● Safety Precautions ●
(Read these precautions before use.)

Before installation, operation, maintenance or inspection of this product, thoroughly read through and understand this manual and all of the associated manuals. Also, take care to handle the module properly and safely.

This manual classifies the safety precautions into two categories: ⚠DANGER and ⚠CAUTION

⚠ DANGER	Indicates that incorrect handling may cause hazardous conditions, resulting in death or severe injury.
⚠ CAUTION	Indicates that incorrect handling may cause hazardous conditions, resulting in medium or slight personal injury or physical damage.

Depending on the circumstances, procedures indicated by ⚠CAUTION may also cause severe injury.

It is important to follow all precautions for personal safety.

Store this manual in a safe place so that it can be taken out and read whenever necessary. Always forward it to the end user.

1. DESIGN PRECAUTIONS

⚠ DANGER

● Make sure to have the following safety circuits outside of the PLC to ensure safe system operation even during external power supply problems or PLC failure.
Otherwise, malfunctions may cause serious accidents.
(1) Most importantly, have the following: an emergency stop circuit, a protection circuit, an interlock circuit for opposite movements (such as normal vs. reverse rotation), and an interlock circuit (to prevent damage to the equipment at the upper and lower positioning limits)
(2) Note that when the PLC CPU detects an error, such as a watchdog timer error, during self-diagnosis, all outputs are turned off. Also, when an error that cannot be detected by the PLC CPU occurs in an input/output control block, output control may be disabled. External circuits and mechanisms should be designed to ensure safe machinery operation in such a case.
(3) Note that the output current of the 24V DC service power supply varies depending on the model and the absence/presence of extension blocks. If an overload occurs, the voltage automatically drops, inputs in the PLC are disabled, and all outputs are turned off.External circuits and mechanisms should be designed to ensure safe machinery operation in such a case.
(4) Note that when an error occurs in a relay, triac or transistor output device, the output could be held either on or off.For output signals that may lead to serious accidents, external circuits and mechanisms should be designed to ensure safe machinery operation in such a case.

2. INSTALLATION PRECAUTIONS

⚠ CAUTION

● Use the product within the generic environment specifications described in section 1-4 of this manual.Never use the product in areas with excessive dust, oily smoke, conductive dusts, corrosivegas (salt air, Cl2, H2S, SO2or NO2), flammable gas, vibration or impacts, or expose it to high temperature, condensation, or rain and wind.If the product is used in such conditions, electric shock, fire, malfunctions, deterioration or damage may occur.
● When drilling screw holes or wiring, make sure cutting or wire debris does not enter the ventilation slits.Failure to do so may cause fire, equipment failures or malfunctions.
● Be sure to remove the dust proof sheet from the PLC's ventilation port when installation work is completed.Failure to do so may cause fire, equipment failures or malfunctions.
● Connect the extension cables, peripheral device cables, input/output cables, battery connecting cables and memory cassette securely to their designated connectors. Loose connections may cause malfunctions.

3. WIRING PRECAUTIONS

⚠ DANGER

● Make sure to cut off all phases of the power supply externally before attempting installation or wiring work.Failure to do so may cause electric shock or damage to the product。
● Make sure to attach the terminal cover, offered as an accessory, before turning on the power or initiating operation after installation or wiring work.
Failure to do so may cause electric shock

⚠ CAUTION

● Connect the AC power supply to the dedicated terminals specified in this manual.If an AC power supply is connected to a DC input/output terminal or the DC power supply terminal, the PLC will burn out.
Do not supply power to the [24+]and [24V] terminals (24V DC service power supply) on the main unit or extension units.Doing so may cause damage to the product.
●DO NOT use the "●" vacant terminals in PLC.
●Perform class D grounding (grounding resistance: 100 Ωor less) to the grounding terminal on the main unit and extension units with a wire 2 mm2 or thicker.
Do not use common grounding with heavy electrical systems。

4. STARTUP AND MAINTENANCE PRECAUTIONS

⚠ DANGER

Do not touch any terminal while the PLC's power is on.
Doing so may cause electric shock or malfunctions.
●Before cleaning or retightening terminals, cut off all phases of the power supply externally. Failure to do so may cause electric shock.
●Make sure to connect the battery for memory backup correctly.
Do not charge, disassemble, heat, short-circuit, or expose the battery to fire.
Doing so may rupture or ignite it.
●Before modifying or disrupting the program in operation or running the PLC, carefully read through this manual and the associated manuals and ensure the safety of the operation. An operation error may damage the machinery or cause accidents.

⚠ CAUTION

● Turn off the power to the PLC before attaching or detaching the memory cassette. If the memory cassette is attached or detached while the PLC's power is on, the data in the memory may be destroyed, or the memory cassette may be damaged.
● Do not disassemble or modify the PLC.
Doing so may cause fire, equipment failures, or malfunctions.
For repair, contact HCFA Corporation limited.
● Turn off the power to the PLC before connecting or disconnecting any extension cable. Failure to do so may cause equipment failures or malfunctions.

5. DISPOSAL PRECAUTIONS

⚠ CAUTION

● Please contact a certified electronic waste disposal company for the environmentally safe recycling and disposal of your device.
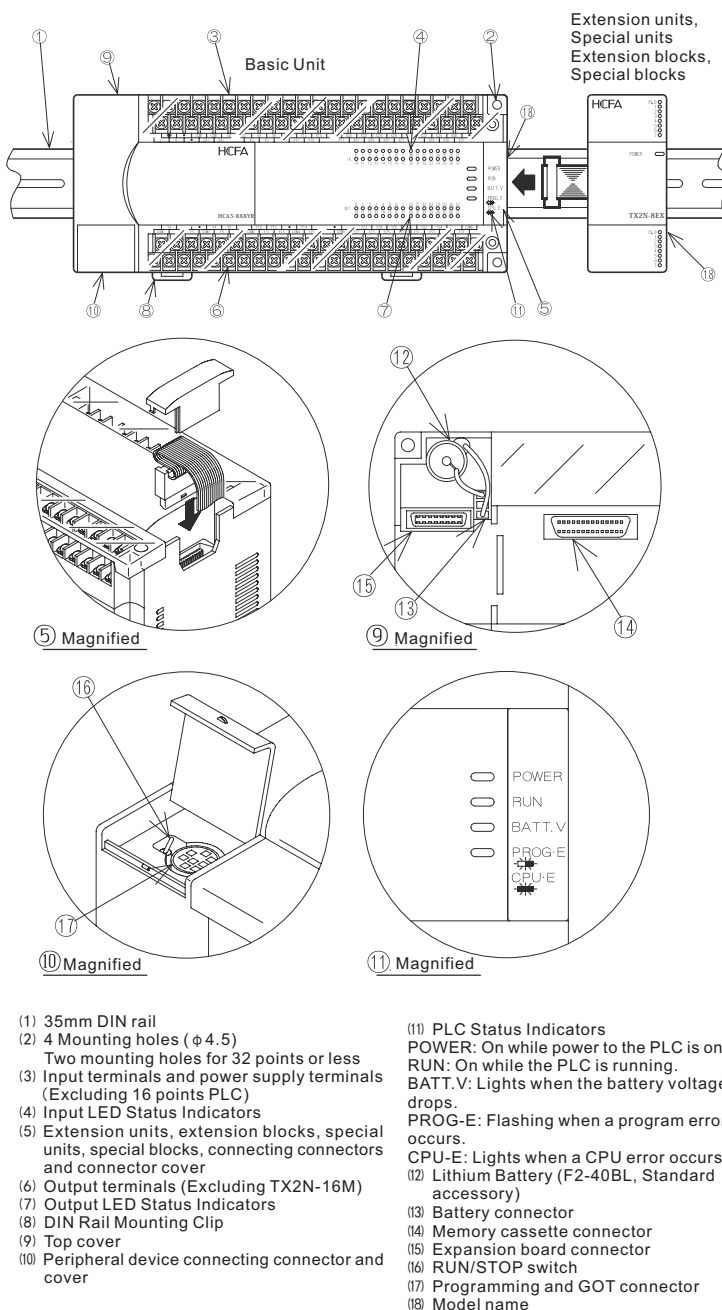

● Major features for HCA5 Programmable Controller ●

[Programmable controller]
Programmable controller of HC series is composed of power supply, CPU, memory cassette and input/output. 24V DC power supply is built in PLC of AC power and DC input type , worked as the sensor or the like power supply.

[Removable terminal blocks]
Removable terminal blocks are built in basic unit and extension units with good maintenance performance.

[Built-in RUN/STOP switch]
The PLC can be started and stopped with the built-in switch, which is under the top cover.

[Program memory]
The PLC has an 8K-step RAM memory.
Use of the memory cassette enables the program memory to be 16K-step.
Optional memory cassette: RAM, EEPROM, EPROM

[Built-in clock function]
The PLC has a clock function to control the time.

[Writing during RUN]
The programming software for personal computer and A7PHP/ A7HGP enables you to modify the program while the PLC is running.

[Comments]
Comments can be created in the program memory by parameter setting. And character comments and display of programming can be realized in peripheral devices of characters input.

[Keywords protection program]
Program memory is set as three-level protection to avoid the misinput and stolen of sequence control.

● Names and Functions of Parts ●

The programmable controller is built-in power supply+ CPU+ Input/ output+ Program memory(RAM). The main processing unit of PLC is also called as Basic unit. Extension units and blocks are available to extend the Input/ output points. And extension units(power supply+ input/ output) and extension blocks(input/ output) are available. Moreover, special function extension devices can be used to have the special control.

1. Part names

Basic Unit

Extension units,
Special units
Extension blocks,
Special blocks

HCFA

HCFA

HCA5 8MR

TX2N-8EX

⑤ Magnified
⑨ Magnified
⑩ Magnified
⑪ Magnified

POWER
RUN
BATT.V
PROG-E
CPU-E

(1) 35mm DIN rail
(2) 4 Mounting holes (φ4.5)
Two mounting holes for 32 points or less
(3) Input terminals and power supply terminals (Excluding 16 points PLC)
(4) Input LED Status Indicators
(5) Extension units, extension blocks, special units, special blocks, connecting connectors and connector cover
(6) Output terminals (Excluding TX2N-16M)
(7) Output LED Status Indicators
(8) DIN Rail Mounting Clip
(9) Top cover
(10) Peripheral device connecting connector and cover

(11) PLC Status Indicators
POWER: On while power to the PLC is on.
RUN: On while the PLC is running.
BATT.V: Lights when the battery voltage drops.
PROG-E: Flashing when a program error occurs.
CPU-E: Lights when a CPU error occurs.
(12) Lithium Battery (F2-40BL, Standard accessory)
(13) Battery connector
(14) Memory cassette connector
(15) Expansion board connector
(16) RUN/STOP switch
(17) Programming and GOT connector
(18) Model name

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2. Selecting methods

When building system with HCA5 series, make sure to consider the following.
①The total number of input/output points (Including occupied points of special blocks) must be 256 points or less on the whole system.
②Power capacity
Basic units and extension units are built-in power supply, providing 24V DC to extension blocks and 5V DC to special blocks.
The current consumption of extension blocks and special blocks is not more than the capacity of the main unit built-in power supply.
③Max special units and special blocks connected to HCA5 main unit is 8.

①Number of Input/ output points

Input/ output points to PLC are shown below.
Input points: 184 or less ⎫
Output points: 184 or less ⎭ Total numbers: 256 or less
The number of input/output points of special units and special blocks are excluded from total number of I/O points of PLC.
256 (Max. number of I/O points)-8(Number of special units/ blocks occupied points *1) *Number of units＞ I/O points controllable on system *1 The occupied points of HCA5-16CCL-M, HCA5-64CL-M, HCA5-16LNK-M, HCA5-ASI-M may exceed 8. Expansion boards and special adapters do not occupy I/O points.

②Power capacity

Power supply capacity calculation of 24V DC & 5V DC is shown below.

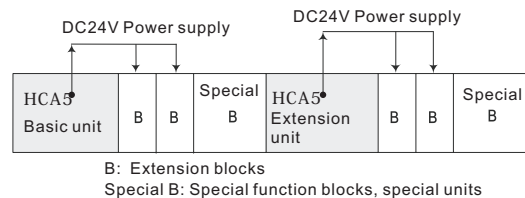| Items		Combination
I/O Extension	<Only extension units connected>. Basic unit + Extension units…..Extension units	Do not calculate the power capacity. And confirm the number of I/O points in Subsection ①.
	Basic unit + Extension blocks…..Extension blocks <Only extension units connected>. Basic units, other extension device +Extension units+ Extension blocks+….Extension blocks	And confirm the number of I/O points in Subsection①and calculating power capacity of 24V DC according to 1-3-3
Special Device Extension	When connecting special units, special blocks, function expansion boards to the above combination.	And confirm the number of I/O points in Subsection①and calculating power capacity of 5V DC according to this manual.

③Number of special function

For details, please refer to this manual for the connecting of special units and special blocks.

3. Extension points and DC24V power supply capacity

Basic unit and extension units can provide DC24V power supply for extension blocks. Check whether the I/O points of extension equipment to be connected is not more than the capacity of the main unit built-in power supply. Below is the example.

Power supply range

DC24V Power supply　　　　DC24V Power supply

HCA5 Basic unit │ B │ B │ Special B │ HCA5 Extension unit │ B │ B │ Special B

B: Extension blocks
Special B: Special function blocks, special units

Basic unit and extension units provide DC24V to the extension block. It needs wiring externally when extension blocks are used for input.

DC 24V capacity calculating

The capacity of DC24V varies depending on the models.
24V DC service power supply is not provided in DC power and AC input products.

Models	Power capacity	Remarks
HCA5-16M、32 M、32 E	250 mA	Power supplied to extension blocks
HCA5-48 M~128 M、HCA5-48 E	460 mA	

The current consumption varies depending on the input/ output of extension blocks. When special function units/blocks are connected, it is necessary to consider whether they can be covered by this remaining power supply capacity.

This remaining power supply capacity (current) can be used as a power supply to external loads (sensors or the like) by the user.

Total capacity of power supply 250mA or 460mA − Input Extension blocks (8 points 50mA) × Number or Extension blocks − Output Extension blocks (8 points 75mA) × Number or Extension blocks ≥0

（This remaining power supply capacity (current) can be used as a power supply to external loads (sensors or the like) by the user. When special function units/blocks are connected, it is necessary to consider whether they can be covered by this remaining power supply capacity. If the calculation results for the current consumption for the 24V DC power supply are negative values, add an input/output powered extension unit.

※When using extension blocks of 16 points, the number of extension blocks should be two. When using input/output extension blocks, the number of extension blocks(HCA5-8ER) should be 0.5 respectively.

[Connecting example]
HCA5-48MR, HCA5-8EX, HCA5-16EX, HCA5-8EYR
460 mA -50 mA*1-50 mA*2-75 mA=235 mA≥0 (Can be extended)

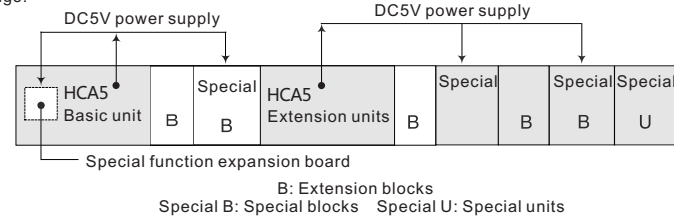──── Remaining capacity of DC24V

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4. Number of special extension and 5V power supply capacity

Make sure to consider the number of extension and DC5V current consumption when using special units, special blocks and expansion boards.

Number of Connecting Units
The maximum units to the basic units are shown below.

Models	Number of connecting units	Remarks
Special function expansion board	Max.1	Connected to the upper part of panel of basic units
Special units	Max.8	Some devices of the following are restricted in the number of connecting units
Special blocks		HCA5-3A、HCA5-16CCL-M、HCA5-32A -M、HCA5-16LN -M 、HCA5-1RM-SET、HCA5-16NT

Power supply range

DC5V power supply can be provided to special blocks and expansion boards in the following range.

DC5V power supply　　　DC5V power supply

HCA5 Basic unit │ B │ B │ Special │ HCA5 Extension units │ B │ B │ Special │ B │ B │ Special U

Special function expansion board
B: Extension blocks
Special B: Special blocks　Special U: Special units

Basic unit and extension units provide DC5V to the next special block. Special units have built-in power.DC5V power supply can be created by extension cables. There's no need for external wiring.Special function expansion boards are powered-on by basic units and don't need any wiring.

DC5V capacity calculating

DC5V power supply of each unit is shown below.
For details of current consumption of special blocks, please refer to Section 1-2.

<DC5V power capacity>

Models	Power capacity	Remarks
HCA5 Basic unit	290mA	DC5V current of CU, memory cassette, connectable evices on programming port are excluded.
HCA5 Basic unit	690mA	Special function expansion boards cannot be connected

DC5V capacity 290mA basic − Special blocks DC5V Current consumption (Refer to 1-2) ≥0 （If the calculation results for the current consumption for the 5V DC power supply are negative values, add an input/output powered extension unit.）

The max. number of extension units for HCA5-16M, HCA5-32M are two; and max. number of extension units for HCA5-48M~128M are three. If connecting more TX0N-3A, add extens ion units (HCA5-32E, HCA5-48E).
Connecting example: HCA5-48MR, HCA5-3A*3
290 mA -(30*3) mA -70mA(Built-in power)=130mA≥0 (Connectable)

5. Generic specification

DESIGN PRECAUTION　　⚠ DANGER

● Make sure to have the following safety circuits outside of the PLC to ensure safe system operation even during external power supply problems or PLC failure.
Otherwise, malfunctions may cause serious accidents.
1) Most importantly, have the following: an emergency stop circuit, a protection circuit, an interlock circuit for opposite movements (such as normal vs. reverse rotation), and an interlock circuit (to prevent damage to the equipment at the upper and lower positioning limits).
2) Note that when the PLC CPU detects an error, such as a watchdog timer error, during self-diagnosis, all outputs are turned off. Also, when an error that cannot be detected by the PLC CPU occurs in an input/output control block, output control may be disabled. External circuits and mechanisms should be designed to ensure safe machinery operation in such a case.
3) Note that the output current of the 24V DC service power supply varies depending on the model and the absence/presence of extension blocks. If an overload occurs, the voltage automatically drops, inputs in the PLC are disabled, and all outputs are turned off. External circuits and mechanisms should be designed to ensure safe machinery operation in such a case.
4) Note that when an error occurs in a relay, triac or transistor output device, the output could be held either on or off.
For output signals that may lead to serious accidents, external circuits and mechanisms should be designed to ensure safe machinery operation in such a case.

Environment Specification

Ambient temperature	0 to 55°C when operating and -25 to 70°C when stored				
Ambient humidity	35~85%RH (no condensation) when operating				
Vibration resistance		Frequency (Hz)	Acceleration (m/s2)	Half amplitude (mm)	Sweep Count for X, Y, Z: 10 times (80 min in each direction)
	When installed on DIN rail	10 to 57	−	0.035	
		57 to 150	4.9	−	
	When installed directly	10 to 57	−	0.035	
		57 to 150	9.8	−	
Shock resistance	147 m/s2 Acceleration, Action time: 11ms, 3 times by half-sine pulse in each direction X, Y, and Z				
Noise resistance	By noise simulator at noise voltage of 1,000 Vp-p, noise width of 1 µs, rise time of 1 ns and period of 30 to 100 Hz				
Dielectric withstand voltage	1.5kV AC for one minute ※1		Between each terminals*2 and ground terminal		
Insulation resistance	5MΩor more by 500V DC megger				
Grounding	Class D grounding (grounding resistance: 100 Ωor less) ※2 <Common grounding with a heavy electrical system is not allowed>				
Working atmosphere	Free from corrosive or flammable gas and excessive conductive dust Working				

※1: Based on I EC61131-2
※2: DC power type: AC500V
※3: Ground the PLC independently or jointly.

Independent grounding — Best condition
Shared grounding — Good condition
Common grounding — Not allowed
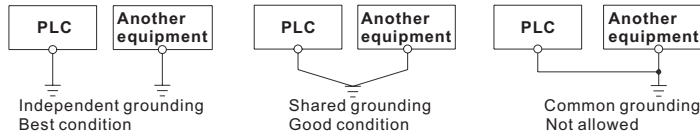
※4: Do not use the PLC under pressure higher than the atmospheric pressure. Doing so may damage the PLC.

● Performance Specification ●

Items		HCA5 Series
Operation control system		Stored program repetitive operation system (dedicated LSI) with interruption function
Input/output control system		Batch processing system (when END instruction is executed) input/output refresh instruction and pulse catch function are provided.
Programming language		Relay symbol system + step-ladder system (SFC notation possible)
Max. memory capacity		16000-steps Comments and file registers (Max. 16000-steps) can be created in the program memory by parameter settings.
Program memory	Built-in memory capacity/type	8000-step RAM (backed up by built-in lithium battery) ■Battery life: Approx. 5 years, approx.. 3 years with RAM memory cassette(Guaranteed 1 year) ■With password protection function (with entry code function)
	Memory cassette (Option)	RAM 16000-steps(2k-, 4k-, 8k-step memory can be selected.) EPROM 16000-steps(2k-, 4k-, 8k-step memory can be selected.) EEPROM 4000-steps (2k-step memory can be selected.) EEPROM 8000-steps (2k-, 4k--step memory can be selected.) EEPROM 16000-steps(2k-, 4k-, 8k-step memory can be selected.) Memory cassette with RTC is not allowed.
	Writing function during running	Provided (Program can be modified while the PLC is running.)
Real-time clock	Clock function	Built-in(Memory cassette with RTC is not allowed) 1980 to 2079 (with correction for leap year) 2- or 4-digit year, accuracy within ±45 seconds/month at 25°C
Kinds of instructions	Basic instructions	Sequence instructions: 27; Step-ladder instructions: 2
	Applied instructions	132 kinds, 309 instructions
Processing speed	Basic instructions	0.08 μs/instruction
	Applied instructions	1.52 μs to several hundred μs/instruction
Number of input/output points	Extension-combined number of input points	X000-X267, 184 points (The device numbers are octal.)
	Extension-combined number of output points	Y000-Y267, 184 points (The device numbers are octal.)
	Total number of points	256 points
Input/output relay		Refer to Input/ output specification.
Auxiliary relay	For general [changeable] ※1	M0 to M499, 500 points
	For keeping [changeable] ※2	M500 to M1023, 524 points
	For keeping [fixed] ※3	M1024 to M3071, 2048 points
	For special	M8000 to M8255, 256 points
State	Initial state	S0 to S9, 10 points
	For general ※1	S10 to S499, 490 points
	For keeping ※2	S500 to S899, 400 points
	For annunciator ※2	S900 to S999, 100 points
Timer (on-delay timer)	100 ms	T0 to T199, 200 points, 0.1 to 3,276.7 sec
	10ms	T200 to T245, 46 points, 0.01 to 327.67 sec
	1ms accumulating type ※3	T246 to T249, 4 points, 0.001 to 32.767 sec
	100ms accumulating type ※3	T250 to T255, 6 points, 0.1 to 3,276.7 sec
Counter	Increment for general (16 bits) ※1	C0 to C99, 100 points, Counting from 0 to 32,767.
	Increment for keeping (16 bits) ※2	C100 to C199, 100 points, Counting from 0 to 32,767.
	Both directions for general (32 bits) ※1	C200 to C219, 20 points, Counting from -2,147,483,648 to +2,147,483,647
	Both directions for general (32 bits) ※2	C220 to C234, 15 points, Counting from -2,147,483,648 to +2,147,483,647.
	High-speed in both direction (32 bits) ※2	Up to 6 points can be used in range from C235 to C255.
Data register (32 bits when paired)	For general (16 bits) ※1	D0 to D199, 200 points
	For keeping (16 bits) ※2	D200 to D511, 312 points
	For keeping (16 bits) ※3	D512 to D7999, 7488 points
	For special (16 bits)	D8000 to D8511, 106 points
	For index (16 bits)	V0 to V7, Z0 to Z7, 16 points
Pointer	For branching of JAMP and CALL	P0~P127, 128 points
	Input interruption and timer interruption	I0□□to I8□□, 9 points
	Counter interruption	I010 to I060, 6 points
Nesting	For master control	N0 to N7, 8 points
Constant	Decimal number (K)	16 bits: -32,768 to +32,767 / 32 bits: -2,147,483,648 to +2,147,483,647
	Hexadecimal number (H)	16 bits: 0 to FFFF / 32 bits: 0 to FFFFFFFF

※1: Non-battery retentive status. The retentive status can be changed by parameter settings.
※2: Battery retentive status. The retentive status can be changed by parameter settings.
※3: Fixed retentive status. The status characteristics are unchangeable.
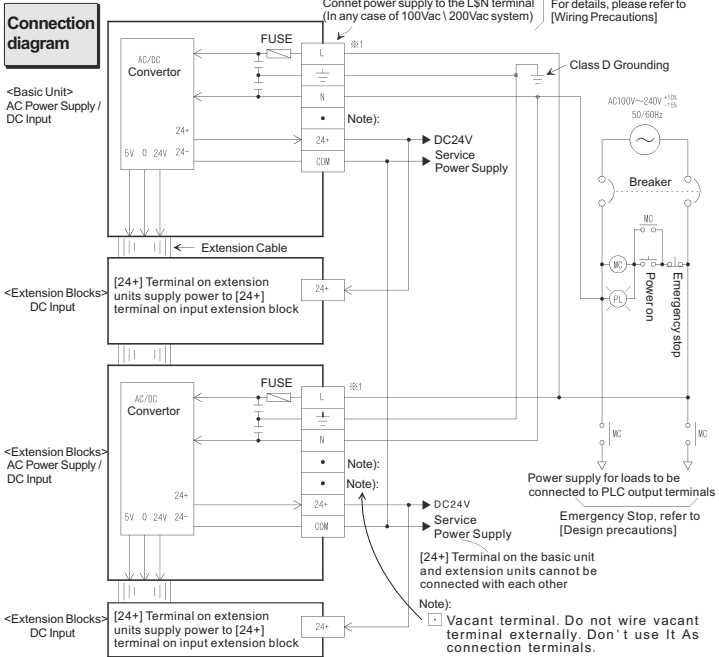
● Power specification ●

AC Power Supply Type, DC Input Type

Items	HCA5-16M	HCA5-32M HCA5-32E	HCA5-48M HCA5-48E	HCA5-64M	HCA5-80M	HCA5-128M
Supply voltage	100 to 240V AC					
Allowable supply voltage range	85 to 264V AC					
Rated frequency	50 / 60 Hz					
Allowable instantaneous power failure time	Operation can be continued upon occurrence of instantaneous power failure for 10 ms or less. When the supply voltage is 200V AC, the time can be change to 10 to 100 ms by editing the user program.					
Power fuse	250V, 3.15A(3A)5□*20mm			250V, 5A 5□*20mm		
Power consumption	30	40	50	60	70	100
Rush current	40 A max. 5 ms or less/100V AC, 60 A max. 5 ms or less/200V AC					
Sensor power supply — No extension blocks	DC 24V, 250mA or less					
Sensor power supply — With extension blocks	DC 24V, 460mA or less / Refer to manual.					

DC Power Supply Type, DC Input Type

Items	HCA5-32M□-D HCA5-48M□-D HCA5-48E□-D	HCA5-64M□-D	HCA5-80M□-D
Supply voltage	24V DC		
Allowable supply voltage range	-30%~+20%		
Allowable instantaneous power failure time	Operation can be continued upon occurrence of instantaneous power failure for 5 ms or less.		
Power fuse	250V 3A 5□× 20mm	250V 5A 5□× 20mm	
Power consumption	25W	30W	35W 40W
Service power supply	——		

WIRING PRECAUTION ⚠ CAUTION

● Connect the AC power supply to the dedicated terminals specified in this manual. If an AC power supply is connected to a DC input/output terminal or DC power supply terminal, the PLC will burn out.
● Do not supply power to the [24+] and [24V] terminals (24V DC service power supply) on the main unit or extension units. Doing so may cause damage to the product.
● DO NOT use the "●"vacant terminals in PLC.
● Perform class D grounding (grounding resistance: 100 Ωor less) to the grounding terminal on the main unit and extension units with a wire 2 mm2 or thicker. Do not use common grounding with heavy electrical systems。
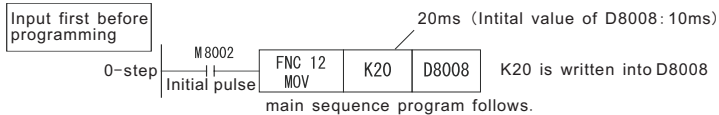
The attachment

☆ Power supply of basic units and extension units should be turned ON/OFF simultaneously.
☆ To avoid the voltage drop of power cable, All power cables must be at least 2mm2.
☆ Operation can be continued upon occurrence of instantaneous power failure for 10 ms or less. Long-time power failure and abnormal voltage drop will make the PLC stop and all outputs are turned off.
☆ Use a cable at least 2mm2(AWG14) to ground equipment. Ground resistance must be less than 100 Ω. Note that the ground cable must not be connected to the same ground as the power circuits.

1. AC Power Supply, DC Input Type

Connection diagram

Connet power supply to the L$N terminal (In any case of 100Vac、200Vac system) For details, please refer to [Wiring Precautions]
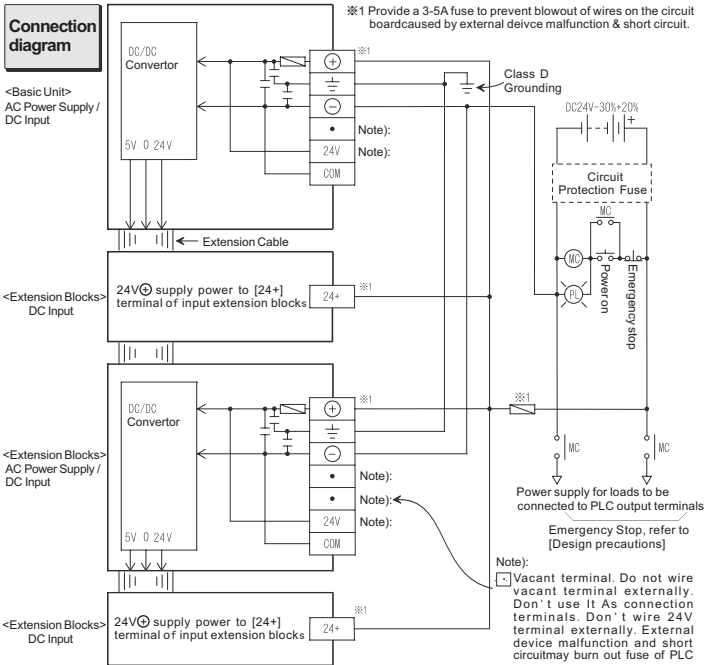
※1: The same power source for the main unit, extension unit and special function unit/block is preferable. When using the different power source from the main unit, turn ON the peripheral devices' power simultaneously, or earlier than the main unit's. When turning OFF the power, confirm the safety of the system and then turn OFF the power of the PLC (including special extension equipment) at the same time.

<Changing allowable instantaneous power failure time>
When the supply voltage of PLC is 200V AC, the time can be change to 10 to 100 ms by editing the user program to change the contents of D8008 in special data register.
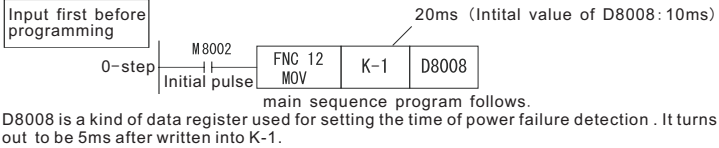
Input first before programming
0-step — M8002 Initial pulse — | FNC 12 MOV | K20 | D8008 | — K20 is written into D8008
main sequence program follows.
20ms (Intital value of D8008: 10ms)

2. DC Power Supply, DC Input Type

Connection diagram

※1 Provide a 3-5A fuse to prevent blowout of wires on the circuit boardcaused by external device malfunction & short circuit.

● As to DC24V, the current consumption of input extension blocks [24+] terminal is <5mA(Input current)+Input points>.
※1: The same power source for the main unit, extension unit and special function unit/block is preferable. When using the different power source from the main unit's, or earlier than the main unit's. When turning OFF the power, confirm the safety of the system and then turn OFF the power of the PLC (including special extension equipment) at the same time.

<Correction of allowable instantaneous power failure time>
Operation of PLC can be continued upon occurrence of instantaneous power failure for 5 ms or less. In order to correct the instantaneous power failure time, K-1 should be written into D8008(9-1) of data register..

Input first before programming
0-step — M8002 Initial pulse — | FNC 12 MOV | K-1 | D8008
main sequence program follows.
20ms (Intital value of D8008: 10ms)

D8008 is a kind of data register used for setting the time of power failure detection . It turns out to be 5ms after written into K-1.

● Input/ output specification ●

1. Input specification

Items	DC Input	DC Input	DC Input	DC Input
Models	<AC power type> Basic unit HCA5 Extension unit	<DC power type> HCA5 Basic unit HCA5 Extension unit		
Input signal voltage	24V DC ±10%*2	24V DC ±10%*2		100~120V AC-15%, +10%
Input signal current	7mA/24V DC(5 mA/24V DC in X010 and more)	5 mA/24V DC		6.2mA/110V AC 60Hz*5
Input ON current	4.5mA or more(3.5 mA or more/24V DC in X010 and more)	3.5 mA or more		3.8mA or more
Input OFF current	1.5mA or less	1.5mA or less		1.7 mA or less
Input response time	About 10 ms	About 10 ms		About 25~30 ms
	Built-in Digital filter in X000~X017. *3 Can be change from 0~60 ms. *4	-		High-speed input is not allowed.
Input signal	Contact input or NPN open collector transistor			Contact input
Input circuit insulation	Insulation with photocoupler			Insulation with photocoupler
Indication of input operation	LED on panel is lit when there is input.			LED on panel is lit when there is input.

*1: Input impedance is 4.3 kΩ in X010 and more of extension units.
*2: The DC power type applies to the power supply voltage range of each unit.
*3: 16M: X000 to X007.
*4: X000,X001: MIN.20ms; X002: MIN.50ms
*5: 70% or less when turned on simultaneously.

WIRING PRECAUTION ⚠ CAUTION

● Connect the AC power supply to the dedicated terminals specified in this manual. If an AC power supply is connected to a DC input/output terminal or DC power supply terminal, the PLC will burn out.
● Do not supply power to the [24+] and [24V] terminals (24V DC service power supply) on the main unit or extension units. Doing so may cause damage to the product.
● DO NOT use the "●" vacant terminals in PLC.
● Perform class D grounding (grounding resistance: 100 Ωor less) to the grounding terminal on the main unit and extension units with a wire 2 mm2 or thicker. Do not use common grounding with heavy electrical systems。

2. Output specification

Items	Relay output	Triac Output	Transistor output
Models	HCA5 Basic unit Extension unit Extension blocks	HCA5 Basic unit Extension unit Extension blocks	①HCA5 basic unit, extension unit ②HCA5 Extension blocks ③HCA5-16EYT-C ④HCA5-8EYT-H
External power supply	30V DC or less or 250V AC or less	85~242V AC	5~30V DC
Circuit insulation	Mechanical insulation	photo-thyristor insulation	Photocoupler insulation
Display of output operation	LED on panel lights when power is applied to relay coil.	LED on panel lights when photo-thyristor is driven.	LED on panel lights when photocoupler is driven
Max. load — Resistance load	2A/ 1 point 8A/ 4 points COM 8A/ 8 points COM	0.3A/ 1 point 0.8A/ 4 points COM 0.8A/ 8 points COM	①0.5A/ 1 point, 0.8A/ 4 points, 1.6A/ 8points (Y000.Y001: 0.3A/ point) ②0.5A/ 1 point, 0.8A/ 4 points, 1.6A/ 8points ③0.3A/ 1 point, 1.6A/ 16points ④1A/1 point, 2A/ 4 points
Max. load — Inductive load	80VA (Refer to life expectancy in 6-2)	15VA/ AC 100V 30VA/ AC 200V	①12W/DC 24V(Y000, Y001: 7.2W/ DC24V) ②12W/ DC24V ③7.2W/ DC24V ④24 W/ DC24V
Max. load — light load	100W	30W	①1.5W/ DC24V(Y000,Y001: 0.9W/DC24V) ②1.5W/ DC24V ③1W/ DC24V ④1.5W/ DC24V
Open circuit leakage current	—	1mA/AV100V, 2mA/AC200V	0.1 mA /DC30V
Min. load	DC 5V 2mA reference value	0.4VA/AC100V, 1.6VA/AC200V)	—
Response time OFF→ON	About 10 ms	1ms or less	0.2ms or less(Y000,Y001: 15ms)
Response time ON→OFF	About 10 ms	10ms or less	0.2ms or less(Y000,Y001: 30ms)

● Maintenance and Periodic Inspection ●

This PLC does not incorporate consumable parts that are factors in the reduction of service life. However, the batteries have a limited life expectancy.

Periodic inspection | Battery life and regular replacement

| Program memory type	Battery service life and replacement period		
	Approx. minimum lifetime	Standard life expectancy	Regular replacement time
Built-in memory EEPROM memory cassette EPROM memory cassette	1 year	5 year	3 year

● Take care that output relay working with high frequency and driving large capacity load may lead to considerable reduction of the product life.
● When inspecting the battery, check the following points.
■ Check that the temperature in the panel is not abnormally increased by other heat generating bodies or direct sunlight.
■ Check that dust or conductive dust has not entered the panel.
■ Check for loosening of wiring and other abnormalities.

Battery replacement

When the battery voltage is low, a "BATT" LED lights (red) while the power is ON, and M8005 and M8006 are switches ON.
Although the battery will continue to function for approximately 1 month after the "BATT" LED switches ON, a replacement battery should be ordered and installed as soon as possible.

Before replacing the battery
Step 4 of the replacement procedure (below), must be performed within 20 seconds after step 3, or the memory content could be lost.
1 Turn the power OFF.
2 Remove the battery cover.
Slightly lift the right side of the battery cover. Grasp the cover between your fingers and remove it.
3 Remove the old battery.
Extract the old battery from the battery holder, and disconnect the battery connector.
4 Install the new battery.
Connect the battery connector to the new battery, and insert the battery into the battery holder within 20 seconds.
5 Attach the battery cover

F2-40BL type Battery
Battery / Battery connector
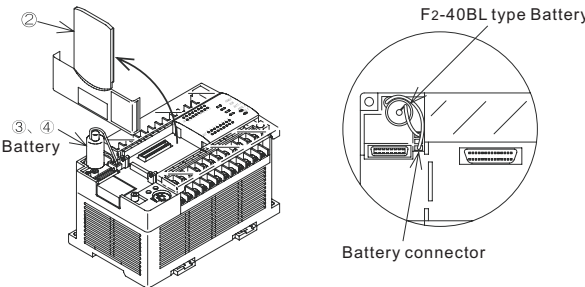
● Note: No touch with the battery contact piece when installing function expansion boards.