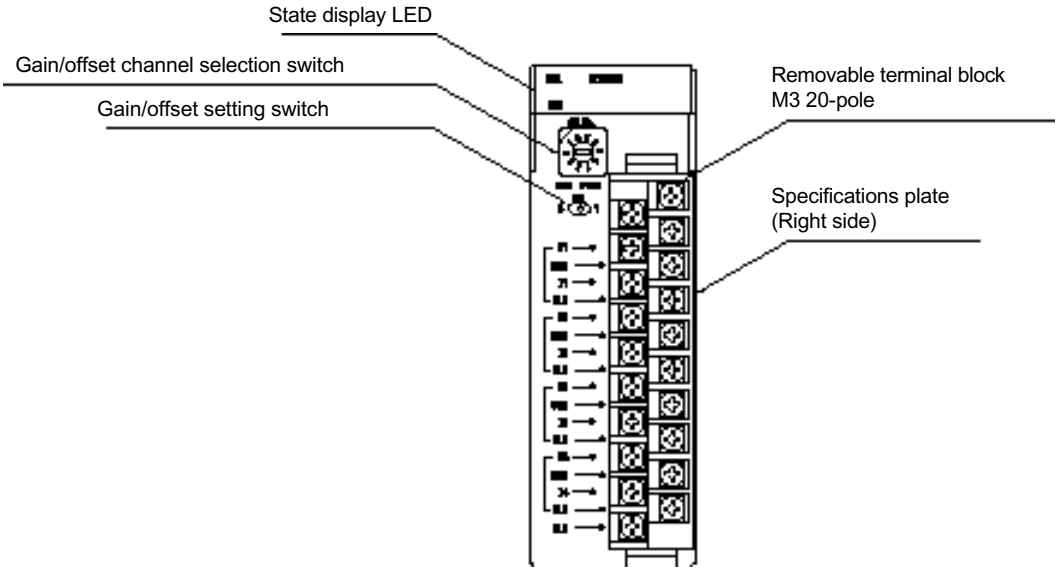


(2) Standard analog input (NP1AX04-MR)

Item		Specifications
Model		NP1AX04-MR
Number of input channels		4 Channels
Input impedance		Voltage input: 1 MΩ, current input: 250 Ω
Maximum allowable input		Voltage input: ± 15 V, current input: ± 30 mA
Input conversion characteristics		<table><tr><th>Input</th><th>Analog input range</th><th>Converted digital value:</th></tr><tr><td>Voltage (V)</td><td>-10 -10, -5 -5, 1 - 5, 0 - 5, 0 - 10</td><td rowspan="2">-500 - 500 or 0 - 1000</td></tr><tr><td>Current (mA)</td><td>0 - 20, 4 - 20, -20 -20</td></tr></table>
Resolution		10 bits
Total accuracy (against full-scale)		± 0.5% or less (25°C), ± 1.0% or less (0 - 55°C)
Form of converted digital values		INT form (integer form)
Sampling time		4 ms/4 channels
Input filter time		47 μs
Input delay times		4 ms + tact time
Connection	External connection	Removable terminal block M3 screw 20-pole
	Applicable wire size	AWG #22 - 18[Note)]
Signal display		ONL: lights on when normal (green LED), ERR: lights on when abnormal (red LED), SETTING: lights on or flashes at the time of setting (green LED)
Insulation method		Photocoupler insulation Except that between channels being uninsulated
Dielectric strength		AC 500 V 1 minute Between the I/O terminals collected together and the FG
Insulation resistance		10 MΩ or more when measured with DC 500 V insulation resistance tester Between the I/O terminals collected together and the FG
Internal current consumption		DC 24 V 120 mA or less (when all channels are used)
Number of occupied words		10 words (input: 8 words, output: 2 words)
Weight		Approx. 200 g

Note) The applicable wire size depends on the crimp-style terminals used. Refer to “4-4-3 Input and output wiring” for details.

< Name of each part >

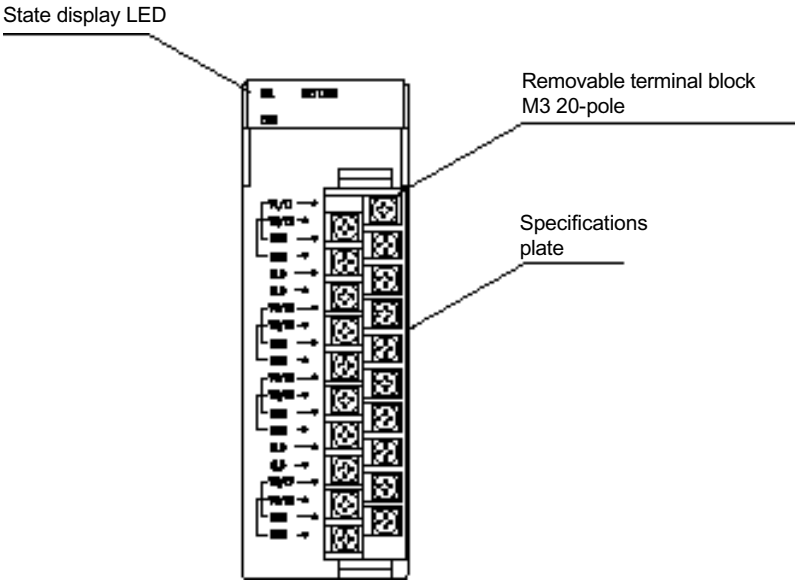


(3) Standard analog input (NP1AX08-MR)

Item		Specifications
Model		NP1AX08-MR
Number of input channels		8 Channels
Input impedance		Voltage input: 1 MΩ or more, current input: 250 Ω or less
Maximum allowable input		Voltage input: ± 15 V, current input: ± 30 mA
Input conversion characteristics		<table><tr><th>Input</th><th>Analog input range</th><th>Converted digital value:</th></tr><tr><td>Voltage (V)</td><td>-10 -10, -5 -5, 1 - 5, 0 - 5, 0 - 10</td><td rowspan="2">-500 - 500 or 0 - 1000</td></tr><tr><td>Current (mA)</td><td>0 - 20, 4 - 20, -20 -20</td></tr></table>
Resolution		10 bits
Total accuracy (against full-scale)		± 0.5% or less (25°C), ± 1.0% or less (0 - 55°C)
Form of converted digital values		INT form (integer form)
Sampling time		1 ms + 0.5ms × Number of convertible channels
Input filter time		47 μs (hardware)
Input delay times		Sampling cycle + tact time
Connection	External connection	Removable terminal block M3 screw 20-pole
	Applicable wire size	AWG #22 - 18[Note)]
Signal display		ONL: lights on when normal (green LED), ERR: lights on when abnormal (red LED), SETTING: lights on or flashes at the time of setting (green LED)
Insulation method		Photocoupler insulation Except that between channels being uninsulated
Dielectric strength		AC 500 V 1 minute Between the I/O terminals collected together and the FG
Insulation resistance		10 MΩ or more when measured with DC 500 V insulation resistance tester Between the I/O terminals collected together and the FG
Internal current consumption		DC 24 V 120 mA or less (when all channels are used)
Number of occupied words		18 words (input: 16 words, output: 2 words)
Weight		Approx. 200 g

Note) The applicable wire size depends on the crimp-style terminals used. Refer to “4-4-3 Input and output wiring” for details.

< Name of each part >

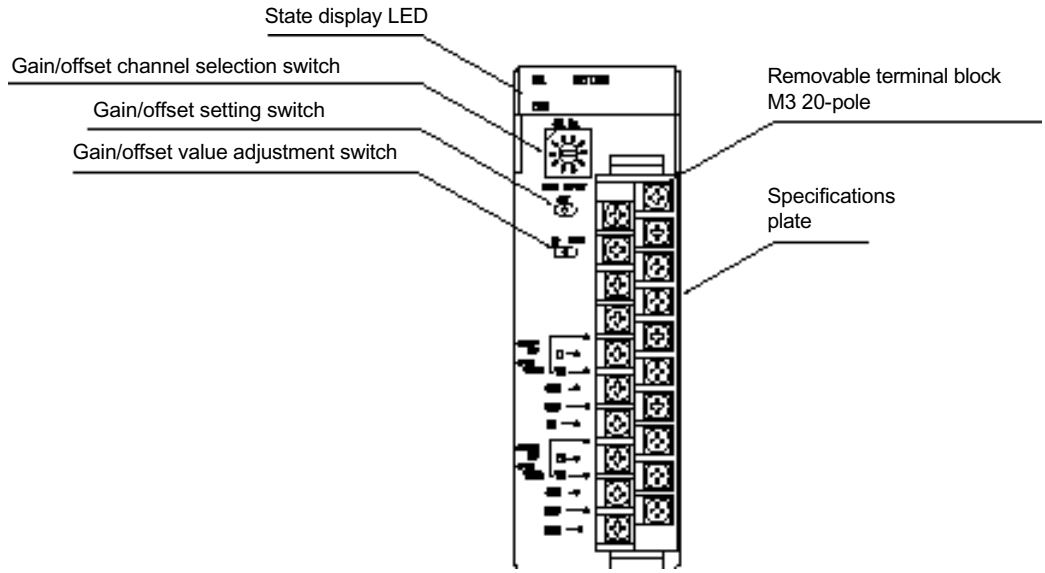


(4) High-speed analog output (NP1AYH2-MR)

Item		Specifications
Model		NP1AYH2-MR
Number of output channels		2 Channels
External load resistance		Voltage output: 1 KΩ, current output: 600 Ω or less
Output 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 - 8000 or 0 – 16000</td><td>-10 -10, -5 -5, 1 - 5, 0 - 5, 0 - 10</td></tr><tr><td>Current (mA)</td><td>0 - 20, 4 - 20</td></tr></table>
Resolution		14 bits
Total accuracy (against full-scale)		± 0.1% or less (25°C), ± 1.0% or less (0 - 55°C)
Form of digital input values		INT form (integer form)
Output delay time		1 ms + tact time
Connection	External connection	Removable terminal block M3 screw 20-pole
	Applicable wire size	AWG #22 - 18[Note)]
Signal display		ONL: lights on when normal (green LED), ERR: lights on when abnormal (red LED), SETTING: lights on or flashes at the time of setting (green LED)
Insulation method		Photocoupler insulation Except that between channels being uninsulated
Dielectric strength		AC 500 V 1 minute Between the I/O terminals collected together and the FG
Insulation resistance		10 MΩ or more when measured with DC 500 V insulation resistance tester Between the I/O terminals collected together and the FG
Internal current consumption		DC 24 V 120 mA or less (when all channels are used)
Number of occupied words		6 words (input: 2 words, output: 4 words)
Weight		Approx. 200 g

Note) The applicable wire size depends on the crimp-style terminals used. Refer to "4-4-3 Input and output wiring" for details.

< Name of each part >

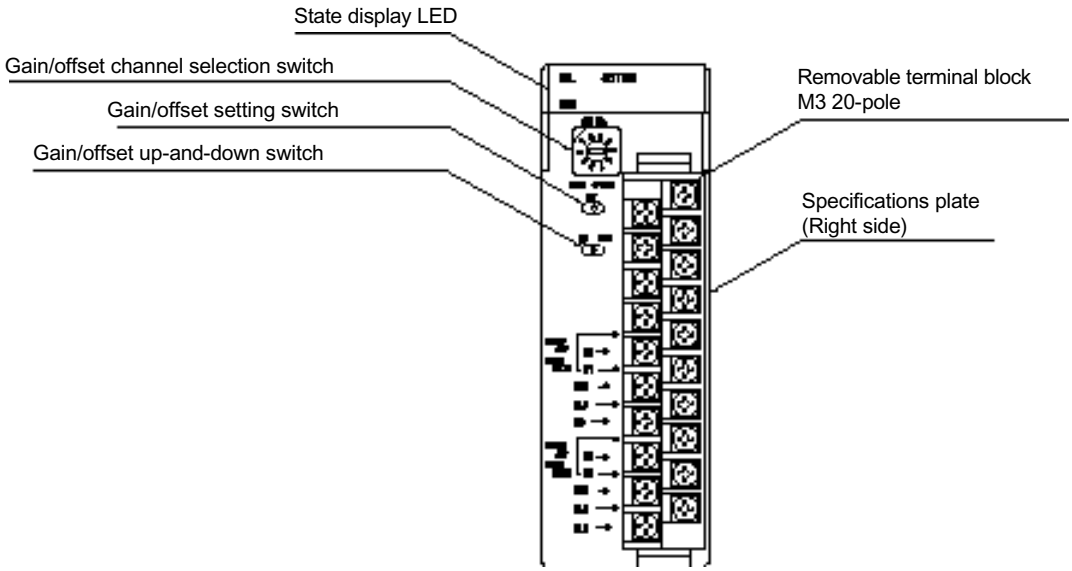


(5) Standard analog output (NP1AY02-MR)

Item		Specifications
Model		NP1AY02-MR
Number of output channels		2 channels
External load resistance		Voltage output: 1 KΩ or more, current output: 600 Ω or less
Output conversion characteristics		<table><tr><th>Output</th><th>Digital input value:</th><th>Analog output range</th></tr><tr><td>Voltage (V)</td><td rowspan="2">-500 - 500 or 0 – 1000</td><td>-10 -10, -5 -5, 1 - 5, 0 - 5, 0 - 10</td></tr><tr><td>Current (mA)</td><td>0 - 20, 4 - 20</td></tr></table>
Resolution		10 bits
Total accuracy (against full-scale)		± 0.5% or less (25°C), ± 1.0% or less (0 - 55°C)
Form of digital input values		INT form (integer form)
Output delay time		2 ms + tact time
Connection	External connection	Removable terminal block M3 screw 20-pole
	Applicable wire size	AWG #22 - 18[Note)]
Signal display		ONL: lights on when normal (green LED), ERR: lights on when abnormal (red LED), SETTING: lights on or flashes at the time of setting (green LED)
Insulation method		Photocoupler insulation Except that between channels being uninsulated
Dielectric strength		AC 500 V 1 minute Between the I/O terminals collected together and the FG
Insulation resistance		10 MΩ or more when measured with DC 500 V insulation resistance tester Between the I/O terminals collected together and the FG
Internal current consumption		DC 24 V 120 mA or less (when all channels are used)
Number of occupied words		6 words (input: 2 words, output: 4 words)
Weight		Approx. 200 g

Note) The applicable wire size depends on the crimp-style terminals used. Refer to "4-4-3 Input and output wiring" for details.

< Name of each part >

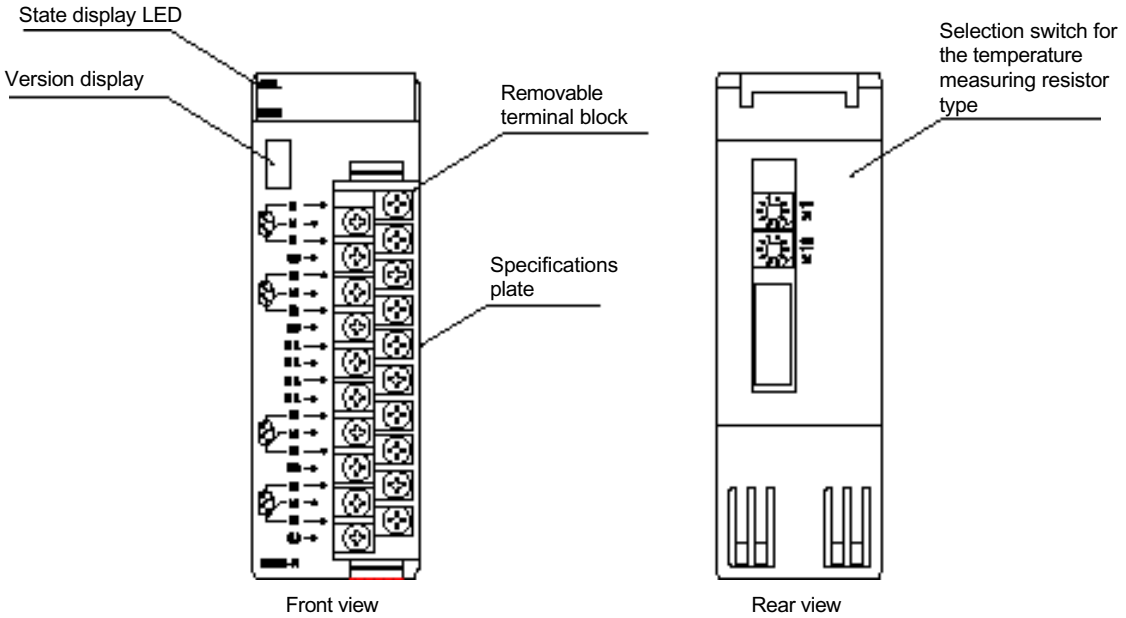


(6) Temperature measuring resistor input (NP1AXH4-PT)

Item		Specifications
Model		NP1AXH4-PT
Number of input channels		4 Channels
Temperature measuring resistor that can be connected		Platinum temperature measuring resistor (Pt 100, JPt 100)
Accuracy (against full-scale)		± 0.3%, ± 1 Digit (Ambient temperature 18◦C - 28◦C) ± 0.7%, ± 1 Digit (Ambient temperature 0◦C - 55◦C)
Allowable resistance value of the input wiring		10 Ω or less
Sampling cycle		500 ms/4 channels
Input filter time		Hardware (time constant): 50 ms Digital filter time: 1 - 100 s (setting can be made with a minimum unit of 1 s)
Connection	External connection	Removable terminal block (module protrusion type) with M3 screws 20-pole
	Applicable wire size	AWG#22-18 (twisted stranded wires with shield should be used)Note)
Signal display		ONL: lights on when normal (green LED), ERR: lights on when abnormal (red LED)
Insulation method		Photocoupler insulation
Dielectric strength		AC 500 V 1 minute Between the external terminals collected together and the FG
Insulation resistance		10 MΩ or more when measured with DC 500 V insulation resistance tester
Internal current consumption		DC 24 V 150 mA or less
Number of occupied words		16 words (input: 8 words, output: 8 words)
Weight		Approx. 240 g

Note) The applicable wire size depends on the crimp-style terminals used. Refer to “4-4-3 Input and output wiring” for details.

< Name of each part >

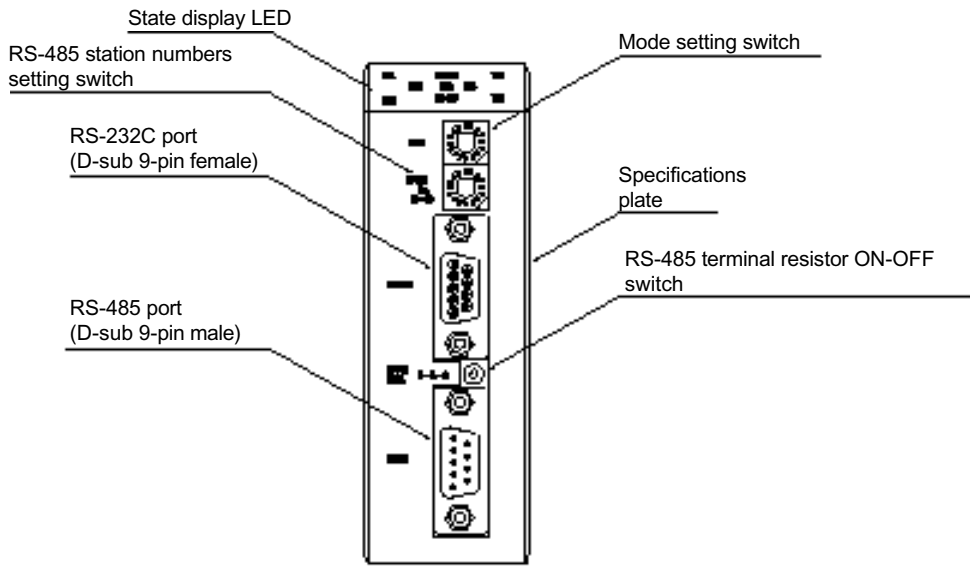


3-6 Communications Module Specifications

(1) Versatile communications module (NP1L-RS1)

Item	Specifications	
Model	NP1L-RS1	
Number of SX busses connected	Maximum 16 units/1 configuration (classification B)	
Port	RS-232C 1 channel	RS-485 1 channel
Transmission method	Half duplex serial communications method/full duplex serial communications method (switching by means of software)	
Synchronization method	Start-stop synchronization method	
Transmission rate	1200/2400/4800/9600/19200/38400/57600 bps (The total rate of 2 channels shall be up to a maximum of 57600 bps.)	
Transmission distance	15 m or less	1 km or less (provided that the transmission rate is 19.2 kbps or less)
Number of units connected	1:1 (1 external equipment can be connected)	1:31 (maximum) (provided that the station number of this module is limited to 0 - F)
Connection method	D-sub 9-pin connector (female)	D-sub 9-pin connector (male)
Transmission protocol	Non-procedural FB by means of the application program (FB) inside the CPU module (attached to the TDsxEditor), FA package (to be purchased separately)	
Insulation method	Photocoupler insulation	
Dielectric strength	AC 445 V 1 minute Between the I/O connectors collected together and the FG	
Insulation resistance	10 MΩ or more when measured with DC 500 V insulation resistance tester Between the I/O connectors collected together and the FG	
Number of occupied slots	1 slot	
Internal current consumption	DC 24 V 110 mA or less	
Weight	Approx. 170 g	

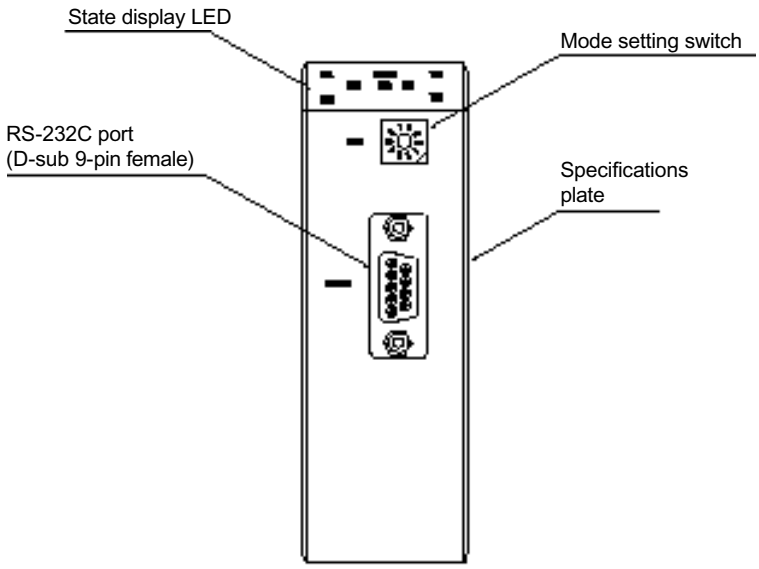
< Name of each part >



(2) Versatile communications module (NP1L-RS2)

Item	Specifications
Model	NP1L-RS2
Number of SX busses connected	Maximum 16 units/1 configuration (classification B)
Port	RS-232C 1 channel
Transmission method	Half duplex serial communications method/full duplex serial communications method (switching by means of software)
Synchronization method	Start-stop synchronization method
Transmission rate	1200/2400/4800/9600/19200/38400/57600 bps
Transmission distance	15 m or less
Number of units connected	1:1 (1 external equipment can be connected)
Connection method	D-sub 9-pin connector (female)
Transmission protocol	Non-procedural FB by means of the application program (FB) inside the CPU module (attached to the TDsxEditor), FA package (to be purchased separately)
Insulation method	Photocoupler insulation
Dielectric strength	AC 445 V 1 minute Between the I/O connectors collected together and the FG
Insulation resistance	10 MΩ or more when measured with DC 500 V insulation resistance tester Between the I/O connectors collected together and the FG
Number of occupied slots	1 slot
Internal current consumption	DC 24 V 90 mA or less
Weight	Approx. 160 g

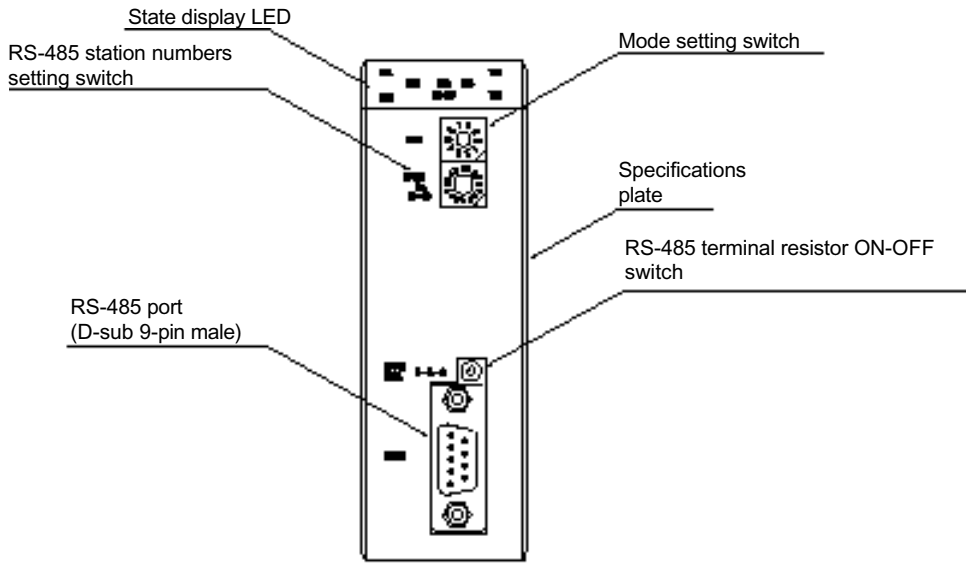
< Name of each part >



(3) Versatile communications module (NP1L-RS4)

Item	Specifications
Model	NP1L-RS4
Number of SX busses connected	Maximum 16 units/1 configuration (classification B)
Port	RS-485 1 channel
Transmission method	Half duplex serial communications method/full duplex serial communications method (switching by means of software)
Synchronization method	Start-stop synchronization method
Transmission rate	1200/2400/4800/9600/19200/38400/57600 bps
Transmission distance	1 km or less (provided that the transmission rate is 19.2 kbps or less)
Number of units connected	1:31 (maximum) (provided that the station number of this module is limited to 0 - F)
Connection method	D-sub 9-pin connector (male)
Transmission protocol	Non-procedural FB by means of the application program (FB) inside the CPU module (attached to the TDsxEditor), FA package (to be purchased separately)
Insulation method	Photocoupler insulation
Dielectric strength	AC 445 V 1 minute Between the I/O connectors collected together and the FG
Insulation resistance	10 MΩ or more when measured with DC 500 V insulation resistance tester Between the I/O connectors collected together and the FG
Number of occupied slots	1 slot
Internal current consumption	DC 24 V 80 mA or less
Weight	Approx. 160 g

< Name of each part >



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

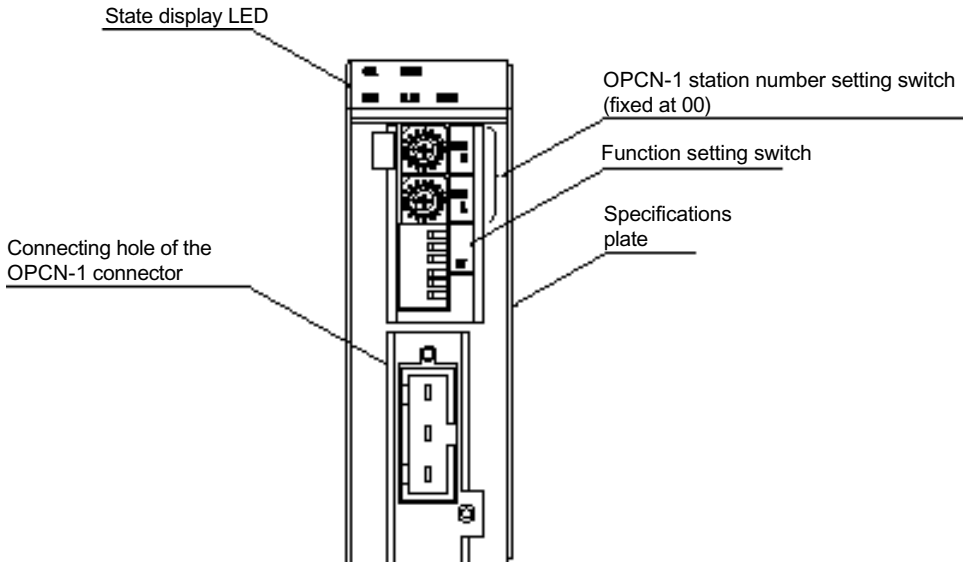
This is a remote I/O master module that can construct one OPCN-1 1 system by itself alone.

Item	Specifications
Model	NP1L-JP1
Number of SX busses connected	Maximum 8 units/1 configuration (classification A)Note)
Number of slave stations connected	31 units/1 master module
Connection method	Removable dedicated connector (M3.5)
Transmission line mode	Bus configuration (multi-drop)
Transmission line	Electric power transmission line: twisted pair cable Its total length depends on the baud rate.
Transmission method	Half duplex serial transmission, in compliance with EIA RS-485
Transmission rate (maximum total length)	125 kbps (1000 m), 250 kbps (800 m), 500 kbps (480 m), 1 Mbps (240 m)
Encoding method	NRZI (Non Return to Zero Inverted) method
Error check	FCS (Frame Check Sequence CRC-16)
Number of I/O points	Maximum 2032 points (127 words)
Insulation method	Photocoupler insulation
Dielectric strength	AC 445 V 1 minute Between the connectors collected together and the FG
Insulation resistance	10 MΩ or more when measured with DC 500 V insulation resistance tester Between the connectors collected together and the FG
Number of occupied slots	1 slot
Internal current consumption	DC 24 V 130 mA or less
Weight	Approx. 200 g (single module), approx. 40 g (OPCN-1 connector)

Note) If other remote I/O master modules are connected to the SX bus, the total number of remote I/O master modules that can be connected is up to 8 units.

(Number of units of OPCN-1 master modules) + (Other remote I/O master modules) ≤ 8 units

< Name of each part >

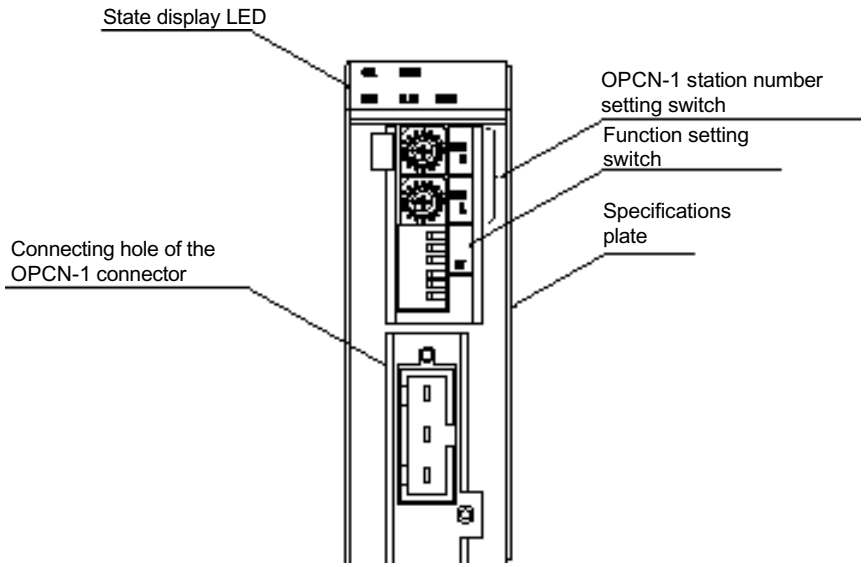


(5) OPCN-1 interface module (NP1L-RJ1)

This is an interface module used when the I/O module of μGPCsx is used on the OPCN-1.

Item	Specifications
Model	NP1L-RJ1
Connection method	Removable dedicated connector (M3.5)
Base board used	TD1BS-06 (6-slot base), TD1BS-08 (8-slot base), TD1BS-11 (11-slot base), TD1BS-13 (13-slot base)
Insulation method	Photocoupler insulation
Dielectric strength	AC 445 V 1 minute Between the connectors collected together and the FG
Insulation resistance	10 MΩ or more when measured with DC 500 V insulation resistance tester Between the connectors collected together and the FG
Number of occupied slots	1 slot
Internal current consumption	DC 24 V 130 mA or less
Weight	Approx. 200 g (single module), approx. 40 g (OPCN-1 connector)

< Name of each part >

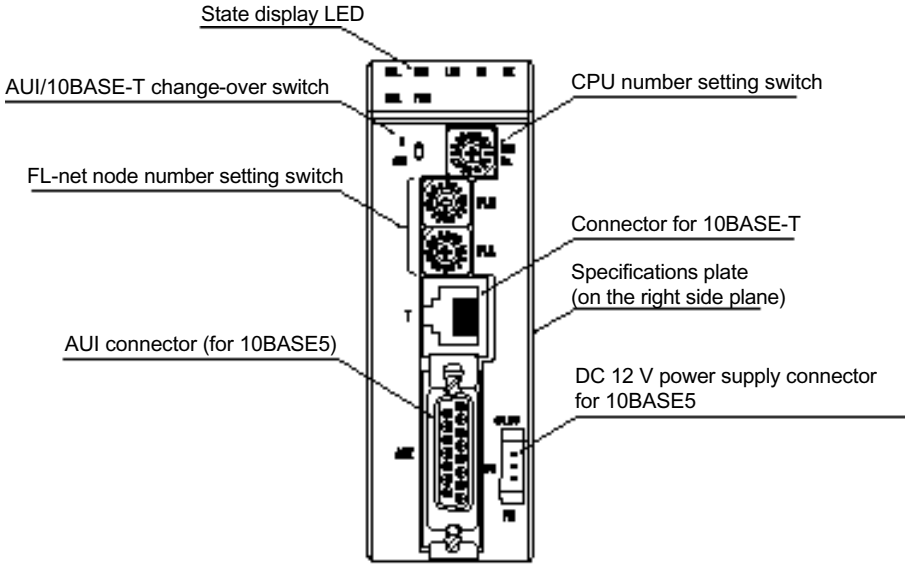


(6) FL-net module

Item	Specifications
Model	NP1L-FL1
Number of SX busses connected	Maximum 2 units/1 configuration[Note)]
Number of FL-net connected	100 nodes/segment (up to a maximum of 256 units by means of repeaters)
Connection method	AUI connector (10BASE5) or UTP connector (10BASE-T)
Transmission line mode	Bus configuration (multi-drop)
Transmission method (code)	Baseband (Manchester code)
Data exchange method	• Cycling transmission method using the common memory area • Data size: maximum 8704 words (512 words+8192 words)
Transmission rate	10 Mbps
Error check	CRC (SUTODIN II)
Insulation method	Pulse transformer insulation
Dielectric strength	AC 1500 V 1 minute Between the connectors collected together and the FG
Insulation resistance	2 MΩ or more when measured with DC 500 V insulation resistance tester Between the connectors collected together and the FG
Number of occupied slots	1 slot
Internal current consumption	DC 24 V 105 mA or less
External power supply	DC 12 V 500 mA or less (required only when 10BASE5 is used)
Weight	Approx. 210 g

Note) Up to 2 units of FL-net modules in total can be connected.

< Name of each part >



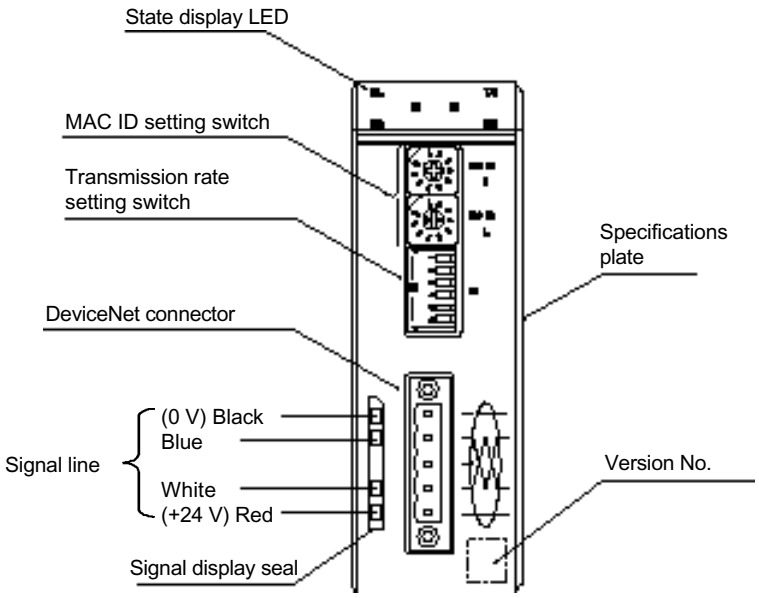
(7) DeviceNet module (NP1L-DN1)

Item	Specifications
Model	NP1L-DN1
Number of SX busses connected	Maximum 8 units/1 configuration (classification A)[Note)]
Number of slave nodes connected	Maximum of 63 units
Connection method	Open type screw connector
Transmission line mode	Bus configuration (multi-drop)
Transmission line	Trunk line, branch line (drop line)
Transmission rate (maximum total length)	125 kbps (500 m), 250 kbps (250 m), 500 kbps (100 m)
Number of I/O points	Maximum 2032 points (127 words)
Insulation method	Photocoupler insulation
Dielectric strength	AC 445 V 1 minute Between the connectors collected together and the FG
Insulation resistance	10 MΩ or more when measured with DC 500 V insulation resistance tester Between the connectors collected together and the FG
Internal current consumption	DC 24 V 90 mA or less
Network current consumption	DC 24 V 45 mA or less
Weight	Approx. 170 g

Note) If other remote I/O master modules are connected to the SX bus, the total number of remote I/O master modules that can be connected is up to 8 units.

(Number of units of DeviceNet master modules) + (Other remote I/O master modules) ≤ 8 units

< Name of each part >



(8) SX bus optical link module (NP1L-0L1)/SX bus optical converter (NP2L-0E1)

Item		Specifications	
Model		NP1L-0L1	NP2L-0E1
Number of units connected		Maximum 64 units/1 configuration (total number of units of NP1L-0L1 and NP2L-0E1)	
Optical fiber	Type	PCF (Polymer Clad Fiber)	
	Core/clad diameters	200 μm/230 μm	
	Minimum bending radius	50 mm Note 1)	
	Optical connector	F07 type	
Transmission distance		Maximum 800 m between stations (total extended distance: 25.6 km) Note 2)	
Allowable attenuation of the amount of light		7 dB or less Note 2)	
Number of occupied slots		1 slot	-
Internal current consumption		DC 24 V 54 mA or less	DC 24 V 70 mA or less
Power supply terminal	Terminal shape	-	3-pole M3 (tightening torque 0.5 - 0.7 N· m)
	Rated input voltage	-	DC 24 V (DC 22.8 - 26.4 V) Note 3)
	Applicable wire size	-	AWG#16
	Rush current	-	165 mA or less: at the time of using switching power supply 50 Ao-p - 70 μs: DC 24 V when directly powered on
Weight		Approx. 135 g	Approx. 155 g

Note 1) The minimum bending radius may depend on the model of optical fiber used. The specifications given in the above table is the value of the HG-20/08 manufactured by Sumitomo Electric Industries, Ltd.

Note 2) The transmission distance of optical fiber is determined by the attenuation of optical fiber. The attenuation increases as the ambient temperature of the optical fiber used decreases (the use in low temperatures) or when there is bending stress and the grinding of connectors, resulting in a decrease in the transmission distance. The specifications given in the above table is the value of a product having ground connectors at both ends under an environment of the temperature range used being 25°C and no bending stress. Also, attention should also paid to the attenuation resulting from long-term deterioration.

[For reference]

Calculation formula and transmission distance under the ambient temperature used in the case of using the HG-20/08 manufactured by Sumitomo Electric Industries, Ltd.

< Calculation formula in the case of a cable of 100 m or less >

Attenuation [dB] = 1.4 dB+loss at low temperatures+loss when without grinding

1.4 dB is the cable transmission loss of a cable of 100 m or less. (Fixed value.)

For the loss at low temperatures, the value of the 100 m cable in the table below shall apply.

< Calculation formula in the case of a cable of 100 m or more >

Attenuation [dB] = (8 - 6 × log(cable length)) × cable length + loss at low temperatures + loss when without grinding

- Unit of cable length is [km].

*The loss when without grinding is 0.75 dB per connector unground. In the case of a connector with both ends unground, the loss will be 1.5 dB.

< List of loss at low temperatures of the HG-20/08 >

Temperature [C]	Loss [dB]	
	1 km cable	100 m 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

< Transmission distance in relation to the ambient temperature of the HG-20/08 >

Ambient temperature [C]	With both ends ground	With both ends unground
25	800 m	500 m
20	800 m	500 m
15	700 m	500 m
10	700 m	500 m
5	700 m	500 m
0	600 m	400 m
-5	600 m	400 m
-10	600 m	400 m
-15	500 m	300 m
-20	500 m	300 m

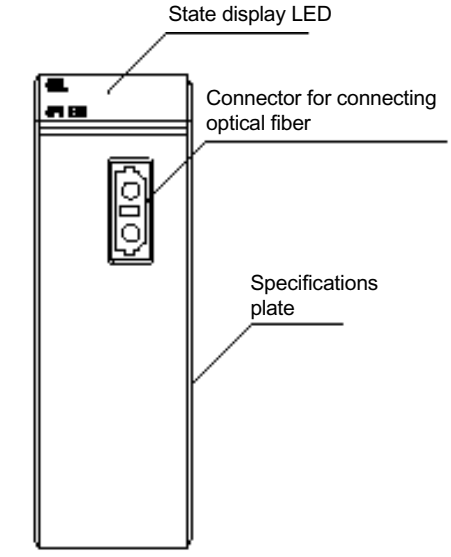
Note 3) The external power supply used per unit should be a switching power supply of DC 24 V 1 A or more that has been processed by the “strengthened insulation.” For its wiring method, refer to “4-4-5 Wiring of the power supply part of the SX bus optical converter.”

Note 4) Transmission delay time at the time of the optical link system

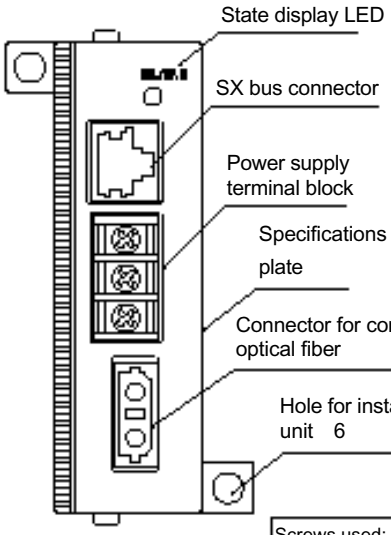
At the time of the optical link system, a transmission delay given by the following formula occurs. The SX bus tact time should be considered at the time of the system designing.

(Transmission delay time) = (Number of units of the optical link equipment) × 1 μs + (Total length of the optical fiber cable (km)) × 4.97 μs [μs]

< Name of each part >



Model : NP1L-OL1



Model : NP2L-OE1

Screws used: M4
Tightening torque: 1.8 N-m

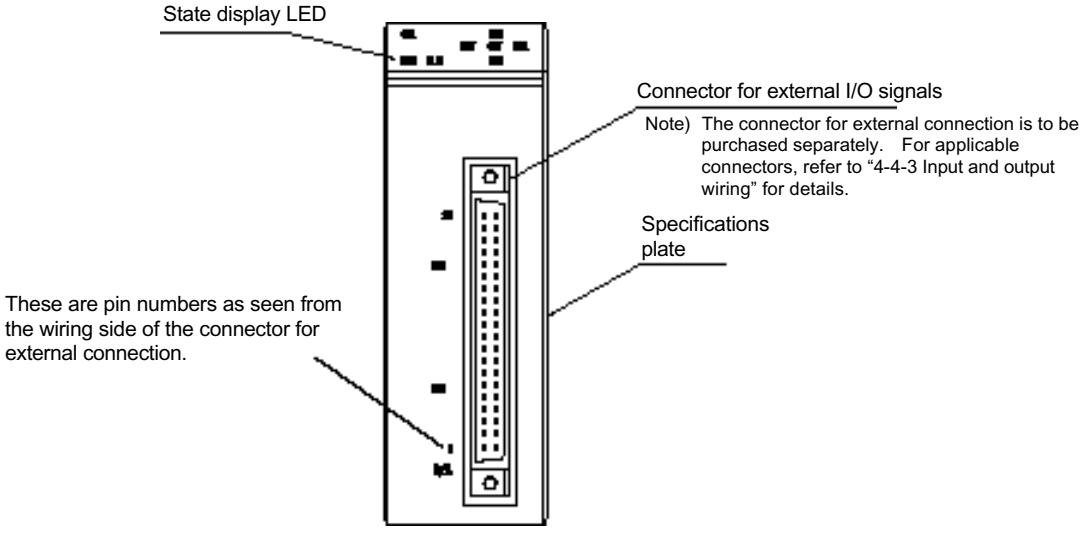
* Recommended products
Optical fiber: HG-20/08 manufactured by Sumitomo Electric Industries, Ltd. (type: H-PCF)
Optical connector: CF-2071 manufactured by Sumitomo Electric Industries, Ltd.
Crimping tool: CAK-0057 manufactured by Sumitomo Electric Industries, Ltd.

3-7 Positioning Module Specifications

(1) High-speed counter module (NP1F-HC2)

Item		Specifications
Model		NP1F-HC2
Count input signal	Input mode	90° phase difference 2-phase signal, forward-reverse signal, code pulse ..... switching by means of software
	Level	Square wave open collector signal or differential signal
Counter	Type	Capable of carrying out the ring counter operation, reset operation, gate operation, comparing detection operation and Z-phase detection operation
	Number of channels	2 channels (independent)
	Counting speed	500 kHz
	Counting range	-2,147,483,648 - 2,147,483,647 (DINT type)
	Gradual multiplication function	× 4 (2-phase signal only)
	Reset operation	By means of instruction given by software
	Gate operation	By means of instruction given by external input signals and software
	Comparing detection operation	By means of instruction given by software
	Z-phase detection operation	By means of instruction given by external input signals and software The external input signal can be selected at the rise/fall edges.
Comparison	Number of output points	1 point/channel
	Comparing range	Same as the counting range
	Comparing content	(Counting value) ≥ (Comparing value) → Output ON
	Comparing output	Open collector output (in the form of sync) DC 24 V Maximum rated load: 100 mA
Insulation method		Photocoupler insulation
Dielectric strength		AC 1500 V 1 minute Between the I/O connectors collected together and the FG
Insulation resistance		10 MΩ or more when measured with DC 500 V insulation resistance tester Between the I/O connectors collected together and the FG
Number of occupied words		16 words
Number of occupied slots		1 slot
Internal current consumption		DC 24 V 85 mA or less
External supply voltage		DC 24 V supplied from external power supply
Weight		Approx. 140 g

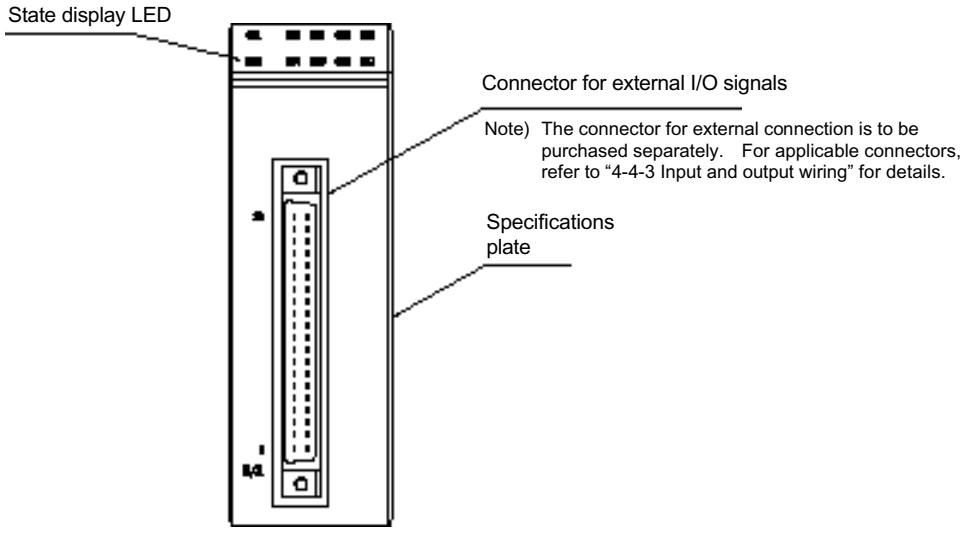
< Name of each part >



(2) Multi-channel high-speed counter module (NP1F-HC8)

Item		Specifications
Model		NP1F-HC8
Count input signal	Input mode	90° phase difference 2-phase signal, forward-reverse signal, code pulse ..... switching by means of software
	Level	Square wave open collector signal or differential signal
Counter	Type	Capable of carrying out the ring counter operation, reset operation, gate operation
	Number of channels	8 channels (independent)
	Counting speed	50 kHz
	Counting range	-32768 - 32767 (INT type)
	Gradual multiplication function	× 4 (2-phase signal only)
	Reset operation	By means of instruction given by software
	Gate operation	By means of instruction given by external input signals and software
Insulation method		Photocoupler insulation
Dielectric strength		AC 1500 V 1 minute Between the I/O connectors collected together and the FG
Insulation resistance		10 MΩ or more when measured with DC 500 V insulation resistance tester Between the I/O connectors collected together and the FG
Number of occupied words		12 words
Number of occupied slots		1 slot
Internal current consumption		DC 24 V 100 mA or less
External supply voltage		DC 24 V supplied from external power supply
Weight		Approx. 195 g

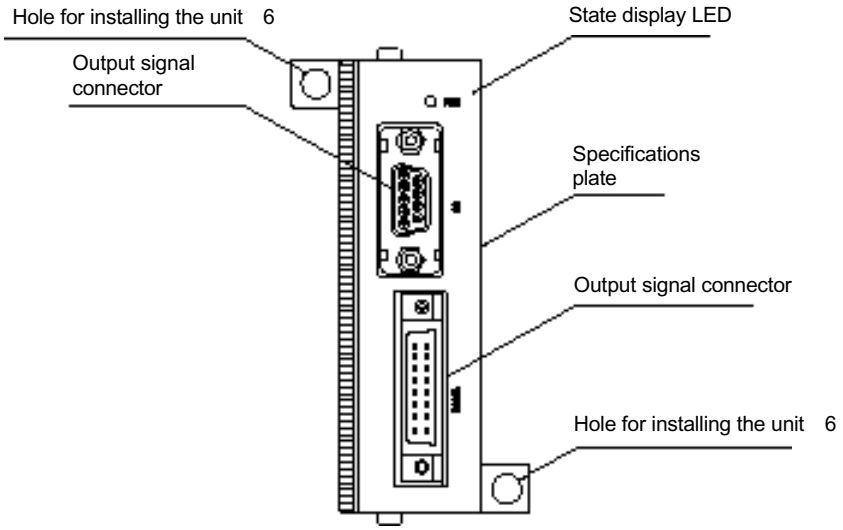
< Name of each part >



(3) Positioning signal converter (NP2F-LEV)

Item		Specifications
Model		NP2F-LEV
Number of converted axes		For use for 4 axes (for use for 4 channels)
Input signal	Input frequency	Maximum 1 MHz
	Input mode	Open collector input
Output signal	Output frequency	Maximum 1 MHz
	Output mode	Differential signal
Insulation method		Uninsulated (between input-output signals), The external power supply is insulated.
External power supply		DC 24 V 40 mA to be supplied from the external power supply
Weight		Approx. 130 g

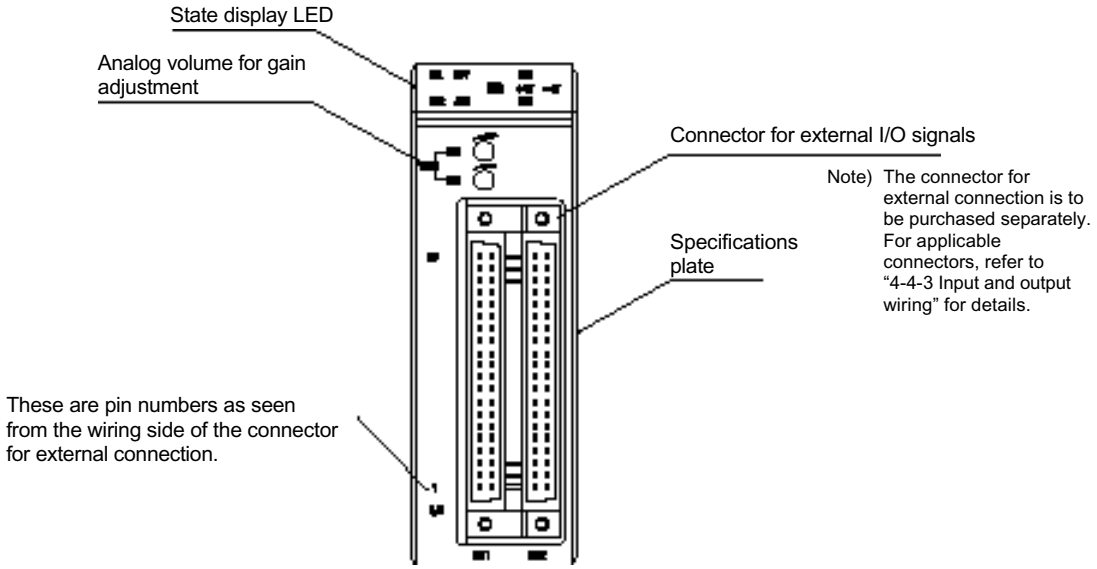
< Name of each part >



(4) 2-axis analog instruction positioning (NP1F-MA2)

Item		Specifications
Model		NP1F-MA2
Number of controlled axes		2 axes
Positioning control		Semi-closed loop control
Acceleration/deceleration characteristics		Trapezoidal acceleration/deceleration (at the time of pulse generation mode)
Maximum position data		Instruction of 2^{32} - 1 pulses/time
Speed instruction	Instruction voltage	Analog speed instruction (0 - ± 10.24 V)
	Signal mode	Analog voltage instruction
Feedback pulse	Input frequency	500 kHz
	Input mode	Open collector input or differential signal (90◦ phase difference phase A, phase B and phase Z signals)
Manual pulser	Input frequency	500 kHz
	Input mode	Open collector input or differential signal (90◦ phase difference phase A, phase B or forward pulse+reverse pulse)
Control function		3 types (pulse generation mode, position instruction mode, position control mode)
Combined actuator		Servo system equipped with analog speed instruction input function
Insulation method		Uninsulated (interface between amplifiers and interface between manual pulses) Photocoupler insulation (digital I/O) *External connection equipment needs strengthened insulation.
Number of occupied words		I/O area (input: 14 words/output: 8 words, total 22 words)
Number of occupied slots		1 slot
Internal current consumption		DC 24 V 150 mA or less
Weight		Approx. 200 g

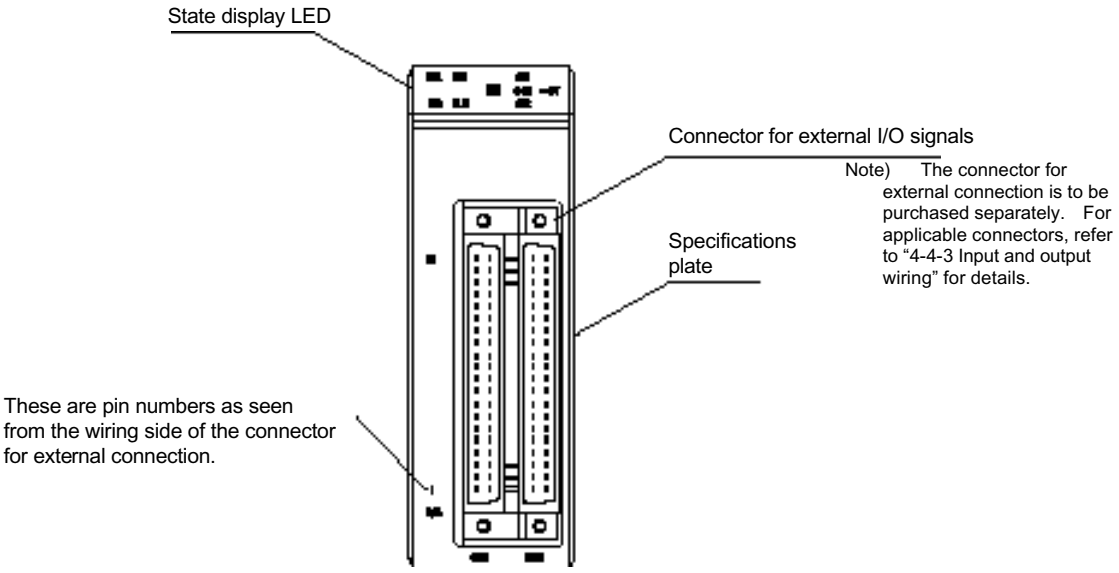
< Name of each part >



(5) 2-axis pulse set instruction positioning (NP1F-MP2)

Item		Specifications
Model		NP1F-MP2
Number of controlled axes		2 axes
Positioning control		Open loop control
Acceleration/deceleration characteristics		Trapezoidal acceleration/deceleration (at the time of pulse generation mode)
Maximum position data		Instruction of 2^{32} - 1 pulse/time
Instruction pulse	Pulse frequency	250 kHz
	Pulse frequency resolution	16 bit/20 bit
	Output mode	Open collector output (forward pulse+reverse pulse)
Feedback pulse	Input frequency	500 kHz
	Input mode	Open collector input or differential signal (90◦ phase difference phase A, phase B and phase Z signals)
Manual pulser	Input frequency	500 kHz
	Input mode	Open collector input or differential signal (90◦ phase difference phase A, phase B or forward pulse+reverse pulse)
Control function		2 types (pulse generation mode, position instruction mode)
Combined actuator		Servo system or stepping motor equipped with pulse set input function
Insulation method		Photocoupler insulation
Dielectric strength		AC 1500 V 1 minute Between the I/O connectors collected together and the FG
Insulation resistance		10 MΩ or more when measured with DC 500 V insulation resistance tester Between the I/O connectors collected together and the FG
Number of occupied words		I/O area (input: 14 words/output: 8 words, total 22 words)
Number of occupied slots		1 slot
Internal current consumption		DC 24 V 95 mA or less
External power supply		DC 24 V 35 mA supplied from external power supply
Weight		Approx. 200 g

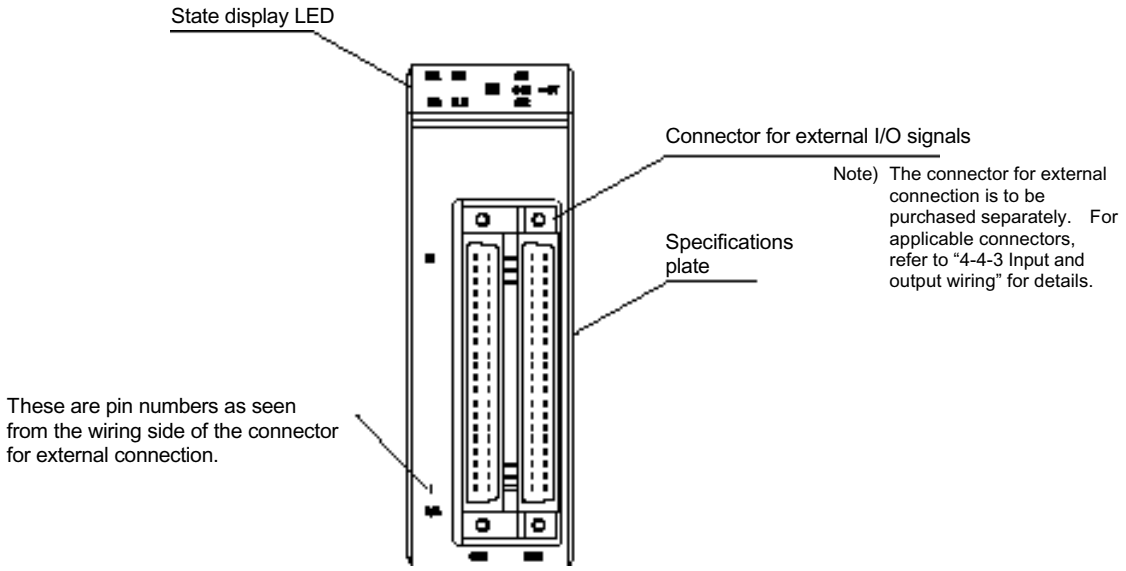
< Name of each part >



(6) Pulse set output positioning (NP1F-HP2)

Item		Specifications
Model		NP1F-HP2
Number of controlled axes		2 axes
Positioning control		Open loop control
Acceleration/deceleration characteristics		Trapezoidal acceleration/deceleration (at the time of pulse generation mode)
Maximum position data		Instruction of 2^{32} - 1 pulse/time
Instruction pulse	Pulse frequency	250 kHz
	Pulse frequency resolution	16 bit/200 bit
	Output mode	Open collector output (forward pulse+reverse pulse)
Control function		1 type (pulse generation mode)
Combined actuator		Servo system or stepping motor equipped with pulse set input function
Insulation method		Photocoupler insulation
Dielectric strength		AC 1500 V 1 minute Between the I/O connectors collected together and the FG
Insulation resistance		10 MΩ or more when measured with DC 500 V insulation resistance tester Between the I/O connectors collected together and the FG
Number of occupied words		I/O area (input: 8 words/output: 8 words, total 16 words)
Number of occupied slots		1 slot
Internal current consumption		DC 24 V 95 mA or less
External power supply		DC 24 V 35 mA supplied from external power supply
Weight		Approx. 180 g

< Name of each part >



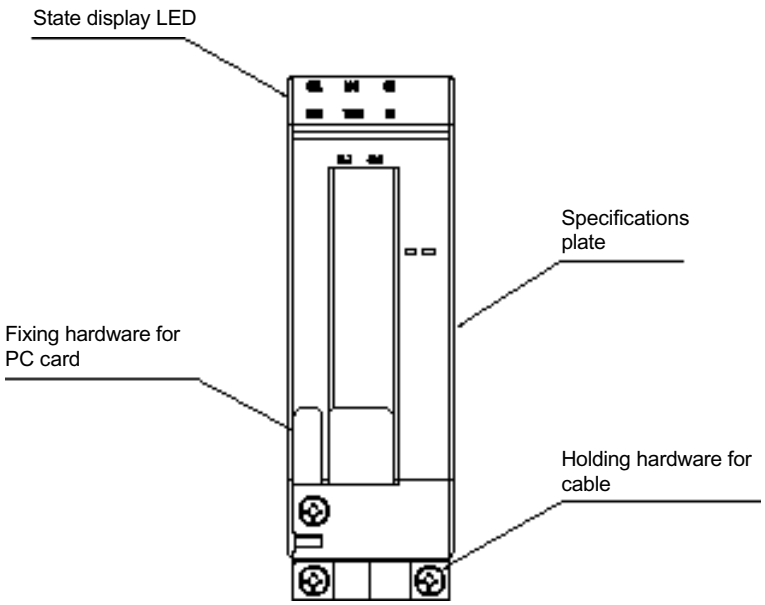
3-8 Function Module Specifications

(1) PC card interface module (NP1F-PC2)

Item		Specifications
Model		NP1F-PC2
Number of SX busses connected		Maximum 4 units
PC card interface part		In compliance with JEIDA Ver. 4.1/PCMCIA 2.01 Type I, II × 2 slots 5 V specifications • Restrictions: Either LAN card or modem card can be installed.
Card used		LAN card, modem card, memory card (SRAM card, flash memory card)
Function	LAN card	TCP/IP protocol, UDP/IP protocol, communication protocol with Mitsubishi Ethernet interface and loader command via the network are supported.
	Memory card	Read/write of data from and onto the CPU
Insulation method		None (uninsulated within the module)
Number of occupied slots		1 slot
Internal current consumption		120 mA or less
Weight		Approx. 200 g

Note) Environmentally resistant specifications are restricted by the specifications of the PC card used.

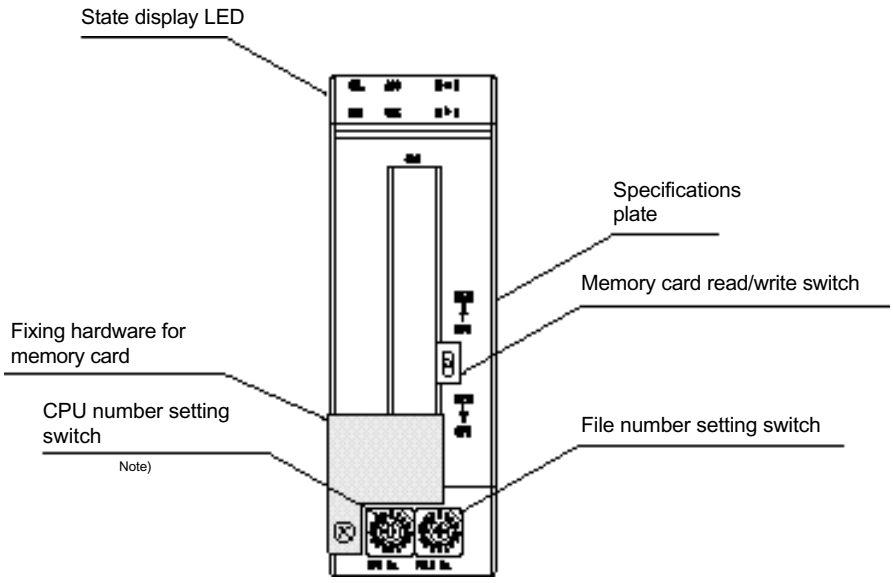
< Name of each part >



(2) Memory card interface module (NP1F-MM1)

Item	Specifications
Model	NP1F-MM1
Number of SX busses connected	Classification B
Memory card interface part	In compliance with JEIDA Ver. 4.1/PCMCIA 2.01 Type I, II × 1 slot 5 V specifications
Card used	Memory card (SRAM card)
Function	Program read/write, data read/write etc.
Insulation method	Uninsulated
Number of occupied slots	1 slot
Internal current consumption	120 mA or less
Weight	Approx. 200 g

< Name of each part >



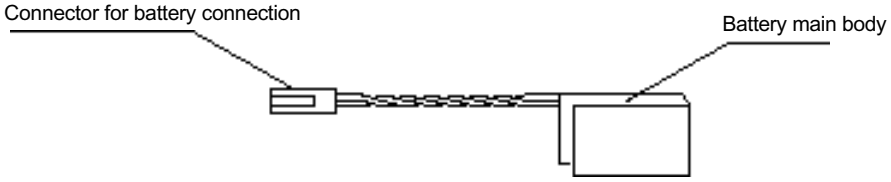
3-9 Auxiliaries and Others

(1) Battery for data backup (NP8P-BT)

Item	Specifications
Model	NP8P-BT
Battery classification	Lithium primary battery (charging prohibited)
Nominal voltage	DC 3.6 V
Battery guarantee period	5 years (at ambient temperature: 25◦C)Note)
Outer dimensions	14.5 × 24.5 cable length: 50 mm
Weight	Approx. 10 g

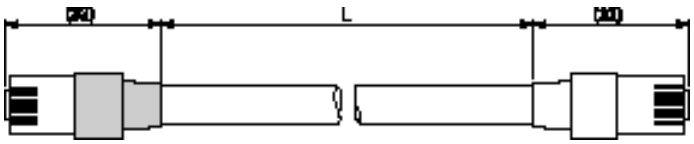
Note) This guarantee period is the guarantee period for a single battery and the guarantee period is also 5 years at the ambient temperature of 25◦C even when the battery is stored as an auxiliary.
The backup time for memory depends on the equipment and ambient temperature in which the battery is installed. Note that the backup time is shortened to about a half as the ambient temperature rises by 10◦C.

< Name of each part >



(2) SX bus increasing cable (NP1C- □ □)

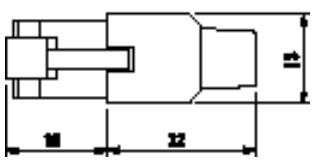
Model	Cable length (L)
NP1C-P3	300 mm
NP1C-P6	600 mm
NP1C-P8	800 mm
NP1C-02	2,000 mm
NP1C-05	5,000 mm
NP1C-10	10,000 mm
NP1C-25	25,000 mm



OUT side (orange) IN side (white)

(3) SX bus loop back plug (NP8B-BP)

This is a plug to configure the SX bus to be connected to the end of the SX bus into a loop-like form.



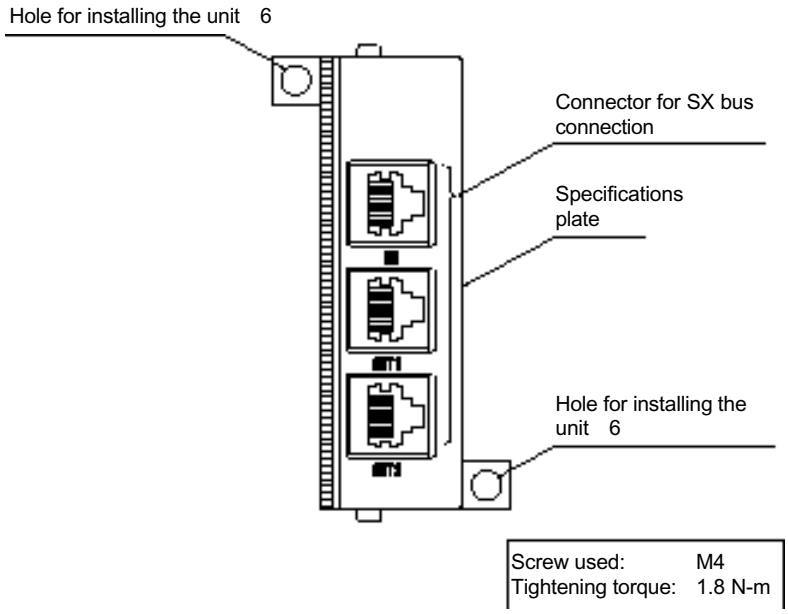
(4) SX bus T-branch unit (NP8B-TB)

This is a unit to make a branching connection of the SX bus

Item	Specifications
Model	NP8B-TB
SX bus total extended distance	25 m
Number of units connected, number of branches	Maximum 25 units inclusive of the base board
Weight	Approx. 160 g

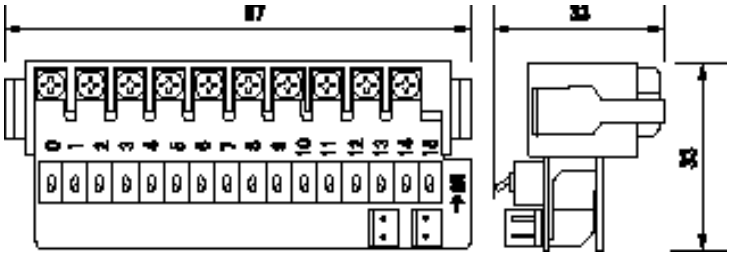
Note) For the SX bus T-branch increasing system, refer to “2-2-3 SX bus T-branch increasing system.”

< Name of each part >



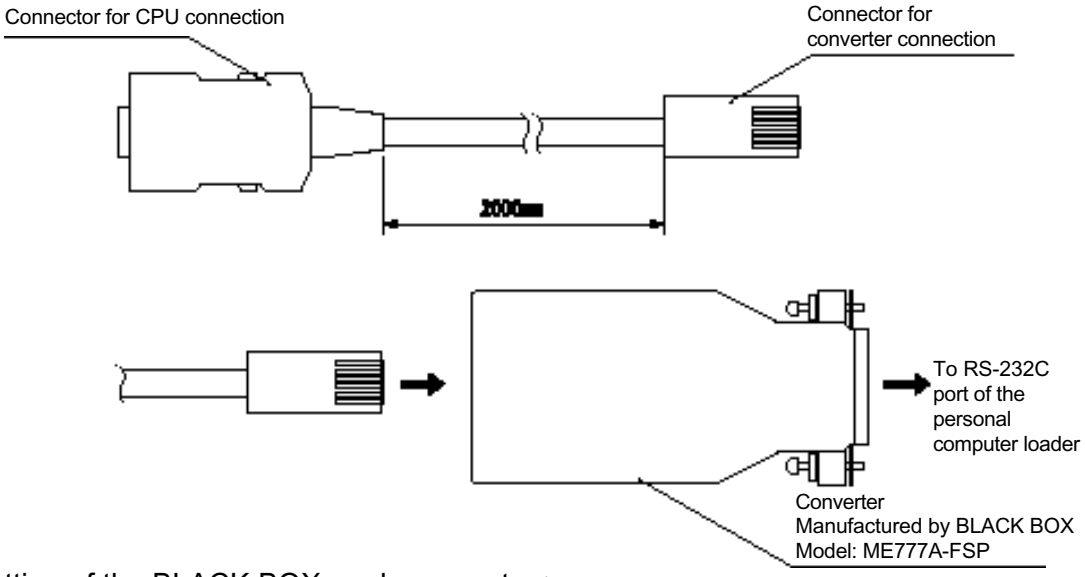
(5) Trial input switch (NP8X-SW)

This is a trial input switch dedicated to the digital input module (NP1X1606-W.)



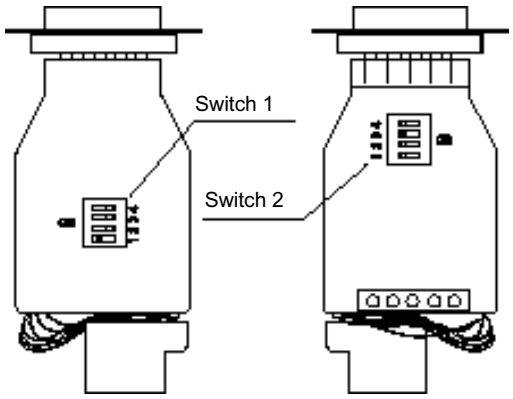
Note) This product is dedicated to the desktop debugging.
It must not be used being installed within the panel.

(6) TDsxEditor connection cable (NP4H-CA2 (without a converter), NP4H-CNV (with a converter))



< Setting of the BLACK BOX made converter >

The conversion case should be opened to set the switches on the printed circuit board as shown in the figure below.



< Switch setting table >

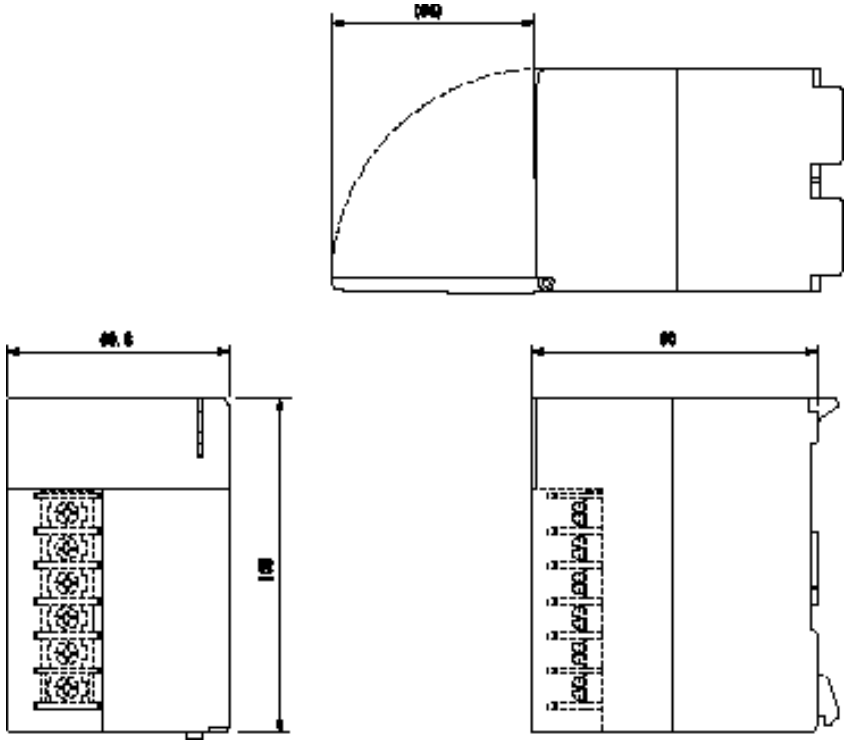
The setting should be made as in the shaded areas.

	Function	ON	OFF
Switch 1-1	Terminal resistor	120 Ω	16 kΩ
Switch 1-2	2/4-wire system	2-wire system	4-wire system
Switch 1-3			
Switch 1-4	Echo Mode	ON	OFF
Switch 2-1	Carry control	RTS	"H" at all times
Switch 2-2	RS/CS delay	8 ms	None
Switch 2-3	Not used		
Switch 2-4	Not used		

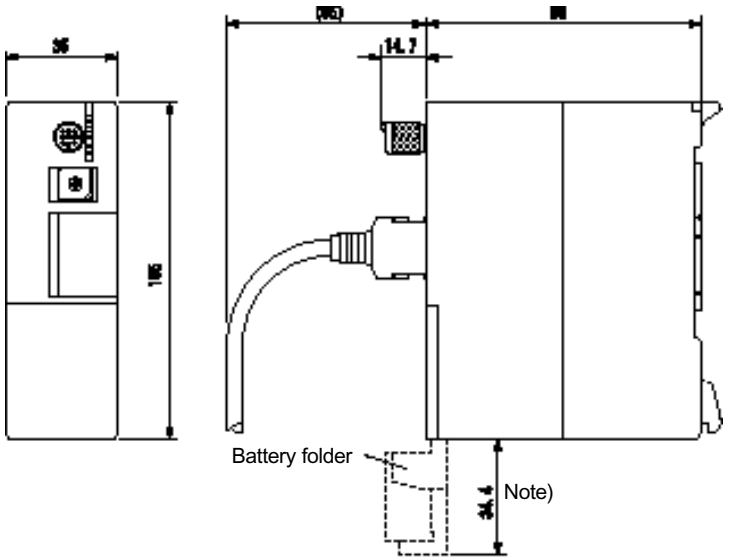
3-10 Outer Specifications

Outer dimensions of each of the μGPCsx products are given below. (unit: mm)

(1) Power supply module TD1S-22/TD1S-42



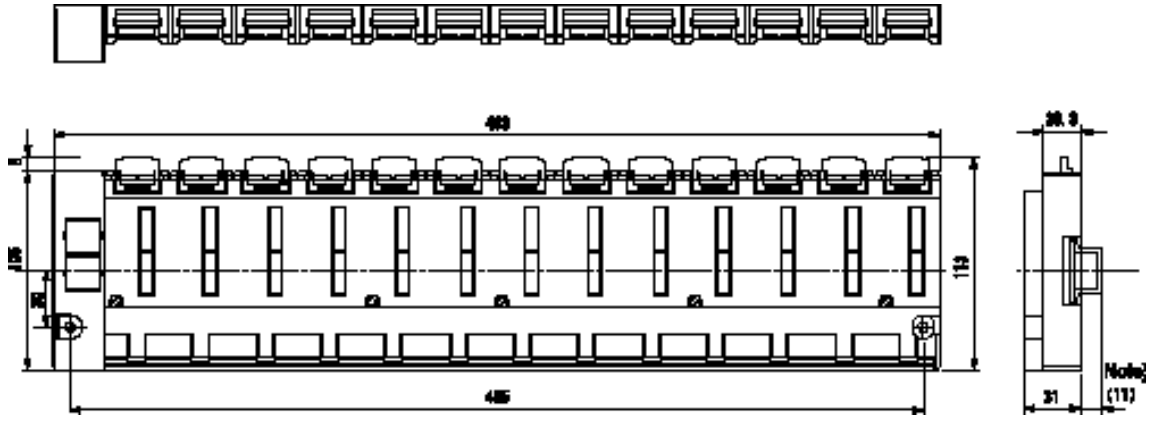
(2) CPU module TD1PS-32/TD1PS-74



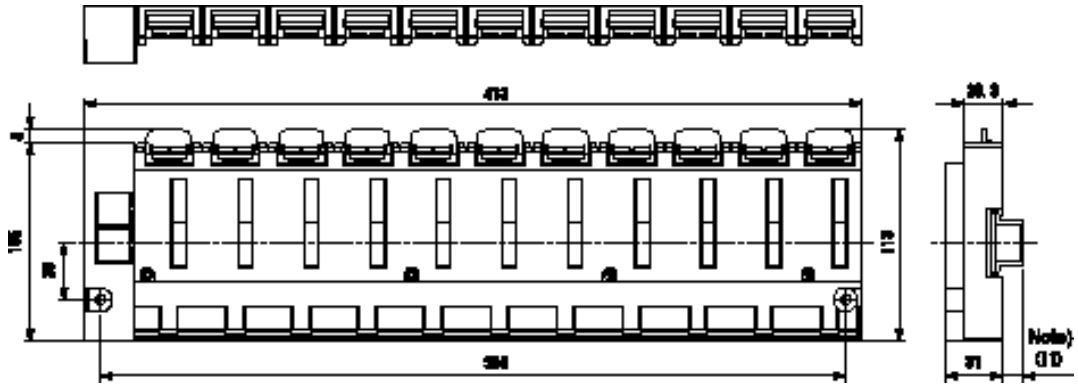
Note) In the case of the standard CPU, the user ROM card cannot be attached/ detached unless the battery folder is opened at an angle of 180°.

(3) Base board

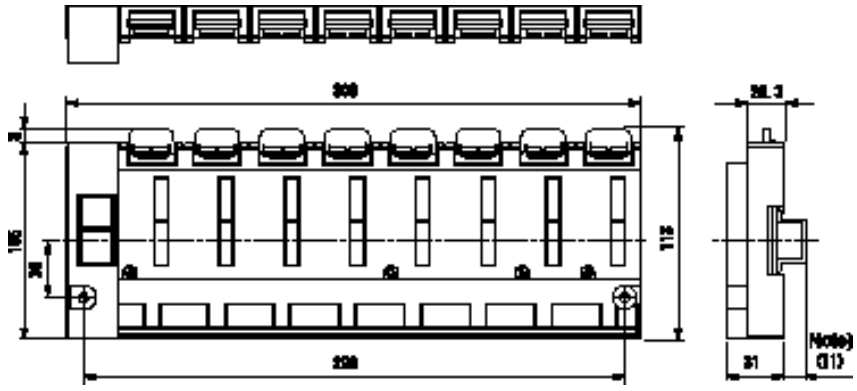
[1] TD1BP-13/NP1BS-13



[2] TD1BS-11

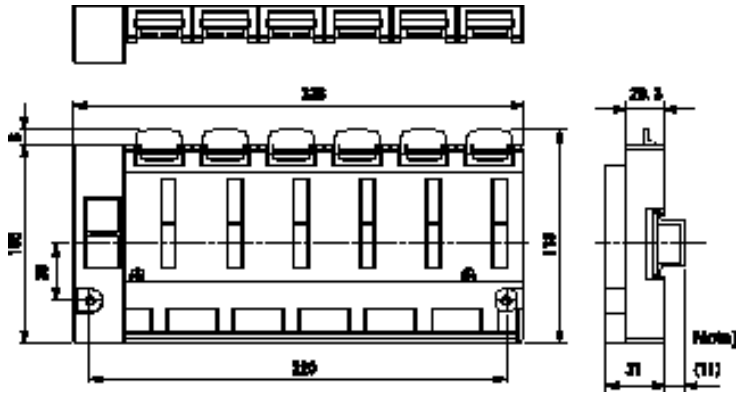


[3] TD1BS-08



Note) The dimensions in the parentheses: ( ) are those when the rail (TH35-15AL) is used.

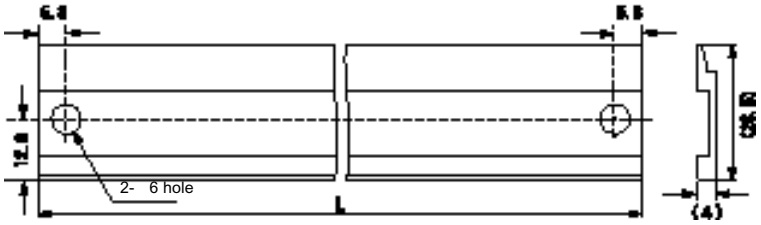
[4] TD1BS-06



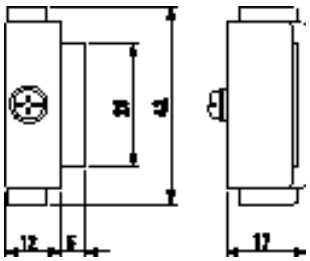
Note) The dimensions in the parentheses: ( ) are those when the rail (TH35-15AL) is used.

(4) Base board installation hardware (attached to the base board)

Classification	L (mm)
For TD1BP-13/TD1BS-13	476.5
For TD1BS-11	406.5
For TD1BS-08	301.5
For TD1BS-06	231.5

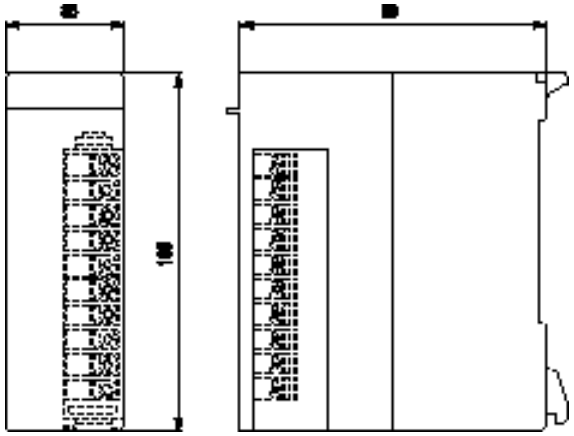


(5) Fixing hardware for base board

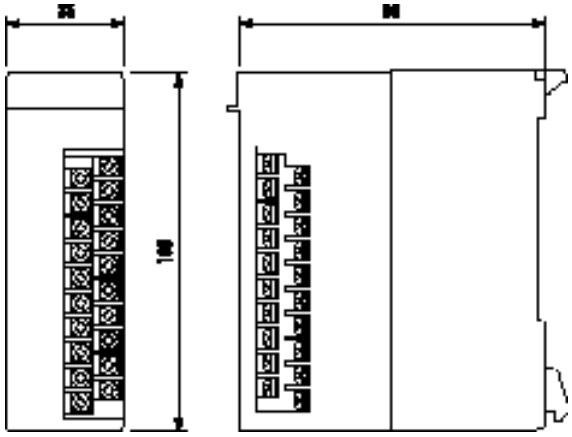


(6) I/O module

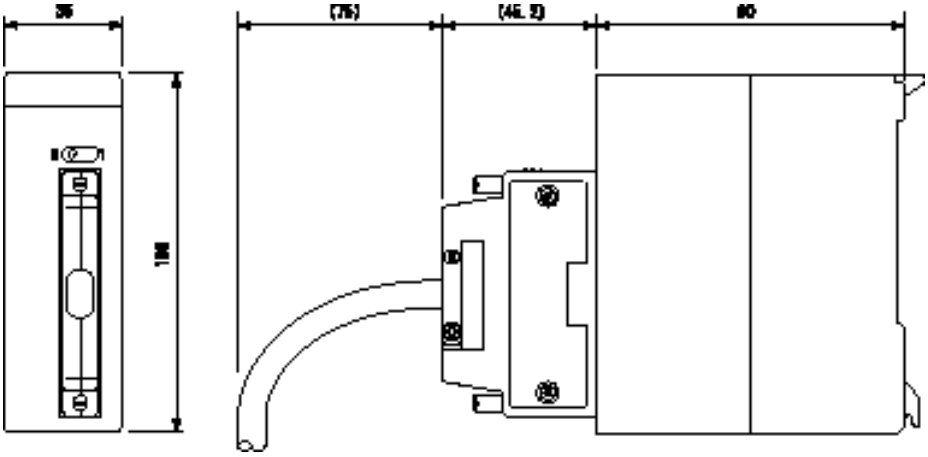
[1] 6-point/8-point modules



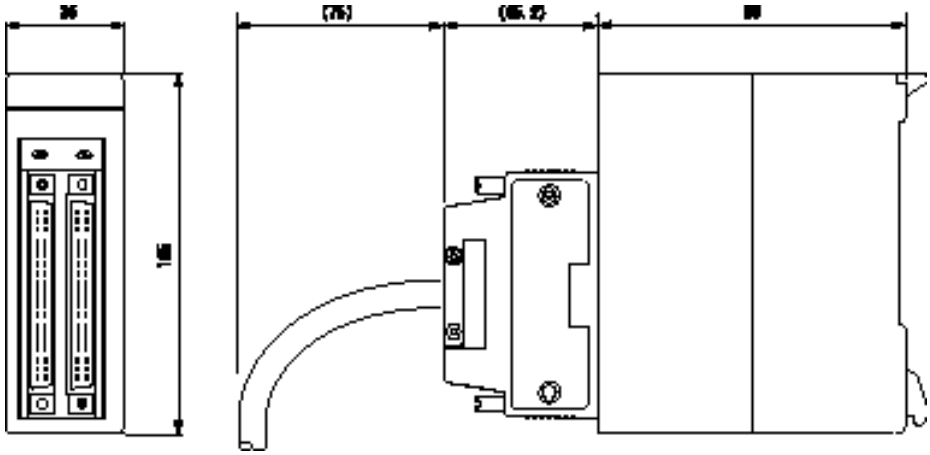
[2] 16-point module/analog input module/analog output module



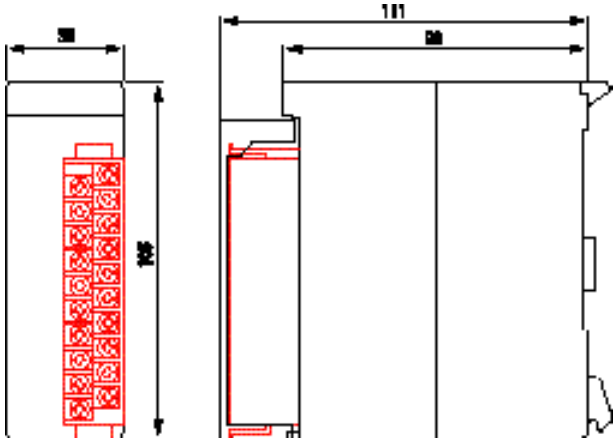
[3] 32-point module



[4] 64-point module

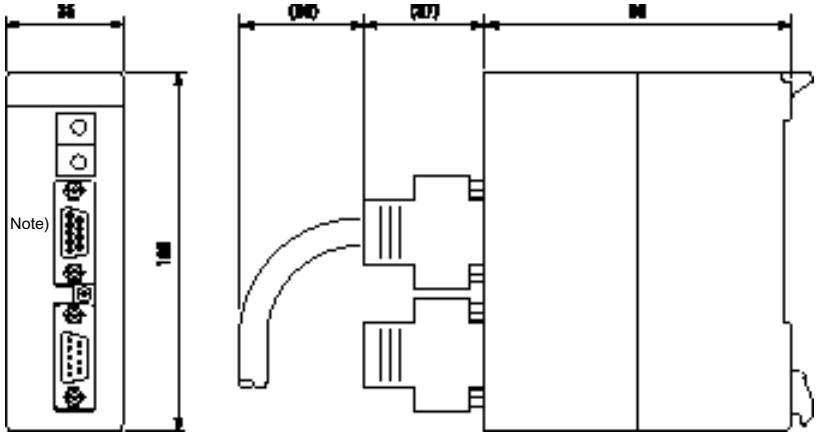


[5] Terminal block projecting module (temperature measuring resistor input module NP1AXH4-PT, thermocouple input module NP1AXH4-TC)



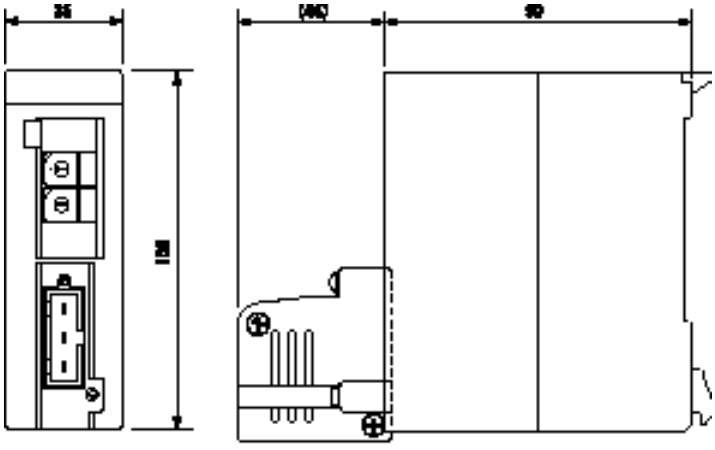
(7) Communications module

[1] Versatile communications module NP1L-RS1/2/4



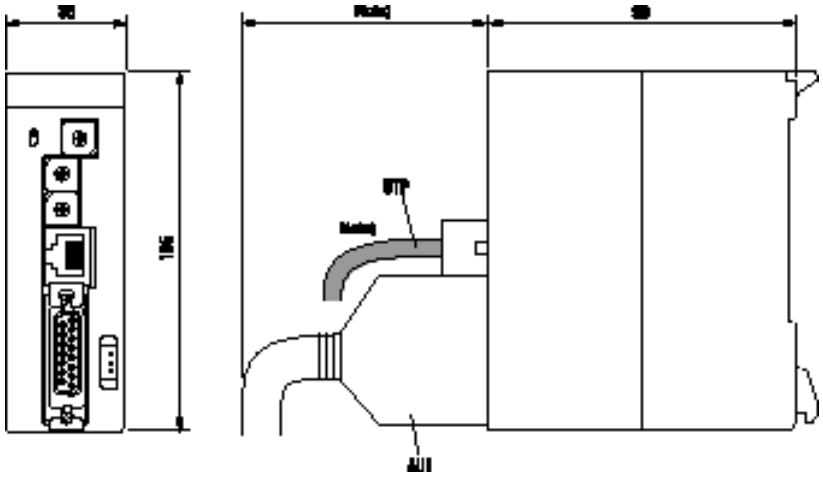
Note) With or without connectors, switches depends on the model, but the outer dimensions are the same.

[2] OPCN-1 master module NP1L-JP1/OPCN-1 slave module NP1L-RJ1



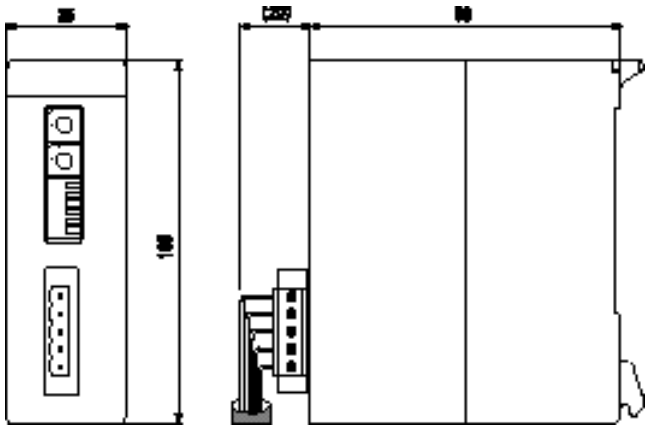
Note) With or without connectors, switches depends on the model, but the outer dimensions are the same.

[3] FL-net module NP1L-FL1

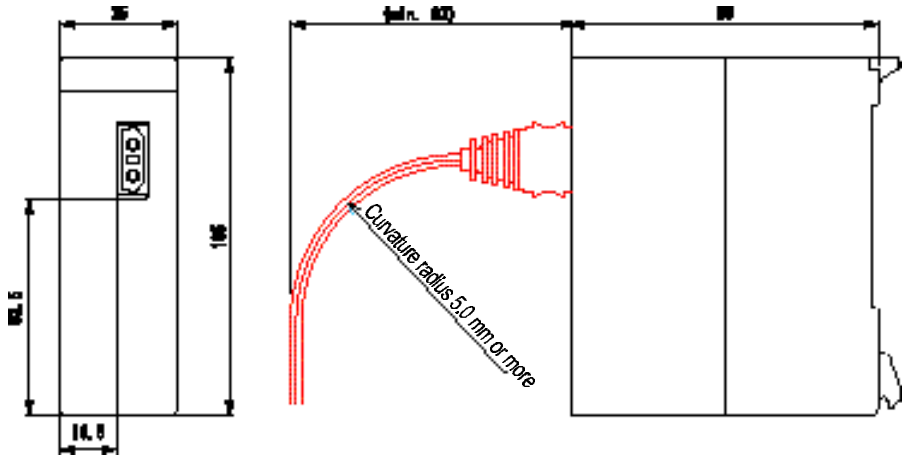


Note) For the AUI cable or UTP cable, the connector size and bending of the cable should be considered. (For the bending size, check the specifications of the cable used.)

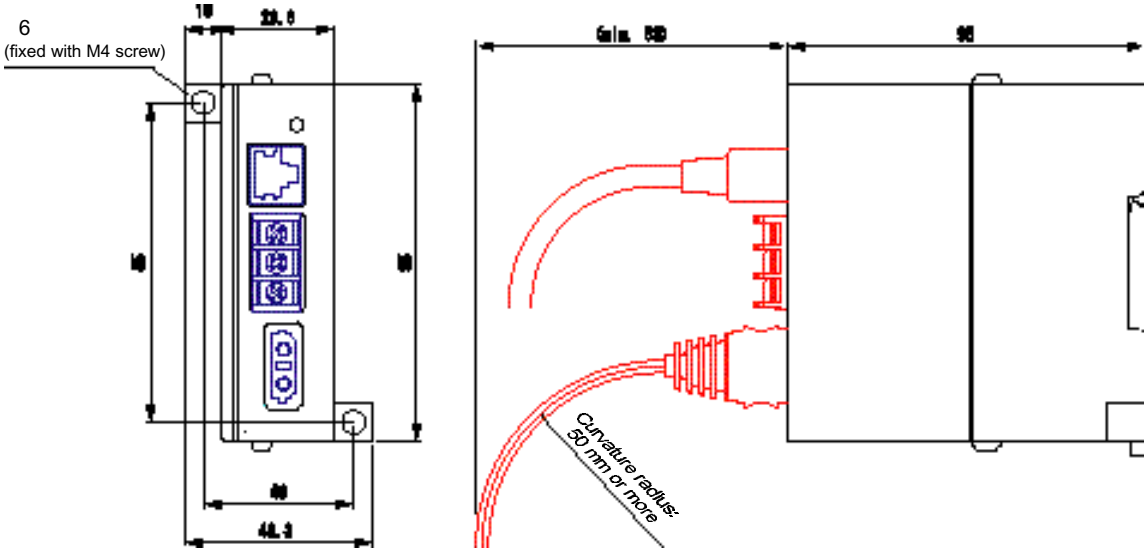
[4] DeviceNet master module NP1L-DN1



[5] SX bus optical link module NP1L-0L1

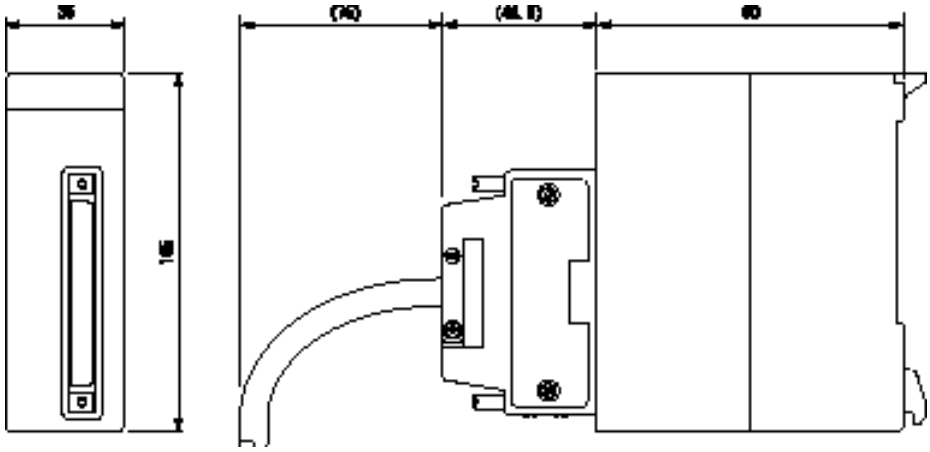


[6] SX bus optical link converter NP2L-0E1

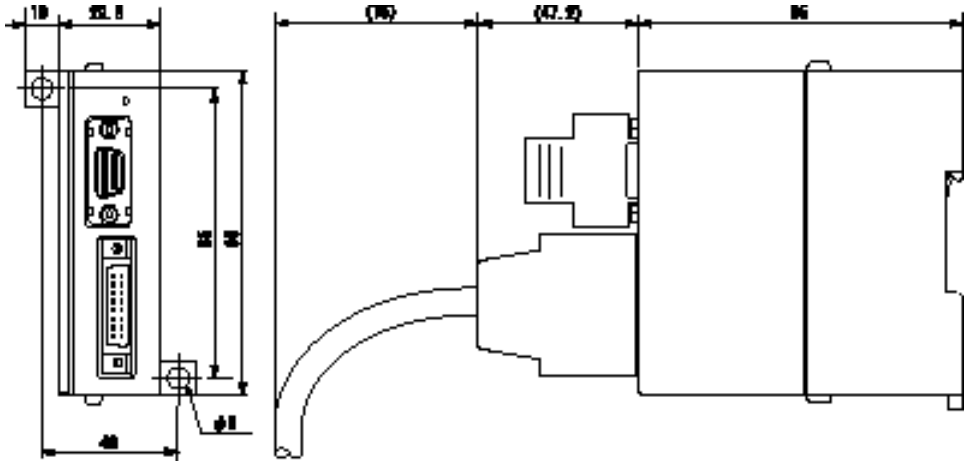


(8) Positioning module/unit

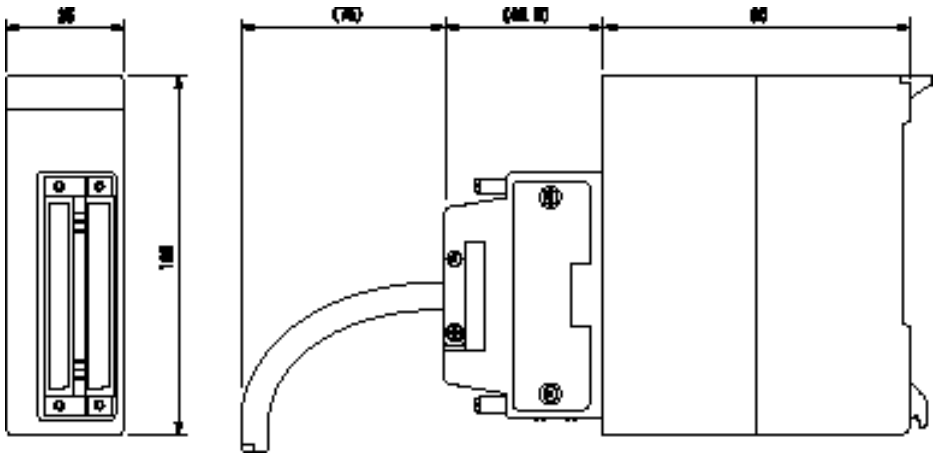
[1] High-speed counter module NP1F-HC2/multi-channel high-speed counter module NP1F-HC8



[2] Signal converter NP2F-LEV



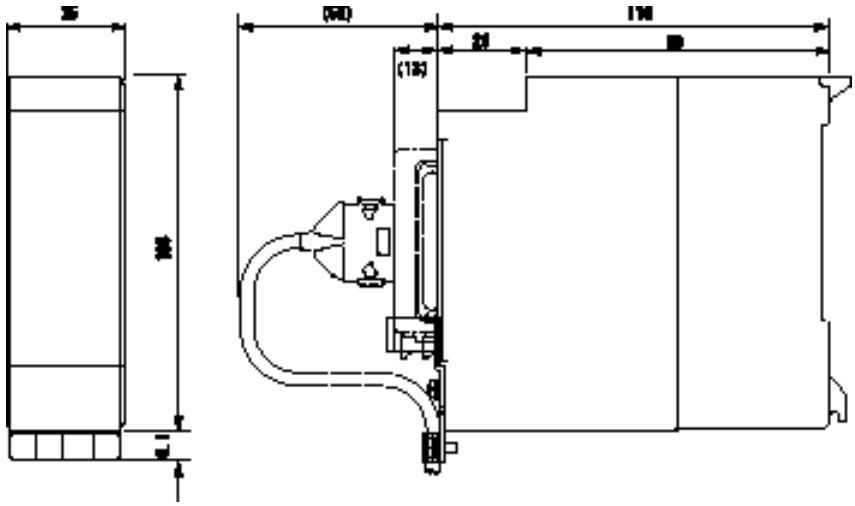
[3] Positioning module NP1F-MA2/NP1F-MP2/NP1F-HP2



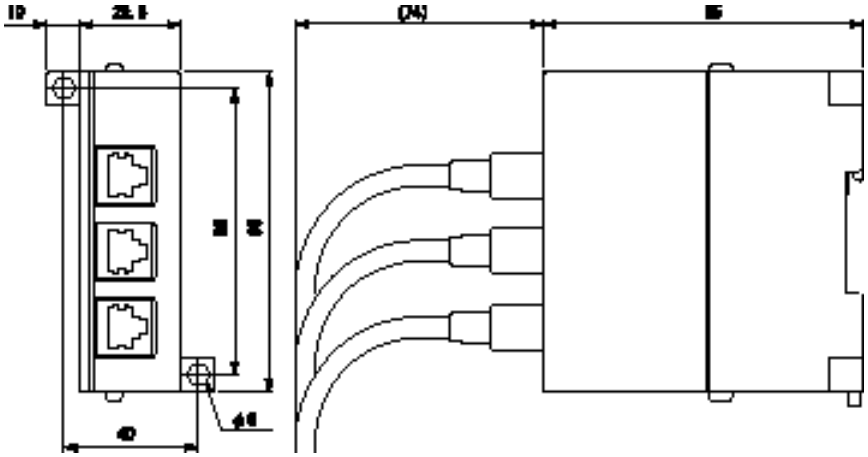
(9) Function module/unit

[1] PC card interface module NP1F-PC2

Memory card interface module NP1F-MM1



[2] SX bus T-branch unit NP8B-TB



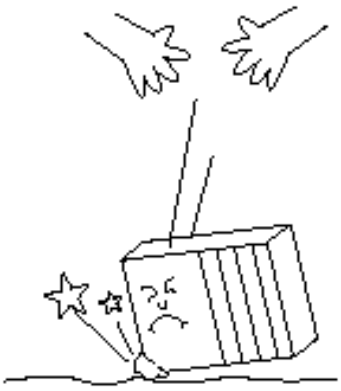
Chapter 4
Installation and Wiring

Table of contents

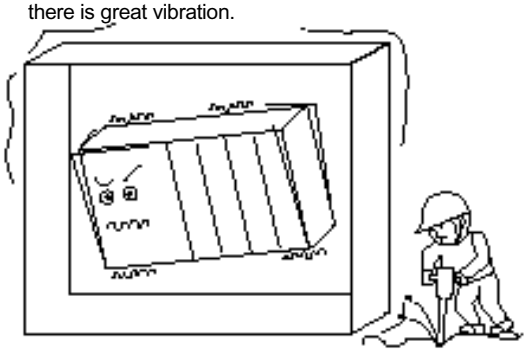
4-1 Handling Notice

• **Cau**	• Avoid the following when installing and using a product. Failure to do so may ause breakage, a malfunction or a fault of the product.

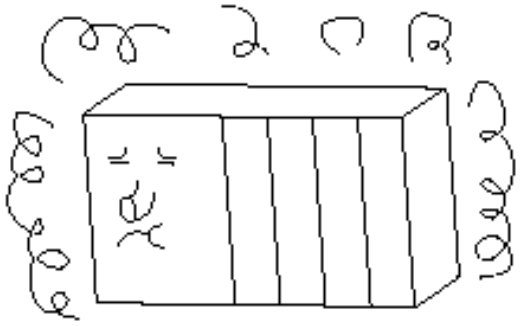
• [1] Do not drop it or let it fall down.



• [2] Do not install it particularly in a place where there is great vibration.

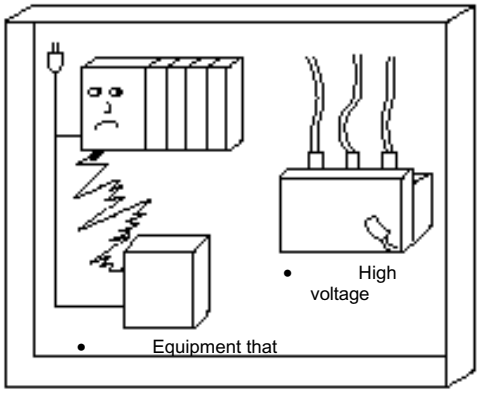


• [3] Do not install it in a place around which there are corrosive gasses.



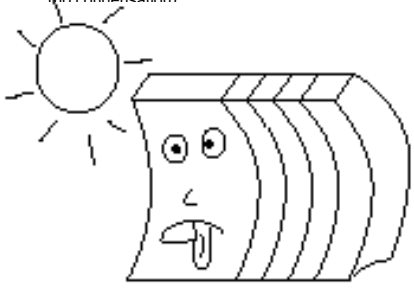
• [4] Do not install it in the same panel as that for equipment of high voltage (3000 V, 6000 V or more.)

• [5] Do not use it with the same power supply



• [6] Do not use it in an environment of high temperatures, high humidity or of low temperatures. (It should not be used in a place where there is a rapid change in temperature and there is condensation.)

{ • Ambient temperature used 0 - 55°C
Ambient humidity used 20 - 95% RH
(no condensation) }



4-2 Before Installation

4-2-1Checking the commodities

First of all, check the following at the time of unpacking the commodities you purchased.

[1] Whether the commodities are what you ordered.

[2] Whether there is no breakage etc. in the commodities.

[3] Whether all accessories are in order. (The accessories are described in "1-2 Model list.")

⚠ Caution
Do not use those that were found to be damaged or distorted at the time of unpacking. Failure to observe this may cause a fire, a malfunction or a fault.

4-2-2Environment to install the control panel

⚠ Caution
Use it in an environment that is described in instructions and manuals. The use in an environment of high temperatures, high humidity, condensation, dusts, corrosive gasses and, in particular, of great vibrations and shock, may cause electric shock, a fire, a malfunction or a fault.

Attention should be paid to the following items to ensure high reliability and safety as a system.

Item	Specifications	Remarks
Operating ambient temperature	The panel should be within the range of 0 - 55◦C due to the specified ambient temperature of this equipment. Do not install the panel in a place where it is exposed to direct sunlight.	If the ambient temperature is high, install fans and air conditioners, and if it is low heaters inside the panel should be provided, to attain the specified range.
Relative humidity	The relative humidity should be within the range of 20% - 95%. Do not let condensation occur by causing a rapid change in temperature.	In wintertime in particular, when the heater is turned on or off, there may be condensation resulting from a change in temperature. If there is the possibility, countermeasures should be taken such as keeping the panel powered on, etc.
Antivibration performance	Half amplitude: 0.15 mm, Fixed acceleration: 19.6 m/s^2 Note)	If the vibrations are great, countermeasures should be taken such as: Fixing the panel with antivibration rubber, preventing the vibration of the structure of the building and the floor, etc.
Shock resistance	Peak acceleration: 147 m/s^2 Note)	
Dusts	It should be used in an environment having no conductive dusts.	In a place where there are a lot of gasses or dusts, an air purge (purification of air) of the panel should be carried out.
Corrosive gasses	It should be used in an environment having no corrosive gasses.	

Note) Antivibration performance and shock resistance decrease when the DIN rail is installed. Use the panel in an environment where there is no vibration or shock.

(Check the contents described in "3-1 General Specifications.") Also, do not use it in an environment where vibrations or shock occur continually even when the unit is fixed in the panel with screws.

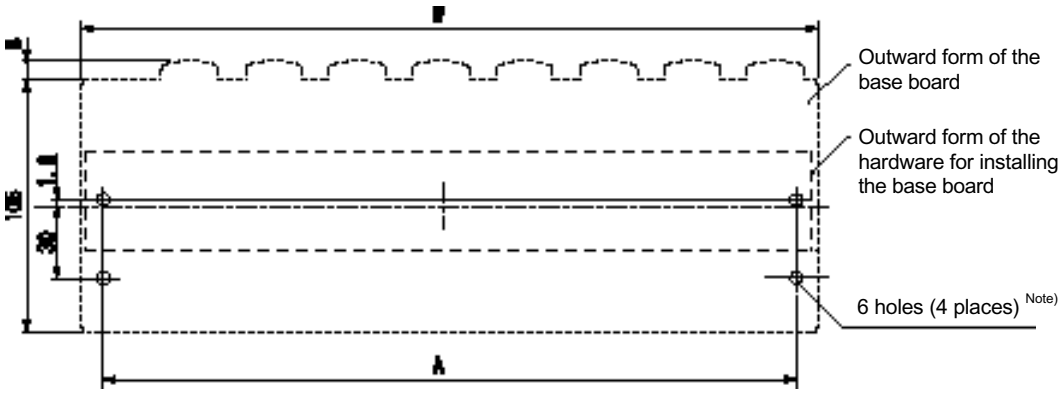
4-3 Installation onto the Control Panel

In installing the μGPCsx onto the control panel, the base board can directly be installed onto the control panel, or alternatively onto the DIN rail.

4-3-1 Direct installation onto the control panel

If the base board is installed directly onto the control panel, the hardware for installing the base board in the accessories (NP8B-□) should be used.

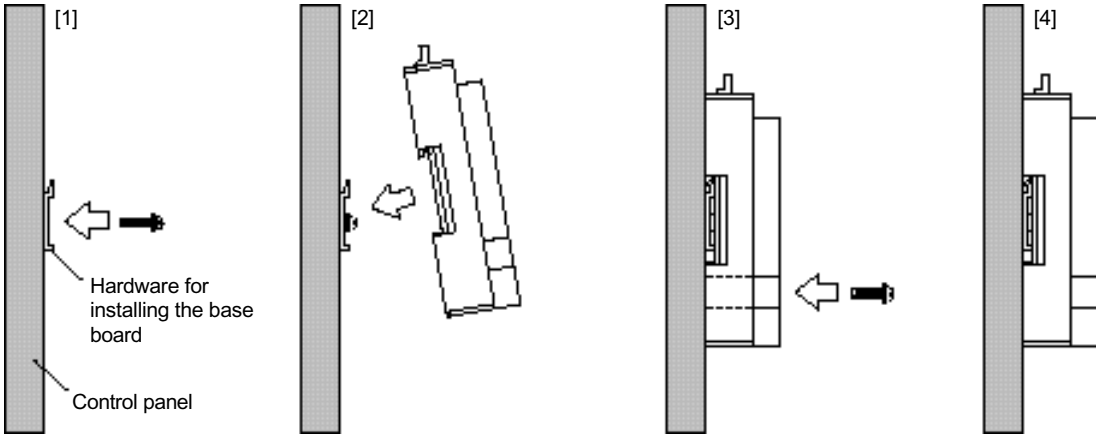
(1) Installation dimensions



Note) The hole size set forth in the above figure is the size of the hole made on the base board and the hardware for installation.

Base board model	Size of the hole for installation A (mm)	Base board width W (mm)
TD1BS-06	220	238
TD1BS-08	290	308
TD1BS-11	395	413
TD1BS-13	465	483
TD1BP-13	465	483

(2) Installation procedure of the base board



[1] Install the hardware for installing the base board (accessory). M5 screws should be used.

[2] Hang the base board onto the hardware for installing the base.

[3] Put screws through the holes for direct fixation and fix the base board.

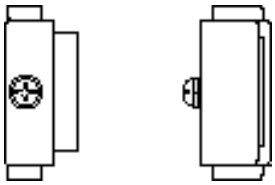
[4] Now the installation of the base board is over. After the base board is installed, each of the modules such as power supply modules, CPU modules etc. should be installed.

4-3-2Installation onto the DIN rail

If the base board is installed onto the panel using the DIN rail, the fixation hardware (NB8B-ST) to be purchased separately should be used.

(1) Fixation hardware (NP8B-ST)

The fixation hardware to be purchased separately should be put onto both ends of the base board and should then be fixed onto the DIN rail.

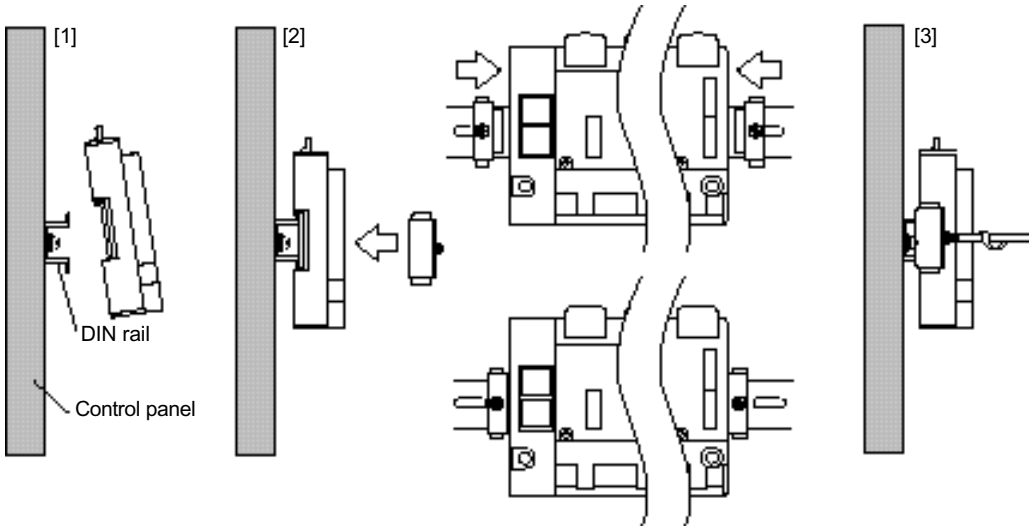


(2) DIN rail

The DIN rail listed below should be used.

Model	Height (mm)	Rail length (mm)	Material
TH35-7.5	7.5	900	Steel
TH35-7.5 AL	7.5	900	Aluminum
TH35-15 AL	15	900	Aluminum

(3) Installation procedure of the base board

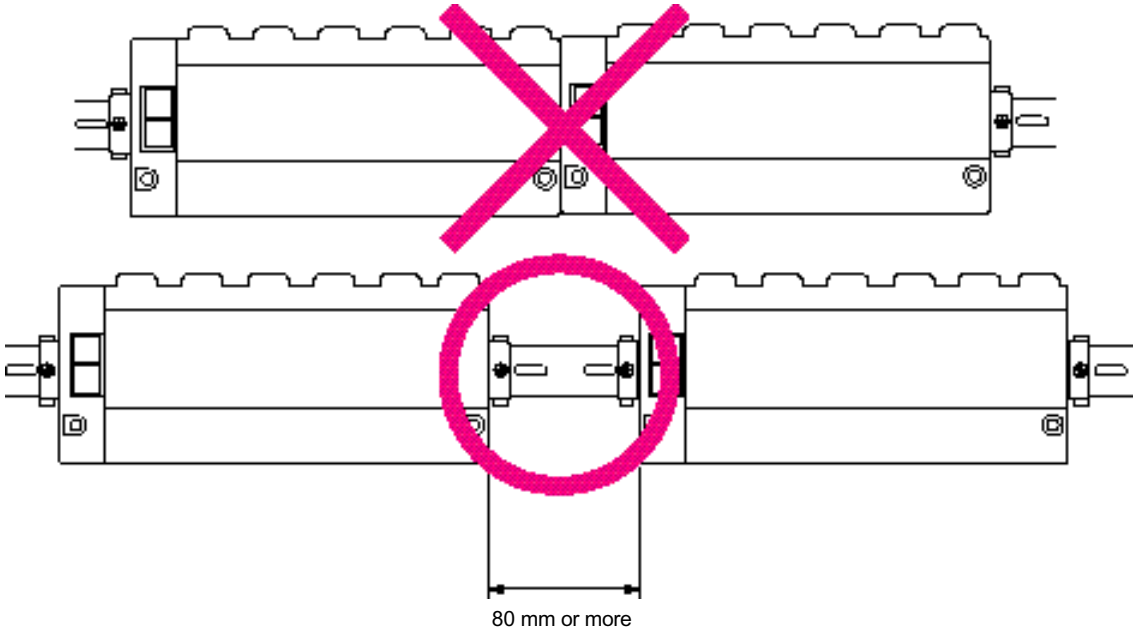


[1] Install the DIN rail onto the control panel and hang the base board onto the DIN rail.

[2] Put the fixation hardware through the DIN rail from both sides of the base board and insert the hardware into the nail insertion parts of the base board.

[3] Tighten the screws of the fixation hardware with a screwdriver. (Tightening torque: 1.0 - 1.3 N· m)

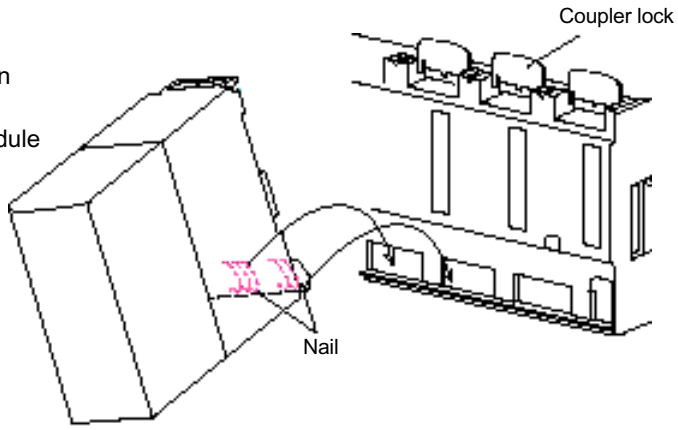
Note) When fixing the base board, the fixation hardware must be installed onto both sides of 1 unit without fail.



4-3-3Installation of each module onto the base board

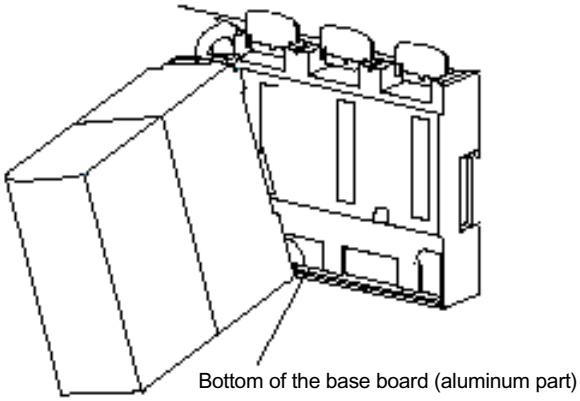
[1] Erect the coupler locks of the slot in which a module is mounted.

Put the nails at the back of the module onto the bottom of the base board (aluminum part).

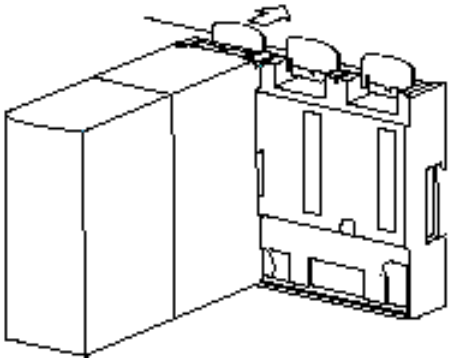


[2] Install the upper part of the back of the module onto the base board.

* At this time, make sure that the nails at the upper back of the module are securely hooked onto the bottom of the base board (aluminum part) so that the module will not slide toward the left or right. If the module is pushed in while it is slid toward the left or right, the connector may be broken.



[3] Make sure that the coupler lock is hooked in the holes at the upper back of the module. If it is loosened, push the coupler lock toward the direction as indicated with the arrow.



* To remove the module, lay down the coupler lock to this side and follow the procedure in reverse order.

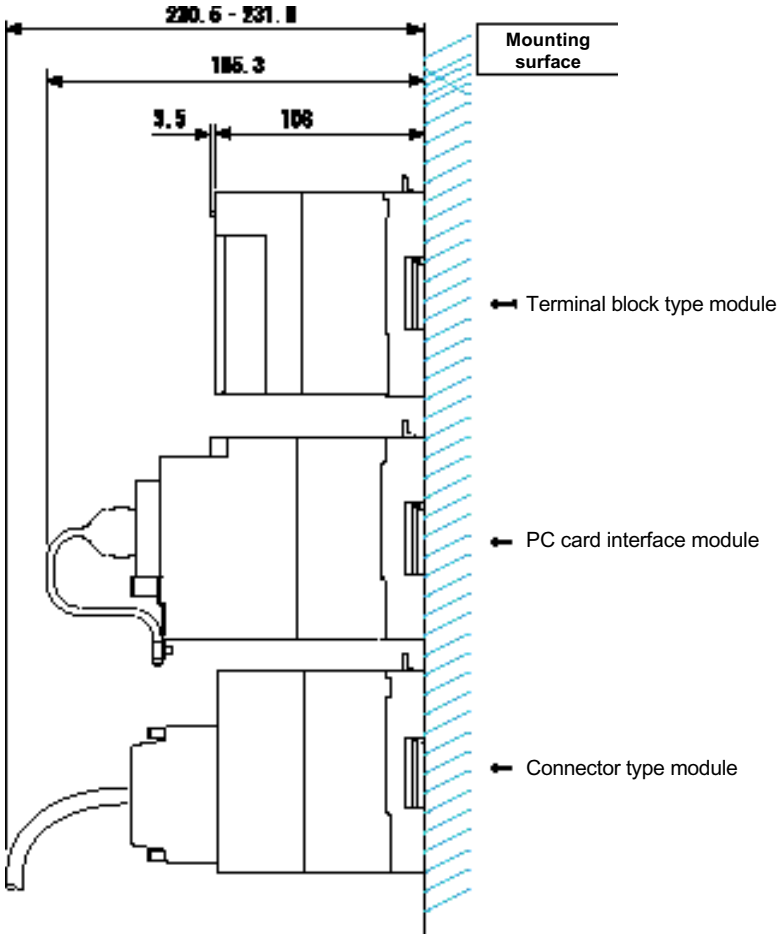
Note 1) Live wires must never be attached/detached. Also, modules must be removed only after making sure that the ALM LED (red) of the power supply module has completely been turned off.

Note 2) In the event that the module has been mounted by mistake with the nails at the back of the module are not hooked to the bottom of the base board, then lay down the coupler lock to this side and remove it by pushing it onto the bottom of the base board.

Removing it by force may cause breakage.

4-3-4Installation height of the base board + module

The height of major modules mounted on the base board is shown in the illustration below.



- Note) Make up a structure of the control panel in which ventilation, ease of operation and ease of maintenance are taken into consideration, making reference to the dimensions in the above illustration.

4-3-5Installation position of the PC

Caution

Secure the space for installation as described below and at the same time make sure that good ventilation is secured.

If ventilation is not enough, it may cause abnormal heating, resulting in a fault of the PC.

Required space is as follows.

[1] For between the units and the remote I/Os space of 110 mm is required in the vertical direction, and space of 10 mm is needed in the horizontal direction.

Note) If the base board is installed onto the DIN rail, space of 80 mm or more is required in view of the size of the fixation hardware and ease of installation work.

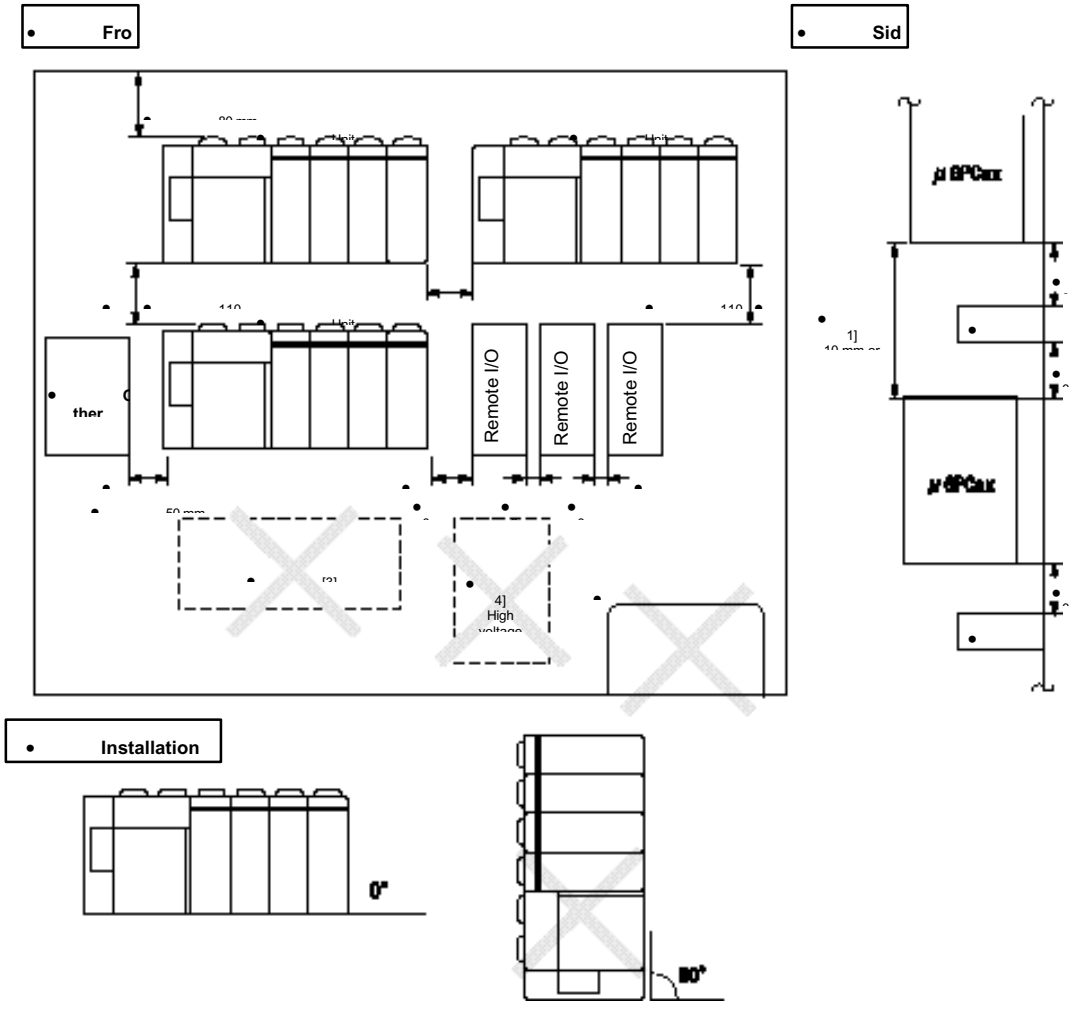
[2] Space of 50 mm or more should be provided between the units, remote I/Os and other equipment or structures to secure good ventilation.

[3] Do not install heating elements (such as a heater, transformer, resistor or others) beneath the PC.

[4] The PC should be separated (shielded) from high voltage equipment, high voltage lines and power-driven machinery as farther as possible, and the I/O lines of the PC must not be wired in parallel with such machines.

[5] The surface on which the PC is installed should be perpendicular to the floor surface of the panel, and it must not be installed horizontally.

[6] The angle of installing the PC should be 0◦ (vertical installation) and no other angle should be employed.



4-4 Wiring

4-4-1 Matters requiring attention at the time of wiring work

When wiring work is carried out, safety notice must be observed without fail.

(1) Dangerous matters at the time of installation/wiring work

Danger
Do not touch live parts such as terminals etc. while electricity is on. Failure to observe this may cause electric shock.
Mounting, dismantling, wiring work, maintenance and inspection must be made with electric power supply shut off without fail. Work while power is activated may cause electric shock, a malfunction or a fault.
Emergency stop circuit, interlock circuit etc. must be configured outside of the PC. Failure to observe this may result in breakage in machines or accidents caused by a fault of the PC.
Never make the FG terminal open while short-circuiting LG - FG. (Ground the wire without fail.) Failure to observe this may cause electric shock.

(2) Matters requiring attention at the time of installation/wiring work

Caution
Electric wires of a size fit for the voltage to be applied and the current to be input must be selected and must be tightened with specified torque. Any improper wiring or tightening may cause a fire or a drop, a malfunction or a fault of the product.
Screws for terminals and screws for installation must be checked at regular intervals to ensure that they are securely tightened. Their use while in a loosened state may cause a fire or a malfunction.
Construction work must be done so that no foreign matter such as trash, debris of electric wires, iron powder etc. gets into the inside of equipment. Failure to observe this may cause a fire, an accident, a malfunction or a fault of the product.
When performing the installation/wiring work of the PC, antistatic measures should be taken such as wearing a band to remove static electricity, etc. to discharge static electricity with which human bodies etc. are charged. Also, do not touch directly the terminals of an IC or pins of a connector etc. on the printed circuit board. Excessive amount of static electricity may cause a malfunction or a fault.

(3) Matters requiring attention at the time of checking the wiring

Caution
Change of a program, forced output, start-up, stop etc. while in operation must be made after making sure that safety has been secured. Failure to observe this may cause breakage in machines or an accident as a result of functioning of machines by misoperation.
Loader connectors must be inserted in the proper direction. Failure to observe this may cause a malfunction.

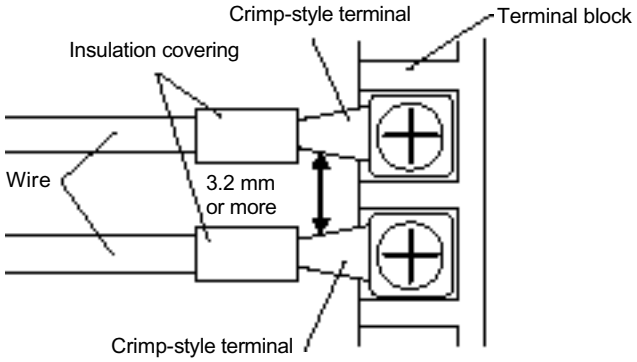
(4) Matters requiring attention after the wiring is over

Caution
After wiring is over, trash prevention paper in modules/units must be removed without fail. Operation without removing the trash prevention paper may cause a fire, an accident, a malfunction or a fault of the product.

(5) Other matters requiring attention

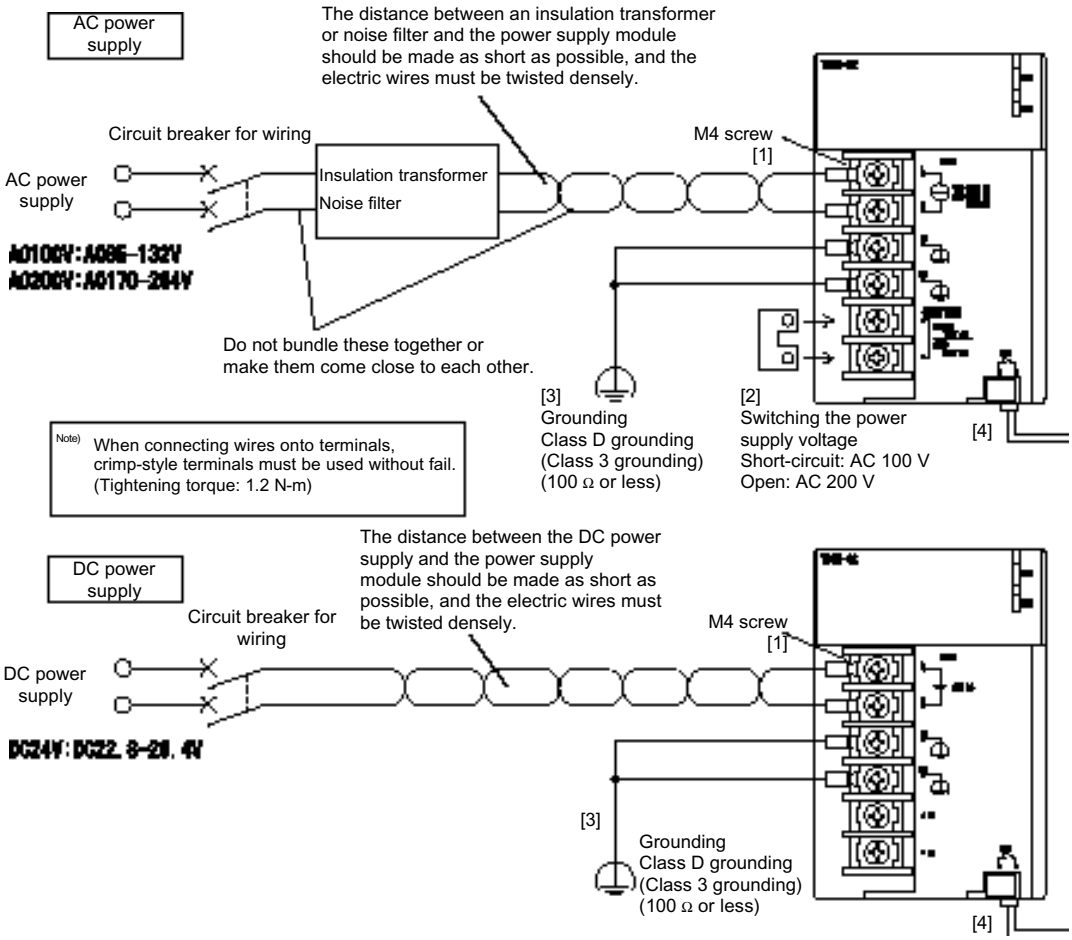
When wiring is made onto the terminal block type module, attention must be paid to the following:

- Crimp-style terminals should be used in wiring, paying attention to the inclination of the crimp-style terminals, and an electrical spacing between the wires adjacent to each other (3.2 mm or more) must be secured.
- The crimp-style terminal should also be provided with an insulation covering.



- When wiring, the length of the bent part of the wire should be 1.5 times as long as the covering or more. If it is excessively short, breakage in wires may occur.

4-4-2Wiring of the power supply



(1) Wiring of the power supply

- In the case of an AC power supply

  Wires of 2 mm^2 should be twisted densely and wired onto the power supply of AC 100 - 120 V or AC 200 - 240 V.

- In the case of a DC power supply

  Wires of 2 mm^2 should be twisted densely and wired onto the power supply of DC 24 V (DC 22.8 - 26.4 V).

[For reference]

While the allowable range of the AC power supply of the μGPCsx is AC 100 V: AC 85 - 132 V, AC 200 V: AC 170 - 264 V, it is recommended that a range should be employed that is as close as possible to the rated values (AC 100 - 110 V, AC 200 - 220 V).

If the voltage is too low, a small amount of drop in voltage may cause a power outage, and if the voltage is too high, the heating value of the power supply module becomes great, which may result in the shortened service life. When the fluctuations in voltage are great, measures should be taken such as connecting a constant voltage transformer, etc.

One of the countermeasures against the noise that comes from the power supply is to install an insulation transformer or noise filter between the circuit breaker for wiring and the power supply module. If this method is employed, attention should be paid to the following.

- Do not bundle the wire of the insulation transformer or noise filter at the primary side and that at the secondary side together or make them come close to each other. Failure to observe this may eliminate the noise removal effect.
- The distance between the insulation transformer or noise filter and the power supply module should be made as short as possible, and wires of 2 mm^2 must be twisted densely when wiring.

(2) Switching of power supply voltage (AC power supply only)

When short-circuiting: AC 100 V (a short-circuiting strip that is an accessory of the power supply module should be used.)

When open: AC 200 V

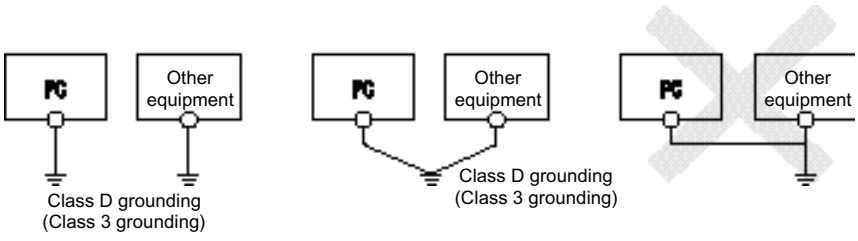
(3) Grounding

When grounding, the following should be carried out.

- The FG terminal should be connected in the form of the branch of a tree, with the grounding converging part of each panel, namely, with the FG bus, or with the FG converging terminal block, or else with the stud. The diameter of the grounding wire should be 2 mm^2.

  The grounding point should be as close to each unit as possible, and the length of the grounding wire should be as short as possible.
- The grounding converging part of each panel should be connected in the form of the branch of a tree, with a grounding converging plate that is provided for each dispersed area unit, and the diameter of the grounding wire should be 5.5 mm^2 or more.

  The grounding wire should be separated as farther as possible from the wires of the strong electricity circuit and the main circuit, and at the same time it should be laid so that the distance in which it is in parallel with such wires will be made as short as possible.
- The grounding should be configured with dedicated grounding poles and grounding wires that are separated from the grounding system of other strong electricity equipment.
- The grounding should be used for the grounding only as much as possible, and the grounding work should be of the Class D grounding (Class 3 grounding). The dedicated grounding poles should be separated from the grounding poles of other equipment with a distance of 10 m or more.
- If dedicated grounding is not possible, then the shared grounding as illustrated below should be employed.
- If installation is made in an area having an especially unfavorable lightning surge environment, then all of the base board, remote I/O units etc. should be electrically insulated from the panel board of the control panel, and besides the grounding of each unit should be made independently, connecting it with a ground.

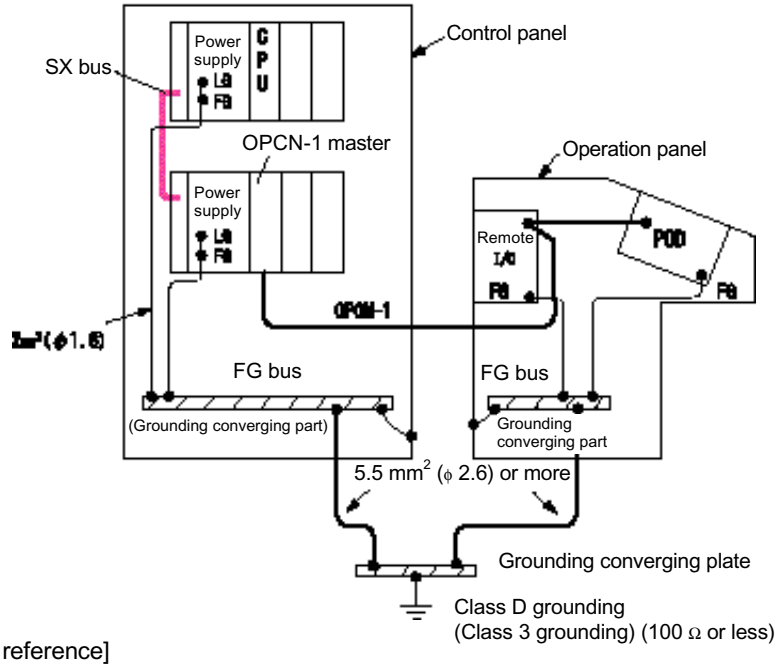


Dedicated grounding (best) Shared grounding (good) Common grounding (no good)

Danger

Never make the FG terminal open while short-circuiting LG - FG. (Ground the wire without fail.)
Failure to observe this may cause electric shock.

< Example of grounding wiring >



[For reference]

The μGPCsx has been given sufficient countermeasures against noise, and hence can be used without grounding except that the noise is especially great. If grounding of good quality cannot be obtained in such cases as the grounding wire is used in common with other equipment, or it is connected to the beam of a building (steel frame part), or else it is wired to the grounding wire intended to prevent electric shock, then it is better not to make a grounding connection.

However, even in such a case of not making a grounding connection, the control panel should securely be grounded.

(4) Wiring of the ALM contacts

If multiple power supply modules (2 units or 3 units) are mounted on 1 base board and used in the case of power supply modules with redundancy, etc., ALM contacts are used to detect faults of the power supply modules.

The ALM contacts should be used being wired with input modules as shown in the illustration below, or being wired to external alarm lamps etc.

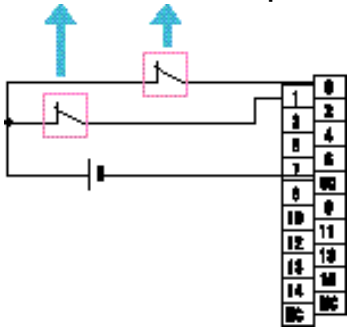
The ALM contact is a normally closed contact (b-contact), which is OFF when the power supply module is in the state of normal operation (when the output voltage is within the range of 22.8 - 26.4 V), and is otherwise ON.

<Example of connection>

An example of connection by means of a DC input module (NP1X1606-W) is given in the illustration below.

The power supply in which abnormality occurred can be identified.

To ALM connectors in power supply modules



4-4-3Input and output wiring

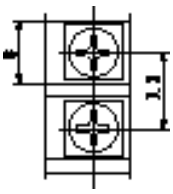
The input and output wiring may be varied depending on the model of the module used, external equipment being connected, electrical specifications, and an environment in the surrounding area. Explanations of contents in general are given herein.

(1) Wiring of terminal block type modules

< Size of wires and crimp-style terminals that can be used >

The terminal block type module is of M3_10-pole, or alternatively of M3_20-pole. When wiring, appropriate wires should be used, employing crimp-style terminals without fail. The sizes of the terminals and wires that can be used in terminal block type modules are as follows.

Manufacturer	Shape	Model	Wire size	
			AWG	mm^2
AMP	Round	36467	22-18	0.3 - 0.8
		34104		
		34105		
Nichifu	Round	0.3-3	24-20	0.2 - 0.5
		0.3-3N		
		1.25-3	22-16	0.3 - 1.3
		1.25-3N		
		1.25-3S		
		1.25-3.5N		
		1.25-3.5S		
		2-3N	16-14	1.3 - 2.0
	Open-end	0.3Y-3	24-20	0.2 - 0.5
		1.25Y-3	22-16	0.3 - 1.3
		1.25Y-3N		
		1.25Y-3S		
		1.25Y-3.5		
		2Y-3	16-14	1.3 - 2.0
		2Y-3.5S		
		AT1-10	22-16	0.3 - 1.3
		AT2-10	16-14	1.3 - 2.0
JST Mfg.	Round	SRA-20-3.2	22-18	0.3 - 0.8
		SRA-20T-3.2		
NTK	Round	0.4-3	26-22	0.2 - 0.3
		1.25-3	22-16	0.3 - 1.3
	Open-end	VR1.25-3		
		VD1.25-3		
		VD2-3S	16-14	1.3 - 2.0



Terminal size

Note) If wires of 2.0 mm^2 are used as signal wires, in some cases the terminal cover of a module may not be able to be closed.

< Tightening torque >

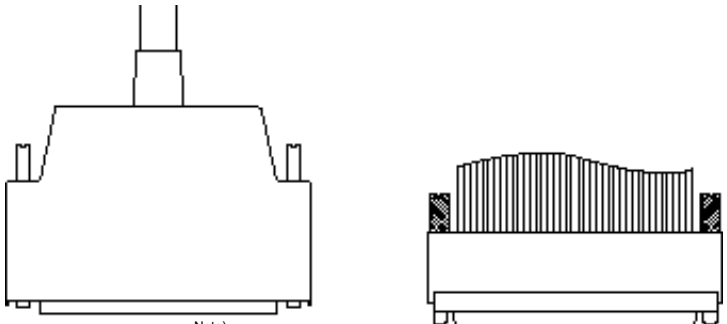
The tightening torque for the crimp-style terminals is 0.5 - 0.7 N - m.

(2) Wiring of the connector type modules

< Connectors used and the size of wires >

The connector to be used is the 40-pin connector manufactured by Fujitsu as shown below.

Type	Model (manufactured by Fujitsu)		Wire size
Soldering type	Socket: FCN-361J040-AU	Connector cover: FCN-360C040-B	AWG23 or less (0.26 mm^2 or less)
Crimping type	Housing: FCN-363J040 Contact: FCN-363J-AU	Connector cover: FCN-360C040-B	Standard terminal: AWG24-28 (0.2 - 0.08 mm^2) Terminal for wires of a large size: AWG22-28 (0.32 - 0.08 mm^2)
Insulation displacement type	FCN-367J040-AU/F (cover not required)		Flat cable 1.27 mm pitch Stranded wire: AWG 28 (0.08 mm^2) Single wire: AWG 30 (0.05 mm^2)

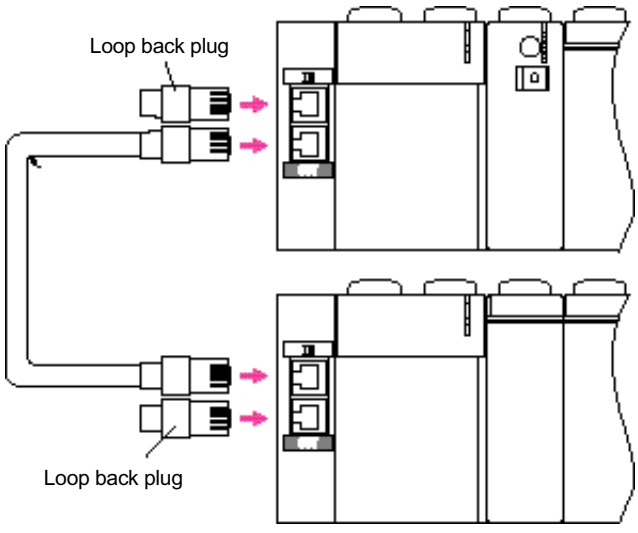


Note) For the soldering type, a model manufactured by Fuji Electric (NP8V-CN1) is employed.

4-4-4Wiring of the SX bus increasing cable

In the μGPCsx, connection between base boards is made by means of a dedicated SX bus increasing cable.

Connection should be made from OUT to IN on the base board. If the wiring is made like OUT-OUT or IN-IN, then because communication cannot be established, the system will not work. Also, SX bus loop back plugs must be connected to the end terminals.



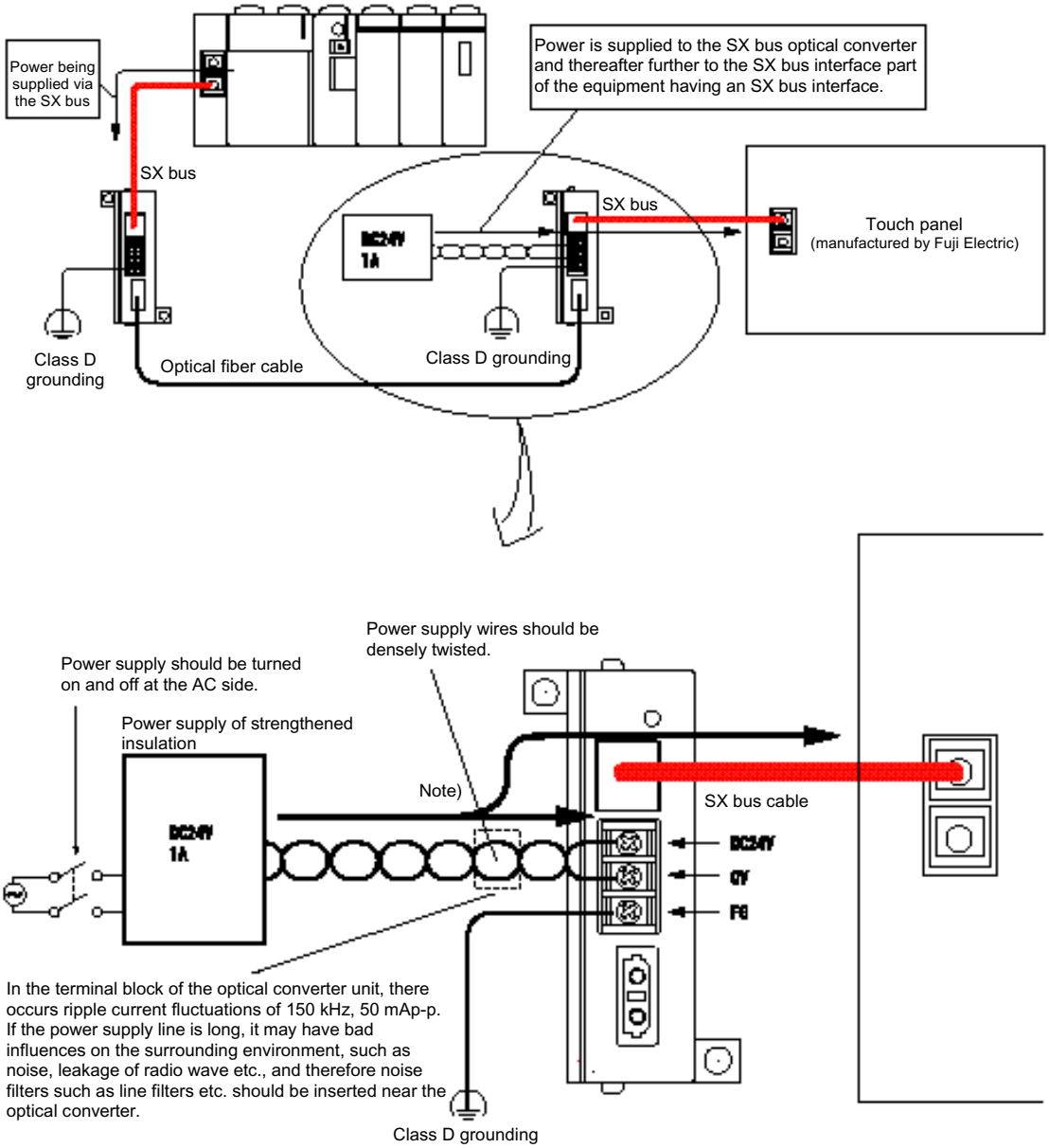
Note) Wiring should be made so that the bending radius of the SX bus increasing cable will be 50 mm or more.

4-4-5Wiring of the power supply part of the SX bus optical converter

Power to the SX bus optical converter (NP2L-0E1) is supplied by the SX bus cable or an external power supply.

If it is powered by an external power supply, a switching power supply of DC 24 V 1 A or more that has been processed by the strengthened insulation should be used.

Also, even if it is not powered by an external power supply, Class D grounding must be made to the FG terminal without fail.

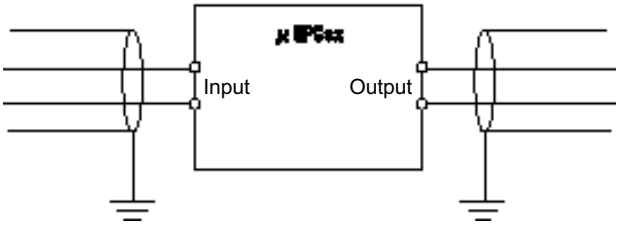


Note) Power that is supplied to this power supply terminal block is also supplied to the POD that is connected with the SX bus optical converter and SX bus cable and to the power supply of the interface part of the servo amplifier (maximum 0.7 A). If a lot of such SX bus equipment is connected and the power supply capacity from the SX bus exceeds 0.7 A, then the monitoring circuit inside the SX bus optical converter works and stops the power supply. To recover this, remove the causes of excessive current first, and then charge the power of the system again.

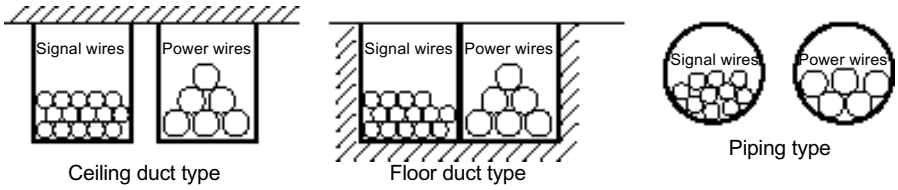
4-4-6Countermeasures against noise in the external wiring

As a general rule, countermeasures against noise in electronic equipment are taken to suppress noise at its source of generation, whereas it is also important to take measures so that the equipment will not be subjected to noise. The reliability of the system can be improved by implementing as many items as possible out of the countermeasures given below.

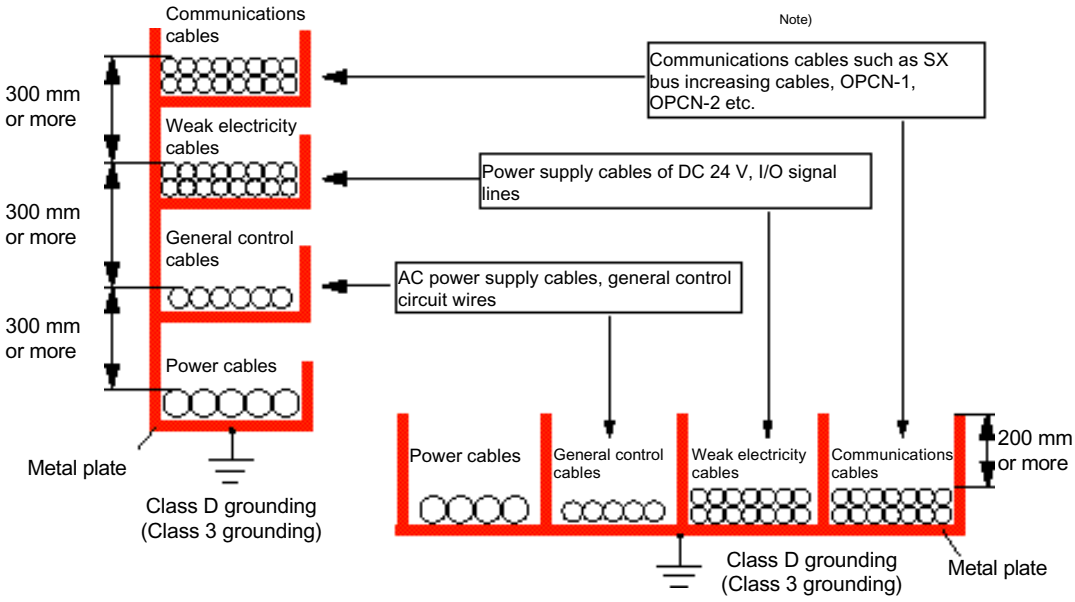
(1) Cables provided with shield should be used for signals of a TTL level, analog I/O signals etc., and they should be grounded at the PC side. Note, however, that the grounding at the side of the equipment connected with the PC may give a better result depending on the condition of external noise.



(2) When wiring, signal wires and power wires should be wired separately.



Note) If these wires are put in the same duct, then the following countermeasures should be taken.



Note) For the wiring of OPCN-1, OPCN-2 cables, refer to the manual of each cable.

4-4-7Emergency stop circuit and interlock circuit

The PC has sufficient reliability and there is no possibility of a decline in safety as a result of using the PC.

However, like other electronic equipment and control equipment, its fault cannot be eliminated completely, and therefore in order to improve its safety further, emergency stop circuit needs to be set up that enables the system to be stopped in case of emergency or when any abnormality occurs.

Note that this emergency stop circuit is realized by means of an external circuit of the PC.

(1) Emergency stop circuit

It needs to be configured by an external circuit and the emergency stop switch should be installed in a place where an operator can easily operate it.

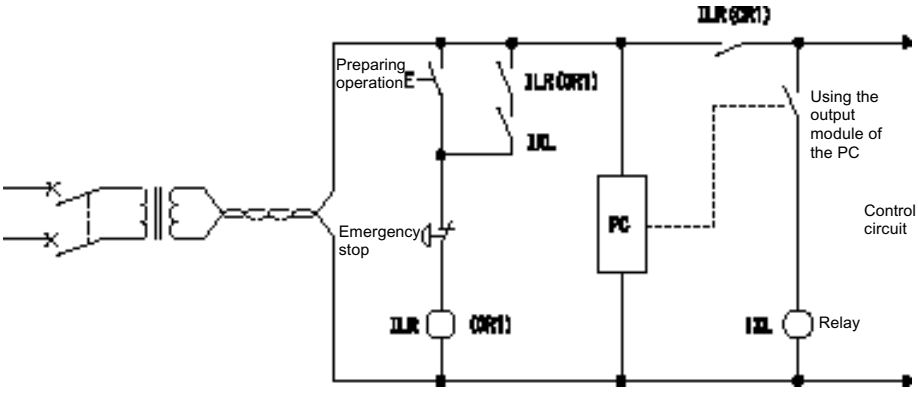
This emergency stop circuit is usually incorporated into an interlock circuit that separates the I/O control power supply when any abnormality occurs, which is described in (2) below.

(2) Interlock circuit

The InterLock Relay (ILR) is to open in order to break the output power supply in case of emergency or when any abnormality occurs.

In this interlock circuit, the contact of IXL, a relay that operates only while the PC is in normal operation, is inserted in the lock up circuit. The application software of the PC should be so programmed that the output of the relay, IXL is shut off when any abnormality is detected by means of the self-diagnosis of the PC.

While the emergency stop circuit may vary depending on the PC used and its configuration as well as the object of control, an example of the circuit is given hereunder.



4-4-8Short circuit protection of the digital output module

The type of protection of the digital output module is “output without protection”. If short circuit protection is carried out, the fuses designated below should externally be connected to each point.

Module model	Maximum load current/ point	Fuse model	Fuse manufacturer
NP1Y08T0902	2.4 A	GP40 (4A)	Daito Communication Apparatus Co., Ltd.
NP1Y08U0902	2.4 A	GP40 (4A)	
NP1Y16T09P6	0.6 A	GP10 (1A)	
NP1Y16U09P6	0.6 A	GP10 (1A)	
NP1Y32T09P1	0.12 A	GP032 (0.32A)	
NP1Y64T09P1	0.12 A	GP032 (0.32A)	
NP1Y32U09P1	0.12 A	GP032 (0.32A)	
NP1Y64U09P1	0.12 A	GP032 (0.32A)	
NP1Y32T09P1-A	0.12A	GP032 (0.32A)	
NP1Y06S	2.2 A	GP50 (5A)	
NP1Y08S	2.2 A	GP50 (5A)	
NP1Y08R-04	2.2 A (at the time of AC)	GP50 (5A)	
NP1Y16R-08	2.2 A (at the time of AC)	GP50 (5A)	
NP1W1606T	0.6 A	GP10 (1A)	
NP1W1606U	0.6 A	GP10 (1A)	
NP1W3206T	0.12 A	GP032 (0.32A)	
NP1W3206U	0.12 A	GP032 (0.32A)	

Chapter 5
Maintenance/Inspection

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5-1 General Matters of Inspection

To ensure that the μGPCsx is used under the best conditions, inspections should be carried out at regular intervals.

5-1-1Interval of inspections

The μGPCsx is chiefly made up of semiconductor devices, and hence it is a PC of high reliability. However, the deterioration of a device may occur depending on the surrounding environment, and therefore it is advisable that inspection should be carried out at regular intervals. Although the standard number of times of inspection is 1 - 2 times/year, it is recommended that the interval of inspections should be shortened depending on the surrounding environment. If inspection results are out of the scope of judgment criteria, improvements must be made so that they are within the scope.

5-1-2Matters requiring attention at the time of using the products

⚠ Caution
Make sure that it is used with the rated voltage and current that are indicated in the operating instructions and manuals. Its use with values other than the rated ones may cause a fire, a malfunction or a fault.
Make sure that it is used under the environment that is indicated in the operating instructions and manuals. Its use under environments of high temperatures, high humidity, condensation, dusts, corrosive gasses, oil, organic solvent, and in particular of great vibrations and shock may be the cause of electric shock, a fire, a malfunction or a fault.
Make sure that no foreign matters such as trash, debris of electric wires, iron powder etc. has gotten into the inside of equipment. Also, make sure that construction work is done so that no such matters get in there. Failure to observe this may cause a malfunction or a fault.
Screws for terminals and screws for installation must be checked at regular intervals to ensure that they are securely tightened. Their use while in a loosened state may cause a fire or a malfunction.

5-1-3Inspection items

When inspecting equipment, carry it out by checking the following items.

Inspection items		Contents of inspection	Judgment criteria	Inspection method
CPU ERR/ALM LED		To check the ERR & ALM LEDs	Not lighted on	Visual inspection
Power supply module	Voltage	Whether the measurement is within the criteria values when measured at the terminal block	AC: 100 V: 85 V - 132 V 240 V: 170 W - 264 V DC: 24 V: 19.2 V - 30 V	Tester
	Fluctuations	Whether there is frequent instantaneous stops or a rapid increase or decrease in voltage	The fluctuations in voltage should be within the above range	Oscilloscope
Remote I/O power supply	Voltage	Whether the measurement is within the criteria values when measured at the terminal block	AC: 100 V: 85 V - 132 V 240 V: 170V - 264 V DC: 24V: 19.2V - 30V 110 V: 90 V - 140 V	Tester
	Fluctuations	Whether there is frequent instantaneous stops or a rapid increase or decrease in voltage	The fluctuations in voltage should be within the above range	Oscilloscope
Ambient environment	Temperature	Whether it is within the range of specifications (in case of equipment inside the panel, the temperature inside the panel shall apply)	0◦C - +55◦C	Maximum/ minimum thermometer
	Humidity	Whether there is any condensation. Whether there is any conspicuous discoloration or rust	20% - 95% RH	Visual inspection, Hygrometer
	Vibration	Whether there is any vibration	There should be none	Feel
	Dust	Whether there is any attachment of trash or foreign matters	There should be none	Visual inspection
State of installation		Whether each card is securely fixed	There should be no loosening	Visual inspection
		Whether there is any loosening in the screws of terminals in external wiring	There should be no loosening	Screwdriver
		Whether the connectors of connecting cables are inserted securely	There should be no loosening or excessive play	Visual inspection, Screwdriver
		Whether external wiring cables are nearly broken apart	There should be no abnormality in appearance	Visual inspection
Battery		Whether the time of replacement has arrived	Indication on the label of effective period	Visual inspection, refer to “5-2 Battery Replacement”.
Maintenance parts		Whether the predetermined number of pieces are ready for use Whether the storage condition is good	Inspection records	
Program		Whether there is no abnormality upon collation Whether the storage condition of the source programs is good	There should be no abnormality	Collation of programs

Note 1) If a fault has occurred, one full module should be replaced. For this purpose, it is recommended that at least a minimum quantity of spare parts should be ready for use.

Note 2) The voltage of a battery decreases during storage due to self discharge. Replace it with a new one before the replacement time arrives.

Note 3) Out of the maintenance parts that are stored, the power supply module should be powered once about every 6 months.

(for the purpose of preventing the loss of capacity of the aluminum electrolytic capacitor used in the power supply module)

5-2 Battery Replacement

The battery should be replaced with a new one when the replacement time arrives, even if there is no indication of abnormality in batteries.

Also, if upon checking the "BAT" LED of the CPU module is lighted on, then the battery must be replaced with a new one promptly.

This is because, even if an alarm of abnormality in batteries has been displayed, the battery can stand a power outage for a certain period of time (about 1 week at 25◦C), but the alarm may possibly be overlooked.

- Replacement time: The year and month is indicated on the battery (guarantee period).

  The replacement time indicated on the battery is the year and month after 5 years from the date of manufacturing (at 25◦C).

- Model of the battery for replacement: NP8P-BT
- Nominal voltage: 3.6 V

■ Matters requiring attention

- Do not short-circuit the two poles.
- Do not put it into fire.
- Not rechargeable.
- Do not disassemble it.
- Upon its disposal, follow the provisions of ordinances as established by the local administrative authorities.

■ Procedure of battery replacement

(1) Shut off the power supplied to the system. (Replacement of batteries can be made with the system being powered.)

(2) Open the cover at the front bottom of the CPU module.

(3) Remove the battery connector, replace the battery with a new one, and fix it.

Replacement should be made quickly (within about 5 minutes). If the system is put into the state of being without a battery for a long period of time, then the contents of the power outage retaining data will be erased.

(4) Close the battery cover.

(5) Repower the system.