IVC3 series Programmable Controller

Enterprise introduction

INVT (Shenzhen INVT Electric Co., Ltd.), a high-tech enterprise founded in 2002, is a key member of national torque plan. Since its foundation, INVT has been devoted to becoming the globally leading and respected provider of products and services in industrial automation and energy power fields, and providing the best products and services to allow customers more competitiveness.

Based on innovations and breakthroughs made in core areas like power electronics, auto control, IT, etc, INVT has evolved into an industry giant with business range covering industrial automation, network power, new energy vehicle and rail transit. INVT became the first A-share listed company (stock code: 002334) in Shenzhen Stock Exchange in 2010. At present, we have established 12 R&D centers (owning over 850 patents), 16 subsidiaries, over 30 domestic offices and warranty centers and 8 overseas branches, forming a sales network covering more than 60 countries and regions.

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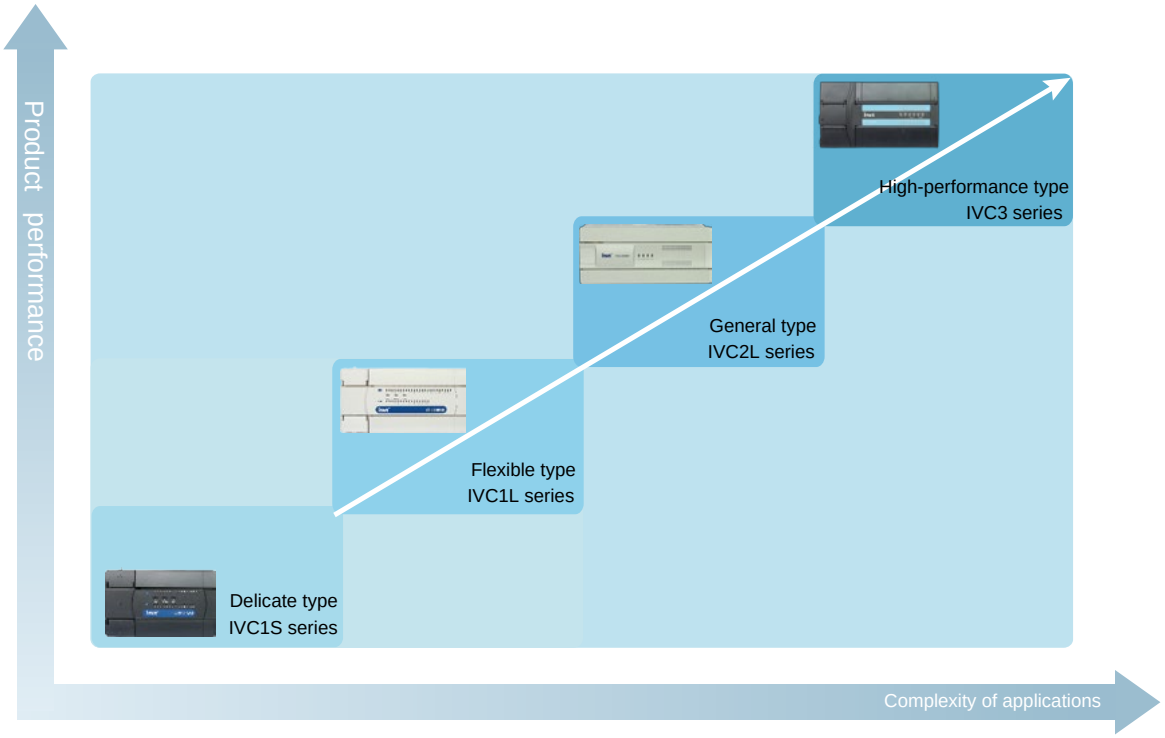
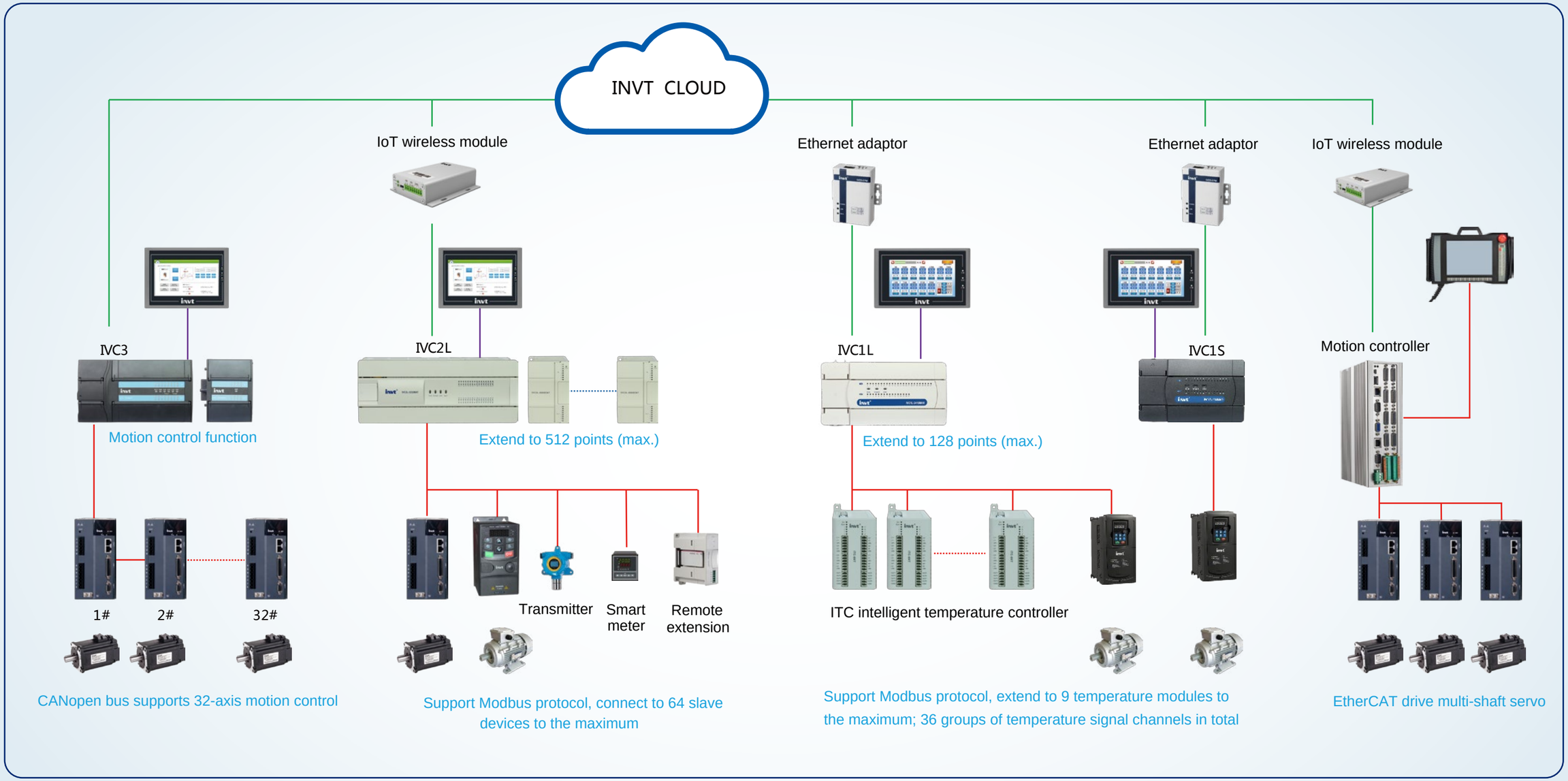
Overview of IVC series PLC product family



In order to satisfy customized needs of different industries, we provide customer with four kinds of IVC series PLC, which are delicate, flexible, general and high performance. The new design theory and abundant product portfolio of IVC series products contribute to the improvement on production efficiency, reduction of product cost and enhancing of product competitiveness.

INVT industrial automation system solution



INVT strives to provide customers with comprehensive and integrated system solution in industry automation industry. Currently, our products cover the control layer, drive layer and field execution layer of industrical applications, including IoT cloud platform, HMI, PLC, motion controller, inverter, servo system, highly efficient motor, etc. We aim to help customers realize intelligent upgrade on traditional factories and products through offering extensive products and exceptional technical service.

Product overview

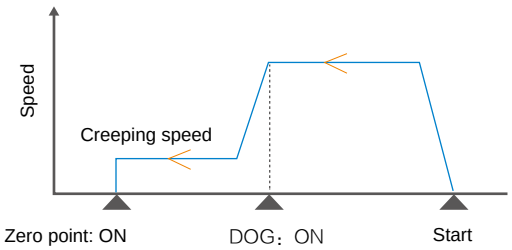
IVC3 series high-performance PLC is our flagship product integrated with the latest information technology, motion control technology and fieldbus control technology. This series of products have all passed CE and RoHS certifications. Its excellent motion control function and flexible communication networking mode make it the best option for product upgrade.

Superior motion control function

Enhanced positioning control

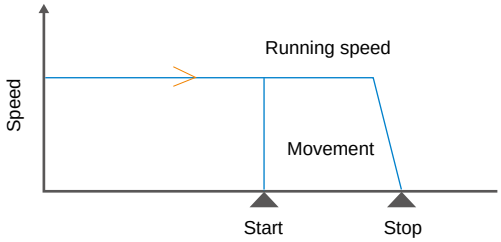
DSZR

Return to the original point from any position.



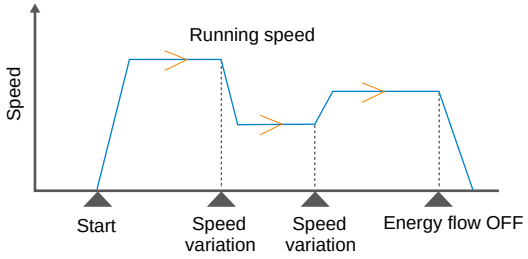
STOPDV

- High speed output can be stopped via interruption, which is immune to the scanning time.
- All the interruption sources can be triggered to support flexible applications.



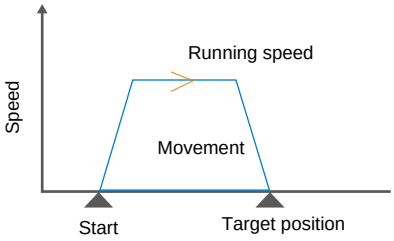
PLSV

The speed is variable anytime during running, eg, smooth acceleration/deceleration during running.



DRVI/DRVA

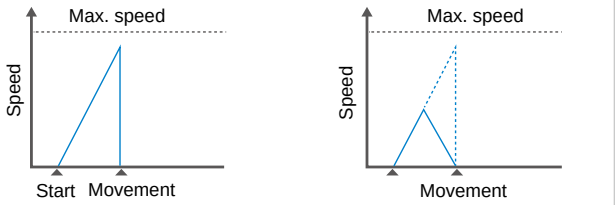
Moving relative to current position or the original point, with acc/dec.



Straight acc/dec, support triangle prevention

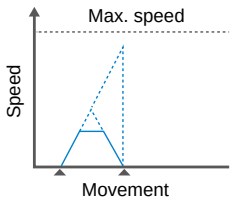
If the movement is relatively small while the max. speed is improper, immediate stop or decelerate-to-stop may occur before max. speed is reached. Adopt high-precision automatic triangle prevention function to avoid mechanical shock.

With triangle prevention



The motor changes from acceleration to sudden stop or decelerate-to-stop, while the inertia will influence the precision and brings mechanical shock.

Without triangle prevention

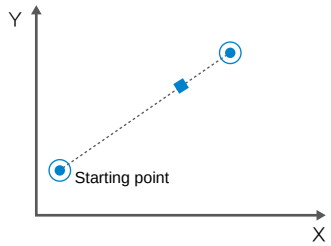


Stable and high-precision operation to avoid mechanical impact

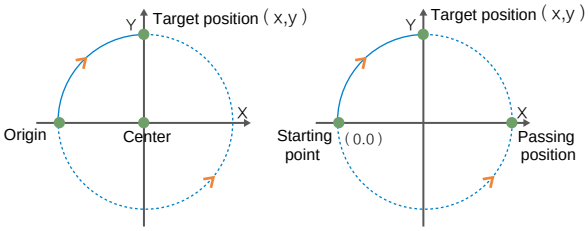
Precise trajectory control (for V2.0 and later version)

- Support linear and circular interpolation, which is a big breakthrough for small PLC;
- Interpolation precision can be accurate to single pulse, and max. speed can reach 200kHz.

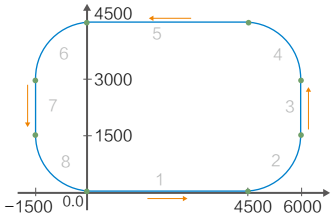
■ Linear interpolation (LIN)



■ Circular interpolation (CW/CCW)



■ Combination of LIN and CW/CCW commands



■ Max. interpolation speed can be up to **200** kHz

	IVC3-1616MAT
Interpolation	Combination of Y0/Y1 and Y2/Y3

Advanced following control (for V2.0 and later version)

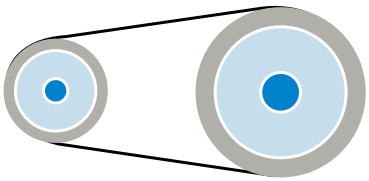
Following function can be set by one command, removing the need for complicated function programs.

■ ECAM

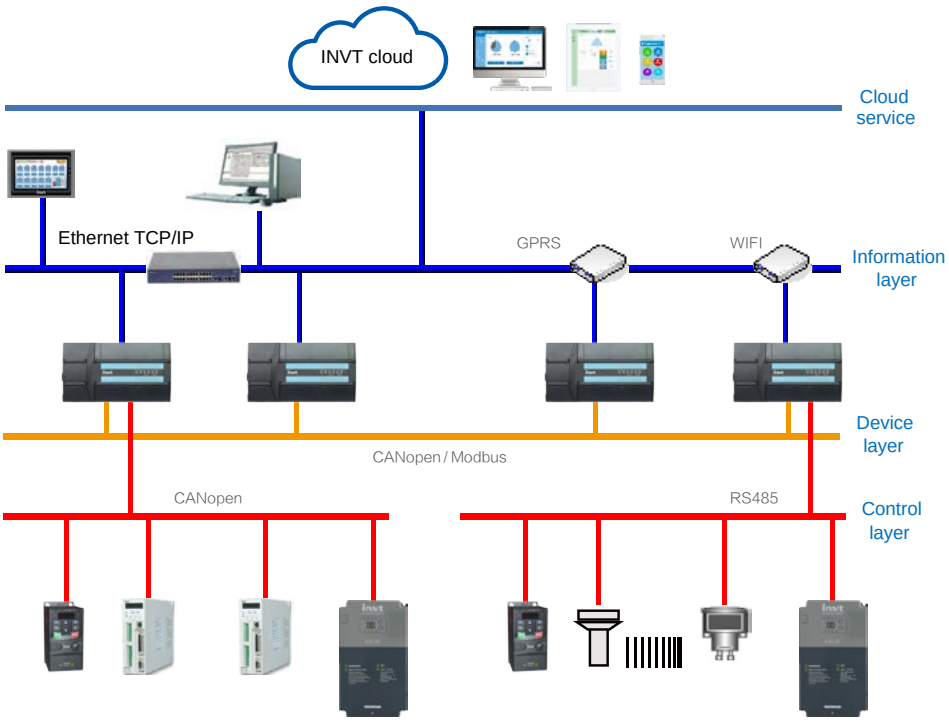
Use the cam curve to simulate mechanical cam, and complete the relative motion control between cam shaft and spindle in the same way as the mechanical cam.

■ GEARBOX

Control the slave shaft to move with the spindle based on a certain ECAM ratio.



Flexible communication networking mode



Communication network covers IoT, control communication and device communication network to realize inter-connection among information layer, control layer and device layer.

Support INVT could servic

Support Ethernet port or serial port to connect to INVT cloud service platform; read device data remotely; adjust device production process and monitor device running state in real time.

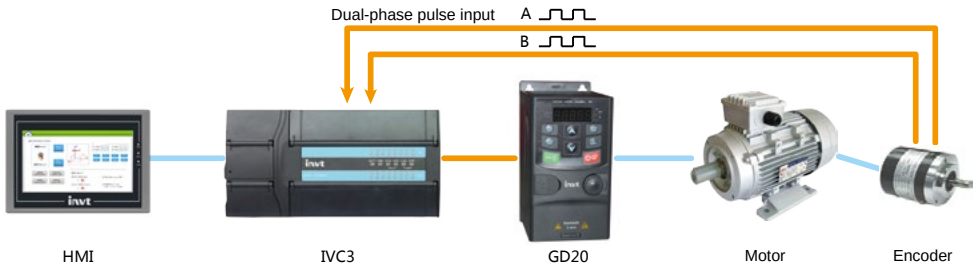
INVT cloud client interface

Support CANopen bus protocol

The PLC, as a master, can be connected to 32 slave devices via CANopen communication bus.

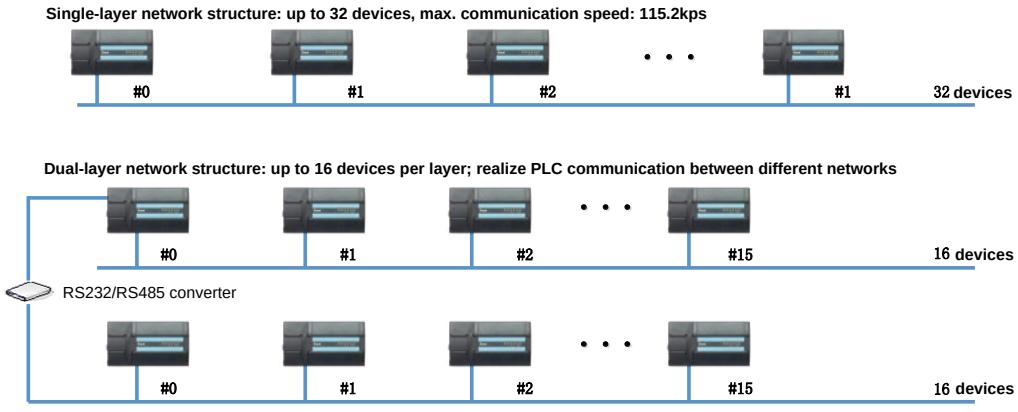
Support multiple high speed pulse inputs/outputs

Support eight 200kHz high speed count inputs; support quadruple frequency count function;
Support eight-axis 200kHz high speed pulse output.



Unique N:N networking mode

Realize networking among multiple PLCs; mutual visit to designated M and D elements information can be realized among PLCs; fit for inter-lock between related devices in the control system; adopt N:N protocol without the need for extra programming.



Technical specification

Name		Description
I/O	Max. I/O points of logic	512
	Max. no. of special extension modules	8
	High speed pulse output	Eight 200kHz (transistor output); support eight-axis positioning; two-axis circular arc interpolation
	Single-phase count channel	Eight 200kHz
	Dual-phase count channel	Four 200kHz
	Digital filter function	For X0–X7, each channel can set separate digital filter; range of input filter constant: 0–60000μs
Storage	Program capacity	64Ksteps
	Permanent storage after power off	Support
	Retain soft elements after power off	All the soft elements except for R
	Hardware support	Backup battery with a life of three years
Soft element	Timer	100ms precision：T0～T209
		10ms precision：T210～T479
		1ms precision：T480～T511
	Counter	16-bit up counter：C0–C199
		32-bit down counter：C200–C235
		32-bit high speed counter：C236～C255，C301～C306
	Data register	D0～D7999，R0～R32767
	Local data register	V0–V63
	Indexing/addressing register	Z0–Z15
	Special data register	SD0–SD1023
	Auxiliary relay	M0～M10239
	Local auxiliary relay	LM0–LM63
	Special auxiliary relay	SM0–SM1023
	State relay	S0～ S4095
Common	Basic command running time	0.065 μs
	Real time clock	Support (hold for at least three years after power off)
Communication	CAN	CANopen DS301 protocol (master) supports 32 stations at most; support 64 TxPDOs; support 64 RxPDOs CANopen DS301 protocol (slave) supports four TxPDOs; support four RxPDOs Terminal resistor: Built-in, support dialing Station number setup: set by DIP switch or programs
	Ethernet	Support Modbus TCP function: program upload/download, monitoring;
	Serial communication port	PORT0: RS232, baud rate: max. 115200bps PORT1: RS485, baud rate: max. 115200bps, terminal resistor: built-in, support dialing PORT2: RS485, baud rate: max. 115200bps, terminal resistor: built-in, support dialing
	USB communication	Standard: USB2.0 full speed, Mini-USB interface; function: program upload/download, monitoring, solid state software upgrade
	Communication protocol	CANopen/ModbusTCP/Modbus/Free port/N:N/Programming port protocol
Encryption	Set password type	Upload password, download password, monitoring password, sub-program password
	Disable upload	Support
	Disable formatting	Support
Application command	Basic instruction	Support
	Compound instruction	Support
	Clock instruction	Support
	Date and clock comparision instruction	Support
	Floating number arithmetic instruction	Support
	Positioning instruction	Support
	High speed IO instruction	Support
	Modbus and inverter instructions	Support
	Read and write EEPROM instruction	Not supported
	Control arithmetic instruction	Support
	Character string instruction	Support
	Bulk data processing instruction	Support
	Data sheet instruction	Support
Interruption resource	Internal timing interruption	3
	External interruption	16
	High speed count interruption	8
	Serial port interruption	12
	PTO output completion interruption	8
	Interpolation completion interruption	1
	Passing position interruption	8
	Power loss interruption	1

Technical specification of signal path

Electrical characteristic of digital input channels

Name	IVC3	
	High speed input end	Common input end
Signal input mode	Source mode or sink mode, please note that hte input types must be the same	
Input impedance	1K	5.7K
Input current	28mA TYP	4.8mA TYP
ON voltage/current	DC18V Min/20mA Min	DC18V Min/3mA Min
OFF voltage/current	DC4V Max/1mA Max	DC4V Max/1mA Max
Digital filter time	X0–X7 is adjustable between 0–60000μs	

Electrical characteristic of digital output channels

Name	IVC3
	Transistor output
External power	5～24V DC
Circuit insulation	Optocoupler insulation
Action instruction	The indicator lights up when optocoupler is being driven
Open circuit leakage current	Less than 0.1mA/3V DC
Min. load	5mA，5～24V DC
Max. current of resistor load	0.3A/one point, 0.8A/four points, 1.2A/six points, 1.6A/eight points (total running current increases by 0.1A for each additional point)
Max. current of inductive load	Y0－Y7：7.2W/24V DC Others: 12W/24V DC
Max. current of lamp load	Y0－Y7：0.9W/24V DC Others: 1.5W/24V DC
Response time of ON	Y0-Y7：2.5μs Others: 0.5ms
Response time of OFF	

Electrical characteristics of analog input channels

Name	IVC-EH-4AD
Conversion precision	16bits
Analog circuit power	24V DC: max. allowable ripple voltage is 5%; input current is 50mA (via external power of main module or external connection)
Digital circuit power	5VDC, 70mA (via internal power of main module)
Number of IO points occupied	Null
Conversion speed	4ms/channel
Voltage input range	－10～10DC，－5～5DC（input impedance 1MΩ），Set BFM to select input range
Current input range	－20～20mA（input impedance 250Ω）
Voltage input resolution	1mV
Current input resolution	2uA
Precision	±1%
Isolation	Isolate analog circuit and digital circuit with optocoupler; isolate analog circuit and external power with DC/DC; no isolation is performed between analog channels

Electrical characteristic of analog output channels

Name	IVC-EH-4DA
Conversion precision	16bits
Analog circuit power	24V DC: max. allowable ripple voltage is 5%, 50mA (via external power of main module or external connection)
Digital circuit power	5V DC，72mA（via internal power of main module or active extension unit）
Number of IO points occupied	Null
Conversion speed	1ms/channel
Voltage output range	-10～10V DC（External load impedance ≥2KΩ）
Current output range	0～20mA，4～20mA（External load impedance ≤520Ω）
Digital input	Default setting: -10000～10000
Voltage resolution rate	1mV
Current resolution rate	2uA
Precision	±1%
Isolation	Isolate analog circuit and digital circuit with optocoupler; isolate analog circuit and external power with DC/DC; no isolation is performed between analog channels

Electrical characteristics of thermal resistor input channels

Name	IVC-EH-4PT	
Analog circuit power	24V DC: max. allowable ripple voltage is 5%, 50mA (via external power of main module or external connection)	
Digital circuit power	5V DC，72mA（via internal power of main module or active extension unit）	
Number of IO points occupied	Null	
Input signal	Pt100, Cu100, Cu50 thermal resistor	
Conversion speed	（15±2）ms/channel	
Digital output	16-bit A/D conversion	
	Pt100：-1500～6000（0.1℃）	Pt100：-2380～11120（0.1℉）
	Cu100：-300～1200（0.1℃）	Cu100：-220～+2480（0.1℉）
	Cu50：-300～1200（0.1℃）	Cu50：-220～+2480（0.1℉）
Precision	±1% of the full range	
Isolation	Isolate analog circuit and digital circuit with optocoupler; internal isolation is performed between analog circuit and 24V DC power input of the module; no isolation is performed between analog channels	

Electrical characteristics of thermal coupler input channels

Name	IVC-EH-4TC	
Analog circuit power	24V DC: max. allowable ripple voltage is 5%, 50mA (via external power of main module or external connection)	
Digital circuit power	5V DC，72mA（via internal power of main module or active extension unit）	
Number of IO points occupied	Null	
Input signal	K, J, E, N, T, R, S thermal resistor	
Conversion speed	240ms/channel	
Digital output	16-bit A/D conversion	
	K/N：-1000～12000（0.1℃）	K/N：-1480～+21902（0.1℉）
	J/E：-1000～10000（0.1℃）	J/E：-1480～+18320（0.1℉）
	T：-2000～4000（0.1℃）	T：-3280～+7520（0.1℉）
	R/S：0～16000（0.1℃）	R/S：320～29120（0.1℉）
Precision	±1% of the full range	
Isolation	Isolate analog circuit and digital circuit with optocoupler; internal isolation is performed between analog circuit and 24V DC power input of the module; no isolation is performed between analog channels	

Guide for model selection

Model selection table

Main module	Description	Dimension (W×H×D)
IVC3-1616MAT	16-point DC24V input, 16-point transistor output, AC220V power	167×90×90mm
IVC3-3232MAT(under planning)	32-point DC24V input, 32-point transistor output, AC220V power	/

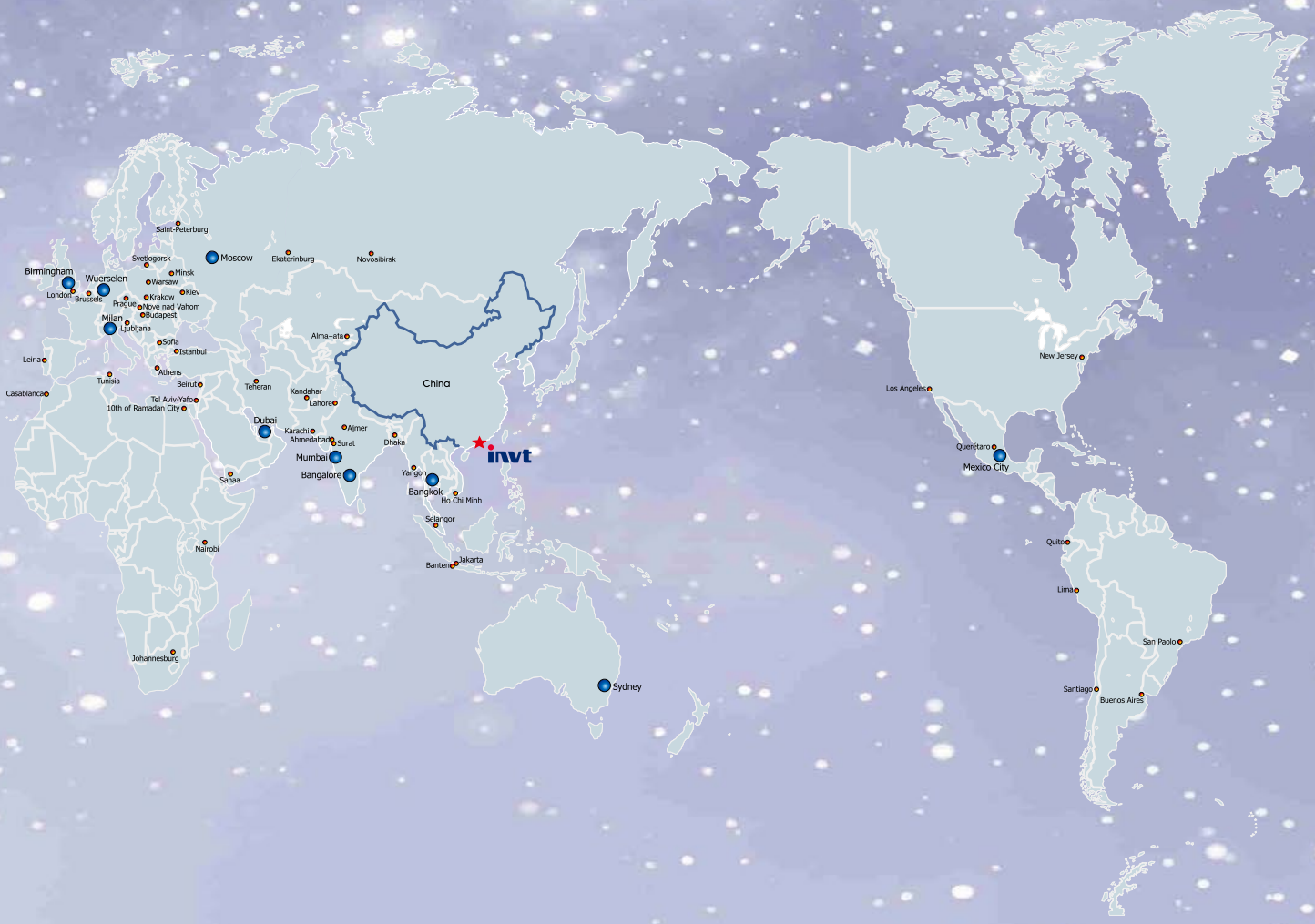
IO extension module	Description	Dimension (W×H×D)
IVC-EH-0808ENR	8-point DC24V input, 8-point relay output	65×90×90mm
IVC-EH-0808ENT	8-point DC24V input, 8-point transistor output	65×90×90mm
IVC-EH-1600ENN	16-point DC24V input	65×90×90mm
IVC-EH-0016ENR	16-point relay output	65×90×90mm
IVC-EH-0016ENT	16-point transistor output	65×90×90mm

Special function extension module	Description	Dimension (W×H×D)
IVC-EH-4AD	Module with four analog inputs	65×90×90mm
IVC-EH-4DA	Module with four analog outputs	65×90×90mm
IVC-EH-4TC	Temperature module with four channels for thermal coupler	65×90×90mm
IVC-EH-4PT	Temperature module with four channels for thermal resistor	65×90×90mm

Models of optional extras

Product specification	Description	Cable length
IVC-SL1	PLC-VS series HMI communication cable	3m
IVC-SL2	PLC download cable (USB)	2m
IVC-SL3	PLC-VT/VK/VA series HMI communication cable	3m
IVC-SL4	HMI download cable (USB)	1.5m
IVC-SL5	PLC-VT/VK/VS series HMI communication cable	7m

Overseas sales service network



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Industrial automation: ■Inverter ■Servo system ■Motor, electric spindle ■Electronic control system ■HMI ■PLC ■Traction system of rail transit ■Intelligent elevator control system

Energy power : ■SVG ■PV inverter ■UPS ■Online management system for energy reduction ■Electronic control system for new energy vehicle

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