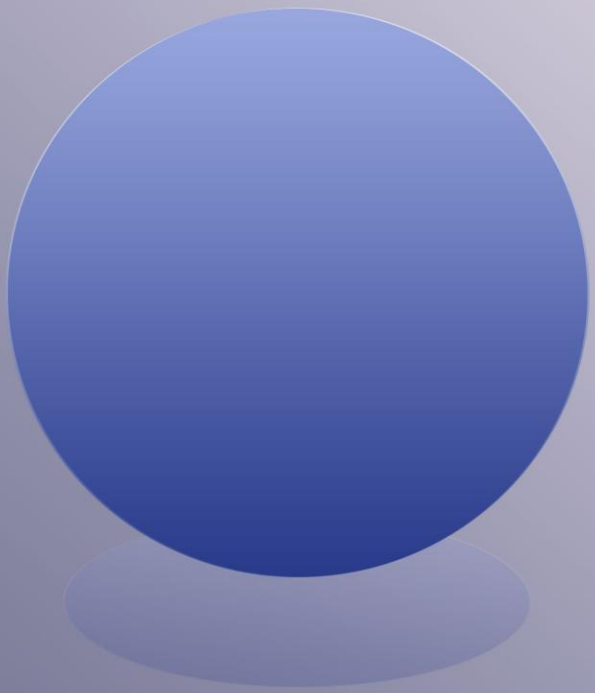
µGPCsH series

User's Manual Hardware



TOYODENKI

Preface

Thank you for purchasing the Toyo Denki FA *μ*GPCsH digital controller. The *μ*GPCsH Series User's Manual (Hardware) explains the system configuration, the hardware specifications of the modules, and their operation. In order to use the *μ*GPCsH correctly, please read this manual carefully.

Please also read the related manuals below.

Name	Number	Content
*μ*GPCsH Series Programming Manual (Instruction Words)	QG18273	*μ*GPCsH Series memory, language, system definitions etc.
*μ*GPCsH Series User's Manual (Operation)	QG18291	Explains the interface of TDFlowEditor and how to use the program
SHPC-172 Operation Manual (PG emulator module)	QG18262	Explains operation of the PG emulator module
SHPC-861 Operation Manual (Pulse output module)	QG18393	Explains operation of the pulse output module
SHPC-161 Operation Manual (Versatile communications module	QG18381	Explains operation of the versatile communications module
SHPC-193 Operation Manual (OPCN-1 I/F module)	QG18356	Explains operation of the OPCN-1 I/F module

Caution

(1) No part of this manual may be reproduced or duplicated without permission.

(2) The content of this manual is subject to change without prior notice.

(3) We have endeavored to make this manual as complete and accurate as possible. However, if you notice any errors or ambiguities, please report them to the sales office shown on the back of this manual, stating the manual number indicated on the front cover.

Safety Notice

Read the “Safety Notice” carefully before using the product and use the product accordingly. In this manual, safety-related items are divided into “Danger” and “Caution” as follows.

⚠Danger: Mishandling may cause death or serious injury.

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

Note that items marked ⚠ Caution may also result in other serious consequences depending on the circumstances.

All safety notices contain important information which should be strictly observed. Matters requiring special attention are shown below, which are also indicated with the marks shown above.

⚠Danger
• Do not touch live parts such as terminals, etc., while electricity is on. Doing so may result in electric shock. • Shut off the power supply before performing mounting, dismantling, wiring, maintenance and inspection work. Working with the power on may result in electric shock, and malfunction or failure of the machinery. • Emergency stop circuits, interlock circuits, etc., must be built into the equipment, not the PC. Otherwise, malfunction of the PC may result in damage or accidents involving the machinery. • Batteries must not be connected with + - terminals placed backward, recharged, dismantled, subjected to pressure or other force, thrown into fire, or short-circuited. Doing so may result in rupture of the batteries or fire. • If the batteries are damaged, leaking or otherwise faulty, do not use them. Doing so may result in rupture of the batteries or fire. • Never open the FG terminal with LG - FG short-circuited. Doing so may result in electric shock. (Ground the wire without fail.)

⚠Caution

- If any articles are found to be damaged or out of shape when you unpack them, do not use them. Doing so may result in fire, malfunction or failure of the machinery.
- Do not subject the product to shock by letting it drop or fall over. Doing so may damage the machinery or cause it to malfunction.
- The product must be installed in accordance with the operating instructions and manuals. Improper installation may cause the product to fall down, malfunction or otherwise fail.
- Use the product with the rated voltage and current indicated in the operating instructions and manuals. Using the product with other values may result in fire, malfunction or failure of the machinery.
- The product must be used or stored under the environment indicated in the operating instructions and manuals. Using or storing the product in environments with high temperatures, high humidity, condensation, dust, corrosive gasses, oil, organic solvents, and significant vibration or shock may result in electric shock, fire, malfunction or failure.
- Select electric wires of the right size for the voltage and current used. They must be tightened with the specified torque. Improper wiring and tightening may result in fire and may cause the product to fall down, malfunction or otherwise fail.
- Perform installation work taking care to prevent foreign matter such as packaging, scraps of electric wires, iron filings, etc., from getting inside the equipment. Foreign matter in the machinery may result in fire, malfunction or failure of the machinery.
- Grounding terminals must be grounded without fail. Failure to ground terminals may cause electric shock or malfunction.
- Screws for terminals and screws for installation must be checked at regular intervals to ensure that they are securely tightened. Loose screws may result in fire or malfunction.

- Unused connectors should be covered with the connector covers provided. Failure to do so may result in malfunction or failure.
- Terminal blocks must be covered with terminal covers. Failure to do so may cause electric shock or malfunction.
- Only perform operations such as changing programs, forced output, start, stop, etc., after ensuring safety. Incorrect operation may cause the machine to function, resulting in accidents or damage to the machinery.
- Tool interface connectors must be inserted in the proper direction. Failure to do so may cause malfunction.
- Before touching the PC, discharge static electricity by touching grounded metals, etc. Excessive static electricity may cause malfunction or failure of the PC.
- Wiring must be performed correctly in accordance with the operating instructions and manuals. Incorrect wiring may result in fire, malfunction or failure of the machinery.
- When removing a plug from its socket, do not pull on the cord. Damage to the cable may result in fire or failure of the machinery.
- Do not change the system by attaching or detaching I/O modules etc. with the power turned on. Changing the system with the power on may result in malfunction or failure.
- The product must never be repaired onsite. If repairs are required, please contact Toyo Denki. In addition, when replacing batteries, ensure that the connectors are attached to the correct terminals. Failure to do so may result in fire, accident, or failure of the machinery. When cleaning the machinery, turn off the power.
- Use a cloth moistened with warm water. Using thinner or other organic solvent may cause melting or discoloration of the surface of the machinery.
- Do not modify or dismantle the product. Doing so may result in failure of the machinery.
- When discarding the product, it should be handled as industrial waste.
- This product is not designed or manufactured for use in equipment or systems that involve the safety of human life.
- If you intend to use this product for special purposes such as controlling atomic energy, for aviation and aerospace, medicine, transportation equipment, transportation vehicles, or for related systems, please consult our sales representative.
- If this product is used with equipment that is expected to involve the safety of human life or serious losses as a result of failure of the equipment, safety devices must be installed.
- The external power supply (DC 24 V power supply etc.) connected to the DC I/O must use a power supply with reinforced insulation from an AC-based power supply. (We recommend using a power supply that complies with EN60950.) Failure to do so may result in accident or failure of the machinery.

History of Revisions

* The manual number is shown at the bottom right of the cover sheet.

Date printed	* Manual number	Details of revision
2010.10	QG18720	First edition issued

Contents

Chapter 1 Outline

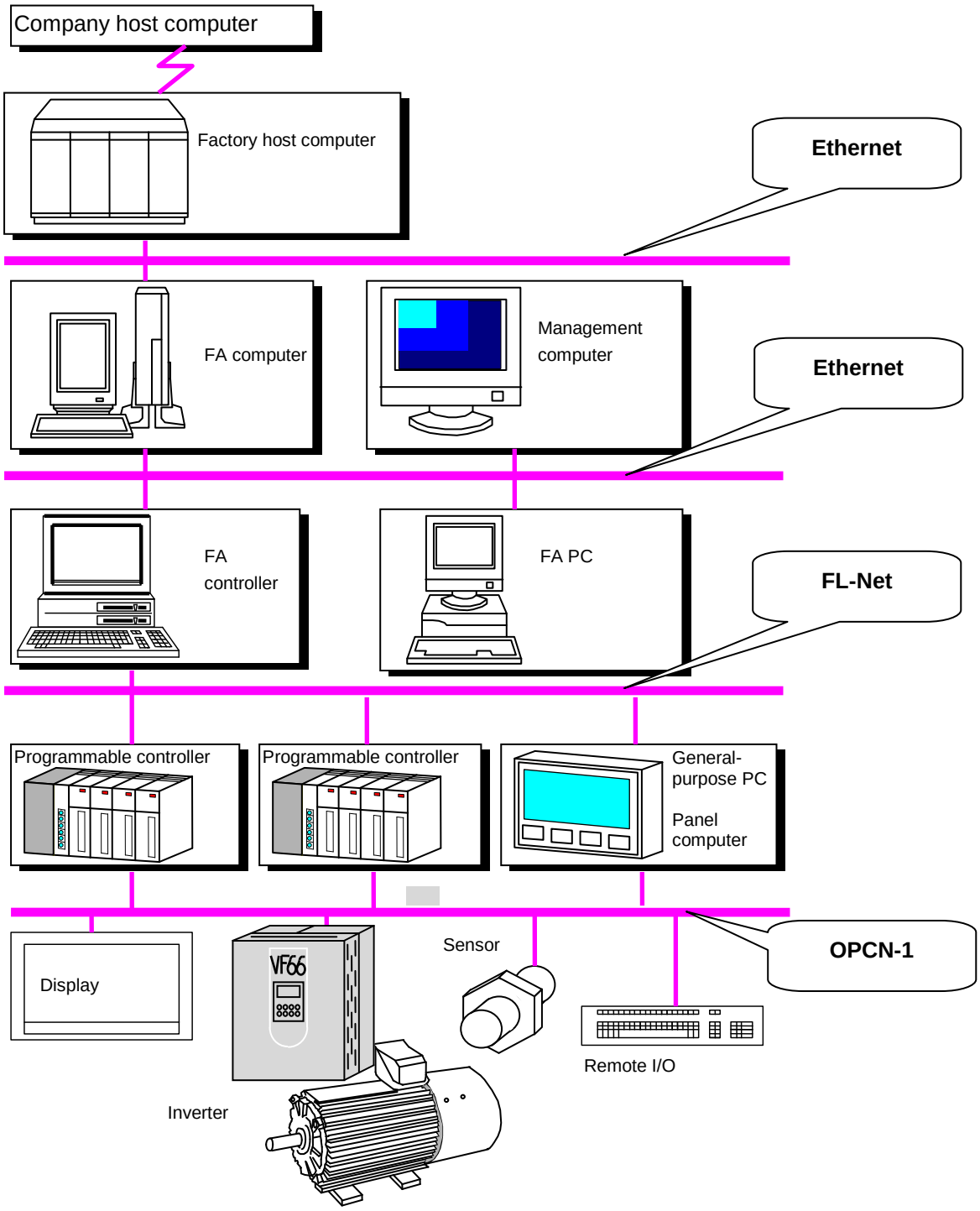
1.1 Model List

1.1.1 Hardware

Function	Name	Outline specification	Accessories	
			Product name	Quantity
Standard CPU module	SHPC-111-Z	• Basic instruction: 100 ns • Program memory: 640 KB • Number of I/O control points: Maximum 8,192 points	–	–
Baseboard	SHPC-011-Z	Number of slots: 9	–	–
	SHPC-012-Z	Number of slots: 5	–	–
	SHPC-013-Z	Number of slots: 3	–	–
Power supply module	SHPC-612-Z	AC 85-264 V input voltage Output capacity 48 W	–	–
Digital input module	SHPC-231-Z	DC 24 V, sink/source 32 bits, connector type	–	–
	SHPC-233-Z	DC 24 V, sink/source 16 bits, screw terminal type	–	–
	SHPC-235-Z	DC 24 V, sink/source 64 bits, connector type	–	–
	SHPC-253-Z	AC 100 V, 8 points 1 common 16 bits, screw terminal type	–	–
Digital output module	SHPC-311-Z	Transistor output sink type 32 bits, output protection: Fuse, connector type	–	–
	SHPC-313-Z	Transistor output sink type 16 bits, output protection: Fuse, screw terminal type	–	–
	SHPC-315-Z	Transistor output sink type 64 bits, output protection: Fuse, connector type	–	–
	SHPC-333-Z	DC 110 V, AC 240 V, relay output 16 bits, screw terminal type	–	–
Digital I/O mixed module	SHPC-411-Z	Input: DC 24 V, sink/source 32 bits, connector type Output: Transistor output sink type 32 bits, output protection: Fuse, connector type	–	–

Function		Name	Outline specification	Accessories	
				Product name	Quantity
Analog input module		SHPC-531-Z	Input 8 channels Resolution 16 bits	–	–
Analog output module		SHPC-511-Z	Output 4 channels Resolution 16 bits	–	–
PG emulator module		SHPC-172-Z	Virtual incremental encoder output A phase, B phase, Z phase	–	–
Pulse output module		SHPC-861-Z	2 channels	–	–
IO extension module		SHPC-032-Z	Master module	SHPC-021-Z (termination resistor)	1
		SHPC-033-Z	Slave module (Maximum 16 slave modules per master)	–	–
Communication module	Versatile communications module	SHPC-161-Z	Versatile communications RS232C 1CH Versatile communications RS422 2CH	–	–
	OPCN-1 communication module	SHPC-193-Z	RS485 OPCN-1 compliant	Short pin for termination resistor connection, termination resistor	1 each

Chapter 2 System Configuration



Chapter 3 Specification

3.1 General Specifications

Item		Specifications
Physical environment	Operating ambient temperature	0 to 55°C
	Storage temperature	-20°C to +85°C
	Relative temperature	30 to 95% RH without condensation
	Dust	No electrically conductive or combustible dust
	Corrosion resistance	No corrosive gas No contact with organic solvents
	Altitude	Elevation of up to 2,000 m
Mechanical operating conditions	Antivibration JIS C9011 compliant	Half amplitude: 0.15 mm, fixed acceleration: 9.8 m/s^2 2 hours in each direction (Total: 2 hours)
	Shock resistance JIS C9012 compliant	Peak acceleration: 14.7 m/s^2 3 times in each direction
Electrical operating conditions	Antinoise	AC power supply induced noise Voltage ±1,500 V, rise time 1ns, pulse width 1 μs
	Antistatic discharge resistance	Contact discharge method: ±6 kV, Air discharge method: ±10 kV
Structure		Built-in panel type IP3
Cooling method		Natural cooling
Dielectric strength		As indicated on each module
Insulation resistance		As indicated on each module
Internal current consumption		As indicated on each module
Weight		As indicated on each module

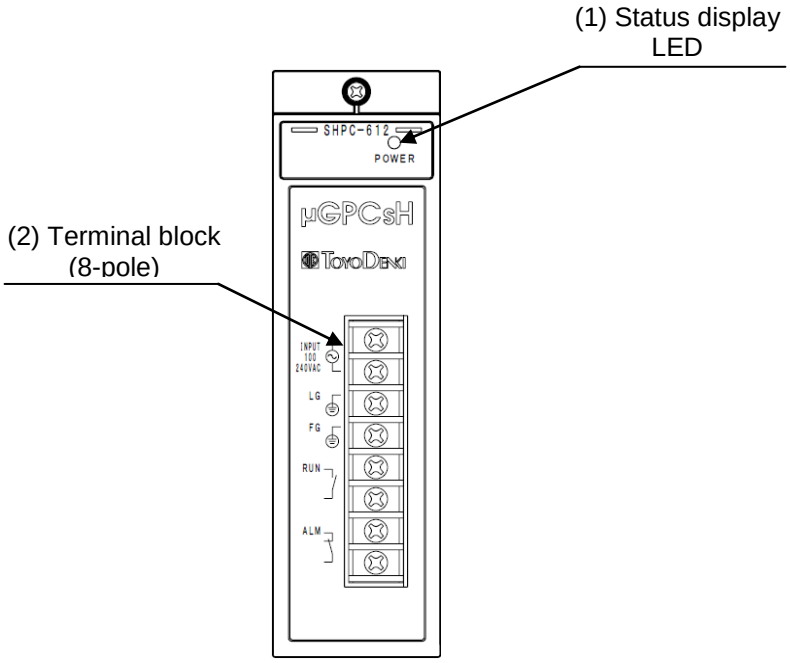
3.2 Power Supply Module Specifications

3.2.1 Power Supply Specifications

Item	Specifications	Remarks
Name	SHPC-612-Z	
Rated input voltage	AC 100/200 V	
Allowable range of voltage	AC 85 to 264 V	
Rated frequency	50/60 Hz	
Allowable range of frequency	47 to 63 Hz	
Allowable instantaneous blackout time	20 ms	At the rated input voltage
Input waveform distortion ratio	±5% or less	
Allowable ripple ratio	±0.1 V (Vp-p)	
Leakage current	0.65 mA or less	
Inrush current	22.5 A or less	
Rated output capacity	48 W	
Rated output voltage	DC 24 V	
Output current	2 A	
Dielectric strength	AC 1,500 V for 1 min	Between input and ground
Insulation resistance	100 MΩ or more (@ DC 500 V)	Between input and ground
Overload protection	Drooping characteristic	
Overvoltage protection	Protected at 31 V	
Operating output	Yes (On when the CPU performs operations)	Relay normally open contact (a-contact) output
Alarm output	Yes (Off when CPU experiences serious failure, minor failure, output voltage down)	Relay normally closed contact (b-contact) output
External dimensions (W x D x H)	40 mm x 122 mm x 130 mm	
Weight	430 g	

*1 : Time of turning on the power again
When turning on the power again, wait for more than 1 second after turning off the power.

3.2.2 Name of Each Part and Its Function



(1) Status display LED

Symbol	Display color	Indication
POWER	Green	On when the output voltage is within the rated range. Off when the output voltage is outside the rated range.

(2) Terminal block (8-pole)

An M4 x 8-pole terminal block. The allocation of terminals is as follows.

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

Symbol	Specifications	Content
INPUT 100-240VAC	Input	AC 85 to 264 V
	Input	
LG	Ground (circuit side)	Power supply filter ground (line ground)
FG	Ground (frame)	Connected to base module plate (frame ground)
RUN	Contact output	Output during CPU operation. Normally open contact (A-contact) non-voltage output
	Contact output	
ALM	Contact output	Output during serious failure, minor failure, and power supply failure. Normally closed contact (B-contact) Non-voltage output
	Contact output	

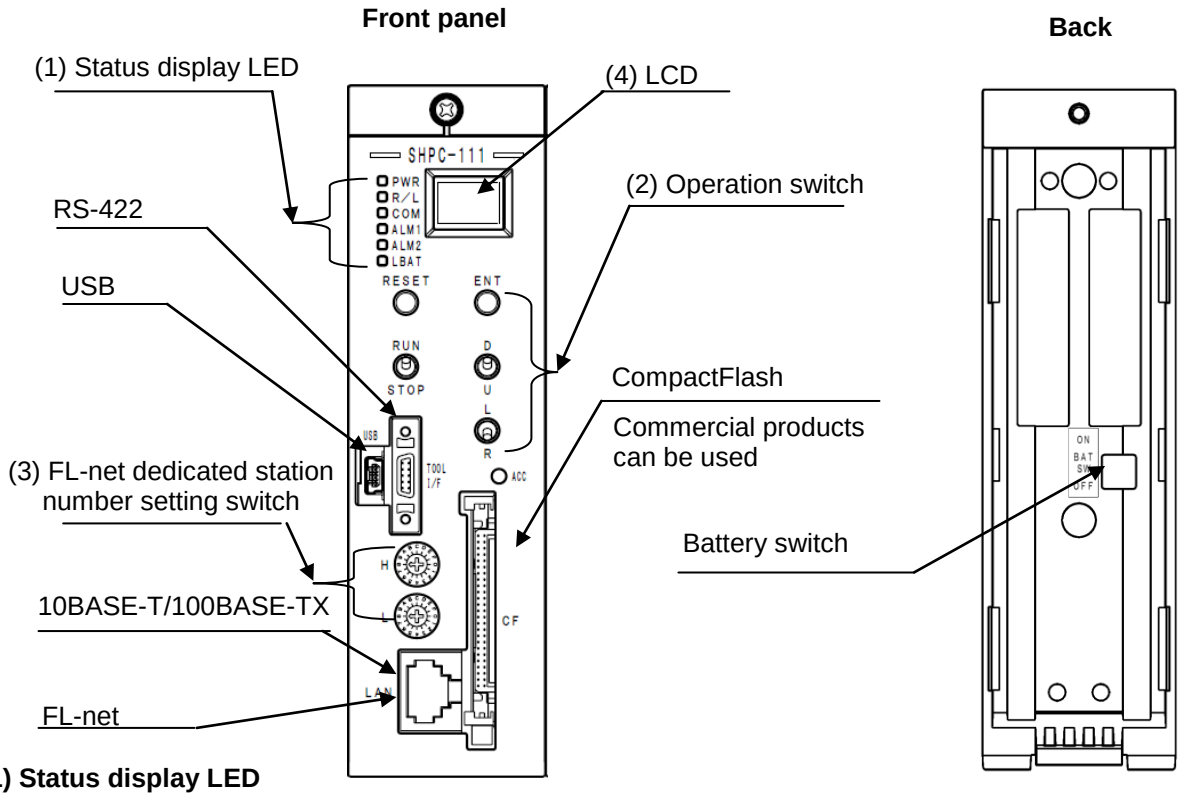
The contacts have a rated voltage of AC 240 V and DC 110 V, and rated current of 1 A.

3.3 Standard CPU Module Specifications

3.3.1 Performance Specification List

Item			Specifications
Name			SHPC-111-Z
Execution control method			Stored program method
			Cyclic scan method
I/O connection method			Directly connected I/O method, remote I/O method
CPU			32-bit processor
Memory type			Program memory, data memory
Programming language			GPC language (data flow form)
Instruction execution time		Sequence instruction	0.1 *μ*s to 0.52 *μ*s
		Application instruction	0.1 *μ*s to 20 *μ*s
Program memory capacity			Approximately 1,000 pages (640 KB)
Data memory	Input and output memory (I/O)		8,192 points
	Global memory		128,000 words
	Local memory		128,000 words
	Retain memory		64,000 words
	Adverse load information memory		128,000 words
Number of task units			4 (high-speed task, medium-speed task, low-speed task, low-priority task)
Number of subprograms			100. However, there is no page restriction on subprograms
Interface			RS-422 (dedicated 10-pin square connector)
			10BASE-T/100BASE-T
			FL-net
			CompactFlash
			USB (mini B connector)
Operation switch			Station numbers for STOP/RUN, RESET, FL-net
Service panel			LCD (horizontal 36 dots, vertical 24 dots)
			LCD operation switches (U/D, L/R, ENT)
Diagnosis function			CPU hardware check, IO module status check
Calendar function			±60 seconds/month (25°C) (Retained for approximately 5 days (25°C) after power stoppage when the battery is switched off)
Backup			Storage of clock and saved memory
			Retained for approximately 5 days (25°C) after power stoppage when the battery is switched off
			Guaranteed for 5 years with the battery switched on
			Uses both supercapacitor and battery
Number of slots occupied			1 dedicated slot
Internal current consumption			170 mA
External dimensions (W x D x H)			40 mm x 122 mm x 130 mm
Weight			360 g

3.3.2 Name of Each Part and Its Function



(1) Status display LED

Symbol	Display color	Indication
PWR	Green	On when power is supplied to the CPU
R/L	Green	R: RUN; On when the CPU performs operations L: LINK; On when FL-net module link is established
COM	Green	On during 100BaseTX/10BaseT communication
ALM1	Red	On when CPU experiences serious failure
ALM2	Yellow	On when CPU experiences minor failure
LBAT	Yellow	On when the voltage of the built-in battery is low (only when the CPU is turned on)
ACC	Red	On when the CompactFlash card is accessed. (When on, do not remove the CompactFlash card.)

(2) Operation switch

Symbol	Content
RESET	System reset switch. Note: Only enabled when (RUN STOP) is STOP
RUN STOP	RUN (CPU operation execution switch) STOP (CPU operation stop)
ENT	When pressed displays the local module IP address. For writing to the CompactFlash card
U/D	For writing to the CompactFlash card
R/L	Unused

Battery switch

Symbol	Content
BAT SW ON OFF	Off switch for the backup battery. Unless switched on, backup from the battery is not enabled. Backup from the supercapacitor is enabled even when switched off. Turn off when keeping spares for a long time.

(3) FL-net dedicated station number setting switch

Standard IP address: Set 1 to 254 of 192.168.250.1 to 254 with a hexadecimal (01 to FE).The IP address 192.168.250 can be changed with TDFlowEditor.

(4) LCD

Display	Name	Status		Content	Action
		Serious failure Operation stopped	Minor failure Operation continued		
CPU RUN!	CPU RUN	–	–	The CPU started operation. (Displayed for approximately 1 second)	–
CPU STOP!	CPU STOP	–	–	The CPU stopped operation. (Displayed for approximately 1 second)	–
XXX.XXX. XXX.XXX	IP address	–	–	IP address	–
DnLoad Error	Download error	Yes	–	Failed to convert program code	Revise the program or download it again.
SysTsk TmOver	System task time over	Yes	–	System task (system process) congestion occurred.	Revise the program that caused congestion.
Task n WDOG	Taskn (1 to 3) watchdog	Yes	–	Application task congestion (infinite loop) occurred.	Revise the program (task n) that caused congestion.
Task n TmOver	Task n (1 to 3) time over	–	Yes	Execution of application task operation cycle was canceled (task omission).	Revise the program (task n) that caused congestion.
IO ID ErUXSX	IO ID error	–	Yes	IO module ID was changed. The unit number of the relevant module (0 to F) and slot number (1 to 9) goes in X.	IO module malfunction, or the extension cable may be disconnected. Perform inspection or replacement.
IO Def ErUXSX	IO define error	–	Yes	Reading IO module ID failed. (Present bit: 15-bit on → off) The unit number of the relevant module (0 to F) and slot number (1 to 9) goes in X.	Likely due to a non-existent IO module, dropped connection, watchdog error, blown fuse, etc. Perform inspection or replacement.
IOFalt ErUXSX	IO fault error	–	Yes	Reading IO module ID failed. (Error bit: 14-bit off → on) The unit number of the relevant module (0 to F) and slot number (1 to 9) goes in X.	Likely due to an IO module malfunction, incomplete initialization, no external power supply, etc. Perform inspection or replacement.
BusAcc ErUXSX	Bus access error	–	Yes	An IO slot read-write instruction was executed in relation to vacant slots. The unit number of the relevant module (0 to F) and slot number (1 to 9) goes in X.	Revise the program that caused the bus access error.

Sysdef ErUXSX	System definition error	–	Yes	IO allocation and module mounting status do not match. The unit number of the relevant module (0 to F) and slot number (1 to 9) goes in X.	Revise the IO allocation.
Battery Low!	Battery low	–	Yes	Indicates that the battery built into the CPU is low.	Replace the battery.

(5)RUN STOP switch operation

Switch status	TDFlowEditor STOP request	TDFlowEditor RUN request
RUN	Transition to STOP status	In the STOP status, transition to RUN status
STOP	No status change	No status change

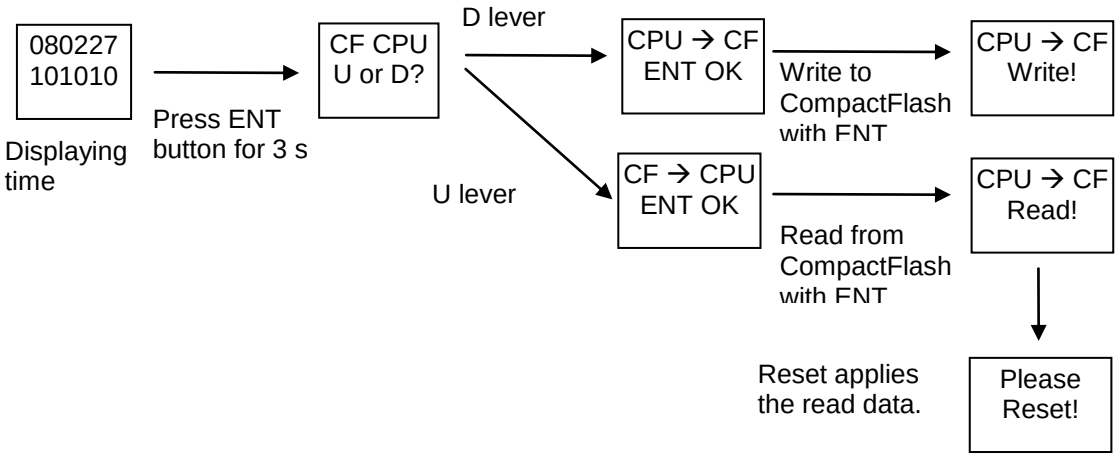
Note: Operation from SHPC-111 Ver 1.06.You can check the version from the type information in the TDFlowEditor online PLC RAS information.

3.3.3 CompactFlash Card Operation

With the CPU module CompactFlash you can save and read application programs and write files (FWRITE function) and read them (FREAD function) from application programs.

3.3.3.1 Operation from the CPU Module

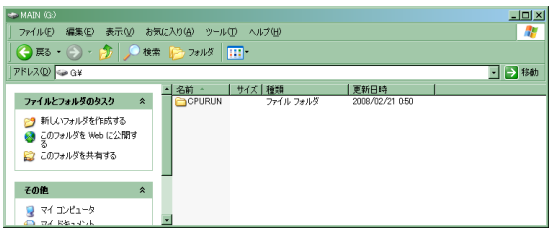
Press the “ENT” button for 3 seconds or more to enter the CompactFlash card operation mode.



When reading and writing to the CompactFlash Card, the ACC LED comes on. When the LED is on, do not remove the CompactFlash card.

3.3.3.2 Saving to CompactFlash Card

The folder for saving applications is stored in the “CPURUN” folder in the CompactFlash card.



The detailed content is in the following files.

(1) XXXXXXXX.BIN
Application program (ladder content) file.

(2) SYSDEFXXXX.BIN
System definition information file.

(3) TASKXX.BIN
Task configuration information file.

(4) USERXX.BIN
Adverse load information compressed file. (Window message and contact comment compressed file)

3.3.3.3 Errors when Reading and Writing CompactFlash Card

Display	Content
No Files	When reading the CompactFlash card, the IO allocation file for the system definition information file was absent.
Sysdef NGFile	When reading the CompactFlash card, the IO allocation file for the system definition information file did not match the actual configuration.
CFCard Error	Failed to write to the CompactFlash card. The CompactFlash card may be invalid.
Proces Error	Failed to read from the CompactFlash card. The CompactFlash card may be invalid.
CFCard InitEr	Failed to initialize CompactFlash card (folder created, old file deleted).The CompactFlash card may be invalid.

3.3.3.4 CF card recommendation model

The maker model of the CF card which confirmed movement is as follows.

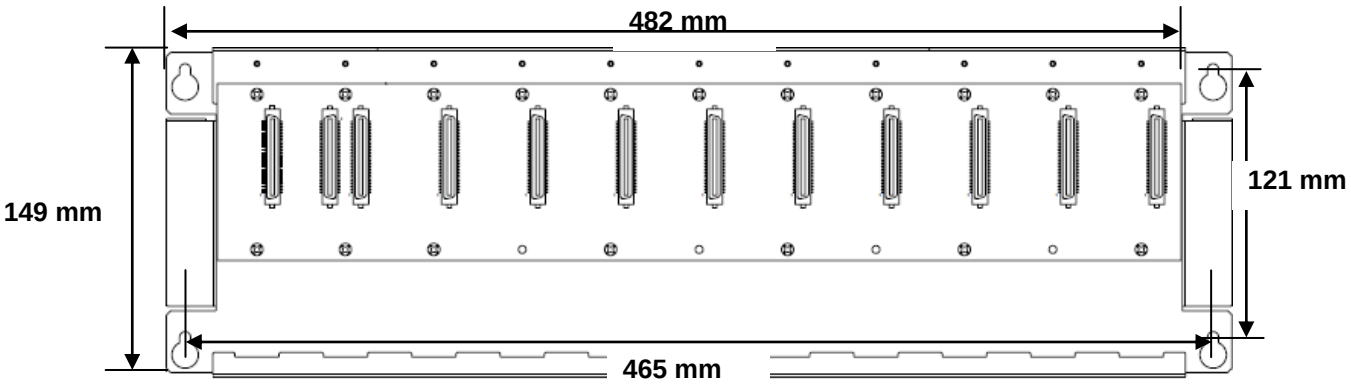
Company	Type	Capacity
Haiwara Sys-Com Co. Ltd.	HPC-CF1GZ3U5	1GB

3.4 Baseboard Specifications

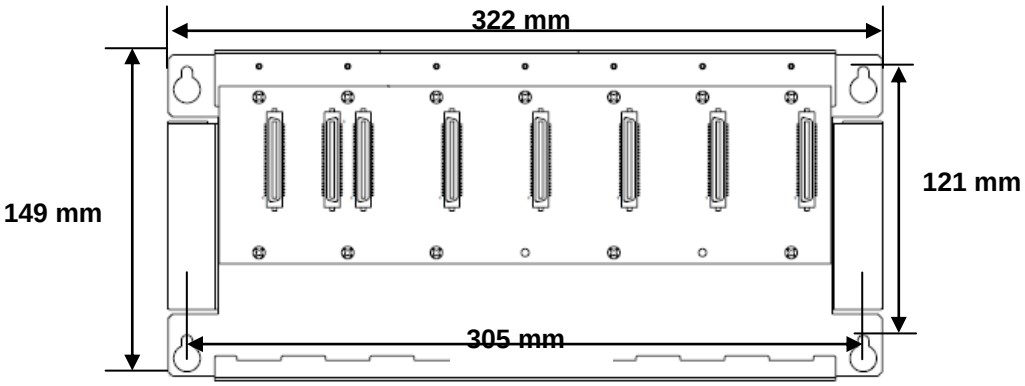
3.4.1 Performance Specification List

Item	Specifications		
Name	SHPC-011-Z	SHPC-012-Z	SHPC-013-Z
Number of slots	9 slots	5 slots	3 slots
External dimensions (W x D x H)	482 mm x 149 mm x 130 mm	322 mm x 149 mm x 130 mm	242 mm x 149 mm x 130 mm
Mounting dimensions	465 mm x 121 mm	305 mm x 121 mm	225 mm x 121 mm
Weight	1,050 g	700 g	520 g

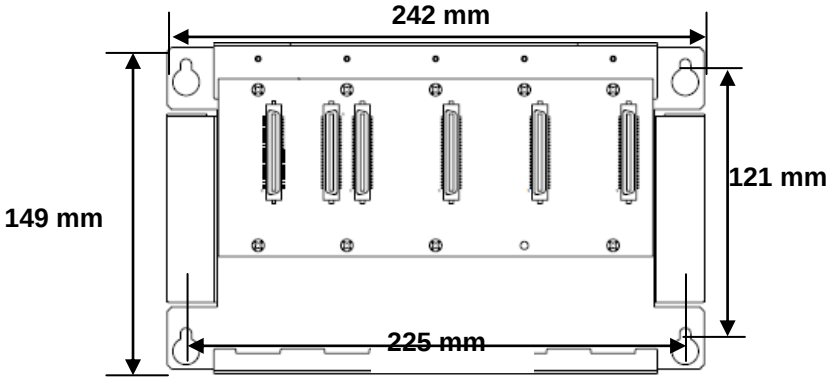
SHPC-011-Z



SHPC-012-Z



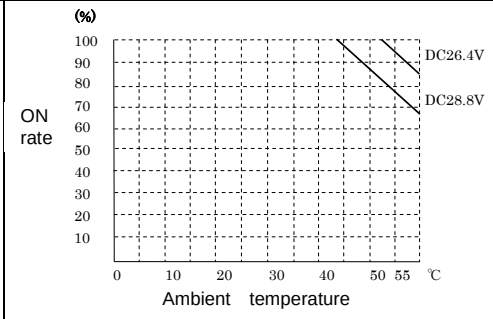
SHPC-013-Z



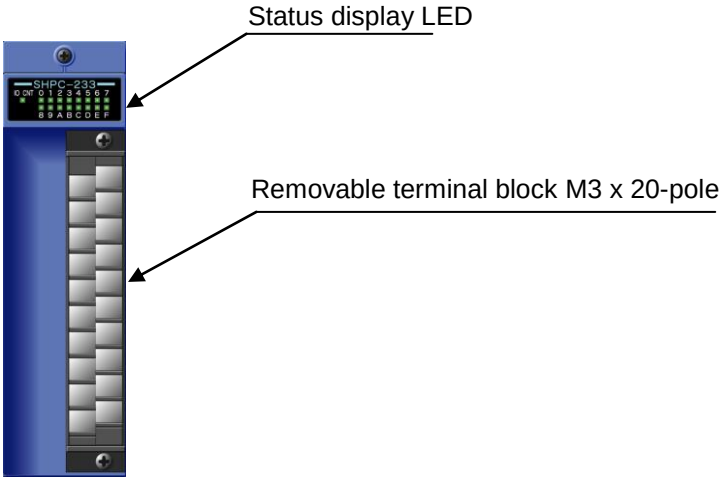
3.5 Individual Specifications of the Digital Input Module

3.5.1 DC 24 V Input 16 Points

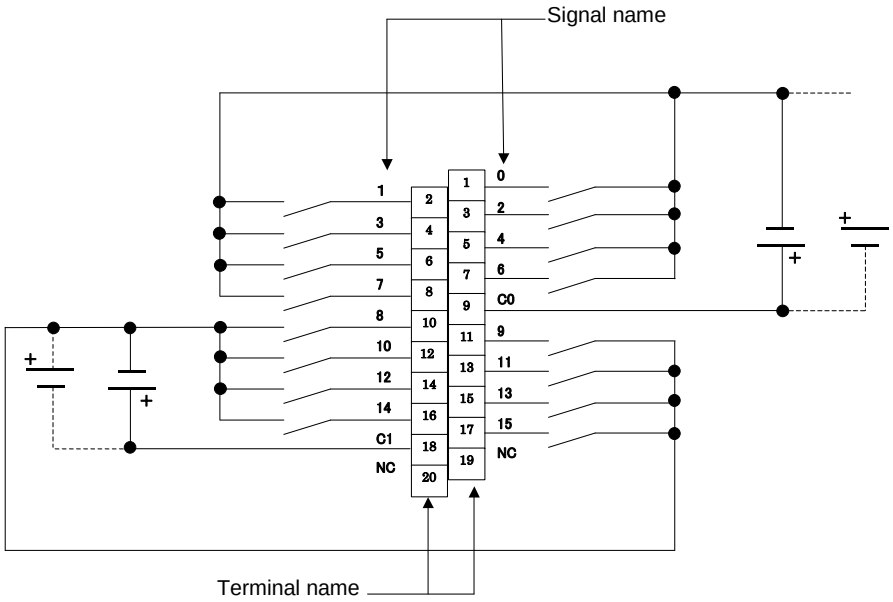
3.5.1.1 Performance Specification List

Item			Specifications
Name			SHPC-233-Z
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
Input circuit characteristics	Input format		Sink/source shared
	Rated current		7 mA (at DC 24 V)
	Input impedance		3.3 KΩ
	Standard operating range	Off → On	15 to 30 V
		On → Off	0 to 5 V
	Input delay time	Off → On	The soft filter times can be changed all at once in the parameter settings. 1 ms, 5 ms, 10 ms, 20 ms, and 70 ms can be set.
		On → Off	
	Input type		DC Type 1
Connection	External connection		Removable terminal block M3 screw 20-pole
	Applicable wire size		AWG #22 to 18
Status display LED			LED on when each point turns on Logic side IO CNT: LED on when communication with the CPU module is established
Insulation method			Photocoupler insulation
Dielectric strength			AC 1,500 V 1 minute Between the input terminals as a group and FG
Insulation resistance			10 MΩ or more when measured with DC 500 V insulation resistance tester Between the input terminals as a group and FG
Dilating conditions			
Dilating conditions			Simultaneously on ratio Maximum 70% (at DC 24 V/55°C)
External supply voltage			DC 24 V: For signals
Internal current consumption			DC 24 V ±10%　35 mA or less (when all points are on)
Number of words occupied			1 word
External dimensions (W x D x H)			40 mm x 122 mm x 130 mm
Weight			230 g

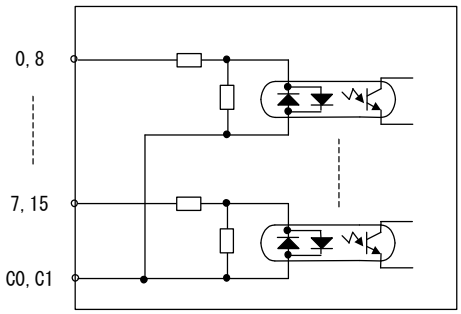
3.5.1.2 Name of Each Part and Its Function



3.5.1.3 External Connection

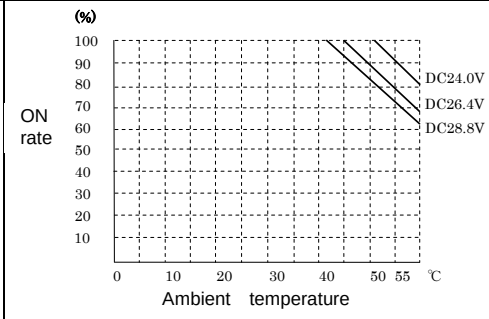


3.5.1.4 Internal Circuit

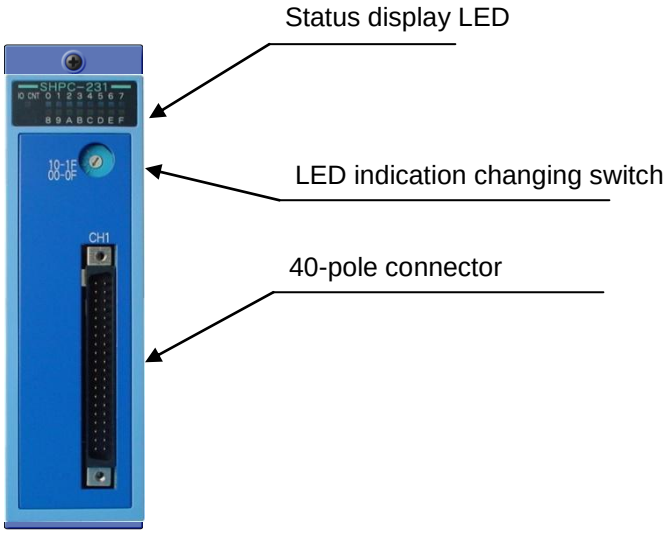


3.5.2 DC 24 V Input 32 Points

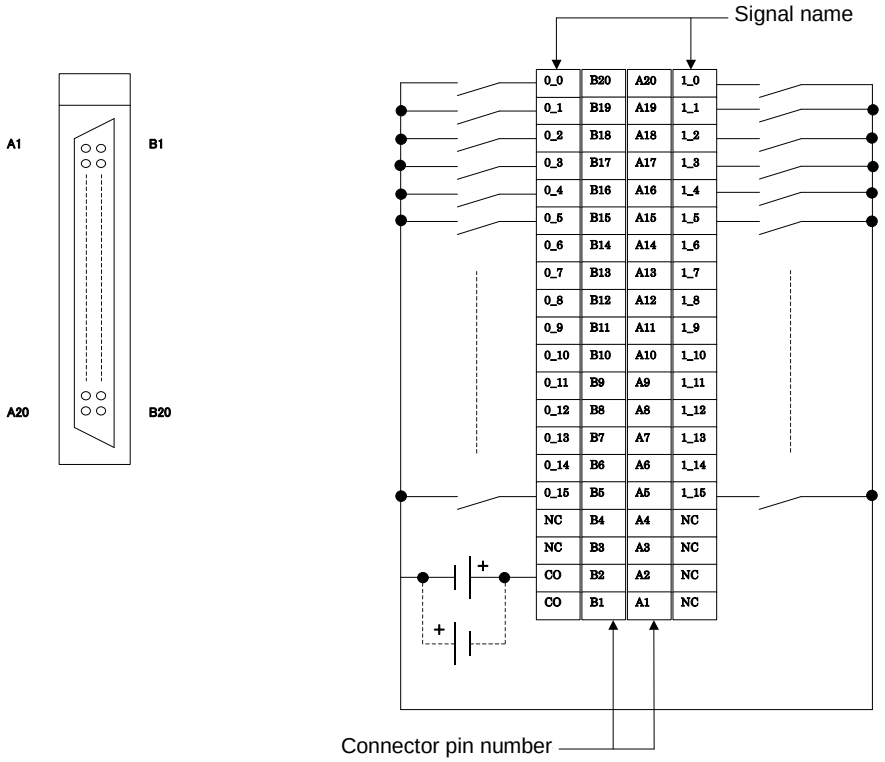
3.5.2.1 Performance Specification List

Item			Specifications
Name			SHPC-231-Z
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
Input circuit characteristics	Input format		Sink/source shared
	Rated current		4 mA (at DC 24 V)
	Input impedance		5.6 KΩ
	Standard operating range	Off → On	15 to 30 V
		On → Off	0 to 5 V
	Input delay time	Off → On	The soft filter times can be changed all at once in the parameter settings. 1 ms, 5 ms, 10 ms, 20 ms, and 70 ms can be set.
		On → Off	
	Input type		DC Type 1
Connection	External connection		1 40-pole connector (FCN-365P040-AU)
	Applicable wire size		AWG#23 or less (when using a soldered connector)
Status display LED			LED on when each point turns on by flicking switchLogic side IO CNT: LED on when communication with the CPU module is established
Insulation method			Photocoupler insulation
Dielectric strength			AC 1,500 V 1 minute Between the input terminals as a group and FG
Insulation resistance			10 MΩ or more when measured with DC 500 V insulation resistance tester Between the input terminals as a group and FG
Dilating conditions			
External supply voltage			DC 24 V: For signals
Internal current consumption			DC 24V ±10%　50 mA or less (when all points are on)
Number of words occupied			2 words
External dimensions (W x D x H)			40 mm x 122 mm x 130 mm
Weight			220 g

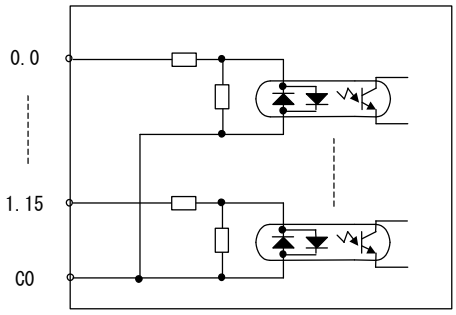
3.5.2.2 Name of Each Part and Its Function



3.5.2.3 External Connection

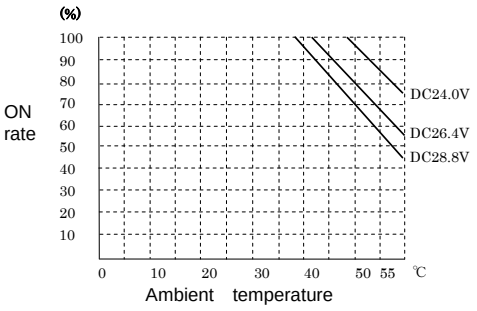


3.5.2.4 Internal Circuit

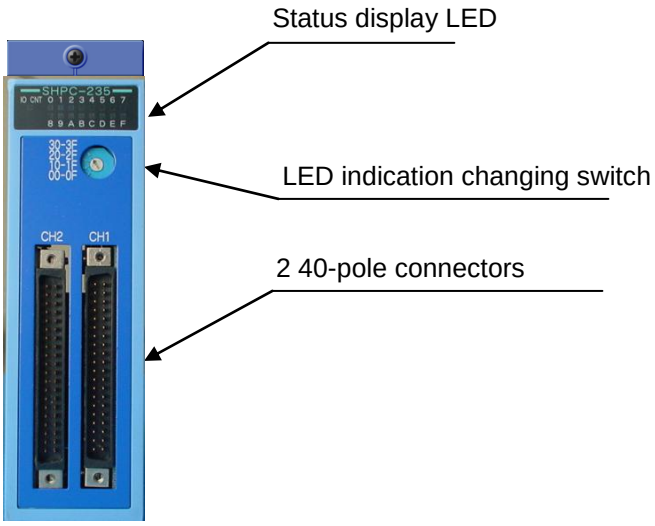


3.5.3 DC 24 V Input 64 Points

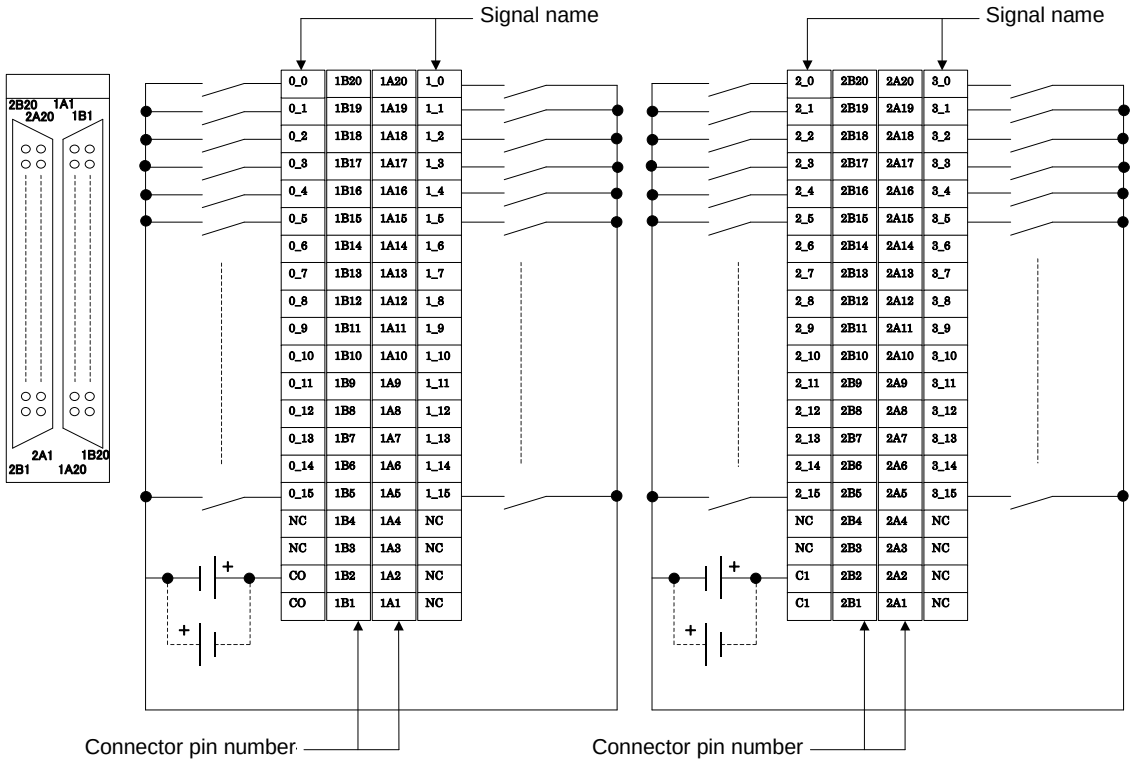
3.5.3.1 Performance Specification List

Item			Specifications
Name			SHPC-235-Z
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
Input circuit characteristics	Input format		Sink/source shared
	Rated current		4 mA (at DC 24 V)
	Input impedance		5.6 KΩ
	Standard operating range	15 to 30 V	15 to 30 V
		0 to 5 V	0 to 5 V
	Input delay time	Off → On	The soft filter times can be changed all at once in the parameter settings. 1 ms, 5 ms, 10 ms, 20 ms, and 70 ms can be set.
		On → Off	
	Input type		DC Type 1
Connection	External connection		2 40-pole connectors (FCN-365P040-AU)
	Applicable wire size		AWG#23 or less (when using a soldered connector)
Status display LED			LED on when each point turns on by flicking switch Logic side IO CNT: LED on when communication with the CPU module is established
Insulation method			Photocoupler insulation
Dielectric strength			AC 1,500 V 1 minute Between the input terminals as a group and FG
Insulation resistance			10 MΩ or more when measured with DC 500 V insulation resistance tester Between the input terminals as a group and FG
Dilating conditions			
External supply voltage			DC 24 V: For signals
Internal current consumption			DC 24 V ±10% 85 mA or less (when all points are on)
Number of words occupied			4 words
External dimensions (W x D x H)			40 mm x 122 mm x 130 mm
Weight			290 g

3.5.3.2 Name of Each Part and Its Function



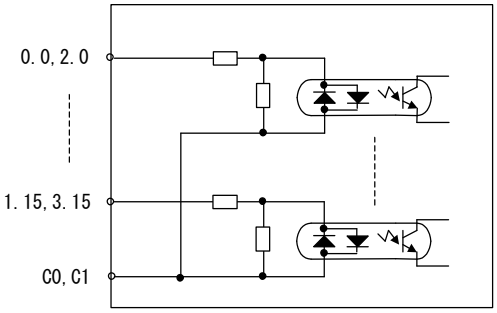
3.5.3.3 External Connection



0_0	1B20	1A20	1_0
0_1	1B19	1A19	1_1
0_2	1B18	1A18	1_2
0_3	1B17	1A17	1_3
0_4	1B16	1A16	1_4
0_5	1B15	1A15	1_5
0_6	1B14	1A14	1_6
0_7	1B13	1A13	1_7
0_8	1B12	1A12	1_8
0_9	1B11	1A11	1_9
0_10	1B10	1A10	1_10
0_11	1B9	1A9	1_11
0_12	1B8	1A8	1_12
0_13	1B7	1A7	1_13
0_14	1B6	1A6	1_14
0_15	1B5	1A5	1_15
NC	1B4	1A4	NC
NC	1B3	1A3	NC
CO	1B2	1A2	NC
CO	1B1	1A1	NC

2_0	2B20	2A20	3_0
2_1	2B19	2A19	3_1
2_2	2B18	2A18	3_2
2_3	2B17	2A17	3_3
2_4	2B16	2A16	3_4
2_5	2B15	2A15	3_5
2_6	2B14	2A14	3_6
2_7	2B13	2A13	3_7
2_8	2B12	2A12	3_8
2_9	2B11	2A11	3_9
2_10	2B10	2A10	3_10
2_11	2B9	2A9	3_11
2_12	2B8	2A8	3_12
2_13	2B7	2A7	3_13
2_14	2B6	2A6	3_14
2_15	2B5	2A5	3_15
NC	2B4	2A4	NC
NC	2B3	2A3	NC
C1	2B2	2A2	NC
C1	2B1	2A1	NC

3.5.3.4 Internal Circuit

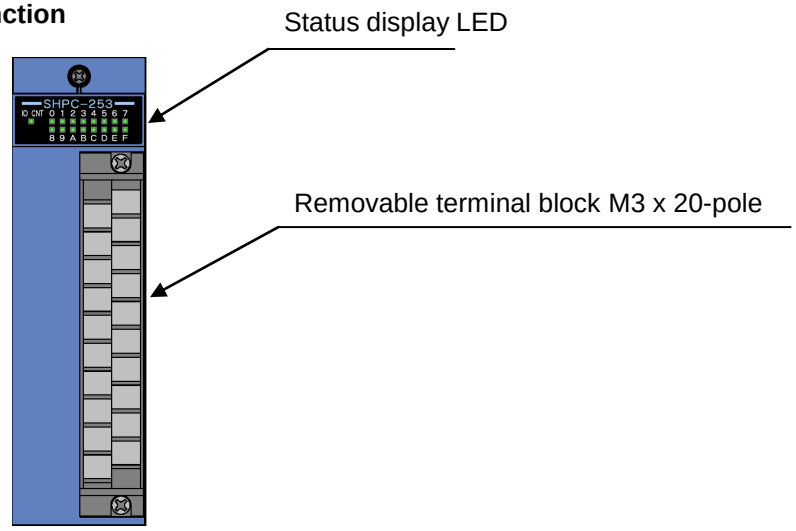


3.5.4 AC 100 V Input 16 Points

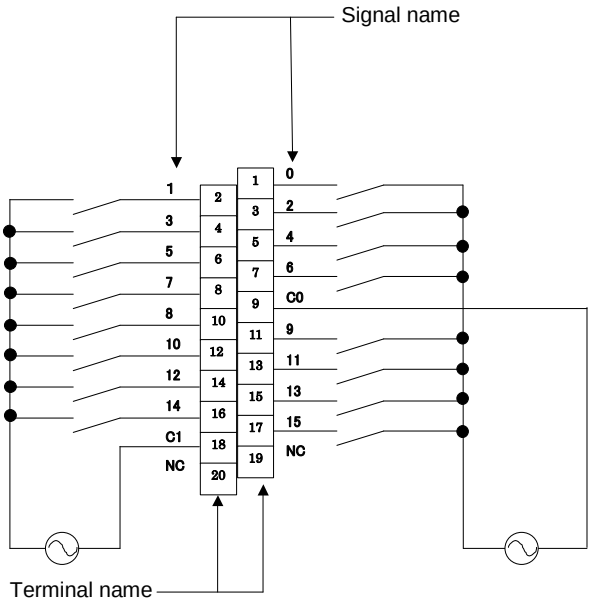
3.5.4.1 Performance Specification List

Item			Specifications
Name			SHPC-253-Z
Number of input points (common configuration)			16 points (8 points / common 2 circuits)
Input signal conditions	Input format		DC 24 V
	Rated voltage		AC 100 to 120 V
	Maximum allowable voltage		AC 132 V
	Waveform distortion ratio		5% or less
	Rated frequency		50/60 Hz
	Allowable range of frequency		47 to 63 Hz
	Inrush current		Maximum 150 mA
Input circuit characteristics	Rated current		10 mA/point (AC 100/120 V)
	Input impedance		10 kΩ (50 Hz), 9 kΩ (60 Hz)
	Standard operating range	Off → On	80 to 132 V
		On → Off	0 to 20 V
	Input delay time	Off → On	Approximately 10 ms
		On → Off	Approximately 10 ms
		Soft filter	The soft filter times can be changed all at once in the parameter settings. 10 ms, 20 ms, and 70 ms can be set.
	Input type		AC Type 1
Connection	External connection		Removable terminal block M3 screw 20-pole
	Applicable wire size		AWG #22 to 18
Status display LED			LED on when each point turns on Logic side IO CNT: LED on when communication with the CPU module is established
Insulation method			Photocoupler insulation
Dielectric strength			AC 1,500 V 1 minute Between the input terminals as a group and FG
Insulation resistance			10 MΩ or more when measured with DC 500 V insulation resistance tester Between the input terminals as a group and FG
External supply voltage			AC 100 to 120 V: For signals
Internal current consumption			DC 24 V ±10% 40 mA or less (when all points are on)
Number of words occupied			1 word
External dimensions (W x D x H)			40 mm x 122 mm x 130 mm
Weight			250 g

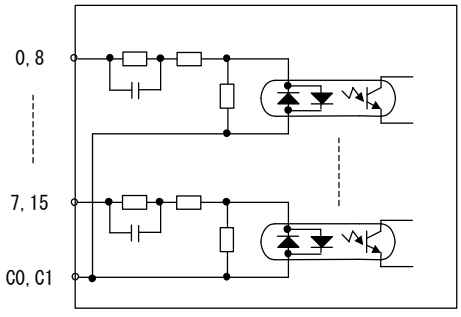
3.5.4.2 Name of Each Part and Its Function



3.5.4.3 External Connection



3.5.4.4 Internal Circuit



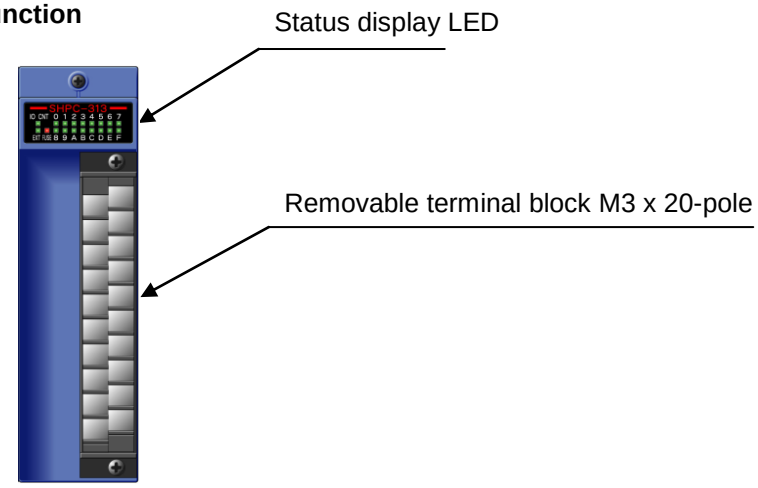
3.6 Individual Specifications of the Digital Output Module

3.6.1 Transistor Output 16 Points

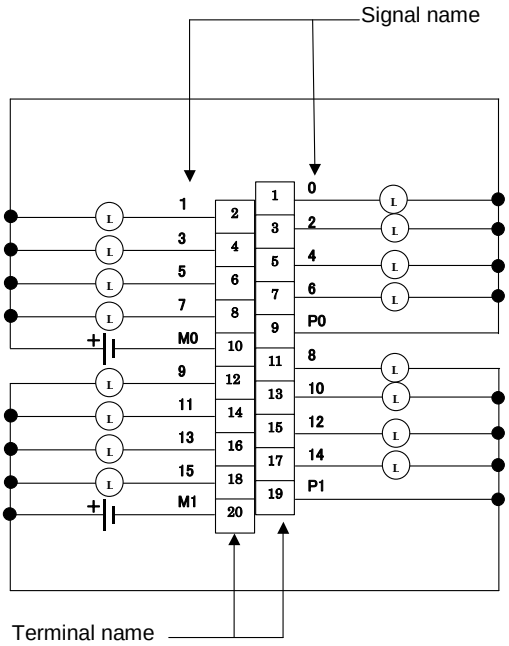
3.6.1.1 Performance Specification List

Item			Specifications
Name			SHPC-313-Z
Number of output points (common configuration)			16 points (8 points / common 2 circuits)
Output power conditions	Rated voltage		DC 12 to 26 V
	Allowable range of voltage		DC 10.2 to 30 V
Output circuit characteristics	Output format		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 when off		Maximum 0.1 mA
	Output type		Transistor output
	Withstand surge current		2 A 10 ms
Output protection type	Built-in fuse		125 V 7 A × 2 (Replacement of fuses cannot be performed by the user)
	Surge suppression circuit		Varistor
	Other output protection		None
Maximum opening/closing speed			1,800 times/hour (This is a restriction when there is an induced load. There is no restriction when there is a resistance load.)
Connection	External connection		Removable terminal block M3 screw 20-pole
	Applicable wire size		AWG #22 to 18
Status display LED			LED on when each point turns on Logic side IO CNT: LED on when communication with the CPU module is established EXT: LED on when connected to external power FUSE: LED on when the fuse blows or when not connected to external power
Insulation method			Photocoupler insulation
Dielectric strength			AC 1,500 V 1 minute Between the output terminals as a group and FG
Insulation resistance			10 MΩ or more when measured with DC 500 V insulation resistance tester Between the input terminals as a group and FG
Dilating conditions			None
External power supply			DC 24 V: For driving transistors
Internal current consumption			DC 24V ±10% 40 mA or less (when all points are on)
Number of words occupied			1 word
External dimensions (W x D x H)			40 mm x 122 mm x 130 mm
Weight			230 g

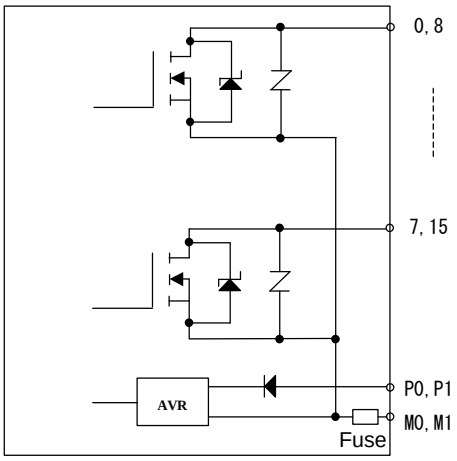
3.6.1.2 Name of Each Part and Its Function



3.6.1.3 External Connection



3.6.1.4 Internal Circuit

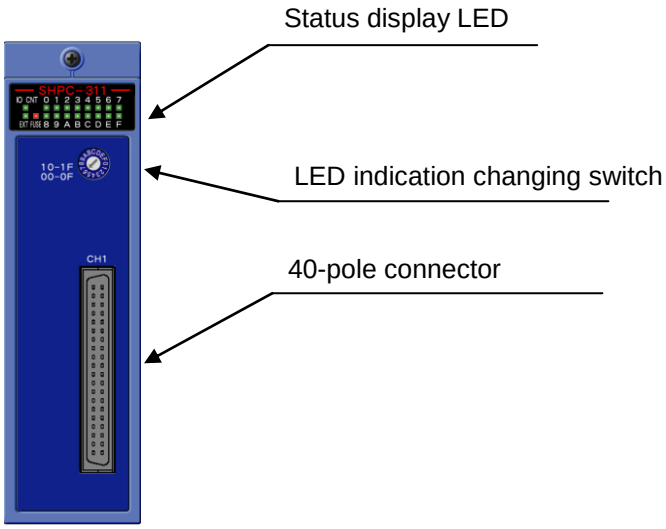


3.6.2 Transistor Output 32 Points

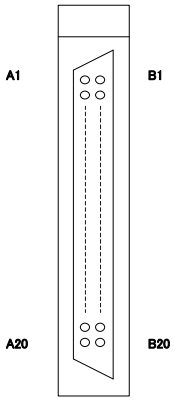
3.6.2.1 Functional Specification List

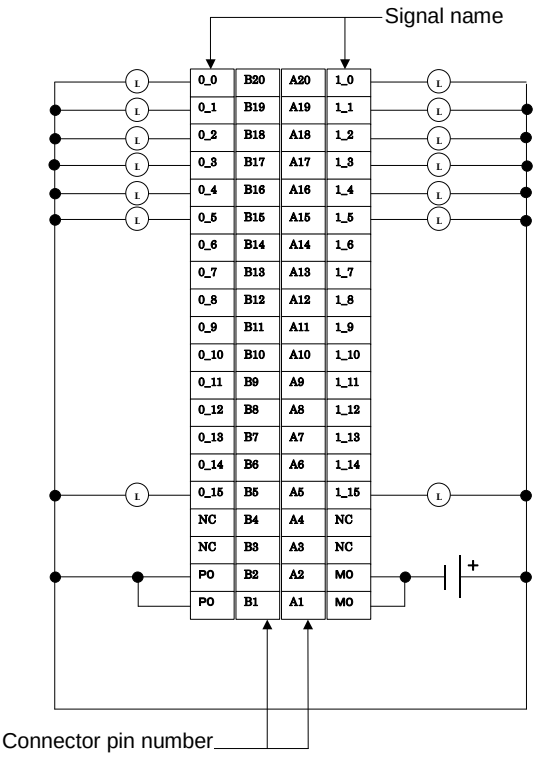
Item			Specifications
Name			SHPC-311-Z
Number of output points (common configuration)			32 points (32 points / common 1 circuit)
Output power conditions	Rated voltage		DC 12 to 26 V
	Allowable range of voltage		DC 10.2 to 30 V
Output circuit characteristics	Output format		Sync output
	Maximum load current		0.12 A/point (DC 30) 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 when off		Maximum 0.1 mA
	Output type		Transistor output
	Withstand surge current		2 A 10 ms
Output protection type	Built-in fuse		125 V 5 A (Replacement of fuses cannot be performed by the user)
	Surge suppression circuit		Zener diode
	Other output protection		None
Maximum opening/closing speed			3,600 times/hour (This is a restriction when there is an induced load. There is no restriction when there is a resistance load.)
Connection		External connection	1 40-pole connector (FCN-365P040-AU)
		Applicable wire size	AWG#23 or less (when using a soldered connector)
Status display LED			LED on when each point turns on by flicking switch Logic side IO CNT: LED on when communication with the CPU module is established EXT: LED on when connected to external power FUSE: LED on when the fuse blows or when not connected to external power
Insulation method			Photocoupler insulation
Dielectric strength			AC 1,500 V 1 minute Between the output terminals as a group and FG
Insulation resistance			10 MΩ or more when measured with DC 500 V insulation resistance tester Between the input terminals as a group and FG
Dilating conditions			None
External power supply			DC 12 to 24 V, 52 mA: For driving transistors
Internal current consumption			DC 24 V ±10% 45 mA or less (when all points are on)
Number of words occupied			2 words
External dimensions (W x D x H)			40 mm x 122 mm x 130 mm
Weight			220 g

3.6.2.2 Name of Each Part and Its Function

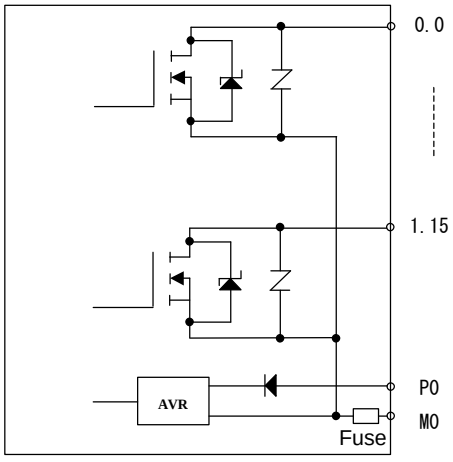


3.6.2.3 External Connection





3.6.2.4 Internal Circuit

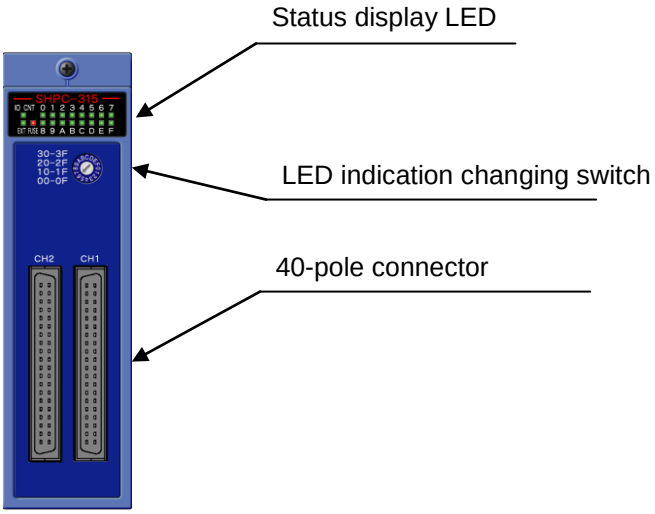


3.6.3 Transistor Output 64 Points

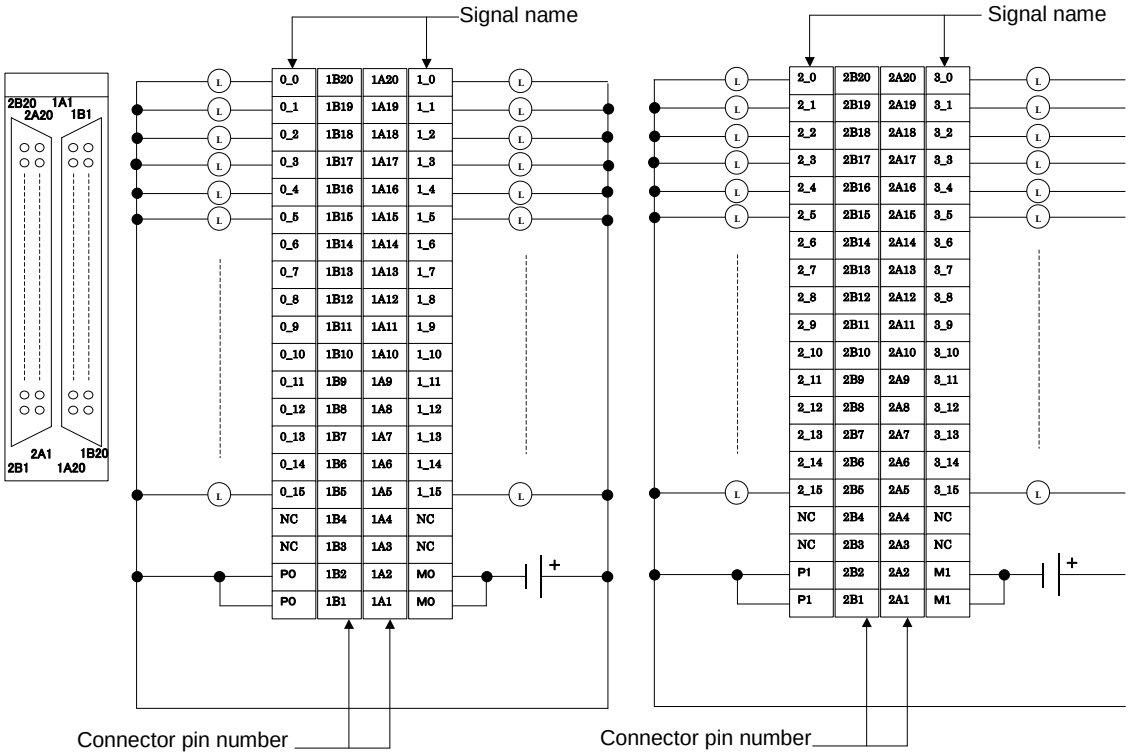
3.6.3.1 Functional Specification List

Item			Specifications
Name			SHPC-315-Z
Number of output points (common configuration)			64 points (32 points / common 2 circuits)
Output power conditions	Rated voltage		DC 12 to 26 V
	Allowable range of voltage		DC 10.2 to 30 V
Output circuit characteristics	Output format		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 when off		Maximum 0.1 mA
	Output type		Transistor output
	Withstand surge current		0.3 A, 10 ms
Output protection type	Built-in fuse		125 V 5 A x 2 (Replacement of fuses cannot be performed by the user)
	Surge suppression circuit		Zener diode
	Other output protection		None
Maximum opening/closing speed			3,600 times/hour (This is a restriction when there is an induced load. There is no restriction when there is a resistance load.)
Connection	External connection		2 40-pole connectors (FCN-365P040-AU)
	Applicable wire size		AWG#23 or less (when using a soldered connector)
Status display LED			LED on when each point turns on by flicking switch Logic side IO CNT: LED on when communication with the CPU module is established EXT: LED on when connected to external power FUSE: LED on when the fuse blows or when not connected to external power
Insulation method			Photocoupler insulation
Dielectric strength			AC 1,500 V 1 minute Between the output terminals as a group and FG
Insulation resistance			10 MΩ or more when measured with DC 500 V insulation resistance tester Between the input terminals as a group and FG
Dilating conditions			None
External power supply			DC 12 to 24 V, 80 mA: For driving transistors
Internal current consumption			DC 24 V ±10% 90 mA or less (when all points are on)
Number of words occupied			4 words
External dimensions (W x D x H)			40 mm x 122 mm x 130 mm
Weight			290 g

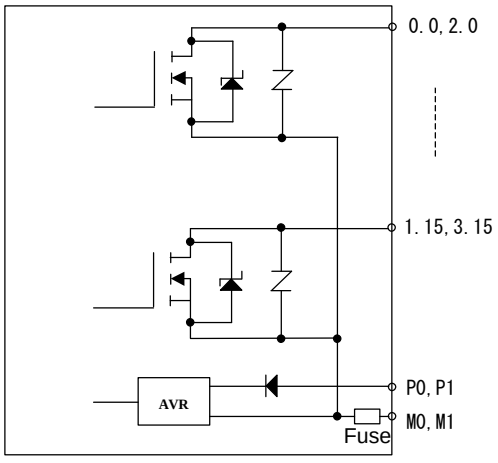
3.6.3.2 Name of Each Part and Its Function



3.6.3.3 External Connection



3.6.3.4 Internal Circuit

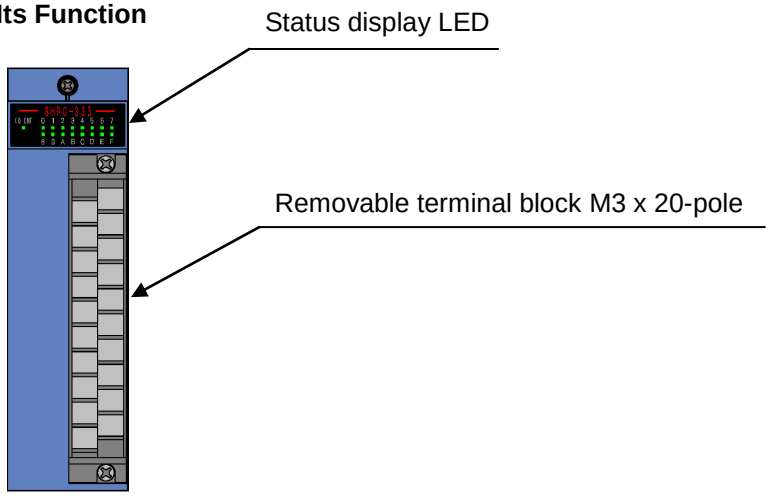


3.6.4 Relay Output 16 Points

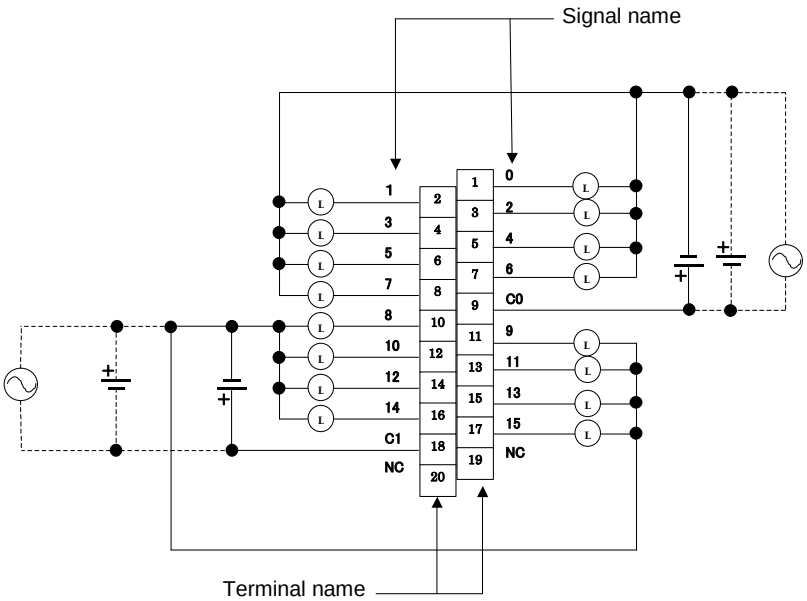
3.6.4.1 Functional Specification List

Item			Specifications
Model			SHPC-333-Z
Number of output points (common configuration)			16 points (8 points / common 2 circuits)
Output power conditions	Rated voltage		AC 240 V, DC 110 V
	Allowable range of voltage		AC 264 V or less, DC 140 V or less
	Rated frequency		–
	Allowable range of frequency		–
Output circuit characteristics	Output format		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 switching voltage/current		DC 5 V
	Output delay time	Off → On	Approximately 10 ms
		On → Off	Approximately 10 ms
	Leakage current when off		Maximum 0.1 mA
Output protection type	Built-in fuse		None
	Output type		Relay (both AC and DC)
	Surge suppression circuit		Varistor
	Other output protection		None
Maximum opening/closing speed			1,800 times/hour
Connection	External connection		Removable terminal block M3 screw 20-pole
	Applicable wire size		AWG #22 to 18
Status display LED			LED on when each point turns on Logic side IO CNT: LED on when communication with the CPU module is established
Insulation method			Photocoupler insulation
Dielectric strength			AC 1,500 V 1 minute Between the output terminals as a group and FG
Insulation resistance			10 MΩ or more when measured with DC 500 V insulation resistance tester Between the input terminals as a group and FG
Dilating conditions			None
Internal current consumption			DC 24 V ±10% 145 mA or less (when all points are on)
Number of words occupied			1 word
External dimensions (W x D x H)			40 mm x 122 mm x 130 mm
Weight			300 g

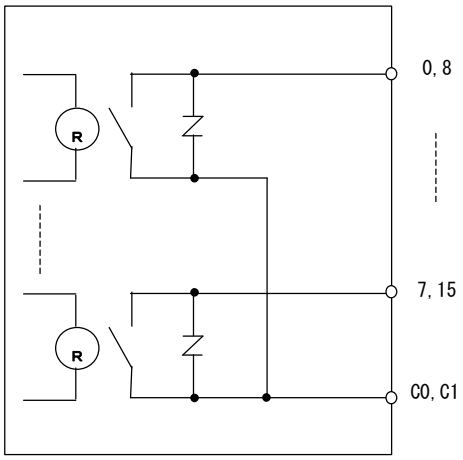
3.6.4.2 Name of Each Part and Its Function



3.6.4.3 External Connection



3.6.4.4 Internal Circuit



3.7 Individual Specifications of the Digital I/O Mixed Module

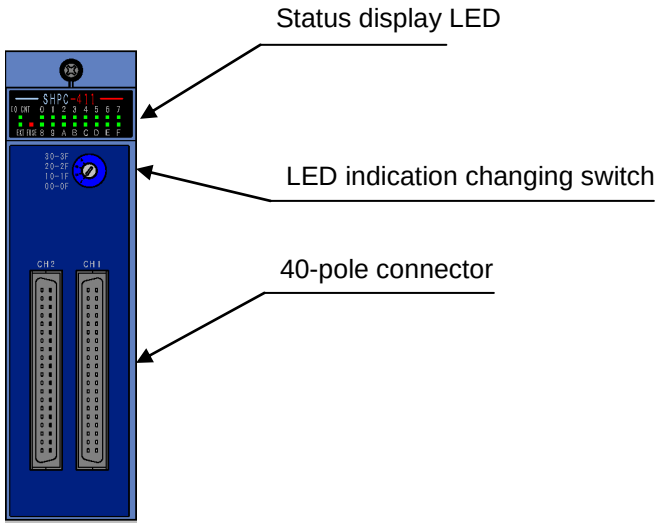
3.7.1 DC 24 V Input 32 Points, Output 32 Points

3.7.1.1 Performance Specification List

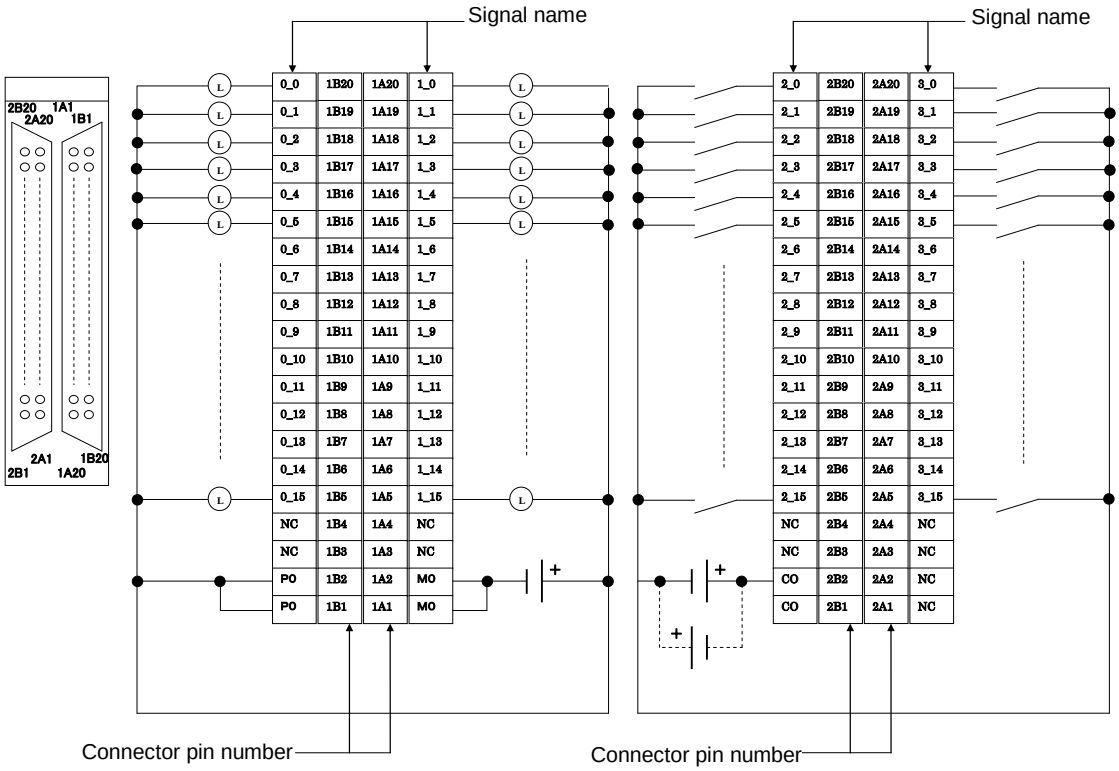
Item			Specifications
Name			SHPC-411-Z
Number of input points (common configuration)			32 points (32 points / common 1 circuit)
Input signal conditions	Rated voltage		DC 24 V
	Maximum allowable voltage		DC 30 V
	Allowable ripple ratio		5% or less
Input circuit characteristics	Input format		Sink/source shared
	Rated current		4 mA (at DC 24 V)
	Input impedance		5.6 KΩ
	Standard operating range	15 to 30 V	15 to 30 V
		0 to 5 V	0 to 5 V
	Input delay time	Off → On	The soft filter times can be changed all at once in the parameter settings. 1 ms, 5 ms, 10 ms, 20 ms, and 70 ms can be set.
		On → Off	
	Input type		DC Type 1
Number of output points (common configuration)			32 points (32 points / common 1 circuit)
Output power conditions	Rated voltage		DC 12 to 26 V
	Allowable range of voltage		DC 10.2 to 30 V
Output circuit characteristics	Output format		Sync output
	Maximum load current		0.12 A/point (DC 30) 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 when off		Maximum 0.1 mA
	Output type		Transistor output
	Withstand surge current		2 A 10 ms
Output protection type	Built-in fuse		125 V 5 A (Replacement of fuses cannot be performed by the user)
	Surge suppression circuit		Zener diode
	Other output protection		None
Maximum opening/closing speed			3,600 times/hour (This is a restriction when there is an induced load. There is no restriction when there is a resistance load.)
Connection	External connection		2 40-pole connectors (FCN-365P040-AU)
	Applicable wire size		AWG#23 or less (when using a soldered connector)
Status display LED			LED on when each point turns on by flicking switch Logic side IO CNT: LED on when communication with the CPU module is established EXT: LED on when connected to external power FUSE: LED on when the fuse blows or when not connected to external power
Insulation method			Photocoupler insulation
Dielectric strength			AC 1,500 V 1 minute Between the input terminals as a group and FG
Insulation resistance			10 MΩ or more when measured with DC 500 V insulation resistance tester Between the input terminals as a group and FG
Dilating conditions			Simultaneously on ratio Maximum 70% (at DC 24 V/55°C)
External supply voltage			DC 24 V: For signals

Item	Specifications
External power supply	DC 12 to 24 V, 52 mA: For driving transistors
Internal current consumption	DC 24 V ±10% 90 mA or less (when all points are on)
Number of words occupied	4 words
External dimensions (W x D x H)	40 mm x 122 mm x 130 mm
Weight	290 g

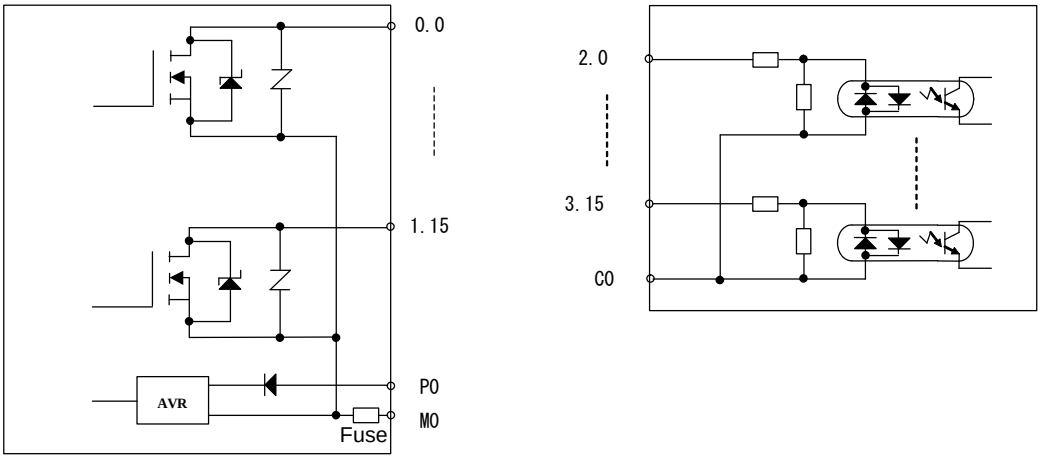
3.7.1.2 Name of Each Part and Its Function



3.7.1.3 External Connection



3.7.1.4 Internal Circuit

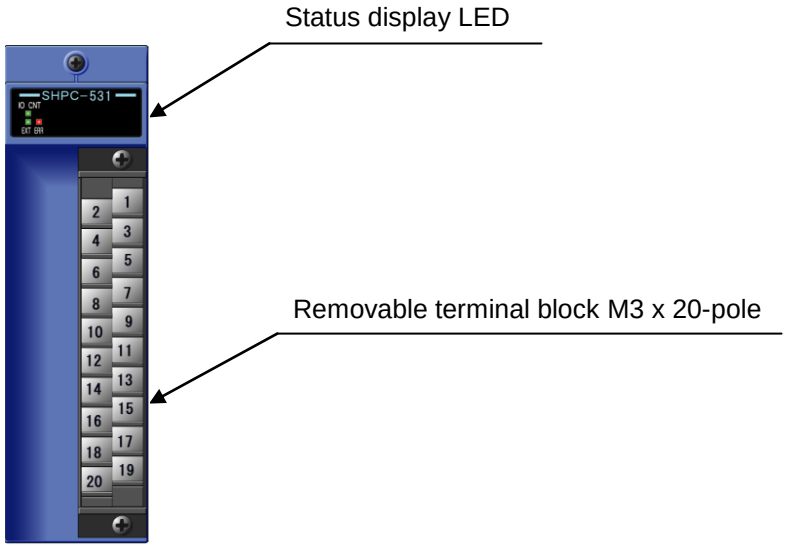


3.8 Analog Input: 8 Channels

3.8.1 Functional Specification List

Item		Specifications		
Name		SHPC-531-Z		
Input register		Voltage (8 ch)	0 to +5 V, 0 to +10 V, +1 to +5 V, -5 to +5 V, -10 to +10 V	16 bits
			0 to +10 v, -5 to +5 v, -10 to +10 v	12 bits
		Current (4 ch)	0 to +20 mA, +4 to 20 mA	16 bits
Number of input channels		8 channels (of which current can be input in 4)		
Input impedance		Voltage input: 1 MΩ, Current input: 250 Ω		
Resolution		16 bits 12 bits		
System accuracy (in relation to scale)		±0.1% or less (25°C), ±1.0% or less (0 to 55°C)		
Digital output value		-32768 to +32768		
A/D conversion time		0.5 ms/8 ch		
Connection	External connection	Removable terminal block M3 screw 20-pole		
	Applicable wire size	AWG #22 to 18		
Status display LED		RUN: On when normal, ERR: On when abnormal IO CNT: LED on when communication with the CPU module is established		
Insulation method		Photocoupler insulation. However, uninsulated between channels		
Dielectric strength		AC 1,500 V 1 minute Between the input terminals as a group and FG		
Insulation resistance		10 MΩ or more when measured with DC 500 V insulation resistance tester Between the input terminals as a group and FG		
Internal current consumption		DC 24 V ±10% 100 mA or less		
Number of words occupied		8 words		
External dimensions (W x D x H)		40 mm x 122 mm x 130 mm		
Weight		250 g		

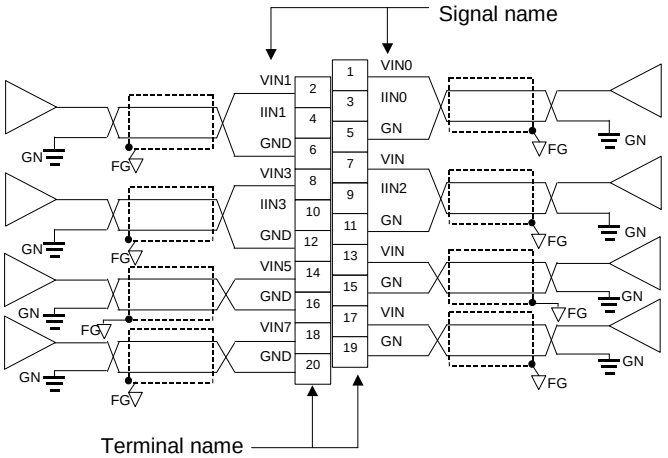
3.8.2 Name of Each Part and Its Function



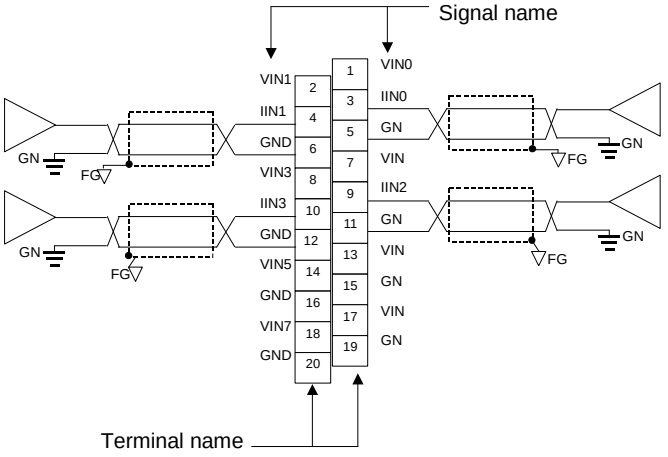
3.8.3 External Connection

2: Voltage input 1 (VIN1)	⊕	⊕	1: Voltage input 0 (VIN0)
4: Current input 1 (IIN1)	⊕	⊕	3: Current input 0 (IIN0)
6: GND1	⊕	⊕	5: GND0
8: Voltage input 3 (VIN3)	⊕	⊕	7: Voltage input 2 (VIN2)
10: Current input 3 (IIN3)	⊕	⊕	9: Current input 2 (IIN2)
12: GND3	⊕	⊕	11: GND2
14: Voltage input 5 (VIN5)	⊕	⊕	13: Voltage input 4 (VIN4)
16: GND5	⊕	⊕	15: GND4
18: Voltage input 7 (VIN7)	⊕	⊕	17: Voltage input 6 (VIN6)
20: GND7	⊕	⊕	19: GND6

Voltage input connection



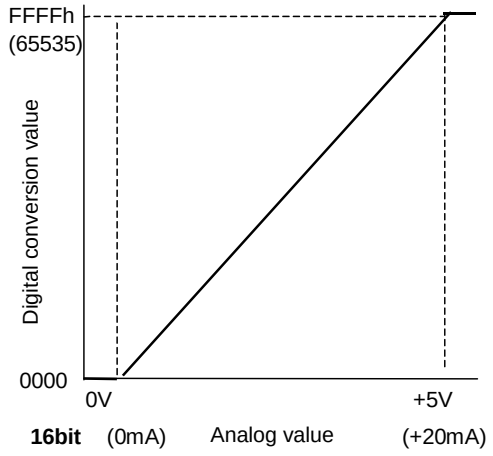
Current input connection



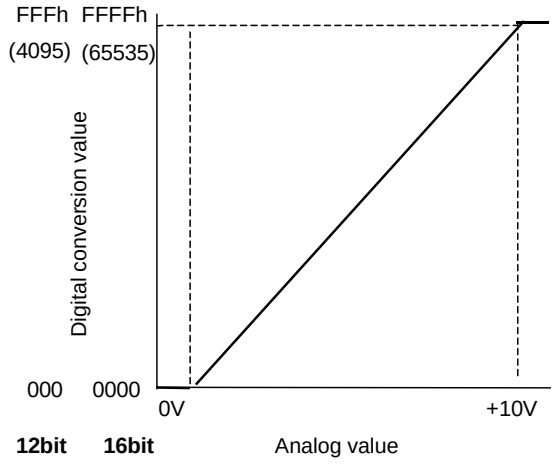
3.8.4 Scaling

The relationship between the input data and digital conversion value is as follows.

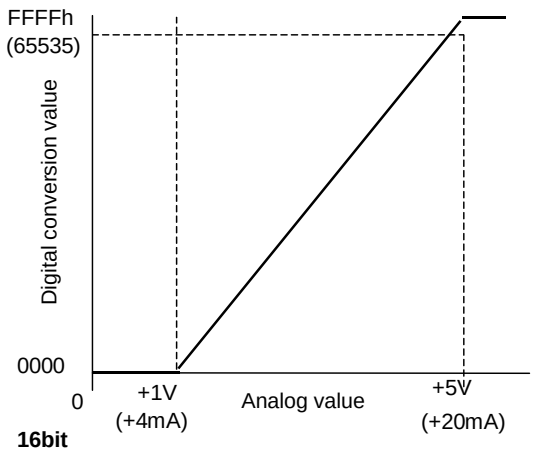
0 to +5 V (0 to 20 mA)



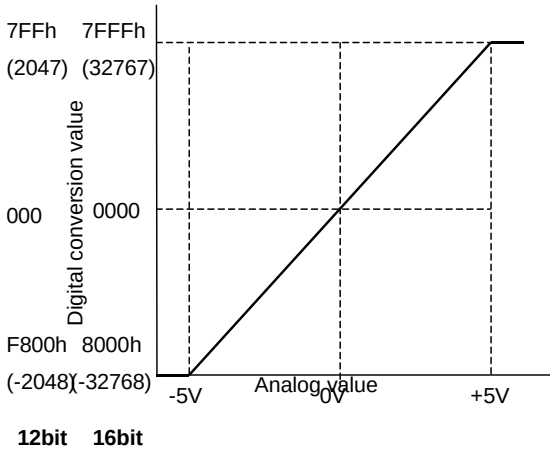
0 to +10 V



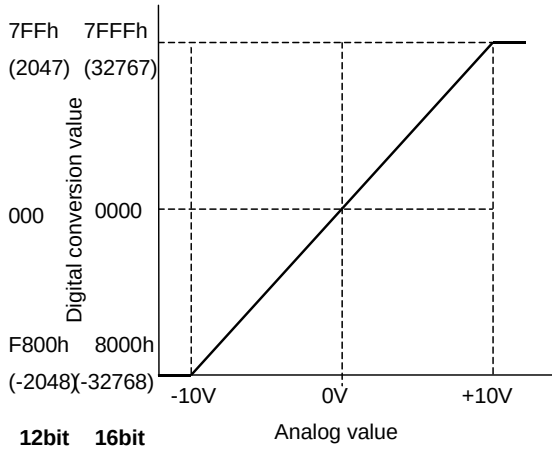
+1 to +5 V (+4 to +20 mA)



-5 to +5 V



-10 to +10 V

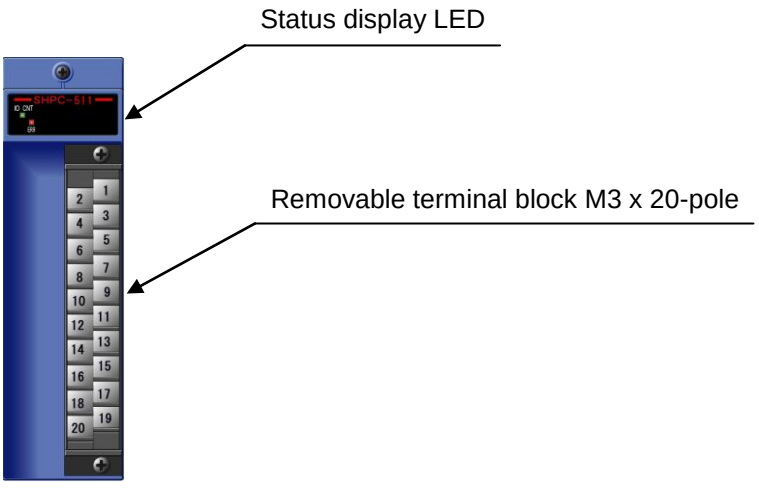


3.9 Analog Output: 4 Channels

3.9.1 Functional Specification List

Item		Specifications		
Name		SHPC-511-Z		
Output register		Voltage (4 ch)	0 to +5 V, 0 to +10 V, +1 to +5 V, -5 to +5 V, -10 to +10 V	16 bits
			0 to +10 v, -5 to +5 v, -10 to +10 v	12 bits
		Current (4 ch)	0 to +20 mA, +4 to 20 mA	16 bits
Number of output channels		4 channels		
External load resistance		Voltage output: 1 kΩ or more, current output: 500 Ω or less		
Resolution		16 bits 12 bits		
System accuracy (in relation to scale)		±0.1% or less (25°C), ±1.0% or less (0 to 55°C)		
Digital input value		-32768 to +32768		
D/A conversion time		0.5 ms/4 ch		
Connection	External connection	Removable terminal block M3 screw 20-pole		
	Applicable wire size	AWG #22 to 18		
Status display LED		ERR: On when abnormal IO CNT: LED on when communication with the CPU module is established		
Insulation method		Photocoupler insulation. However, uninsulated between channels		
Dielectric strength		AC 1,500 V 1 minute Between the output terminals as a group and FG		
Insulation resistance		10 MΩ or more when measured with DC 500 V insulation resistance tester Between the input terminals as a group and FG		
Internal current consumption		DC 24 V ±10% 120 mA or less		
Number of words occupied		4 words		
External dimensions (W x D x H)		40 mm x 122 mm x 130 mm		
Weight		250 g		

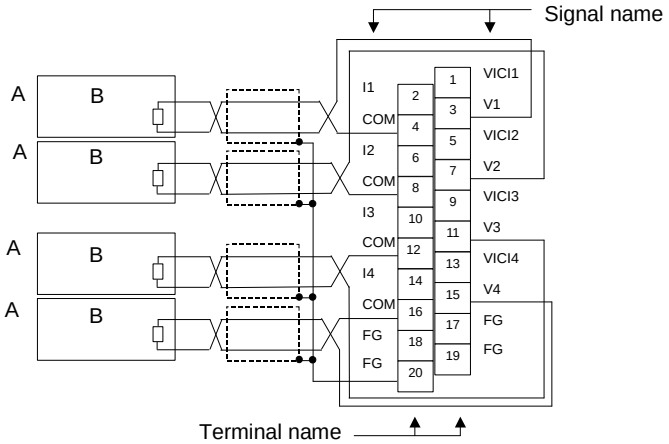
3.9.2 Name of Each Part and Its Function



3.9.3 External Connection

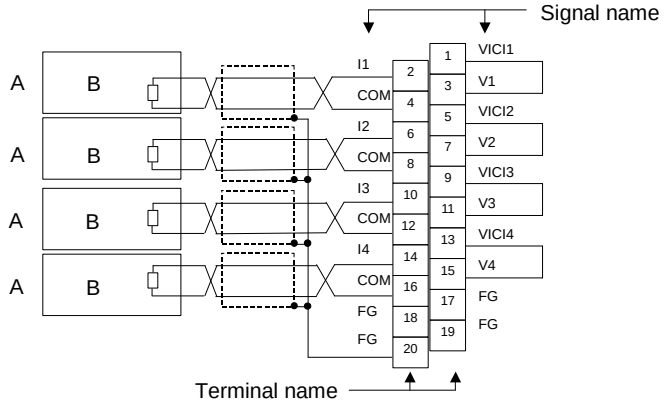
2: Current output 1 (I1)		1: VICI1	
4: COM		3: Voltage output 1 (V1)	
6: Current output 2 (I2)		5: VICI2	
8: COM		7: Voltage output 2 (V2)	
10: Current output 3 (I3)		9: VICI3	
12: COM		11: Voltage output 3 (V3)	
14: Current output 4 (I4)		13: VICI4	
16: COM		15: Voltage output 4 (V4)	
18: FG		17: FG	
20: FG		19: FG	

Voltage output connection



A: Control valve etc.
B: 1 kΩ or more external load resistance

Current output connection

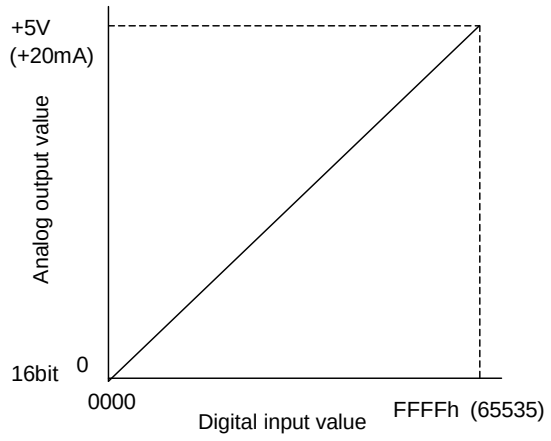


A: Control valve etc.
B: 500 kΩ or less external load resistance

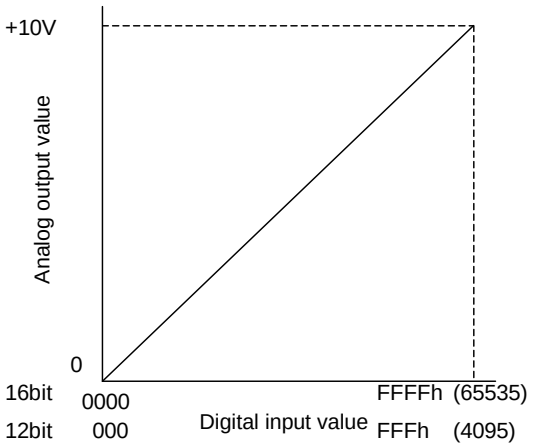
3.9.4 Scaling

The relationship between the input data and output signal is as follows.

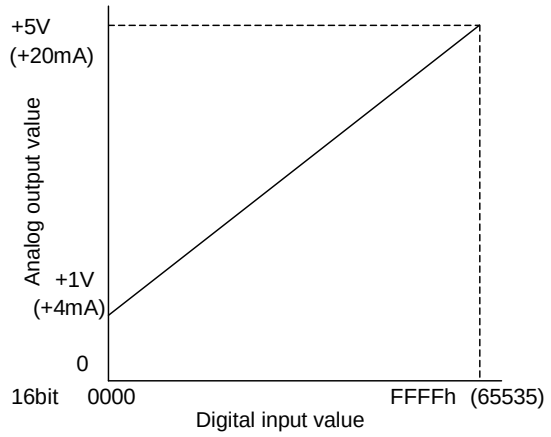
0 to +5 V (0 to +20 mA)



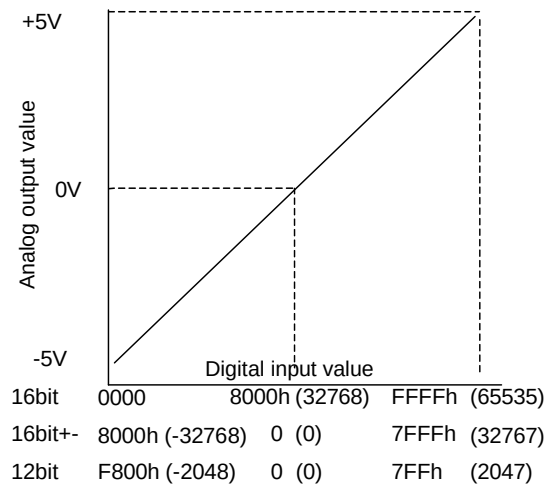
0 to +10 V



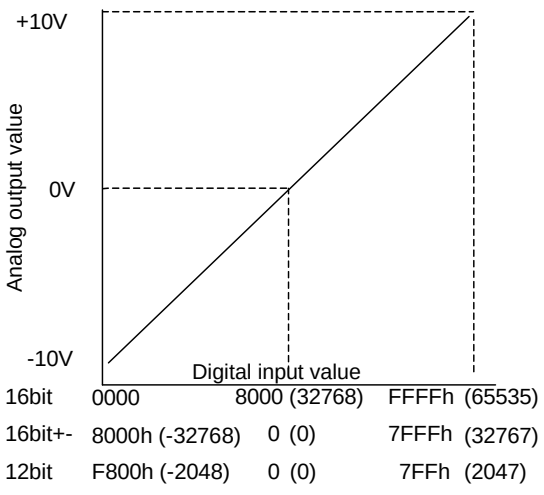
+1 to +5 V (+4 to +20 mA)



-5 to +5 V



-10 to +10 V



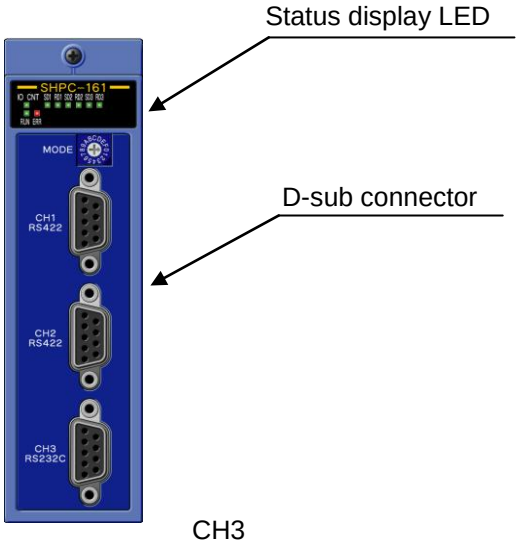
3.10 Communication Module Individual Specifications

3.10.1 Versatile Communications Module

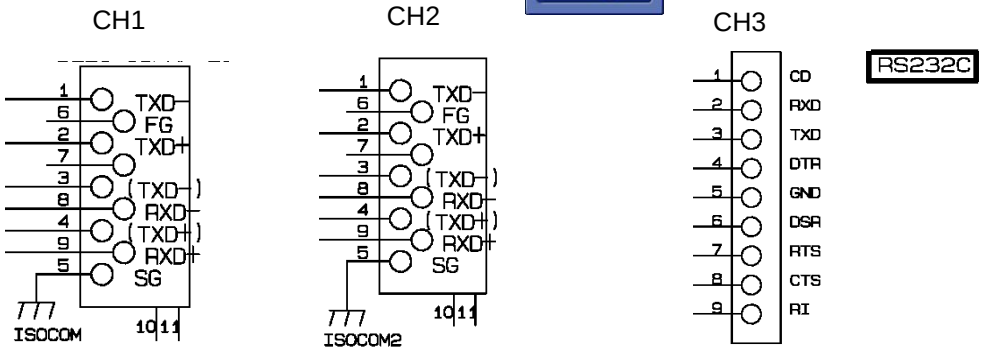
3.10.1.1 Functional Specification List

Item	Specifications		
Name	SHPC-161-Z		
Transmission channel	RS-232C 1 channel		RS-422 2 channels
Internal standard protocol	Touch panel	Fuji Electric: POD UG series Toyo Denki μGPCsx protocol compliant	
		Komatsu: AIP KDP series Toyo Denki μ-GPCH protocol compliant	
Transmission method	Full duplex (with communication protocol)		
Synchronization method	Asynchronous		
Transmission rate	1,200/2,400/4,800/9,600/19,200/38,400/57,600 bps		
Transmission distance	Within 15 m		Within 1 km
Number of units that can be connected	1: 1 (1 external device)		
Connector	D-sub 9-pin connector (male) millimeter screw		D-sub 9-pin connector (female) inch screw
Insulation method	Photocoupler insulation		
Dielectric strength	AC 1,500 V 1 minute Between the output terminals as a group and FG		
Insulation resistance	10 MΩ or more when measured with DC 500 V insulation resistance tester Between the input terminals as a group and FG		
Internal current consumption	DC 24 V ±10% 100 mA or less		
Number of bytes occupied	8 words		
Maximum mountable number	8		
External dimensions (W x D x H)	40 mm x 122 mm x 130 mm		
Weight	260 g		

3.10.1.2 Name of Each Part and Its Function



External connection

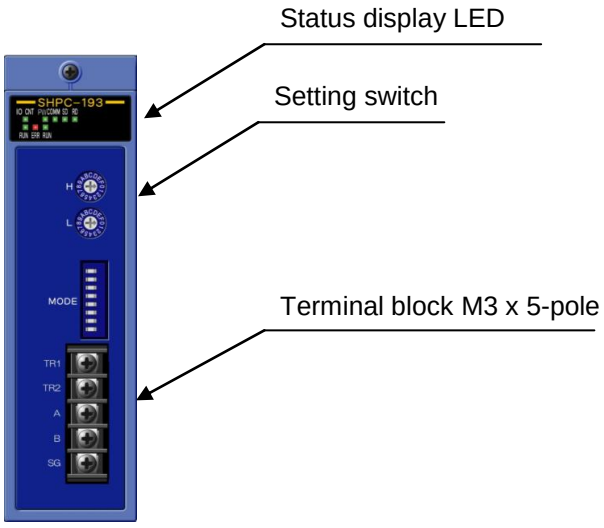


3.10.2 OPCN-1 Master Module

3.10.2.1 Functional Specification List

Item		Specifications
Name		SHPC-193-Z
Transmission channel		RS-485 1 channel
Transmission method		Half duplex
Synchronization method		Bit timing
Transmission rate		125 k/250 k/500 k/1 M/ (2 M) bps
Transmission distance		125 kbps (1000 m), 250 kbps (800 m), 500 kbps (480 m), 1 Mbps (240 m)
Number of units that can be connected		1: 31
Connection	External connection	Terminal block M3 screw 20-pole
	Applicable wire size	AWG #22 to 18
Insulation method		Photocoupler insulation
Dielectric strength		AC 1,500 V 1 minute Between the output terminals as a group and FG
Insulation resistance		10 MΩ or more when measured with DC 500 V insulation resistance tester Between the input terminals as a group and FG
Internal current consumption		DC 24 V ±10% 100 mA or less
Number of words occupied		8,192 words
Maximum mountable number		8
External dimensions (W x D x H)		40 mm x 122 mm x 130 mm
Weight		250 g

3.10.2.2 Name of Each Part and Its Function

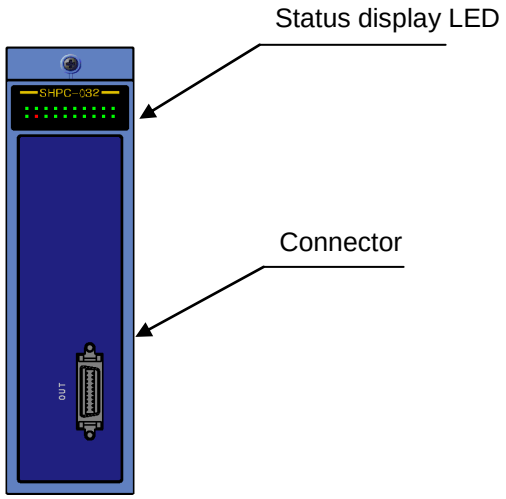


3.10.3 IO Extension Module Master and Slave

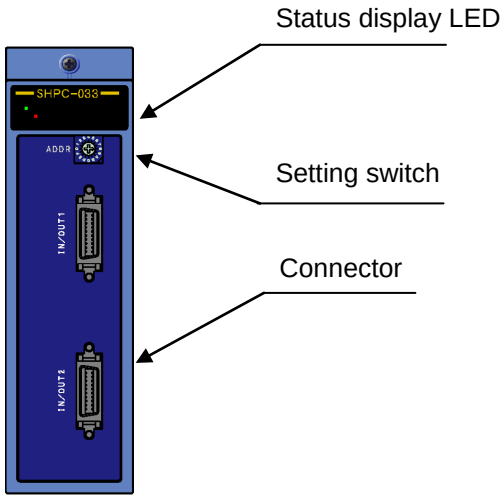
3.10.3.1 Functional Specification List

Item		Specifications
Name	Master	SHPC-032-Z
	Slave	SHPC-033-Z
Number of units that can be connected	Master	1
	Slave	16 slave modules can be connected per master
Installation position	Master	Install in unit with CPU. (1 base 1 unit only)
	Slave	Install in CPU slot position of unit with no CPU.
Connection method		Dedicated extension cable (0.3 m, 0.6 m, 1 m, 2 m, 5 m, 10 m), SX bus total length max 10 m
Signal level		RS485
Status display LED	Master	IO CNT: LED on when communication with the CPU module is established RUN: LED on when the local CPU is operating normally ERR: LED on when the local CPU WDT time up occurs 0 to F: LED on when the relevant unit is in RS485 communication
	Slave	IO CNT: LED on when communication with the CPU module is established RUN: LED on when the local CPU is operating normally ERR: LED on when the local CPU WDT time up occurs
Dielectric strength		AC 1,500 V 1 minute Between the output terminals as a group and FG
Insulation resistance		10 MΩ or more when measured with DC 500 V insulation resistance tester Between the input terminals as a group and FG
Internal current consumption	Master	38 mA
	Slave	56 mA
External dimensions (W x D x H)		40 mm x 122 mm x 130 mm
Weight	Master	220 g
	Slave	270 g

3.10.3.2 Name of Each Part and Its Function



SHPC-032-Z
Master module

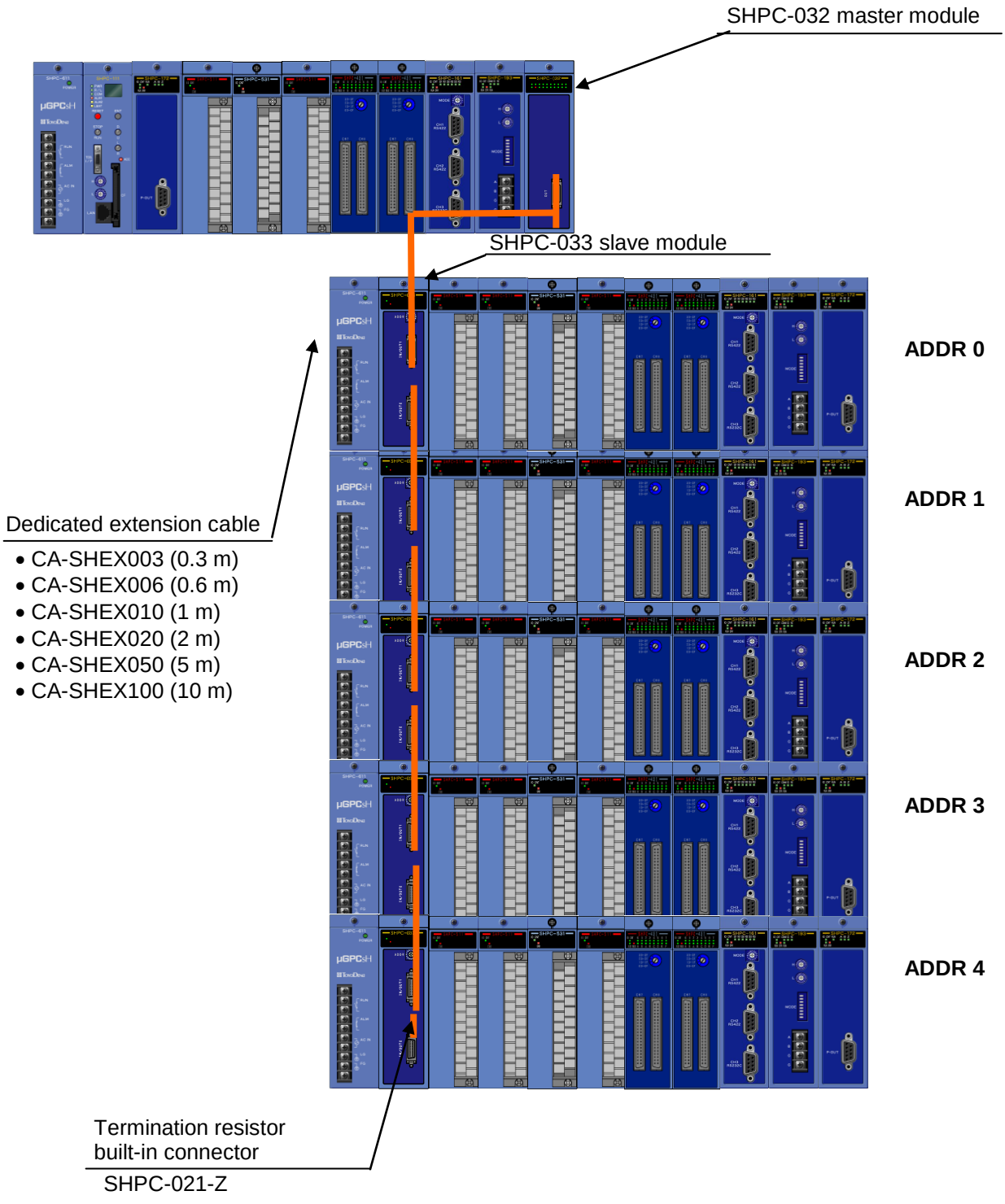


SHPC-033-Z
Slave module

Note: Caution when disconnecting the extension cable

Even if the extension cable is disconnected, the CPU experiences only a minor failure (normal operation continues when there is a system definition conflict or when IO is not implemented and not set) but continues operation. To stop output when IO drops, access the announce relay and create an application program.

Connection method

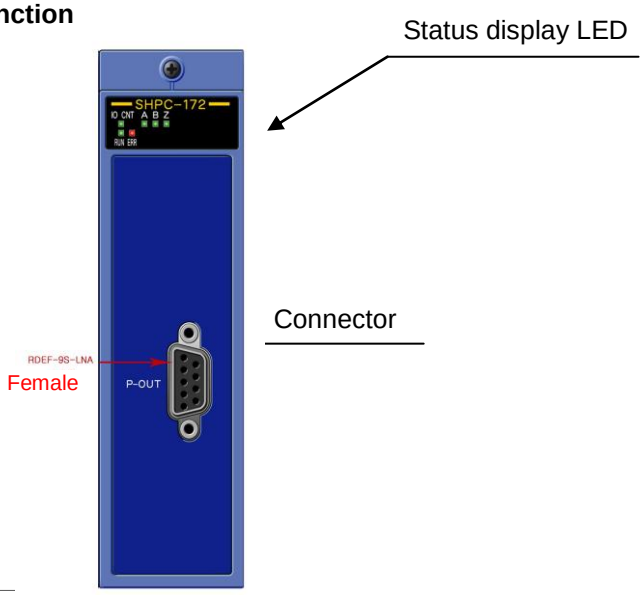


3.10.4 PG Emulator Module

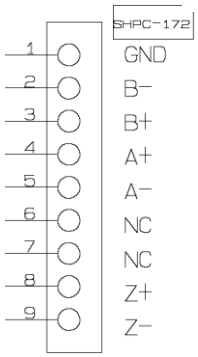
3.10.4.1 Functional Specification List

Item	Specifications
Name	SHPC-172-Z
Pulse generation method	Addition method
Reference clock frequency	67.108860 kHz
Setting resolution	20 bits
Number of output pulses	100 to 65,535 pulses/1 rotation
Output frequency	0 to 624,000 Hz
Output frequency resolution	1.0 Hz
Periodic error	T ±0.01 T (0 to 624 Hz)
Waveform ratio	0.5 T ±0.05 T (0 to 624 Hz)
Phase difference	0.25 T ±0.05 T (0 to 624 Hz)
Signal level	RS-422 A phase, B phase, Z phase
Connector	D-sub 9-pin connector (female)
Insulation method	Photocoupler insulation
Dielectric strength	AC 1,500 V 1 minute Between the output terminals as a group and FG
Insulation resistance	10 MΩ or more when measured with DC 500 V insulation resistance tester Between the input terminals as a group and FG
Internal current consumption	DC 24 V ±10% 100 mA or less
Number of words occupied	8 words
External dimensions (W x D x H)	40 mm x 122 mm x 130 mm
Weight	230 g

3.10.4.2 Name of Each Part and Its Function



External connection

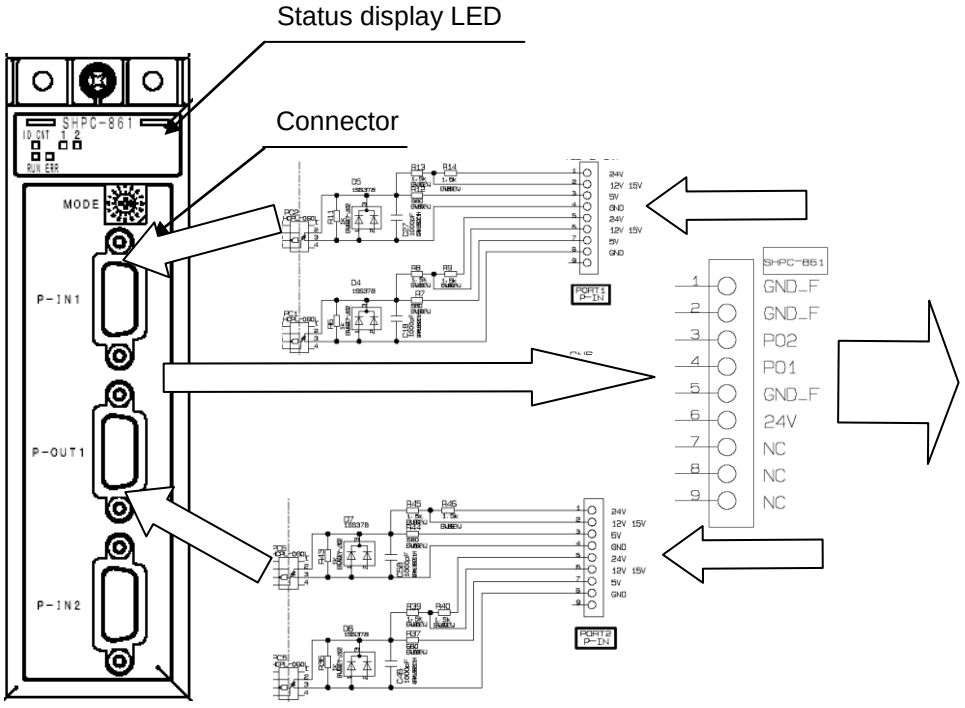


3.10.5 Pulse I/O Module

3.10.5.1 Functional Specification List

Item		Specifications
Name		SHPC-861-Z
Frequency input up-down counter	Input method	DC 5, 12, 15, 24 V input 2 phase, single phase
	Maximum input frequency	100 kHz
	Resolution	4 W occupied per 1 ch (Frequency detection 2 W, input up-down counter 2 W)
	Insulation method	Photocoupler insulation
	Frequency detection accuracy	±0.01% or less
	Connector	D-sub 9-pin connector (male)
Frequency output	Output method	DC 24 V external input Single phase
	Maximum output frequency	32.767 kHz
	Resolution	1 W occupied per 1 ch
	Insulation method	Photocoupler insulation
	Pulse output accuracy	±0.01% or less
	Connector	D-sub 9-pin connector (female)
Dielectric strength		AC 1,500 V 1 minute Between the output terminals as a group and FG
Insulation resistance		10 MΩ or more when measured with DC 500 V insulation resistance tester Between the input terminals as a group and FG
Internal current consumption		DC 24 V ±10% 100 mA or less
Number of words occupied		Input 8 W, output 8 W
External dimensions (W x D x H)		40 mm x 122 mm x 130 mm
Weight		230 g

3.10.5.2 Name of Each Part and Its Function



Chapter 4 Installation and Grounding

4.1 Installation Environment

The following environmental conditions should be avoided when installing the μGPCsH system.

(1) Locations with ambient temperature outside the range of 0 to 55°C

(2) Locations with ambient humidity outside the range of 30 to 95%

(3) Locations where condensation occurs due to rapid temperature change

(4) Locations where combustible or corrosive gas is present

(5) Locations subject to strong impacts or vibration

(6) Locations subject to strong electric fields or magnetic fields

(7) Locations where conductive powder such as dust or iron powder and organic solvents are present in large quantities

(8) Locations subject to rainfall or direct sun light

4.2 Attaching and Removing Units

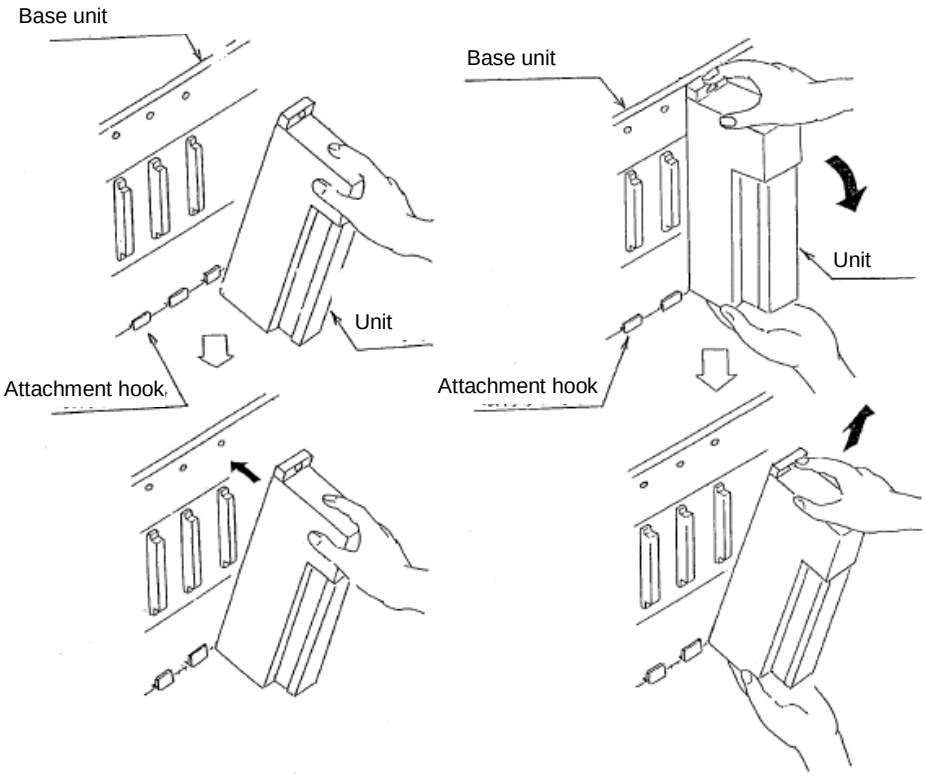
This section explains how to attach the power supply module, CPU module, I/O module, etc., to the baseboard and to remove them.

(1) Attaching a unit

1. Attach the socket on the bottom of the unit to the hook below the slot on the baseboard and insert the top of the module.
2. Check that the baseboard and module connectors are connected.
3. Tighten the attachment screws at the top of the module.

(2) Removing a unit

1. Loosen the attachment screws at the top of the module.
2. Pivot the module towards you on its hook and lift it off.



Chapter 5 Maintenance and Inspection

In order to use the *μ*GPCsH correctly at all times, it is necessary to carry out the following daily and periodic inspections.

5.1 Daily Inspection

Item	Content	Procedure
The attachment of all parts	• Check that attachment screws are not loose.	• Tightening
The connection of all parts	• Check that terminal screws are not loose.	• Tightening • Adjustment
Check the power supply module LEDs.	• Check that the POWER LED is on.	
Check the CPU module LED.	• Check that the PWR LED is on. • Check that the ALM1 LED is off. • Check that the ALM2 LED is off. • Check that the LBAT LED is off.	
Check the extension module LEDs.	• Check that the IO CNT LED is on. • Check that the RUN LED is on. • Check that the ERR LED is off.	
Check the I/O module LEDs.	• Check that the IO CNT LED is on. • Check that the ExT LED is on. • Check that the FUSE LED is off. • Check that the input LED goes on/off. • Check that the output LED goes on/off.	

5.2 Periodic Inspection

Perform inspections once every six months or more. The inspection items are as follows.

Item	Content	Procedure
Measurement of AC supply voltage	• Measure the AC 100/200 V terminal voltage.(AC 85 to 264 V)	• Supply voltage adjustment
	• Measure the terminal voltage of the DC 24 V external power supply.	• Supply voltage adjustment
The connection of all parts	• Check that terminal screws are not loose. Check that the screws are not converging.	• Tightening • Adjustment
Battery	• Check that the LBAT LED is off. (If the LED is on, replace the battery)	• Replacement
Fuse	• Check that the FUSE LED is off. (If the LED is on, replace the module or connect it to an external power supply)	• Replacement • Check the external power supply

5.3 Battery Replacement

Backup for the retain memory and clock is supplied for approximately 5 days by the supercapacitor after the system control power supply is switched off. Thereafter the battery is used. To ensure that the battery works even for long power outages, as a preventive measure, replace it after about 5 years of accumulated outages.

Backup time: Approximately 5 days using the supercapacitor (25°C) and thereafter approximately 5 years using the battery.

Backup time when a battery fault is detected: Approximately 5 days using the supercapacitor (25°C).

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