HCFA CORPORATION LIMITED

User's manual

for HCA1, HCA2 Series Programmable Controller

► 1. Product overview

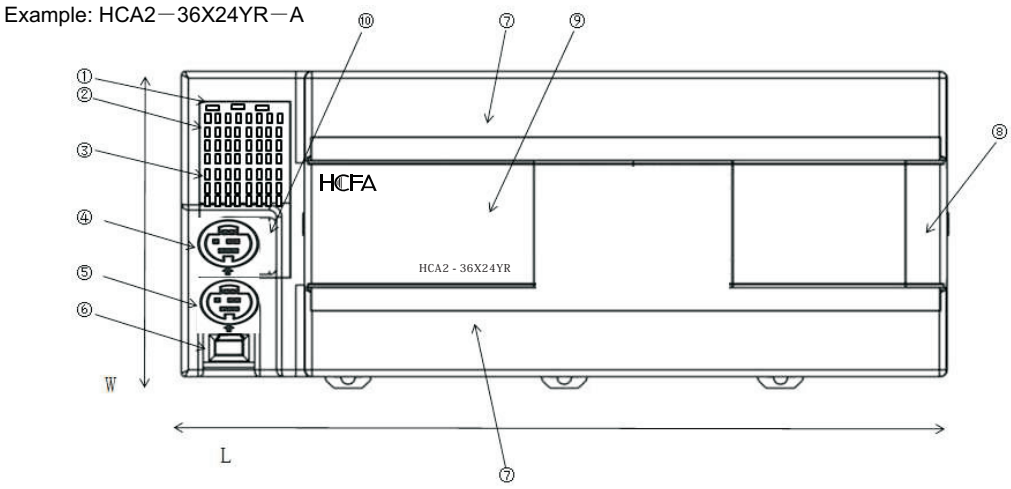
●1.1 Product naming rules

HC A1-36X 24Y R(T)- A (D)
① ② ③ ④ ⑤ ⑥

Code	Contents
①	HC indicates the Chinese Character Pinyin Initials 'HeChuan
②	A2 indicates series number of PLC. HC PLC Types: A1~A8
③	36X indicates 36 input points; Input points of A1 series: 8X, 12X, 16X Input points of A2 series: 8X, 14X, 24X, 36X
④	24Y indicates 24 output points; Output points of A1 series: 6Y、8Y、14Y Output points of A2 series: 6Y、10Y、16Y、24Y Total number of input& output points: A1: 14 points, 20 points, 30 points A2: 14 points, 24 points, 40 points, 60 points
⑤	R(T) indicates output type of PLC R: relay output T: transistor output
⑥	A(D) indicates power supply type of PLC A: AC 85V~264V input D: DC 20.4V~26.4V input

●1.2 Part names

Example: HCA2—36X24YR—A



①Status indicator POWER LED: Lit when power is ON.
RUN LED: Lit when executing a program
ERROR LED: When program error, indicating lampflashes
When CPU error, indicating lamp lit
②Input indicator: HCA1 HCA2 is octal.
③Output indicator: HCA1 HCA2 is octal.
④RS422&485 communication port: Operating according to arrow directions
⑤RS422 communication port: Operating according to arrow directions
⑥RUN/STOP switch
⑦Terminal cover
⑧The right expansion cover
⑨The front cover, built-in battery interface
⑩Two analog potentiometer opening

●1.3 External dimension

Points	L(mm)	W(mm)	H(mm)
HCA1-8X6Y(14 points)	100.2	90	81
HCA1-14X10Y(20 points)	130.2	90	81
HCA1-20X14Y(30 points)	150.2	90	83
HCA2-8X6Y(14 points)	100.2	90	81
HCA2-14X10Y(24 points)	130.2	90	81
HCA2-24X16Y(40 points)	182.2	90	83
HCA2-36X24Y(60 points)	220.2	90	83

●1.4 Performance Specification

Items	Performance
Memory capacity	● Built-in 8K EEPROM ● 8K steps(max.), including comments, file register ● Rewrite: 20,000 times
Install expansion unit/ IO	Optional
Transistor output modules	Optional
High-speed counter	●Increment: 100 kHz* 2 counter, 10 kHz*4 counter ●Up/ down: 100 kHz*1 counter, 10 kHz*1 counter ●Pulse plus direction: 100 kHz * 2 counter ●Differential phases (4×): 50 kHz*1 counter, 5 kHz*1 counter
Pulse output	Support(Only with transistor output modules)
Rs422 communication port	Provided
RS422&485 communication port	Provided
Corresponding links	●Simple PC links (8 base units(max.) can be connected) ●PC links(can be used as a sub-station connection) ●Parallel links(2 base unit can be linked)
Clock	Provided
Battery	Can be used(Sold separately)
Backup time of capacitor	10 days (at most), at 25 ℃(More than 30 minutes after start-up)
Battery-free operation	If there are no batteries, we have to do no battery operation. If power outage more than 8~10 days, only EEPROM data can be kept.

► 2 .Power specification

●2.1AC power module Specification

Items	HCA1			HCA2			
	14 points	20 points	30 points	14 points	24 points	40 points	60 points
Rated voltage	AC 100 - 240V, +10% -15%						
Allowable voltage range	AC 85 - 264V						
Rated frequency	50/60 Hz						
Allowable momentary power failure period	10ms, If less than 10 ms, the PLC will continue operation. If 10 ms or more, the PLC will be shut down						
Power fuse	250V , 1A			250V , 3.15A			
In-rush current	100V AC - Max. 15A for 5ms 200V AC - Max. 25A for 5ms			100V AC - Max. 30A for 5ms 200V AC - Max. 50A for 5ms			
Power consumption	19W	20W	21W	29W	30W	32W	35W
24V DC External power	DC24V 400mA (Have nothing with expansion module connection)						

Attention: Includes Input current (7mA or 5mA perpoint)

❶

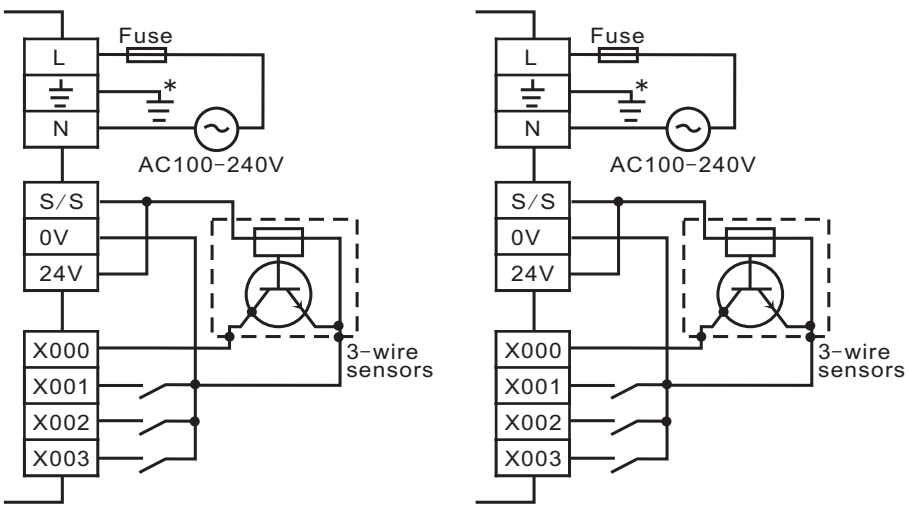
●2.2 DC power module Specification

Items	HCA1			HCA2			
	14points	20points	30points	14points	24points	40points	60points
Power consumption	DC 12~24 V +10% -15%						
Allowable voltage range	DC 10.2V~28.8V						
Allowable momentary power failure period	5mS, If less than 5 ms, the PLC will continue operation. If 5 ms or more, the PLC will be shut down						
Inrush current	DC24V - Max. 10A for 100 μs			DC24V - Max. 25A for 1ms DC 12V - Max. 22A for 0.3ms			
Power consumption	6.5W	7W	8W	14.5W	15W	18W	20W

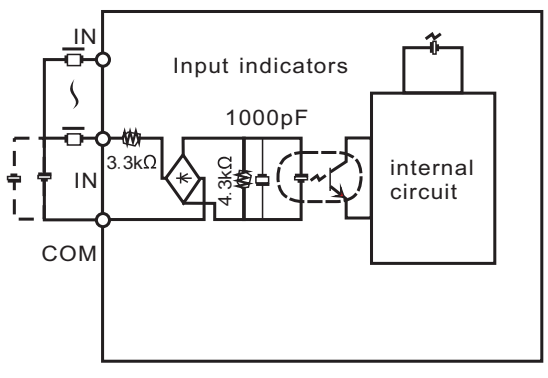
Attention: Includes Input current (7mA or 5mA per point)

►3 .Input / Output wiring diagram

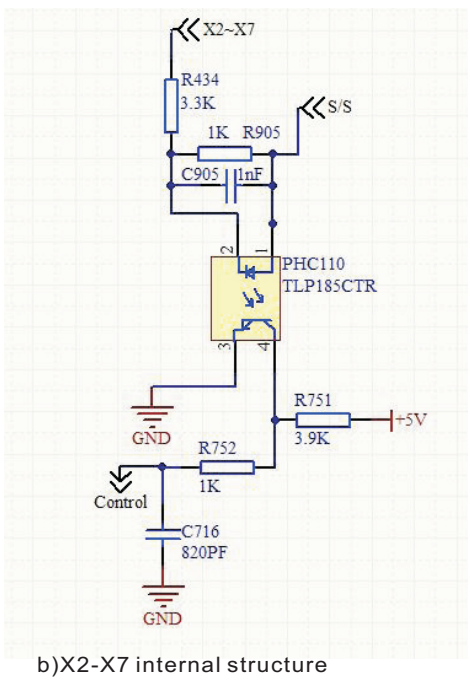
●3.1 Input wiring diagram



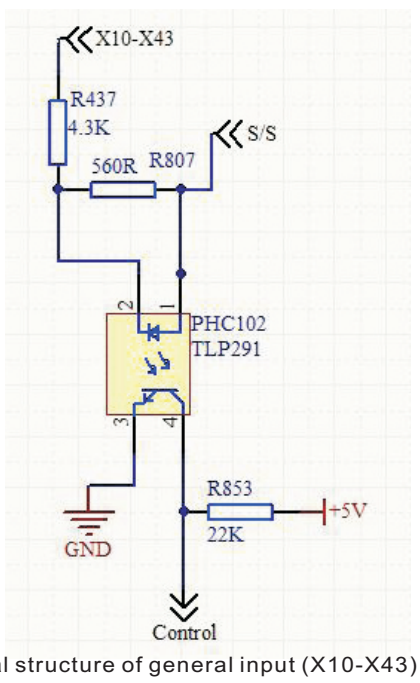
The source / sink connection of input terminal as the example.



a)2*100KHz internal circuit of high-speed input



b)X2-X7 internal structure



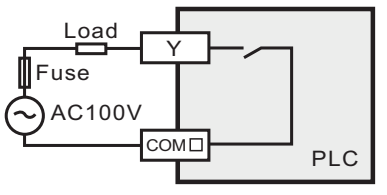
c) Internal structure of general input (X10-X43)

●Caution:Unidirectional coupling is used in photocoupler input forall HCA1/HCA2 series, and all inputs can only be sinking input.

●3.2 Output wiring diagram

3.2.1 Relay output specification and wiring

Output type		Relay	
External power supply		≤DC30V ≤240V(It should be lower than AC 250V if not consistent with CE/UL/CUL)	
Maximum load	Resistive load	2A/1 point	The total load current should not exceed following values of common collector. Output 1 point common collector:2A Output 4 point common collector: 8A Output 8 point common collector: 8A
	Inductive load	80VA	
Minimum load		DC5V 2mA (Reference value)	
Open circuit leakage current		_	
Response Time	OFF→ON	About 10 ms	
	ON→OFF	About 10 ms	
Circuit isolation		Mechanical isolation	
Operation indication		When relay coil is energized, LED is lit.	



Short-circuit protection

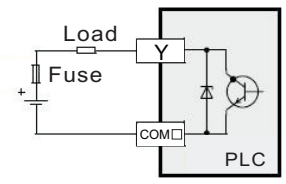
★Precaution:
Protection circuit for load short-circuit: A short-circuit at a load connected to an output terminal could cause burnout at the output element or the PCB. To prevent this, a protection fuse should be inserted at the output.
Contact protection circuit of inductive load: An internal protection circuit for the relays is not provided in the relay output circuit for this product. It is recommended to use inductive loads with built-in protection circuits. When using loads without built-in protection circuits, insertan external contact protection circuit composed of surge absorber to reduce electromagnetic interference and extend the product life

❷

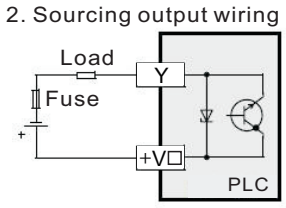
●3.2.2 Transistor output specification and wiring

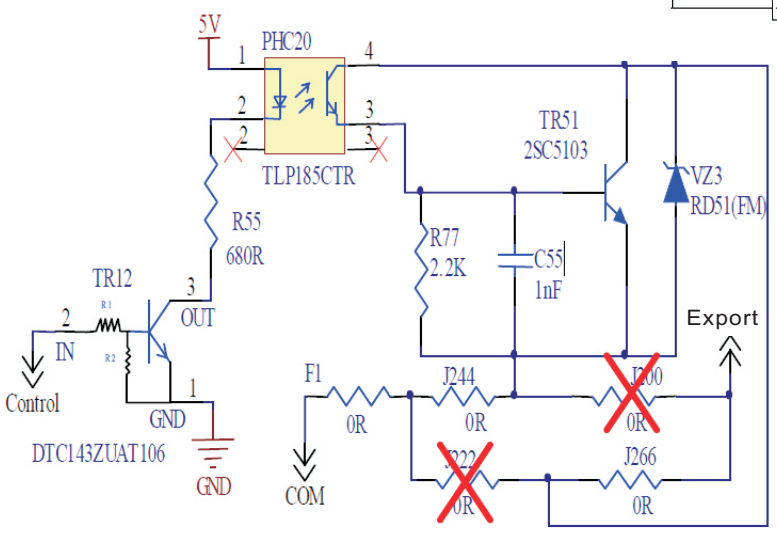
External Power supply		DC5~30V
Maximum load	Resistive load	The total load current should not exceed the following values of common collector resistance load. Output 1 point common collector: 0.5A Output 4 point common collector: 0.8A Output 8point common collector: 1.6A
	Inductive load	12W/DC 24V
Minimum load		–
Open circuit leakage current		⩽0.1 mA / DC30V
ON Voltage		⩽1.5V

1. Sinking output wiring



2. Sourcing output wiring





●Attention:All outputs are set as sinking output modes in all HCA1/ HCA2 series with transistor output.

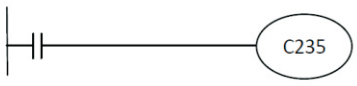
► 4 .High-speed counter input/ pulse output instruction

[Input] high-speed counter function
1 phase: 60kHz * 2 points，10kHz *4 points　2 phase: 30kHz * 1 points, 5kHz X1 points
[Input] Pulse latch function
To capture signal of 10μs(X0,X1) or 50μs(X2~X5)
[Input] external interrupt function
By external signals of 10μs(X000,X001) or 50μs(X002~X005),it can process interrupt program first.
[Output] pulse output function
2 pulse train outputs 100kHz (max.) at the same time(transistor output base units only). With special positioning instruction of ZRN, DRVI、DRVA.

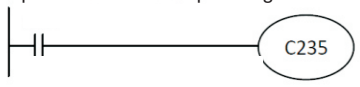
●4.1 High-speed counter input example

High-speed counter coil drive depends on Contact points. In high-speed counting, please use energized contact points.

Example: M8000(monitoring)



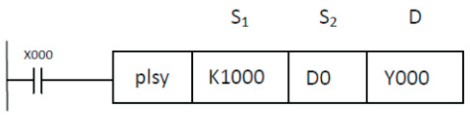
Input number corresponding to C235

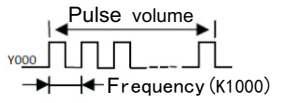


Please use contact points in countingWhen specifying counting number into relay,
Intermittent while programmingHigh-speed counter cannot count correctly

●Please note that if we use contact device of analog switch to count, switch vibration may cause counting error.
●If high-speed counter coil programmed, the corresponding input filter in input relay will automatically be 20μs (X000, X001) or 50μs (X002~X005) (initial value: 10 ms)
●Serial number of input relay cannot be used with same input instructions at the same time, e.g: Input interrupt processing(pointer), pulse output density instruction SPD
●Output contact points of high-speed counters will not execute instructions even with current value, unless counting input pulse set.
●When output coil of high-speed counter(OUT C***) on/off, it can start/ stop execution counting. Output coil should be programmed in the main program. If programmed in step ladder circuit, subroutine, interrupt handlers, Counting and Counting Stop Function can work until step ladder circuit and subroutine perform.

●4.2 High-speed counter output example (only applicable to transistor output)





●PLSY instruction: produces quantitative pulse with assigned frequency
S1: assigned frequency
HC1A，HC2A：16-bit instruction→1~32，767(HZ), 32-bit instruction→1~100，000(HZ)
When S1specified word device changes during instruction execution, output frequency changes accordingly.
S2: assigned pulse volume
●Allowable setting range: 16-bit instruction→1~32，767(PLS), 32-bit instruction→1~2，147，483，647（PLS）
Setting value is zero, the generated pulse do no limit.
In DPLSY instruction，（D1，D0）can be set as pulse value.
During instruction execution , when S2 specified word device changes, it starts executing change instruction in next instruction drive.
D specifies Y serial number of output pulse, only valid with Y000 or Y001(Please use transistor output mode)
●X000 is OFF, output interrupts. Reset NO, it starts from initial state. Continuous pulse occurs, X000 will be OFF，Y000 will be OFF ,too.
●Duty ratio of pulse is 50%ON, 50%OFF. Output control is not affected by scan cycle, then interrupt processing.
●Pulse completing, marking the end of M8029 action

●5.Terminal arrangements for HCA1 &HCA2 series

HCA1-6X4Y□-A

	E	COM	X1	X3	X5	•	
L	N	X0	X2	X4	•		
COM	•	Y0	Y2	•	COM1		
24V	•	COM0	Y1	Y3	•		

HCA1-8X6Y□-A

	E	COM	X1	X3	X5	X7	
L	N	X0	X2	X4	X6		
COM	•	Y0	Y2	Y4	COM1		
24V	•	COM0	Y1	Y3	Y5		

HCA1-12X8Y□-A

	E	COM	X0	X2	X4	X6	X10	X12	•
L	N	•	X1	X3	X5	X7	X11	X13	
COM	Y0	Y1	Y2	Y3	Y4	Y5	Y6	Y7	
24V	COM0	COM1	COM2	COM3	COM4	COM5	COM6	COM7	

HCA1-16X14Y□-A

	E	COM	X0	X2	X4	X6	X10	X12	X14	X16	•	•
L	N	•	X1	X3	X5	X7	X11	X13	X15	X17	•	
COM	Y0	Y2	COM1	Y4	Y6	•	Y10	Y12	Y14	•	COM4	
24V	COM0	Y1	Y3	COM2	Y5	Y7	COM3	Y11	Y13	Y15	•	

HCA2-24X16Y□-A

	E	COM	X0	X2	X4	X6	X10	X12	X14	X16	X20	X22	X24	X26	•	•
L	N	•	X1	X3	X5	X7	X11	X13	X15	X17	X21	X23	X25	X27	•	
COM	Y0	Y2	COM1	Y4	Y6	•	Y10	Y12	Y14	Y16	•	•	•	•	•	
24V	COM0	Y1	Y3	COM2	Y5	Y7	COM3	Y11	Y13	Y15	Y17	•	•	•	•	

HCA2-36X24Y□-A

	E	COM	X0	X2	X4	X6	X10	X12	X14	X16	X20	X22	X24	X26	X30	X32	X34	X36	X40	X42	•
L	N	•	X1	X3	X5	X7	X11	X13	X15	X17	X21	X23	X25	X27	X31	X33	X35	X37	X41	X43	
COM	Y0	Y2	COM1	Y4	Y6	•	Y10	Y12	Y14	Y16	•	Y20	Y22	Y24	Y26	•	•	•	•	•	
24V	COM0	Y1	Y3	COM2	Y5	Y7	COM3	Y11	Y13	Y15	Y17	COM4	Y21	Y23	Y25	Y27	•	•	•	•	

HCA2-8X6Y□-A

	E	COM	X1	X3	X5	X7	•	•	•
L	N	X0	X2	X4	X6	X10	•	•	
COM	Y0	Y2	COM1	Y4	•	•	•	•	
24V	COM0	Y1	Y3	COM2	Y5	•	•	•	

HCA2-14X10Y□-A

	E	COM	X1	X3	X5	X7	X11	X13	X15
L	N	X0	X2	X4	X6	X10	X12	X14	
COM	Y0	Y2	COM1	Y4	Y6	•	Y10	•	
24V	COM0	Y1	Y3	COM2	Y5	Y7	COM3	Y11	

Manual number:DOC- HCA1 HCA2
Micro programmable controller instruction manual
Manual version: V1.0
Date: Jan.5th , 2013
HCFA Corporation Limited