

Initiative Integrity Innovation

BETTER WORK, BETTER LIFE

Focus on high-end automation
QP-series Smart PAC



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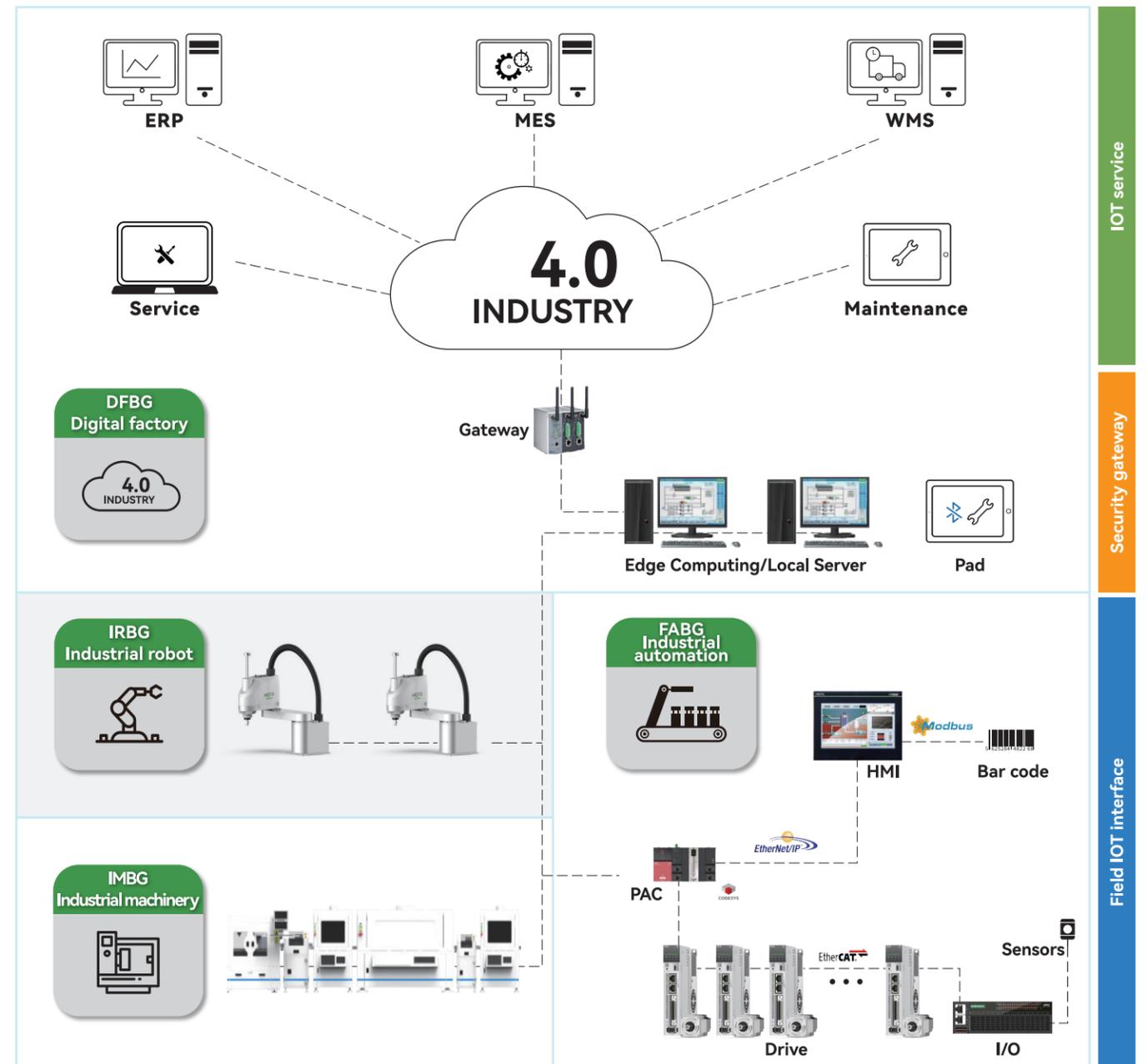
Due to the delay in updating the paper version, please refer to the official website for the latest product information



Founded in 2011, Zhejiang Hechuan Technology Co., Ltd. is an enterprise focusing on the R&D, manufacturing, sales and application integration of industrial automation products, and is committed to providing core components and system integration solutions for smart factories. The main products include PLCs, servo systems, vision systems, encoders, inverters, touch screens, electric drums, etc., covering the entire field of industrial automation



We not only provide the core components of industrial automation, but also engage in the industrial process, industrial robots, industrial machines, and digital factories, and can provide enterprises with comprehensive solutions of **automation + intelligent equipment + digitalization**



R&D Centers
5
Set up nationally

R&D investment
10%+
Proportion of revenue

R&D personnel
300+
Elite gathering

- Established five R&D centers in Longyou, Hangzhou, Shenzhen, Dalian and Suzhou
- Self-designed ASIC and SOC chips, realize localization replacement
- First-class AMR magnetic technology/high-precision encoder in the industry

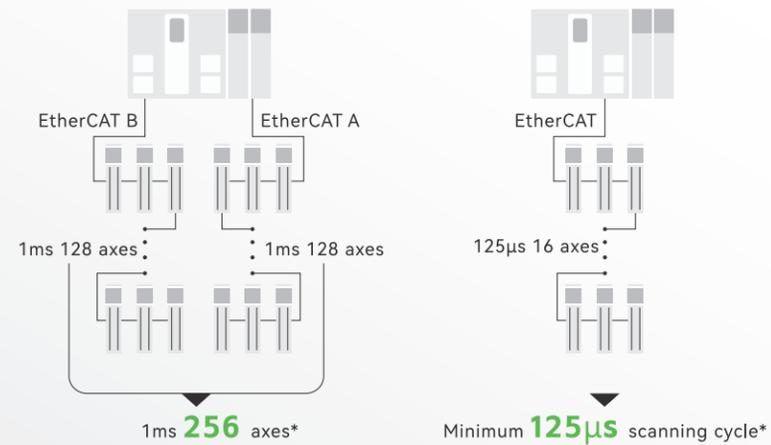
HIGH PERFORMANCE CONTROL

Focusing on high-end industrial automation, the QP series controllers are suitable for a wide range of industries such as **photovoltaic, lithium-ion, semiconductor, printing, etc.**, with its high performance, low scan cycle and super axes-carrying capability

Intel HIGH-PERFORMANCE 4-CORE PROCESSOR



EtherCAT Dual Master



QP-SERIES SMART MECHANICAL CONTROLLER

HIGH INTEGRATION

Rich interfaces

16 inputs, 16 outputs, 2*RS485+1*RS232, 3*Gigabit+1*100M Ethernet, 1*Type-C, 1*USB-A, 1*SD card

3-ch Gigabit Ethernet, no gateway module required, independent IP

192.168.188.XXX	192.168.88.XXX	192.168.8.XXX
EMS/ERP/SCADA	PLC/Robot/RFID	PLC/HMI/AGV/Vision

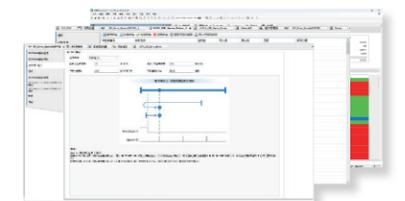


EASY TO DEVELOP

New secondary development IDE platform HCP Work3

Support IEC 61131-3 programming language and follow PLCopen 2.0 specification.

Clear topology, graphical device configuration interface, local configuration interface



EtherNet/IP

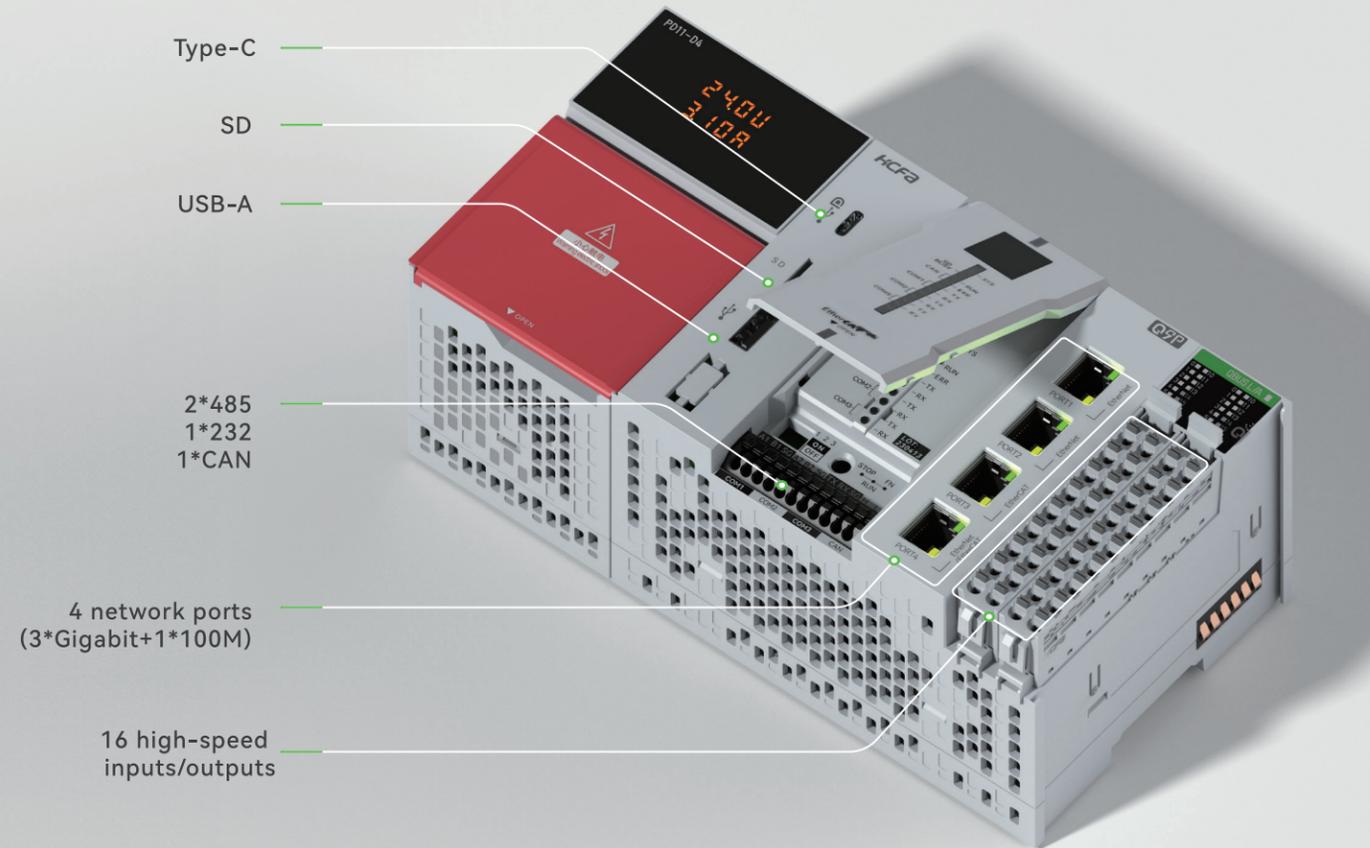


*Note: Supported by some models

RICH HARDWARE INTERFACE/

The QP-series controllers provide a wide range of communication interfaces, including Ethernet, serial port, CAN bus, etc.

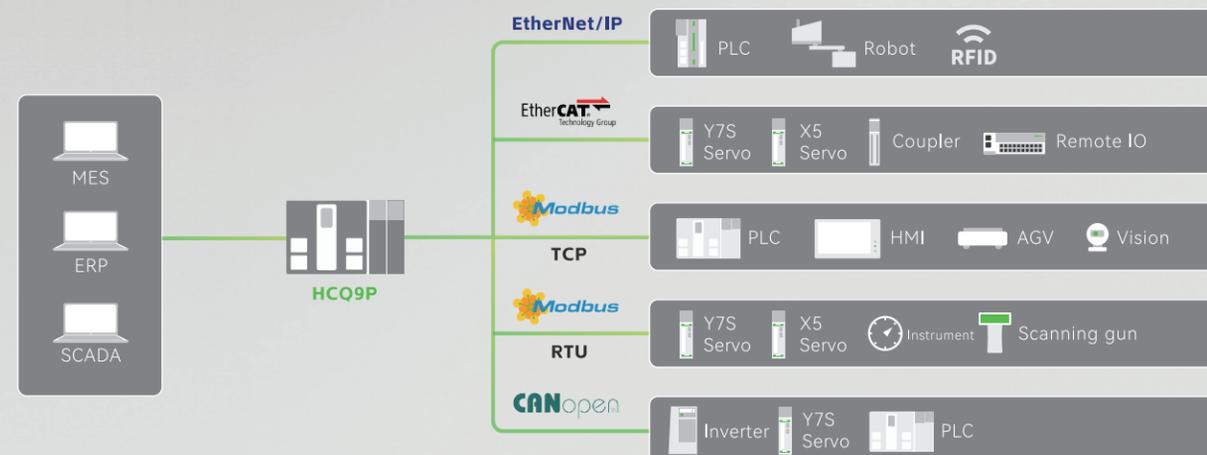
The rich communication interfaces enable HCQP series controllers to exchange data and communicate with other devices and systems quickly and reliably.



SUPPORTS VARIOUS BUS PROTOCOLS/

QP-series intelligent machine controllers support a variety of bus protocols, including Modbus, CANopen, EtherCAT, and EtherNet/IP.

Users can easily interconnect with other devices, sensors and actuators



BRAND-NEW SECONDARY DEVELOPMENT IDE --HCP WORKS3

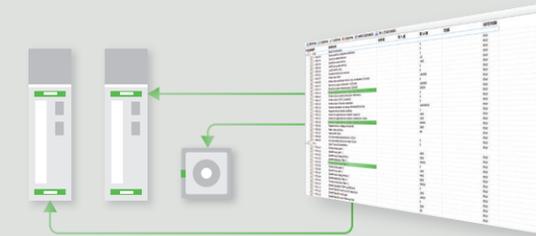
HCP Works3 support IEC 61131-3 programming language and follow PLCopen 2.0 specification.

Built-in servo parameter debugging interface, one-click addition of slave devices, resource usage table and other functions enhance user convenience;

And the features with clear topology structure, graphical device configuration interface, local configuration interface.

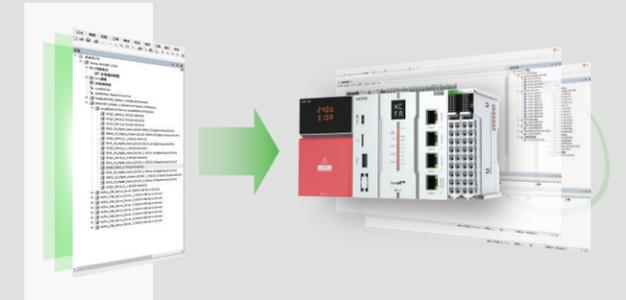
Servo parameter debugging interface/

The built-in servo parameter fast transmission interface supports batch import and export operations of HCFA's full series of servo parameters on the host computer, without the need for additional servo debugging software,



Graphical configuration interface

HCP works3 provides a graphical configuration screen for Q series products. When users configure the hardware, they only need to right-click on the module library on the right side and select the module they want to add.

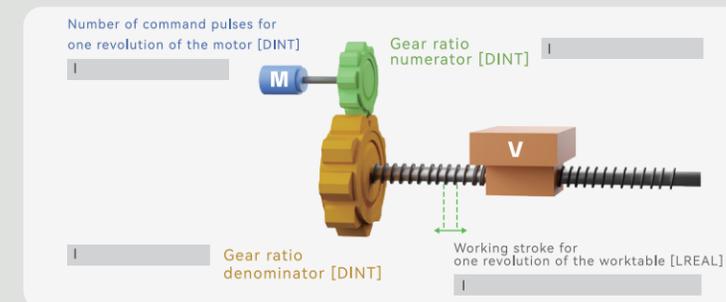


Visualization of parameters configuration/

Provides a clear visualization of the external physical topology (differentiated by linear and rotary axes) to configure the electronic gear ratios, and the unit conversion process is integrated into the actual application scenario, making it easier for the user to understand.

Unit conversion:

$$\text{Number of pulses} = \frac{\text{Number of commanded pulses for one revolution of the motor [DINT]}}{\text{Working stroke for one revolution of the worktable [LREAL]}} \times \frac{\text{Gear ratio numerator [DINT]}}{\text{Gear ratio denominator [DINT]}} \times \text{Travel distance [user unit]}$$



Visual processing

Intuitive resource allocation /

In the resource usage table, users can clearly understand the usage of current programs, data, power-failure hold, I-area, Q-area, M-area, etc., including total capacity, available space, usage rate, etc., as well as the data address and conflict status, which avoids data coverage problems caused by reusing the same address and helps customers allocate resources more rationally.

Data (Byte)

Total capacity: 134217728 Utilization rate: 0.10%
 Available: 134109947
 Used: 107781

Naming Rules for QP-Series Controller

HCQ5P-1500-U4-****

1 2 3 4 5 6 7 8 9 10

1.Product name HC HCFA	2.Product Series Q5: Basic Intelligent Mechanical Controller Q7: Standard Intelligent Mechanical Controller Q9: High-end Intelligent Mechanical Controller	3.Series Type None: Standard type P : PLUS	4.Operation system 1: Linux
5.Internal code 5 n: Reserved	6.Control software module 0 0: CODESYS	7.Additional functions software module 0 0: Standard software	8.Power type U: UPS power supply
9.Product iteration serial number 4	10.Control version No. and non-standard specifications *		

Naming Rules for Power Module

HCQX-PD11-D4-****

1 2 3 4 5 6 7

1.Product name HC HCFA	2.Extension series QX: Q series general extension	3.Series type PD: System power extension	4.Function identification number 11: 100W Power (Compatible with Q-U4 series main units)
5.Power type D: DC power A: AC power	6.Product iteration serial number 4	7.Control version No. and non-standard specifications *	

QP-series Products Comparison

Model name	HCQ5P-1500-U4	HCQ7P-1600-U4	HCQ9P-1700-U4
Processor	Celeron	Intel I5	Intel I7
Hard disk / storage	32G/2G	64G/4G	64G/4G
Programming language	IL, LD, ST, SFC, CFC, FBD		
Program capacity	128Mbytes		
Data capacity	I-zone: 128kBytes, Q-zone: 128kBytes, M-zone: 512kBytes, Power-failure hold area: 6MBytes, Other variables: Unlimited		
Dual EtherCAT master station 1ms recommended number of axes	32 axes + 32 axes	64 axes + 64 axes	128 axes + 128 axes
Pulse axes	8 axes 200kHz pulse		
Main unit I/O	16 inputs, 16 outputs		
Right side expansion (output power)	16W		
Applicable power module	HCQX-PD11-D4, HCQX-PD11-A4*1		
Ethernet		Gigabit*3+100M*1	
Download monitoring protocol	✓	✓	✓
EtherNet/IP Scanner and Adapter	✓	✓	✓
Modbus TCP/IP Server and Client	✓	✓	✓
EtherCAT	*2	*2	*2
CANopen	1-ch: Max. 31 slaves Baud rate (bps): 20k, 50k, 100k, 125k, 250k, 500k, 800k and 1M		
Serial port	COM1, COM2, COM3 (115.2kbps max.)		
RS485-Modbus RTU master-slave (max. 31 slaves)	✓	✓	✓
RS232-Modbus RTU master-slave (max. 1 slave)	✓	✓	✓
Free communication protocol	✓	✓	✓
USB	Type-C: USB 2.0, DP display function will be supported USB A: USB 2.0, supports USB format (ext2 ext3 ext4) Supports program export, file reading and writing		
SD card	1-ch: Max. expansion 128GB, support program export, file reading and writing		

*1 This model will be available subsequently

QP series Controller Specifications

Model name	HCQ5P-1500-U4	HCQ7P-1600-U4	HCQ9P-1700-U4		
Appearance					
Note: QP-Series controllers must be used with PD11 power modules (refer to page 10 for details).					
Processor	Celeron	Intel I5	Intel I7		
Hard disk/ storage (Bytes)	32G/2G	64G/4G	64G/4G		
Programming	Program capacity	128MBytes			
	I-zone/Q-zone/M-zone	128kBytes / 128kBytes / 512kBytes			
	Power-failure holding area	6Mbytes			
	Other variables	Unlimited			
	User data storage capacity	128MBytes (Folder name: FlashFiles)			
Configuration	Number of main unit extensions	Digital/ analog/ other extension Calculated on the basis of the current consumption.			
	External power supply	DC12V/16W			
	Applicable power module	HCQX-PD11-D4, HCQX-PD11-A4*			
Axis capacity	Dual EtherCAT master 1ms recommended number of axes	32 axes + 32 axes	64 axes + 64 axes	128 axes + 128 axes	
	Pulse axis	8-axis 200kHz (open collector output)			
EtherCAT	Communication standards	IEC 61158 Type12			
	EtherCAT Master Specifications	Class B (Compatible with Function Pack Motion Control)			
	Physical layer	100Base-TX			
	Modulation	Baseband			
	Transmission speed	100Mbps (100Base-TX)			
	Duplex mode	Full duplex			
	Topology	Line/Star-type			
	Transmission medium	Category 5 Shielded Twisted Pair			
	Max. transmission distance between nodes	100m			
	Max. number of slaves	65535			
	Max. process data	Input: 5,736Bytes, Output: 5,736Bytes (but max. frame size for process data is 4)			
	Mini. communication cycle	500μs	250μs	125μs	
	CANOpen Master	Link layer	CAN2.0A		
		Termination resistor	Built-in 120Ω, supports dip switch switching		
Supported Baud Rate (bps)		20k, 50k, 100k, 125k, 250k, 500k, 800k and 1M			
Topology		Line-type			
Transmission medium		Category 5 Shielded Twisted Pair			
Max. communication distance		2500m (20kbps)			
Max. number of slaves		31			
Communication cycle		Mini. 125μs			
Serial port		Physical layer	COM1,COM2	RS485	
			COM3	RS232	
	Terminating resistor	COM1,COM2	Supports 120Ω, supports dip switch switching		
	Baud rate	1200bps~115200bps			
	Max. communication distance	COM1,COM2	500m		
COM3		5m			

*This model will be launched subsequently

Model name	HCQ5P-1500-U4	HCQ7P-1600-U4	HCQ9P-1700-U4	
Serial port	Topology	COM1,COM2	Line-type	
		COM3	Point-to-Point	
	Max. number of slaves	COM1,COM2	31	
COM3		1		
Internal clock		At ambient temperature 55°C	Monthly error of -3.5 min~+0.5 min	
	At ambient temperature 25°C	Monthly error of -1.5 min~+1.5 min		
	At ambient temperature 0°C	Monthly error of -3 min~+1 min		

Ethernet Specifications

Items	PORT1	PORT2	PORT3	PORT4	
Functions	Communication, program upload/download, firmware update		Ethercat master	Communication, program upload/download, firmware update, Ethercat master	
Data transfer speed	1000/100/10Mbps		100Mbps	1000/100/10Mbps	
Communication mode	Full duplex/half duplex				
Interface	RJ45 connector				
Max. segment length (length between hub and node)	100m				
Supported protocol	Download monitoring protocol	✓	✓	-	✓
	Modbus TCP/IP server and client	✓	✓	-	✓
	EtherNet/IP Scanner and Adapter	✓	✓	-	✓
	EtherCAT master	-	-	✓	✓
Initial IP address	192.168.188.100	192.168.88.100	-	192.168.8.100	
Cable	Category 5 Shielded Twisted Pair				

Serial Port Specifications

Items	COM1, COM2	COM3
Interface	RS485 connector	RS232 connector
Data transfer rate	Max. 115200bps	
Communication mode	Half-duplex	Full-duplex
Max. transmission distance	500m (at baud rate 9600bps)	5m
Supported protocols	Modbus RTU Master-slave Serial Free Protocols	
Insulation	Digital isolator insulation	
Terminal resistance	Built-in 120Ω, can be switchable	-
Number of slaves supported	31	1

CAN Specifications

Items	Specification
Interface	CAN interface
Number of Interfaces	1-ch
Data transfer rate	Max. 1Mbps
Communication mode	Half-duplex
Max. transmission distance	2500m (at 20kbit/s)
Supported protocols	CANOpen
Insulation	Digital isolator insulation
Terminal resistance	Built in 120Ω, can be switchable
Number of supported slaves	31

USB specifications

Items	Type-C	USB-A
Transmission specification	USB2.0 Type-C, will support DP display	USB2.0
5V, Max. output current	1A	
Max. communication rate	480 Mbps (theoretically)	
Supports USB format	-	ext2 ext3 ext4 squashfs vfat btrfs
Insulation	Non-Isolated	-

General Specifications

Item	Specification		
Weight(g)	710		
Dimensions(mm)	132.2 (W) * 105.5 (H) * 81.9 (D)		
Operating environment	Working temperature	0~55°C	
	Storage temperature	-25~75°C	
	Relative humidity	10~95% (no condensation)	
	Altitude	2,000m Max.	
	Random drop	Twice from 1m, with outer package	
	Vibration	Frequency	5 Hz ~150Hz
		Displacement	3.5mm, constant amplitude
		Acceleration	1.0g, constant amplitude
		Direction	X/Y/Z-axis
	Shock	Random amplitude 15g, 11ms half sine wave, 3 mutually perpendicular axes	
Pollution level	Pollution degree II		
Protection class	IP20		
EMC requirements	Electrostatic discharge	Contact ±4kV, Air ±8kV	
	EFT	±2kV	
	Surge	DC1kV	
Insulation resistance	>1MΩ		
Voltage resistance	2000V, 1min		
Cooling method	Active cooling, fan cooling		
Mounting position	Inside the control box		
Main material	Standard PPE, UL94, fire-proof level V0		
Certification	CE		

Power specifications

Item	HCQ5P-1500-U4	HCQ7P-1600-U4	HCQ9P-1700-U4
Power supply voltage	DC24V		
Voltage fluctuation range	-15%~+20%		
Rated power consumption	35W	46W	50W
Power efficiency	80%		
Allowable instantaneous power-failure time	Continue to operate for momentary power failure of less than 5ms		
Output voltage	DC12V		
Output power	16W		

High-speed I/O input specifications

Item	Specification
Signal Name	16-point high-speed input (I0-I17, octal)
Rated input voltage	DC24V (-15%~+20%, within ±10% pulse)
Input type	Supports NPN, PNP inputs
Rated input current	6.81mA
ON current	>4.1mA
OFF current	<1.07mA
Input resistance	1.5kΩ
Max. Input Frequency	200kHz
Common Mode	1 common terminal for every 8 points

High-speed I/O output specifications

Item	Specification
Signal name	16 high-speed outputs (Q0-Q17, octal)
Output type	Support NPN output
Control circuit voltage	DC5V~24V
Rated load current	250mA
Max. voltage drop at ON	0.05V
Leakage current at OFF	<0.1mA
Output frequency	200kHz
Common mode	1 common terminal for every 8 points

Power POWER SPECIFICATIONS

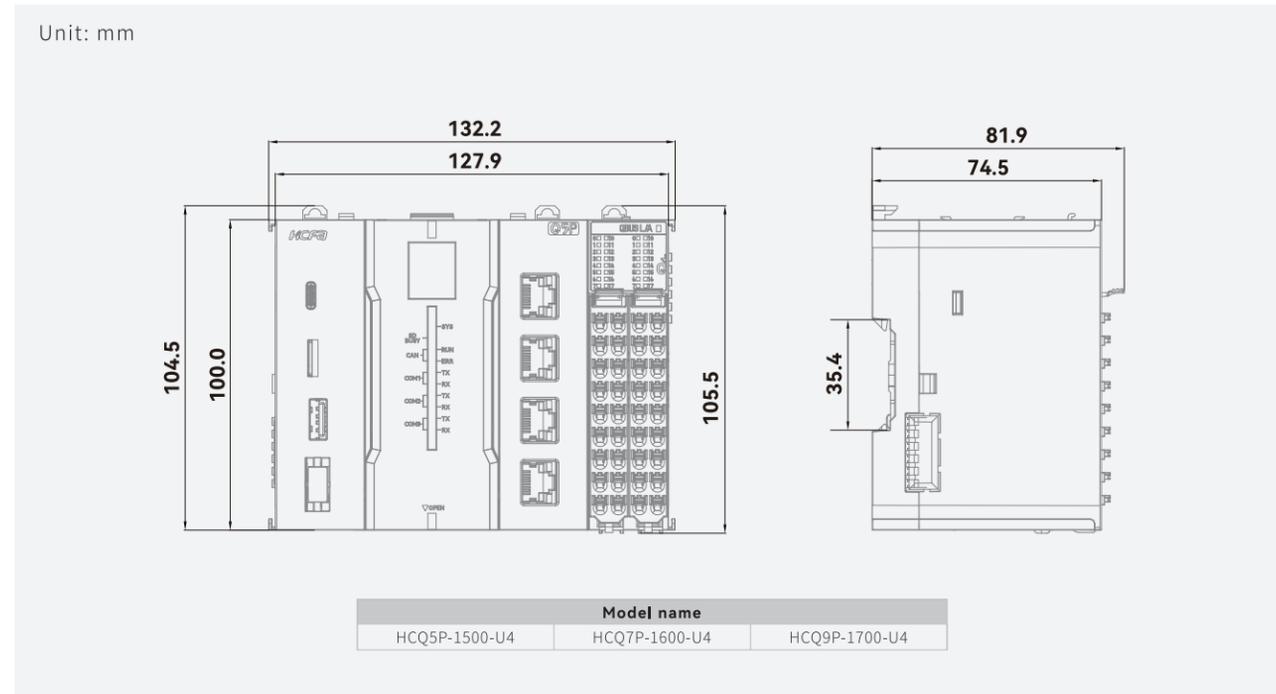
Power Module Specifications

Model name	HCQX-PD11-D4		
Appearance			
Applicable controller	HCQ5P-1500-U4	HCQ7P-1600-U4	HCQ9P-1700-U4
Rated voltage	DC24V (-15%~+20%)		
Power consumption	<2W		
Recommended input power	>200W		
Overheat indication	✓		
Under-voltage protection	✓		
Design life-time	60,000 hours (at ambient temperature 50°C)		
UPS hold time	9s (35W output power)		
UPS charging time	10s (Tpy.)		
Weight (g)	Net weight approx. 190		

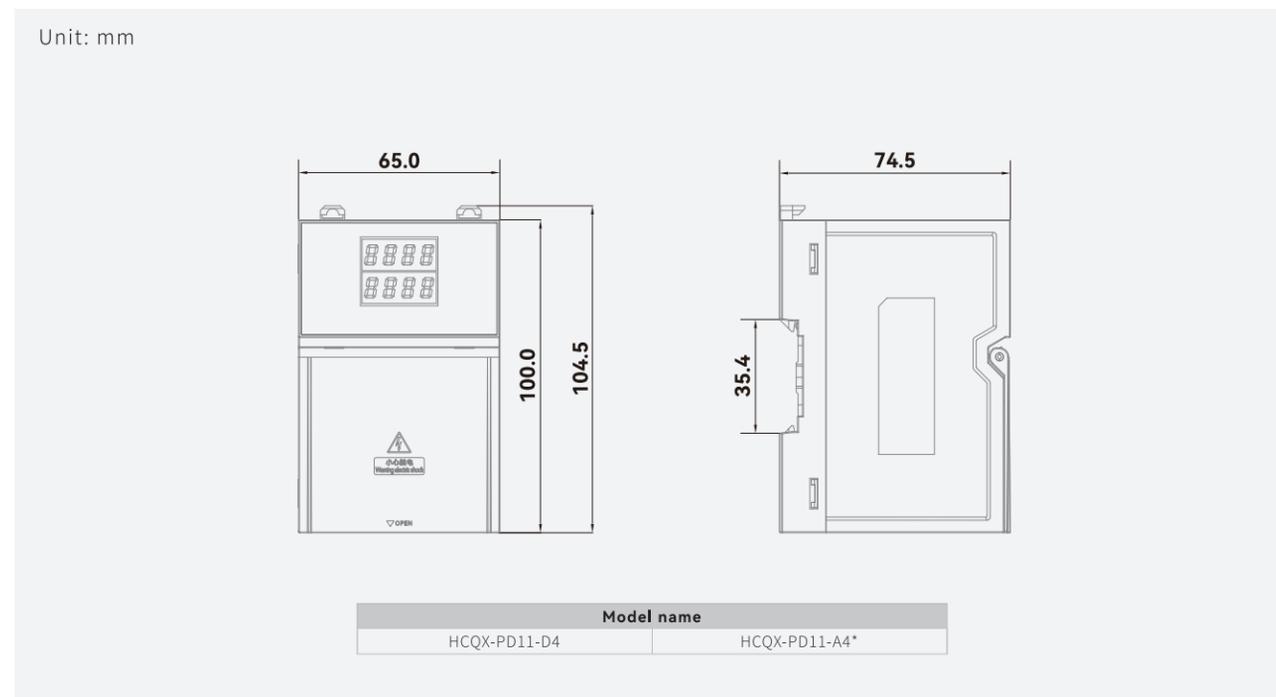
General specifications

Model name	HCQX-PD11-D4		
Dimensions (mm)	65(W) x 104.5(H) x 74.5(D)		
Operating environment	Operating temperature	0~55°C	
	Relative humidity	10~95% (no condensation)	
	altitude	2,000m Max.	
	Insulation withstand voltage	DC500V 1 minute (leakage current 10mA or less)	
	Random drop	Twice from 1m, with outer package	
	Vibration	Frequency	5-150Hz
		Displacement	3.5mm, constant amplitude
		Acceleration	1.0g, constant amplitude
		Direction	X/Y/Z-axis
	Shock	Random amplitude 15g, 11ms half sine wave, 3 mutually perpendicular axes	
Protection class	IP20		
EMC requirements	Electrostatic discharge	Contact ±4kV, Air ±8kV	
	EFT	±2kV	
	Surge	DC500V	
Heat dissipation method	Passive cooling, natural air cooling		
Installation location	Inside the control cabinet		
Main material	Standard PPE, UL94 standard, fire-proof level V0		

QP-Series Controller



Power module



*This model will be launched later

Selection Guide

QP-Series PAC Selection Table-1

Model name	Recommended number of axes*	Output power	High-speed I/O		Interface							Page	
			Input	Output	Ethercat master	Ethernet	CAN	RS232	RS485	Type-C	USB-A		SD Card
HCQ5P-1500-U4	32+32 axes	16W	16 points	16 points	✓	✓	✓	✓	✓	✓	✓	✓	07
HCQ7P-1600-U4	64+64 axes				✓	✓	✓	✓	✓	✓	✓	✓	07
HCQ9P-1700-U4	128+128 axes				✓	✓	✓	✓	✓	✓	✓	✓	07

*Dual EtherCAT master 1ms recommended number of axes

QP-Series PAC Selection Table-2

Model name	Communication Protocol					Page
	ModbusTCP	ModbusRTU	CANOpen	EtherCAT	EtherNet/IP	
HCQ5P-1500-U4	✓	✓	✓	✓	✓	07
HCQ7P-1600-U4	✓	✓	✓	✓	✓	07
HCQ9P-1700-U4	✓	✓	✓	✓	✓	07

Power Module Selection Table

Model name	Specifications	Page
HCQX-PD11-D4	24VDC power module, mounted on the left side of the QP series controller	10
HCQX-PD11-A4*	100~240VAC power module, mounted on the left side of QP series controller	10

*This model will be launched subsequently

PAC and Power Module Matching Table

Power	CPU	HCQ5P-1500-U4	HCQ7P-1600-U4	HCQ9P-1700-U4
HCQX-PD11-D4		✓	✓	✓
HCQX-PD11-A4*		✓	✓	✓
HCQX-PD01-A		✗	✗	✗

* This model will be released subsequently