Machine Automation Motion Total Solution









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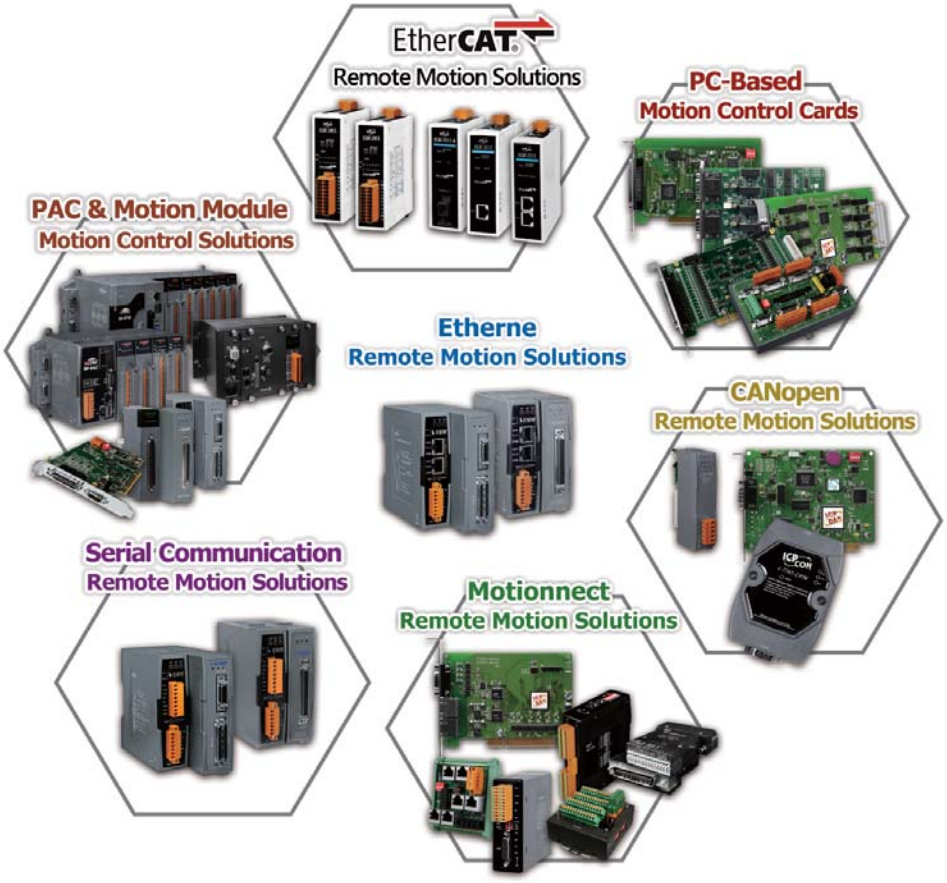


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Overview

Total Solutions for Machine Automation

As a leading automation solutions provider, ICP DAS provides a wide range of motion solutions for machine automation systems, including PAC solutions that using Motion modules on the standard PAC or ISaGRAF XPAC products based on a variety of development software such as VC, C#, VB .NET or ISaGRAF for PAC motion control systems, PC-based solutions developed using PCI/ISA bus motion control products for PC-based motion control systems, and remote motion solutions using Ethernet, Serial Communication, Motionnet, EtherCAT or CANopen motion control products for remote motion control systems.



PAC Solutions

PAC & Motion Module Motion Control Solutions

1. Standard PAC Motion Control
2. ISaGRAF XPAC Motion Control Solutions

PC-Based Motion Control Cards

PC-based Motion Control Cards Solutions

PC-based control systems PCI/PCIe bus motion control cards series, we also offer a variety of quick-connect terminal blocks for a range of servo motors, including Mitsubishi, Panasonic, Yaskawa, Delta, etc.

PC-Based Remote Motion Solutions

Ethernet Remote Motion Solutions

Ethernet Motion Control Unit provides the Ethernet motion solution for customers.

Motionnet Remote Motion Solutions

Provide a high-speed serial communication system that operates with either a Servo motor or a Stepping motor. Motionnet communication is based on a proprietary RS-485 technology (Multi-drop, Half-duplex) that allows considerable savings in wiring requirements, provides effective long-distance high-speed communication.

Serial Communication Remote Motion Solutions

Serial communication motion control unit for customers Modbus RTU Motion control solution for communication functions.

EtherCAT Remote Motion Solutions

The EtherCAT motion solution is an open, high-performance fieldbus system that makes Ethernet technologies available at the I/O level. EtherCAT provides flexible wiring, fast communication and many other nice features.

CANopen Remote Motion Solutions

The CANopen motion solutions integrate a motion control system with a CANopen network using the CANopen Master devices. Users are able to control CANopen motors and remote I/O devices located on the same network, making wiring connections and control both easy and more efficient

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Ultra High Speed Motion Control Solutions - EtherCAT Fieldbus

EtherCAT (Ethernet Control Automation Technology) is a series of Ethernet-based industrial communication buses. It has established the mainstream in the industrial automation industry pursuing high precision, high efficiency, and low cost due to its high-speed communication performance and instant communication system.

Not only do ICP DAS's EtherCAT solutions support all EtherCAT master functions, but they can also update multiple sets of slave devices in a millisecond cycle, including motion control for 32 axes. It offers complete control of various single-axis and multi-group motion functions in terms of motion control. Furthermore, the IEC 61131 Soft PLC function is available for purchase, making it simpler and faster for users to integrate various EtherCAT slave devices.



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Selection Guide: EtherCAT Total Solutions

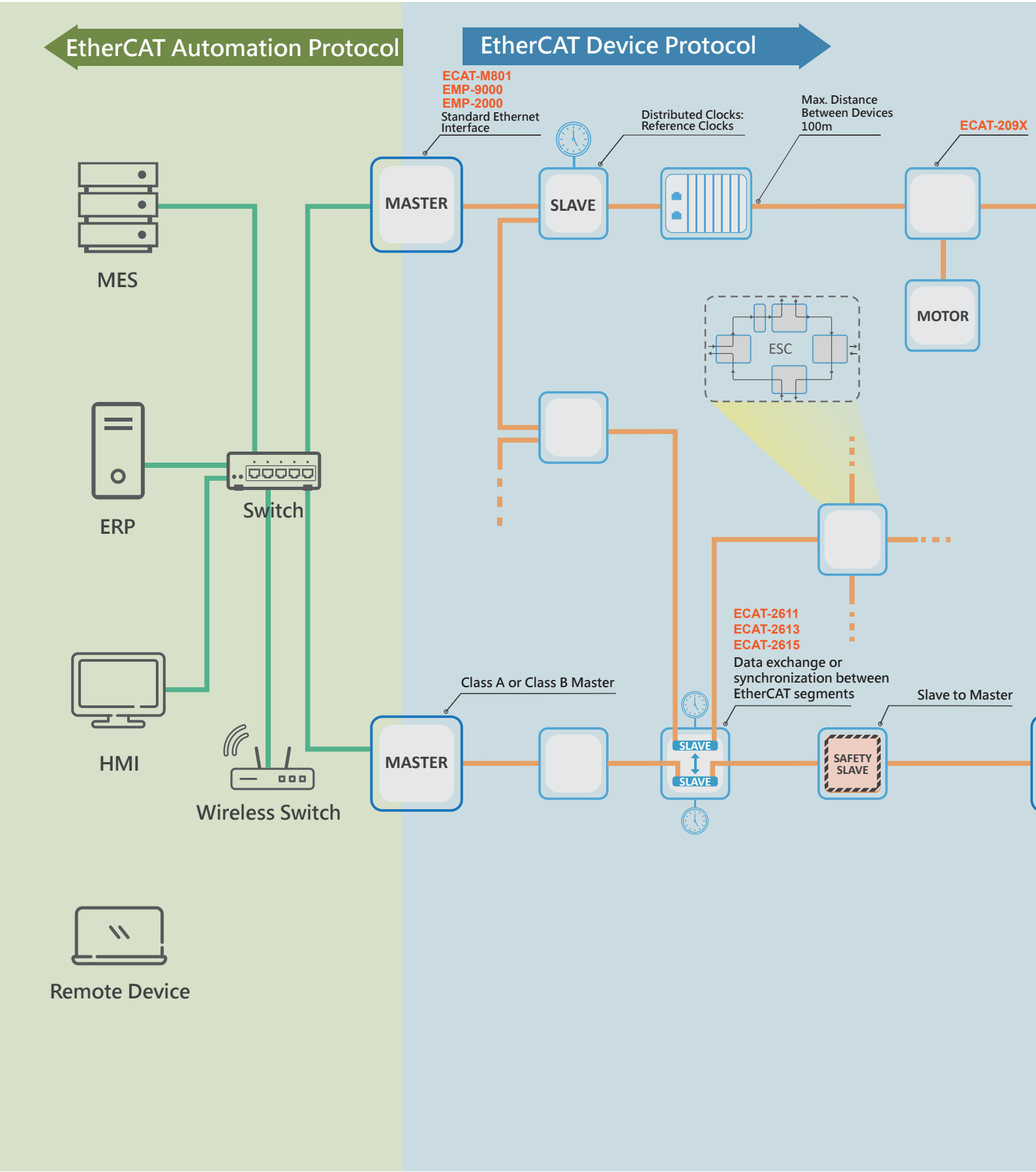
PAC	
EMP-9051-16(32)	EtherCAT 16/32-Axis Master based 9000 series PAC with Windows 10 IoT
EMP-9251-16(32)	EtherCAT 16/32-Axis Master based 9000 series PAC with Windows 10 IoT
EMP-9091-16(32)	EtherCAT 16/32-Axis Master based 9000 series PAC with Windows 10 IoT
EMP-9058-16(32)	EtherCAT 16/32-Axis Master based 9000 series Win-GRAF PAC with Windows 10 IoT
EMP-9258-16(32)	EtherCAT 16/32-Axis Master based 9000 series Win-GRAF PAC with Windows 10 IoT
EMP-9098-16(32)	EtherCAT 16/32-Axis Master based 9000 series Win-GRAF PAC with Windows 10 IoT
Master Board	
ECAT-M801-8AX(/S)	EtherCAT PCI Express 8-Axis Master Board
ECAT-M801-16AX(/S)	EtherCAT PCI Express 16-Axis Master Board
ECAT-M801-32AX(/S)	EtherCAT PCI Express 32-Axis Master Board
ECAT-M801-64AX	EtherCAT PCI Express 64-Axis Master Board
Slave I/O Module	
ECAT-2011H	EtherCAT Slave I/O Module with 12-bit, 16-ch/8-ch AI
ECAT-2012H	EtherCAT Slave I/O Module with 16-bit, 16-ch/8-ch AI
ECAT-2016N	EtherCAT Slave I/O Module with 16-bit, 1-ch Strain Gauge
ECAT-2016-3	EtherCAT Slave I/O Module with 16-bit, 3-ch Strain Gauge
ECAT-2019H	EtherCAT 8-channel Universal Analog Input Module
ECAT-2024/ECAT-2028	EtherCAT Slave I/O Module with Isolated 4-ch/8-ch AO
ECAT-2045(-32)	EtherCAT Slave I/O Module with Isolated 16-ch/32-ch DO (Sink, NPN)
ECAT-2050	EtherCAT Slave I/O Module with Isolated 13-ch DI (Wet) and 4-ch DO (Sink/Source, NPN/PNP)
ECAT-2051(-32)	EtherCAT Slave I/O Module with Isolated 16-ch/32-ch DI (Dry, Wet)
ECAT-2052	EtherCAT Slave I/O Module with Isolated 8-ch DI (Wet) and 8-ch DO (Source, PNP)
ECAT-2052-NPN	EtherCAT Slave I/O Module with Isolated 8-ch DI (Wet) and 8-ch DO (Sink, NPN)
ECAT-2053	EtherCAT Slave I/O Module with Isolated 16-ch DI (Wet)
ECAT-2055(-32)	EtherCAT Slave I/O Module with Isolated 8-ch/16-ch DI (Dry, Wet) and 8-ch/16-ch DO (Sink, NPN)
ECAT-2057(P)	EtherCAT Slave I/O Module with Isolated 16-ch DO (Source, PNP)
ECAT-2057-32	EtherCAT Slave I/O Module with Isolated 32-ch DO (Source, PNP)
ECAT-2057-NPN	EtherCAT Slave I/O Module with Isolated 16-ch DO (Sink, NPN)
ECAT-2057-8P8N	EtherCAT Slave I/O Module with Isolated 8-ch DO (Source, PNP) and 8-ch DO (Sink, NPN)
ECAT-2060	EtherCAT Slave I/O Module with Isolated 6-ch DI (Dry, Wet) and 6-ch Relay
ECAT-2061	EtherCAT Slave I/O Module with Isolated 16-ch Relay
Gateway Module	
ECAT-2610	EtherCAT Slave to Modbus RTU Master Gateway
ECAT-2610-DW	EtherCAT to Modbus RTU and Power Meter Gateway
ECAT-2611	EtherCAT Slave to Modbus RTU Slave Gateway
ECAT-2612	EtherCAT Slave to Modbus TCP Meter Gateway
ECAT-2613	EtherCAT Slave to Modbus TCP Slave Gateway
ECAT-2614	EtherCAT Slave to CANOpen Meter Gateway
ECAT-2615	EtherCAT Slave to CANOpen Slave Gateway
Junction	
ECAT-2512 / ECAT-2513	1-to-2 / 3 Port EtherCAT Junction Slave Module
ECAT-2515 / ECAT-2517	1-to-5 / 7 Port EtherCAT Junction Slave Module
Fiber Converter	
ECAT-2511-A / ECAT-2511-B	EtherCAT to Single-mode Fiber Converter
Stepper Motor Controller/Driver	
ECAT-2091S	EtherCAT single axis stepper motor controller/driver
ECAT-2094S	EtherCAT slave 4-axis stepper motor controller/driver
Incremental Encoder Counter	
ECAT-2092T	EtherCAT Two-Channel Incremental Encoder Counter
ECAT-2093	EtherCAT Three-Channel Incremental Encoder Counter
Plug-In I/O	
EC1-C32	EtherCAT Plug-In I/O Module with Isolated 32-ch DO
EC1-P32	EtherCAT Plug-In I/O Module with Isolated 32-ch DI
EC1-P16C16	EtherCAT Plug-In I/O Module with Isolated 16-ch DI and Isolated 16-ch DO

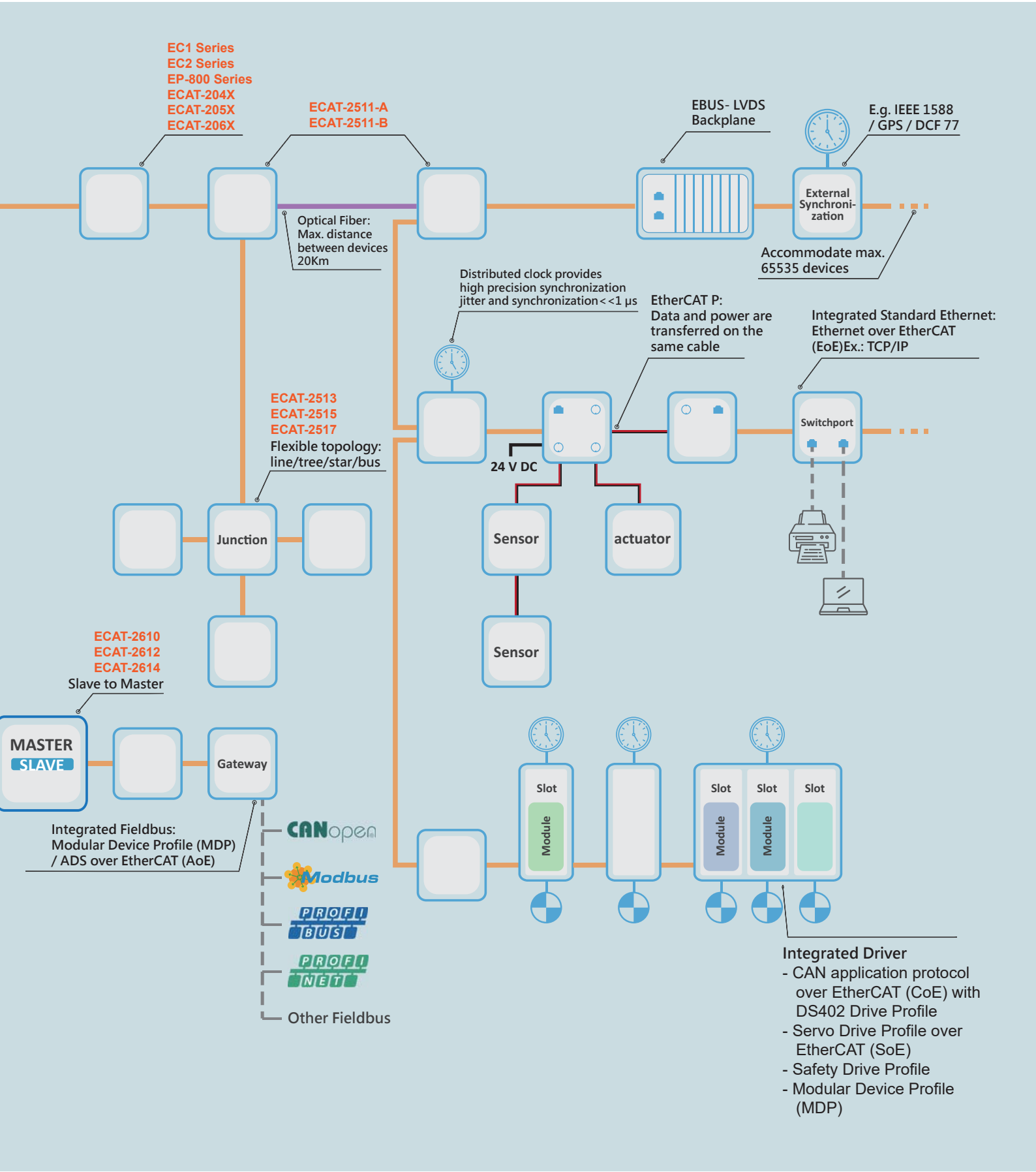
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EtherCAT - System Overview

EtherCAT Factory Network

EtherCAT Device Control Network





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ICP DAS EtherCAT Solution Guide

ICP DAS offers a full range of EtherCAT product components, including master cards, master motion controllers, and dozens of different slave stations: including I/Os for general purposes, splitters, converters, gateways, and motion control modules, etc. Optimizing the real-time performance of your EtherCAT system allows you to effectively reduce system load, improve control efficiency and accuracy, and bring higher quality production efficiency.



Real-time & Reliability

- Up to 64 synchronized axes control
- Communication cycle time: 500 µs (min.)
- Powerful embedded ICP DAS motion engine

Compatibility

- Supports 3rd Master and Slave
- Provides ESI files

Easy Use

- Dedicated API that satisfies rapid development requirements
- Easy configuration with ECAT Utility

Services

- Professional customer service team consultation
- Customized motion control function

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List of Common Drivers and Motors That Have Been Market Tested

Company	Drivers	Types of Motors
Delta	ASDA A2-E series	AC Servo Motor
Hiwin	D2 series	AC Servo Motor
Moons'	STF/RS series	Two-phase Stepper Motor
Mitsubishi	MR-JET	AC Servo Motor
Oriental Motor	AZ series multi-axis	Closed loop Stepper Motor
Panasonic	A5B/A6B series	AC Servo Motor
Shihlin	SDP series	AC Servo Motor
Sanyo Denki	R series	AC Servo Motor
Teco	JSDG2/JSDG2S	AC Servo Motor
Yaskawa	Sigma 7 series	AC Servo Motor



Ease of development

All of ICP DAS's Master products include a complete and simple-to-use C language library that supports the majority of programming language tools on the market, and user only need to call the corresponding function API function to significantly reduce development time.

Compatible with a wide variety of 3rd party EtherCAT component

The EtherCAT Conformance Test Tool (CTT) has validated ICP DAS' EtherCAT solution to ensure the interoperability of various EtherCAT servo drives and third-party EtherCAT products. Users can select any EtherCAT components they require without concern for compatibility.



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Motion Controller

	EMP-9000	EMP-2000	XP-9000
Type	PAC/PLC	PLC	PAC
Support 3rd Party Slave	V		-
No. of Slaves Nodes	512	128	20
No. of Motion Control Axes	64 Axes (Max.)	16 Axes	8 Axes
Windows API	ECATMotion	-	ECATDAQ
PLC Open	V		-

Motion Control Card

	ECAT-M801	ECAT-M808
Type	PCI Express	
Support 3rd Party Slave	V	
No. of Slaves Nodes	512	
No. of Motion Control Axes	64 Axes (Max.)	
Windows API	ECATMotion	
PLC Open	V	

EtherCAT Motion Control Master Selection Guide

Model		Type	No. of Axes	Preloaded EtherCAT Win-GRAF	Software
PAC Controller - The EtherCAT Motion Control Master is competitive in terms of performance, size and price.					
	**EMP-9091-16**	Motion Controller	16	-	Windows API
	EMP-9091-32		32	-	
	EMP-9098-16		16	V	
	EMP-9098-32		32	V	
	EMP-9051-16		16	-	
	EMP-9051-32		32	-	
	EMP-9058-16		16	V	
	EMP-9058-32		32	V	
	EMP-9251-16		16	-	
	EMP-9251-32		32	-	
	EMP-9258-16		16	V	
	EMP-9258-32		32	V	
PLC controller - A compact and efficient motion controller that can communicate with all EtherCAT slaves without programming					
	**EMP-2848M**	Motion Controller	16	Win-GRAF Runtime	Soft PLC
PCI Express Card - Compatible with IPC of various brands. PCI Express can transform the device into a high-efficiency EtherCAT master.					
	**ECAT-M801-8AX**	PCI Express Master	8	-	Windows API
	ECAT-M801-16AX		16	-	
	ECAT-M801-32AX		32	-	
	ECAT-M801-64AX		64	-	

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Built-in Motion Control Commands

Single-axis Motion Control

- Supports CiA402 driver and ICP DAS stepper motor drivers
- Auto Homing function
- Point to point and constant velocity motion
- Virtual axes
- Supports CiA402 servo drives Touch Probe function

Multi-axis Group Motion Control

- Add/Remove axis from a group easily
- Multi-axis interpolation motion (PV/PT/PVT mode)
- 2/3-axis Circular interpolation, Helical interpolation, Profile motion control
- Continuous Interpolation motion (Up to 7000 data buffered)
- Supports Buffered/Aborting/Blending and other commands
- Up to eight groups of simultaneous control

Provide Sample Programs in a variety of Programming Languages

- Python
- Visual C++.NET
- Visual C#.NET
- Visual Basic.NET
- Borland C Builder
- LabVIEW



List of Common Motion Control Commands That Are Supported

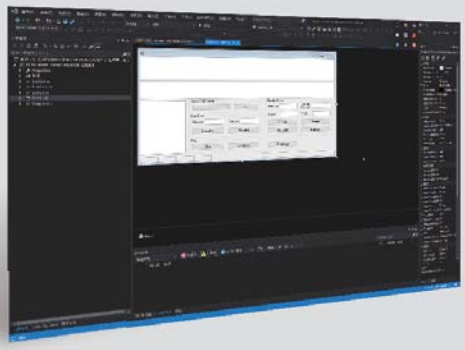
Module	EMP-9000 series	EMP-M801 series
3D Circular	V	V
3D Helical	V	V
Continuous Compare	V	V
T/S Curve	V	V
Trigger	V	V
Position Limit	V	V
Velocity Feed Forward	V	V
Position Reset	V	V
Speed Reset	V	V
Linear Interpolation	V	V
Circular Interpolation	V	V
Continuous Interpolation	V	V

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EMP-9000 EtherCAT Motion Controller (PAC Based)

The EtherCAT compact motion controller from ICP DAS has a full-metal case and fits into a 3U rackmount. It has a high-strength structure, improved anti-noise capability, and a compact size, making it more suitable for use in harsh and complex environments. There is also a local I/O module slot, and e-9K/I-9K/97K modules can be expanded for more diverse applications. The EtherCAT motion control function can control 64 servo axes at once and 512 slave devices simultaneously as the slave node moves. 64-axis linear motion, 32-axis individual motion, 3D linear/circular interpolation, multi-axis synchronous movement, follow-up movement, and electronic cams are some of the motion functions available.

ICP DAS EMP-9_



50% of Development Time Saved



80% Saved space

Get Started Quickly without Prior EtherCAT Knowledge

- Provides a simple API for motion control
- Code samples in a variety of programming languages
  Visual C++/C#/VB.NET/BCB/LabVIEW/Python
- Dedicated ICP DAS I/O module functions
- Provides Win-GRAF PLC

3U Rack-mount Case

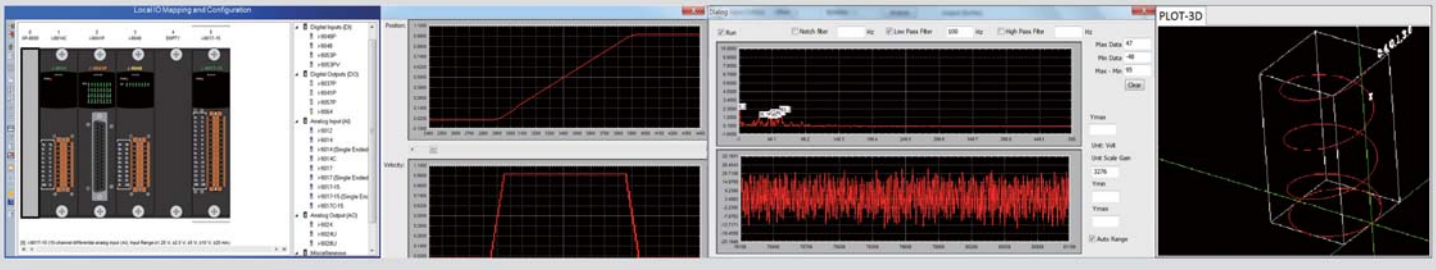
- Can be installed on a 3U cabinet
- Expandable e-9K/I-9K/97K I/O modules
- x86 architecture CPU
- Efficient anti-interference metal outer case

High Efficiency

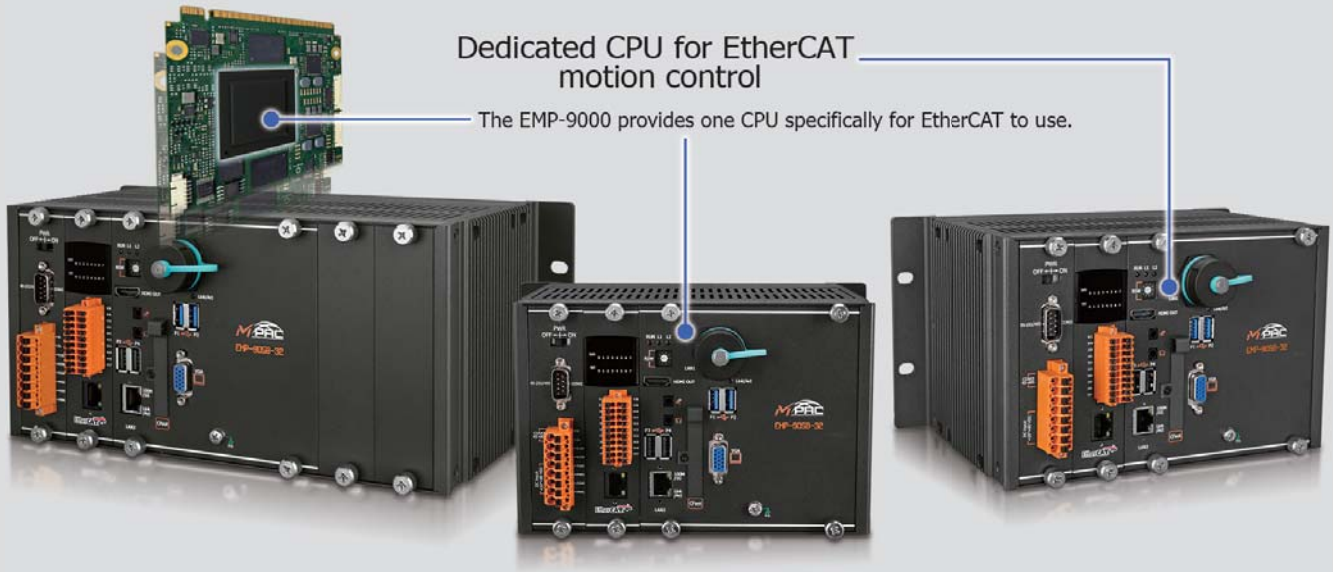
- Cycle times up to 500 μs
- Supports Windows 10 IoT
- Supports 32-bit and 64-bit operating systems
- Independently developed EtherCAT engine by ICP DAS
- Single axis motion control
- Multi-axis group motion control commands

Easy Configuration Program

- One-key configuration of EtherCAT slaves
- Compatible with third-party slave ESI files
- Includes simple troubleshooting
- Supports slave alias writing function



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▲The EMP-9000 series EtherCAT motion controller with an all-metal case meets users' most stringent requirements for anti-interference capability and system size.

	EMP-9000 (PAC/PLCs)	Conventional IPC + EtherCAT master card in the market
Development Platform	Developers can use PLC Open or standard Windows API to develop the program.	Provides only Windows API library
Reduce development time	ECATMotion API and PCL Open functions are easy to use. Provides professional consultation from motion control technical service team.	Provides only Windows API library
Size	Save 80% space of conventional IPC.	Big and heavy
Expandability	Provide 0/2/6 slot expansion modules, which can install high-performance e-9K and PAC I/O modules	Available in conventional PCI or PCIe slots only

ICP DAS Exclusive Features

- Built-in 10 groups of PID control loops
- High-speed data logger
- Analog module filter
- Event trigger control
- Gantry control parameter adjustment program
- Stewart Platform







- **Boost the efficiency of your development**
- **It can be programmed in a variety of languages**
- **EtherCAT motion controller with the highest level of dependability**
- **3U rack-mounted design saves space and wiring**

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EMP-9 X X X - XX

I/O Slot
0/2

CPU
5: i5-8365UE
9: E3950

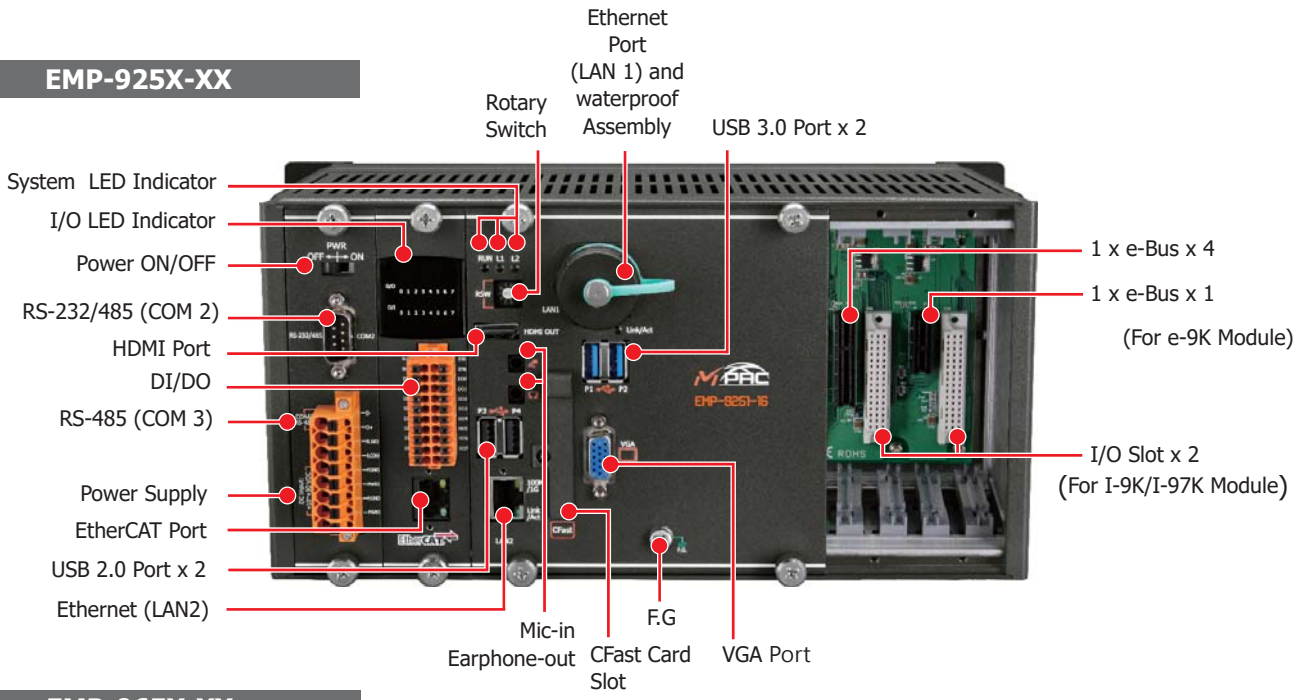
Version
1: Standard
8: Win-GRAF

Number of axes
16: 16 axes
32: 32 axes

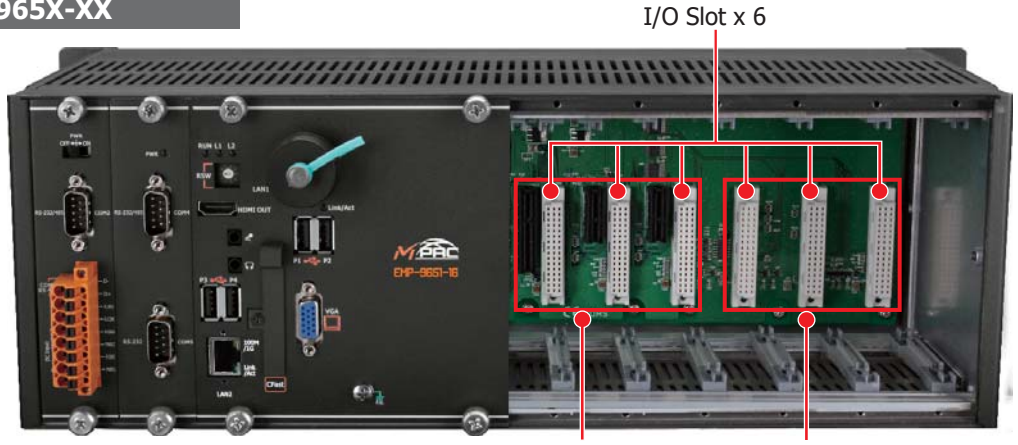
EMP-909X-XX / EMP-905X-XX



EMP-925X-XX



EMP-965X-XX



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Windows 10 IoT **Standard Edition** (Built-in ICP DAS EtherCAT Win32 Library)

Model	CPU	RAM	e-Bus/I-Bus Expansion Slot (Shared)	Cycle Time	EtherCAT Slaves	Motion Axes
EMP-9051-32	i5-8365UE (1.6 ~ 4.1 GHz, 4C8T)	16 GB	-	0.5/1/2/4/8 ms	512	32
EMP-9051-16						16
EMP-9251-32			2			32
EMP-9251-16						16
EMP-9651-32			6			32
EMP-9651-16						16
EMP-9091-32	E3950 (1.6 ~ 2.0 GHz, 4C4T)	8 GB	-			32
EMP-9091-16						16

Windows 10 IoT **Win-GRAF** Version (Built-in ICP DAS EtherCAT Win32 Library and Win-GRAF EtherCAT PLC Software)

Model	CPU	RAM	e-Bus/I-Bus Expansion Slot (Shared)	Cycle Time	EtherCAT Slaves	Motion Axes
EMP-9058-32	i5-8365UE (1.6 ~ 4.1 GHz, 4C8T)	16 GB	-	0.5/1/2/4/8 ms	512	32
EMP-9058-16						16
EMP-9258-32			2			32
EMP-9258-16						16
EMP-9658-32			6			32
EMP-9658-16						16
EMP-9098-32	E3950 (1.6 ~ 2.0 GHz, 4C4T)	8 GB	-			32
EMP-9098-16						16

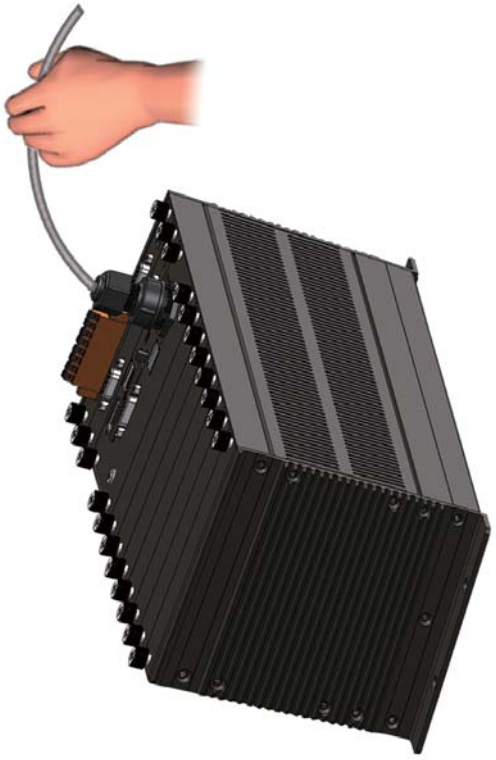


▲ Flexible system design capabilities, can be used with a variety of applications and the use of devices to choose, to enhance the freedom of design.

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Securing the Ethernet Cable

ICP DAS provides two types of RJ-45 network port designs, which can secure the Ethernet cable, avoid poor communication caused by vibration and pulling, and increase the reliability of RJ-45 cable connector.



• Secured RJ45 connector

This RJ45 connector not only can be used with the regular network cable, but also can add a secured connector. Besides, the package allows the regular network connector to get the most reliable locking force.



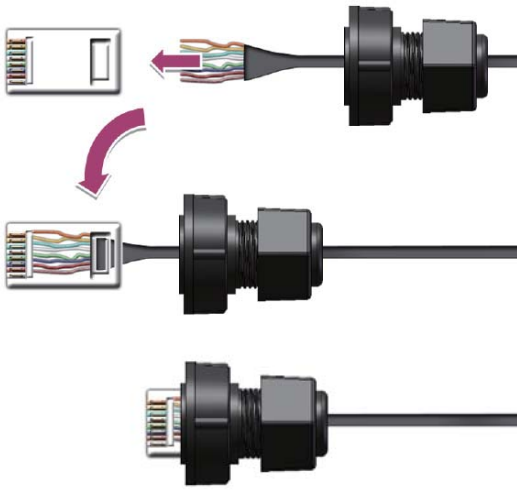
▲Regular Ethernet Cable



▲Secured RJ45 Connector Kit



▲Waterproof Connector Kit



• RJ45 Screw-lockable Connectors

Screw holes (spaced 20 mm) are located on both sides of the RJ45 connectors. Screw holes can also be used in addition to standard network cables.

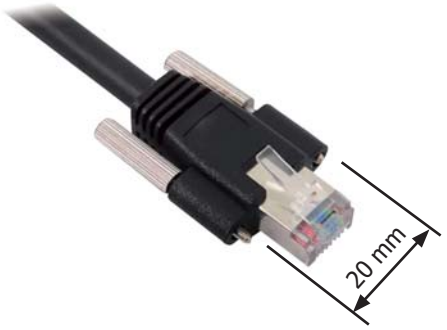
The wire-locked network cable lessens the possibility of the network cable falling off due to vibration.



▲ Screw-lockable RJ45 Connector



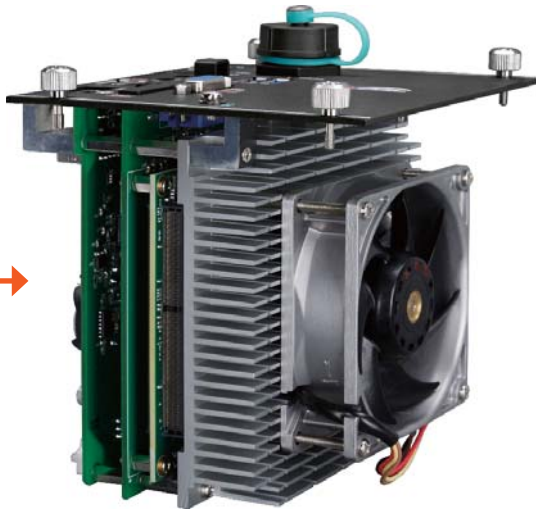
▲ General Ethernet Cable



▲ Ethernet Cable with a Screw-on Lock

High-Efficiency Heat Dissipation CPU

● Design of CPU Heat Dissipation



The temperature of the entire CPU can be reduced by another 10°C with larger heat sinks and fans, extending the service life of electronic components. The fan has been specially selected for the long-life type, with a lifespan of 180,000 hours (about 20 years).

▲ CPU with Long-life Heat Dissipation

(180,000 hrs ≒ 20 years)



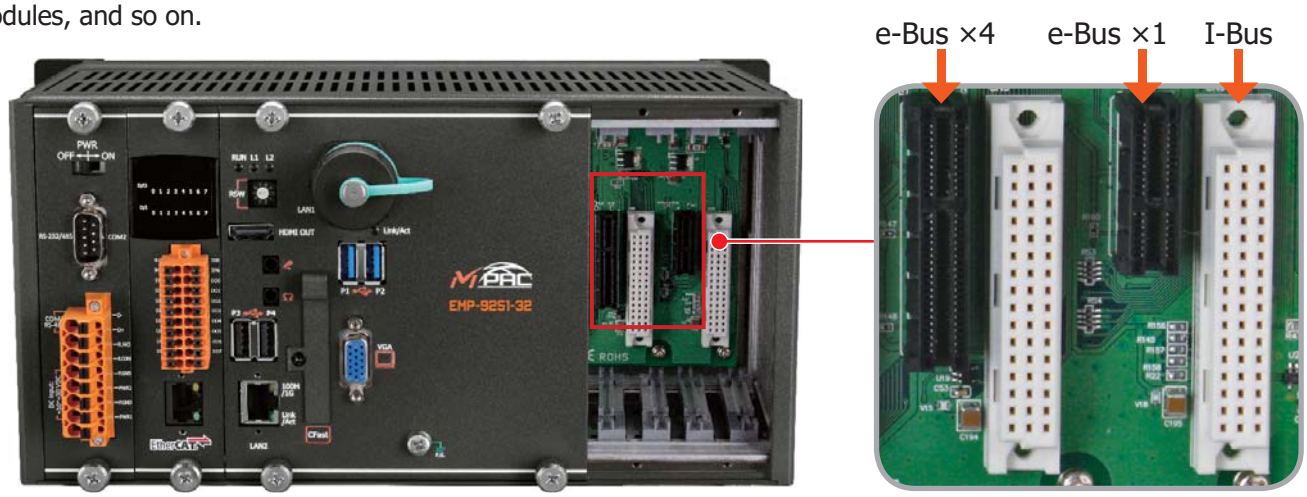
▲ Long Life Design



▲ Regular Design

Expandable I/O Slot Design

The EMP-9000 series offers a variety of I/O expansion options. User can directly integrate e-9K/I-9K/97K series modules via the expansion slot. The e-9K/I-9K/97K high-speed data transmission module can meet the needs of high-speed and stable data acquisition by providing a variety of analog, digital input and output modules, encoder input modules, and so on.



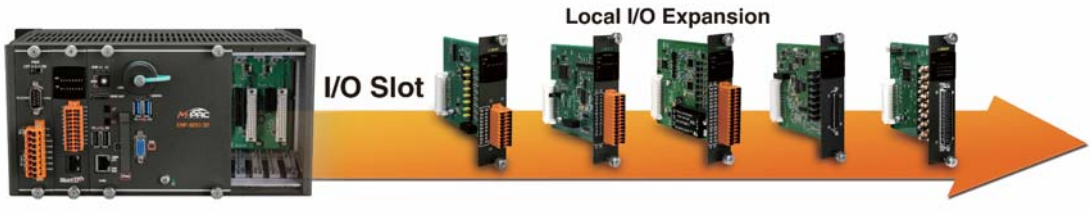
The I/O Module's Communication Interface

The EMP-9000 series can support I/O and communication expansion modules from the e-9K/I-9K/97K series

- The e-9K (e-bus) utilizes PCIe 3.0 communication, has an x1 or x4 communication interface, and has a speed of 500 MB/s or 2 GB/s.
- I-9K uses 8-bit parallel communication, with speeds ranging from 200 to 500 KB/s depending on CPU level.
- The I-97K (I-bus) uses uart communication at 115 kbit/s.

● I-9K/97K Series (I-bus)





Scan the QR code to learn more about the I-9K/I-97K series modules

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● e-9K Series , DAQ Modules (e Bus)

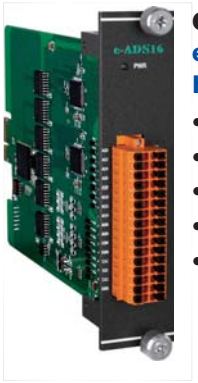
Model	e-Bus	Description
e-LCell4	e-Bus x1	High-speed LoadCell (24-bit, 15KHz) module , 4-channel, Terminal Block
e-ADS16	e-Bus x1	High-speed AI module , 16-channel, 16-bit, 200KHz, Sample & Hold, Terminal Block
e-D96S	e-Bus x1	High-speed bidirectional DIO module , 96-channel, SCSI II 96-pin connector
e-AR300T	e-Bus x1	Accelerometers input , 3-port IEPE interface , 1 channel thermistor input
e-AR400	e-Bus x1	Accelerometers input , 4-port IEPE interface
e-USB400	e-Bus x1	4-port USB3.0 expansion module. 500 MB/s total bandwidth
e-USB404	e-Bus x4	4-port USB3.0 expansion module. 2 GB/s total bandwidth
e-PoE204	e-Bus x4	2-port PoE (10/100/1000 Mbps) expansion module
e-PoE404	e-Bus x4	4-port PoE (10/100/1000 Mbps) expansion module



e-LCell4

e-Bus, 24-bit High-precision Load Cell Input Card

- e-Bus x1
- 4-channel 24-bit load cell input
- 4-channel 24-bit analog input
- 15 kHz sampling frequency



e-A16SH

e-Bus, 200 kS/s, 16 Channels and 16 bits High-speed Analog Input Card

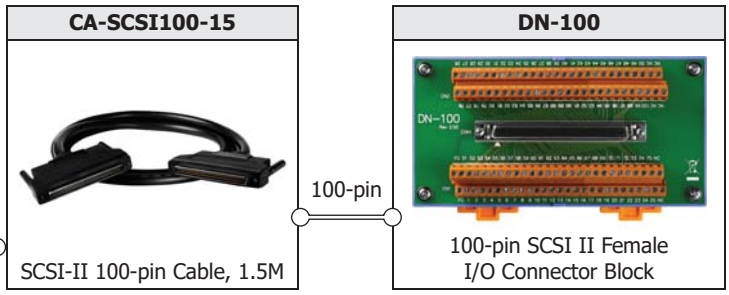
- e-Bus x1
- Simultaneous sampling
- 16-bit 16-channel single-ended analog input
- 2k WORD FIFO
- 16-channel simultaneous sampling single-ended analog input



e-D96S

e-Bus, 96-channel Digital I/O Card

- e-Bus x1
- 96 channels of Digital I/O
- I/O response time 500kHz
- SCSI-II terminal





e-AR300T

e-Bus, 3-channel Accelerometer

- e-Bus x1
- 3 channels with 16-bit simultaneous sampling
- 3 IEPE input ports, drive current is 3 mA
- 1 channel thermistor input
- Up to 125kHz sampling frequency
- Signal dynamic range: ±10V
- There are several trigger modes available, including button trigger, time schedule trigger, threshold trigger, digital input trigger, and remote tool software trigger



e-AR400

e-Bus, 4-channel Accelerometer

- e-Bus x1
- 4 channels 16-bit simultaneous sampling
- 4 IEPE input ports, with 3 mA drive current
- Up to 125kHz sampling frequency
- Signal dynamic range: ±10V
- There are several trigger modes available, including button trigger, time schedule trigger, threshold trigger, digital input trigger, and remote tool software trigger

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e-USB400

e-Bus, 4-port USB3.0 Expansion Module



- e-Bus x1
- 4-port USB3.0 host module that is backward compatible with USB2.0/1.1/1.0
- 500 MB/s total bandwidth
- Each port has a maximum current supply of 900 mA.
- USB Camera Supported



e-PoE204

e-Bus, 4-port PoE Expansion Module



- e-Bus x4
- Supports IEEE 802.3at PoE
- 4 ports 10/100/1000 Mbps Ethernet
- Supports PoE power management and monitoring
- Supports PoE Camera



e-USB404

e-Bus, 4-port USB3.0 Expansion Module



- e-Bus x4
- 4-port USB3.0 host module that is backward compatible with USB2.0/1.1/1.0
- 2 GB/s total bandwidth
- Each port has a maximum current supply of 900 mA.
- USB Camera Supported



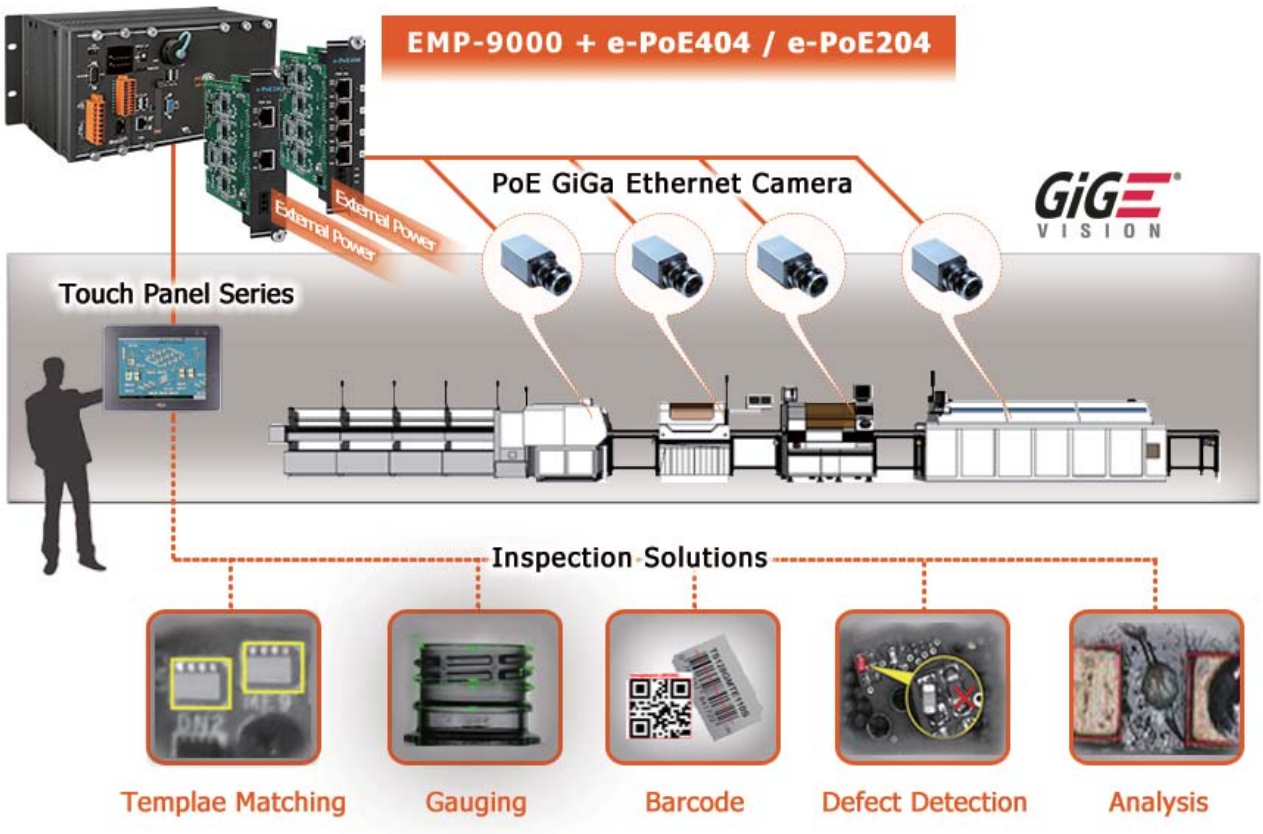
e-PoE404

e-Bus, 4-port PoE Expansion Module



- e-Bus x4
- Supports IEEE 802.3at PoE
- 4 ports 10/100/1000 Mbps Ethernet
- Supports PoE power management and monitoring
- Supports PoE Camera





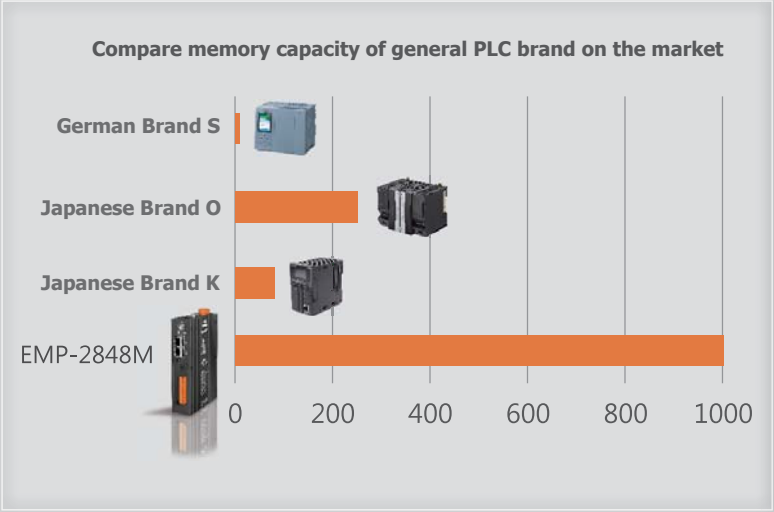
EMP-2848M EtherCAT Motion Controller (Soft PLC Based)

ICP DAS compact EtherCAT motion controller is with metal casing and can fit in a 3U cabinet. It features durable structure and strong anti-noise ability. It is compact and perfect for use under harsh environments. And the network topology and settings of the modules can be done by the built-in web page.

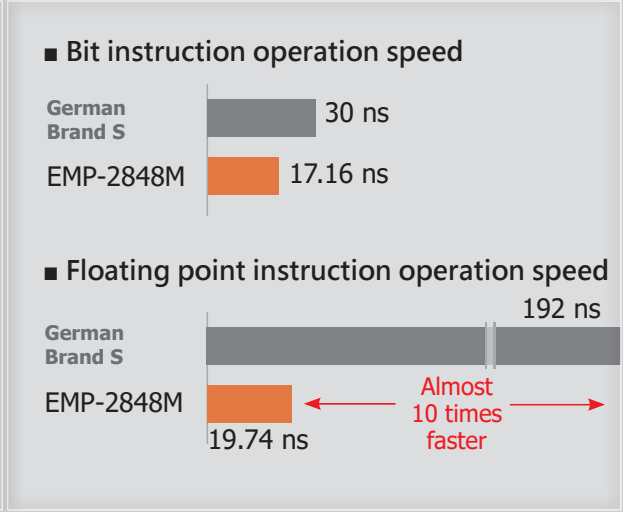
EMP-2000 can integrate control, data processing and network connection into one control platform. It provides Win-GRAF that supports IEC 61131-3 PLC programming language which can meet multi-purpose and high expansion requirements of the automation applications. It can control 16 servo axes and 128 slaves for motion control at the same time.

ICP DAS EMP-2848

Large memory capacity for easy to use



EMP-2848M is really fast!



Support multiple networks

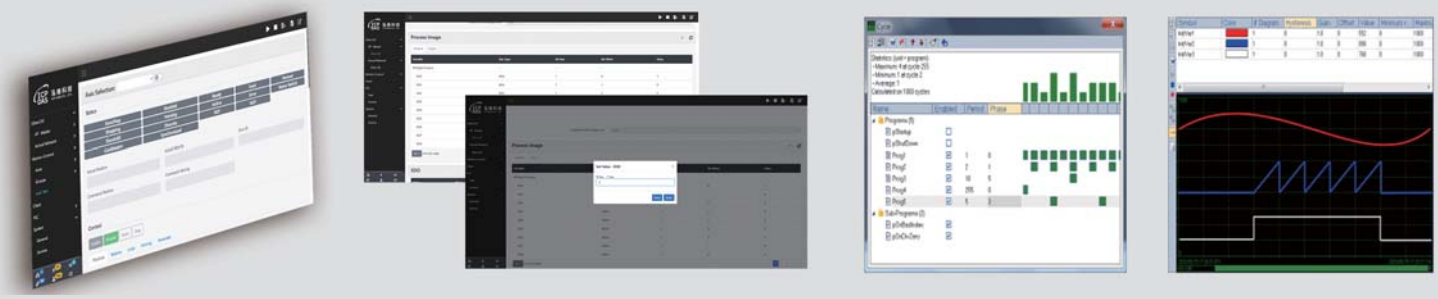
- Support EtherCAT Master
- Support Modbus TCP (Master/Slave)
- Support Modbus RTU/ASCII (Master/Slave)
- Support OPC UA (Available soon)

High efficiency and high protection

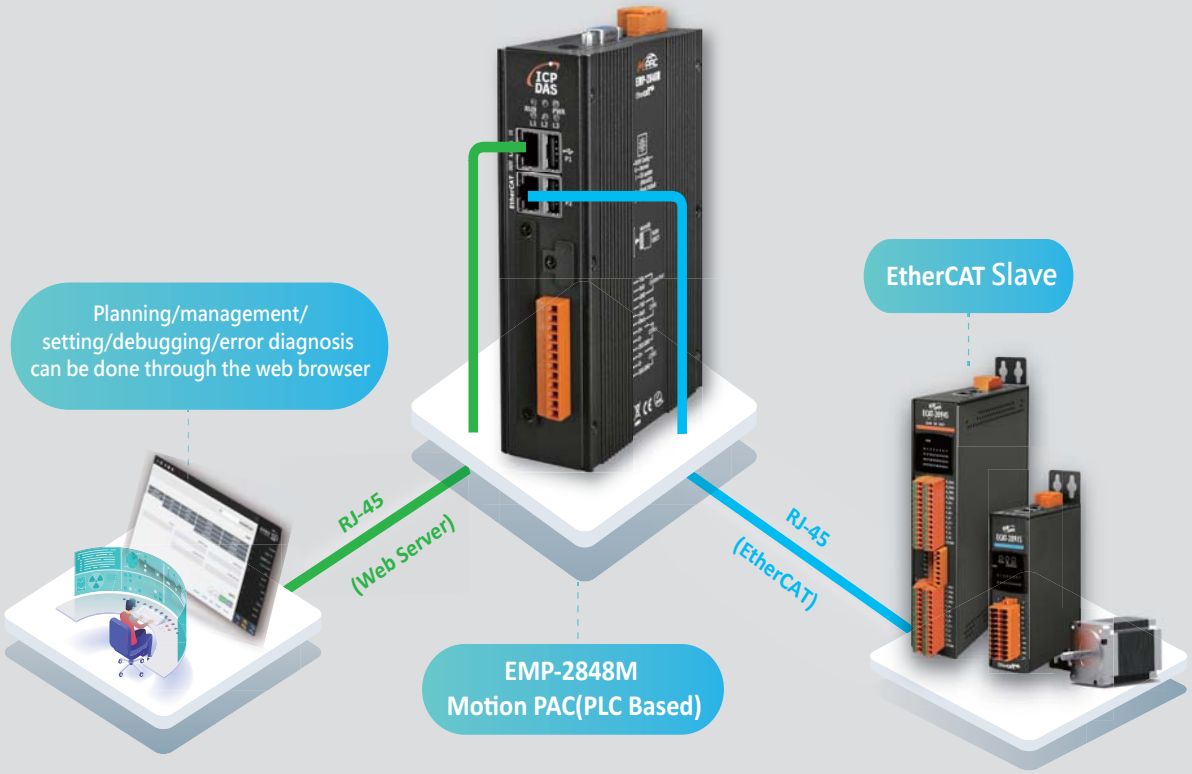
- Cortex-A53 1.6GHz quad-core processor
- Control cycle up to 500 μs
- EtherCAT engine independently developed by ICP DAS
- Single axis motion control
- Metal casing is effective against noise
- Built-in 1G large capacity memory

Built-in integrated web page

- Get EtherCAT network topology with one click
- Compatible with ESI files from third-party slave
- Easy troubleshooting
- Perform commissioning of the motion controller
- Configure slave module parameters
- Support virtual slave ID memory function



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▲ The EMP-2000 series is with a metal casing and features anti-interference and compact in system and space. It lowers the barrier in development and configuration, and take all factors such as compact size, safety, stability, and convenience into account.

Easy to Develop

- Support Win-GRAF Workbench according to IEC 61131-3 PLC Language
- Multiple Soft PLC languages (FBD/LD/IL/ST/SFC)

Support multitasking function

- Up to 4 tasks can be executed simultaneously
- Different communication protocols can be used separately
- Don't worry about the timing of different protocols



EMP-2848M

Thinner than a dictionary!



- **Make programming development more efficient**
- **Programmable in standard PLC language**
- **Most reliable EtherCAT motion controller**
- **Compact and robust, saving space and wiring**

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EtherCAT Master Card (PC Based)

ICP DAS offers EtherCAT network motion control cards that are compatible with Windows and Linux operating systems, allowing you to enjoy convenient and efficient real-time motion control on any computer and platform by plugging in a card. Up to 64 servo axes and 512 slave devices can be controlled synchronously for movement, and a variety of common movement control functions are provided to speed up software development.

ICP DAS EMP-M801

Model	Axes	Slaves	Function
ECAT-M801-8AX	8	512	Full
ECAT-M801-16AX	16	512	Full
ECAT-M801-32AX	32	512	Full
ECAT-M801-64AX	64	512	Linear

Module	Number of axes	Number of Stations
ECAT-2094S	4	1
ECAT-2091S	1	1
ECAT-2513	0	2
ECAT-2515	0	4
ECAT-2517	0	5
ICP DAS I/O Module	0	1



Single Axis Motion Control

- Supports CiA402 driver and ICP DAS stepper motor drivers
- Auto Homing function
- Point to point and constant velocity motion
- Virtual axes
- Supports CiA402 servo drives Touch Probe function

High Performance

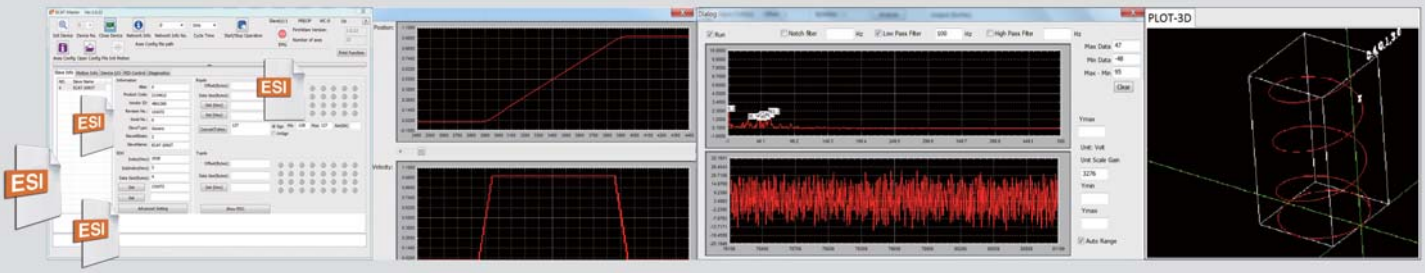
- Cycle times of up to 500 µs
- Supports Windows 10 and Linux operating systems
- Supports 32 and 64-bit operating systems

Local I/O Interface

- 13 isolated digital I/O channels
- PCI Express x1
- Card ID
- 2-axis encoder
- Supports compare trigger

Multi-axis Group Motion Control

- Add/Remove axis from a group easily
- Multi-axis interpolation motion (PV/PT/PVT mode)
- 2/3-axis Circular interpolation, Helical interpolation, Profile motion control
- Continuous Interpolation motion (Up to 7000 data buffered)
- Supports Buffered/Aborting/Blending and other commands
- Up to eight groups of simultaneous control





▲ ECAT-M801 handles motion control, allowing the PC system to focus on other tasks

3D Circular | 3D Helical | Continuous Path
T/S Curve | Compare Trigger | Position Limit
Velocity Feedforward | Position Reset | Speed Reset
Linear | Helical | Continuous

Quick Deployment without Knowing EtherCAT

- Supports a DLL library
- Supports a simple motion control API
- Code samples in a variety of programming languages
C++/C#/VB.NET/BCB/LabVIEW/Python
- Special ICP DAS I/O module functions

Quick Configuration Tools

- Easy configure the slave device
- Compatibility with 3rd party slave device
- An easy-to-use troubleshooting function
- Supports the slave alias name function

Exclusive ICP DAS Features



- Built-in 10 groups of PID control loops
- High-speed data logger
- Analog input filter
- Event trigger
- Gantry control parameter adjustment program
- Stewart Sports Platform

- **Improve the efficiency of your development**
- **Can be programmed in a variety of languages**
- **Allow the ECAT-M801 to assist the system in performing more real-time actions such as motion control, measurement, and so on**

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EtherCAT Stepper Motor Controllers/Drivers



ICP DAS stepping motor controllers are specially designed to drive two-phase bipolar stepping motors by using open loop control, which eliminates the need for a running quantity sensor or an encoder. It uses pulse signal to switch the current trigger without requiring a feedback device for position detection and speed detection, so that it allows the stepper motor to rotate in proportion to the pulse signal. As a result, more precise position and speed control, as well as greater stability can be achieved.

ECAT-2094DS / ECAT-2094S / ECAT-2091S

Accurate and Stable Stepping Motor Control

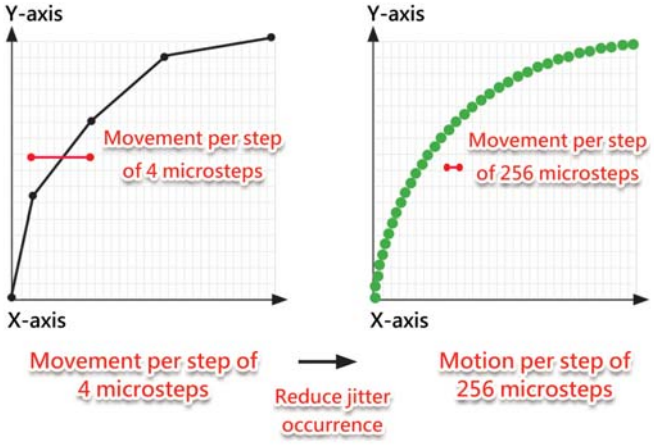
- Support two-phase bipolar stepping motor
- Support CiA402 protocol
- Open loop processing
- Programmable current control, up to 3.3A
- Programmable step resolution
- Up to 256 microsteps per full step

Built-In Multiple I/O Interfaces

- Diff erential encoder (A, B, Z)
- Digital input (limit switch/latch/general function)
- Digital output

High precision

- Offers up to 256 microsteps to enhance stability



Reliable Protection Function

- Built-in driver over temperature and short circuit protection mechanism
- I/O terminal isolation protection
- Automatic rectifi cation prevents the motor from overheating
- Provides fault indicator lights for I/O and motor status.

EtherCAT Communication Interface

- Free-Run/SM/DC mode support
- Cycle time of 0.5 ms
- Four-axis synchronized control

Compact size and easy wiring

The ECAT-209X series can use only one network cable to connect the controller and the stepper driver, which can reduce the wiring compared with pulse control. A space to slip in a book is enough to host a four-axis stepper driver.



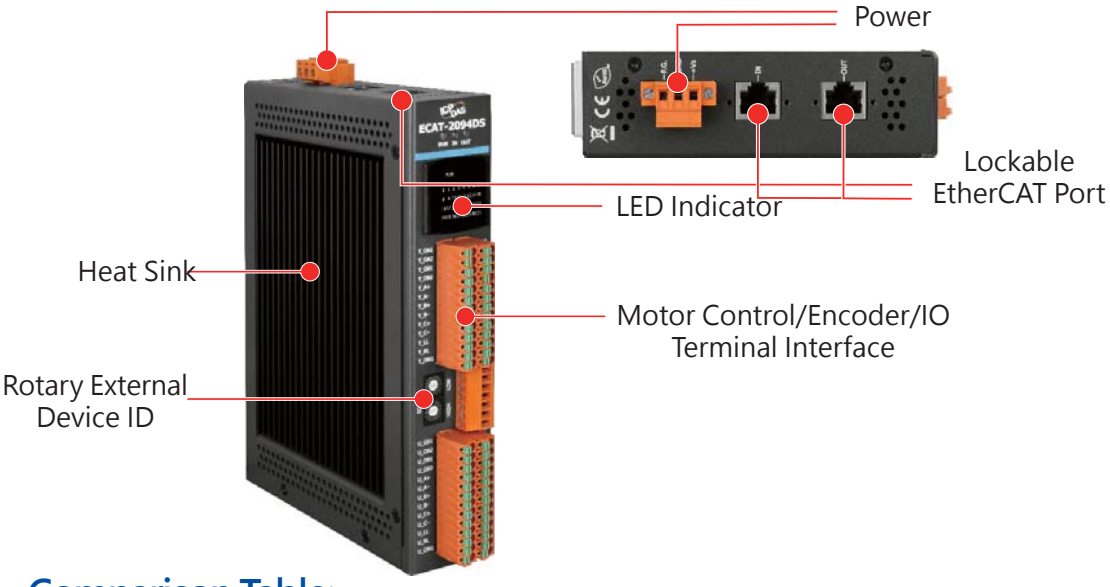
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ECAT-209 Y XXX - XX

Y — axes/channels:
1: 1-axis
2: 2-axis
4: 4-axis
8: 8-axis

XXX — Driver/Encoder Type
S:Stepper Motor (DS402 is not supported)
DS:Stepper Motor
BL:Brushless Driver
P:Pulse
CS:Closed Loop Stepper Driver

XX — **N/A: Below 4A**
8A: 8.0A



Comparison Table:

Model	EtherCAT		Motor output				Encoder input		Digital I/O
	Cycle Time	Support CiA402	Axis	Control Mode	Output current	Microsteps Per Step	Channels	Frequency (MHz)	Channels
ECAT-2091S	0.5 ms	-	1x stepper motor (2 phases)	Open Loop	Peak 1.5A	256 128 64 32 16 8 4 2	1	1	2 DI 1 DO (Sink)
ECAT-2094S	1-axis: 1 ms 2-axis: 2 ms 3-axis: 3 ms 4-axis: 4 ms	-	4x stepper motor (2 phases)	Open Loop			4	4	8 DI 2 DO (Sink)
ECAT-2091DS	0.5 ms	v	1x stepper motor (2 phases)	Open Loop	Peak 3.3A		1	1	3 DI
ECAT-2094DS	0.5 ms	v	4x stepper motor (2 phases)	Open Loop	Peak 3.3A		4	4	12 DI
ECAT-2094P	0.5 ms	v	4x Pulse Output	Open Loop	-		4	4	8 DI 2 DO(Sink)
ECAT-2092CS	0.5 ms	-	2x Stepper motor (2 phases)	Closed Loop	Peak 3.3A		2	2	4 DI 2 DO(Sink)
ECAT-2092DS-8A	0.5 ms	-	2x Stepper motor (2 phases)	Open Loop	Peak 8A		2	2	4 DI 2 DO(Sink)
ECAT-2092BL	0.5 ms	v	1x BLDC motor (2 phases)	Closed Loop	Peak 3.3A		2	2	4 DI 2 DO(Sink)

*All models support DC mode

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Stepper Motor Controller/Driver DS Series

ECAT-2091DS
ECAT-2094DS
ECAT-2092DS-8A



- Up to 4-axis motion control
- Fully Digital Microstepping Technology
- Wide motor voltage range: 9-29VDC
- Open loop processing
- Maximum current 8A
- Anti-interference design
- Support CiA402 protocol

Stepper Motor Controller/Driver S Series

ECAT-2091S
ECAT-2094S



- Up to 4-axis motion control
- Fully Digital Microstepping Technology
- Wide motor voltage range: 6-46VDC
- Open loop processing
- Maximum current 1.5A
- Anti-interference design

Closed-Loop Stepping Motor Driver CS Series

ECAT-2092CS



- Up to 2-axis motion control
- Fully Digital Microstepping Technology
- Voltage range of the motor: 9-29V
- Closed loop processing
- Maximum current 3.3A
- Anti-interference design
- Support CiA402 protocol

Pulse Output Driver P Series

ECAT-2094P



- 4-axis independent control
- Support hand wheels and inching function
- Pulse output up to 4MHz
- Anti-interference design
- Support CiA402 protocol

Brushless Motor Driver BL Series

ECAT-2092BL



- Up to 2-axis motion control
- Support PWM
- Support potentiometer speed control
- Drive all types of brushless motors
- Anti-interference design
- Support CiA402 protocol

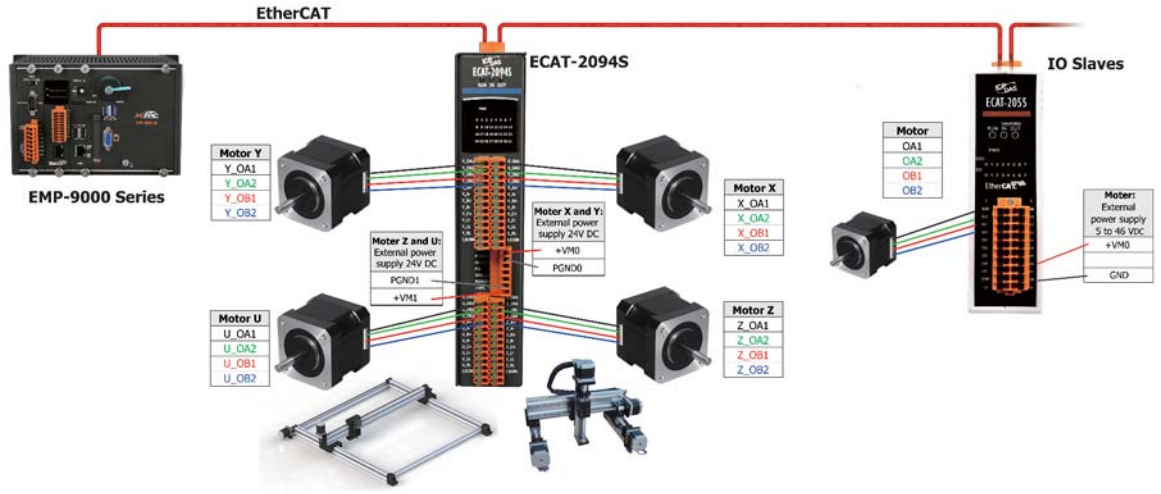
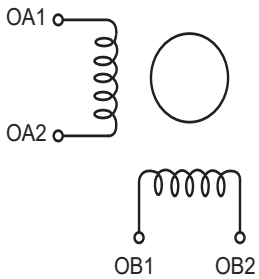
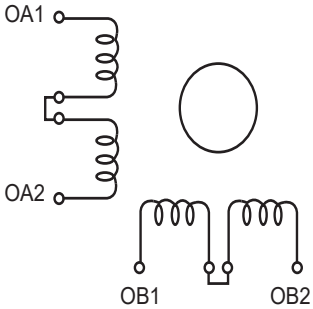
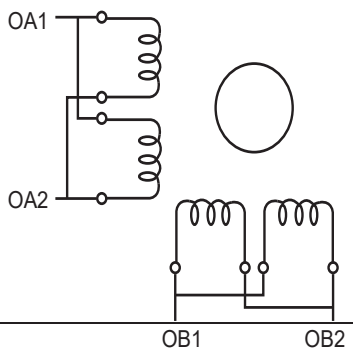


Diagram of ECAT-2094S and ECAT-2091S in EtherCAT Network

Four-lead bipolar motor wiring diagram	Six or Eight-lead unipolar motor wiring diagram (serial)	Eight-lead bipolar motor wiring diagram (parallel)
		

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EtherCAT Encoder

The EtherCAT encoder converts the device's original signals into EtherCAT communication signals, enabling the control system to take full advantage of EtherCAT's nanosecond-precision synchronization, flexible topology, and other benefits, thus achieving precise and reliable control at a lower cost. It allows you to obtain more accurate values faster in the fields of frequency, displacement, and angle measurement.

ECAT-207 E Y - X

E — Channels:
2:2 channel
3:3 channel
4:4 channel

Y — Encoder Type
I: Incremental
A: Absolute

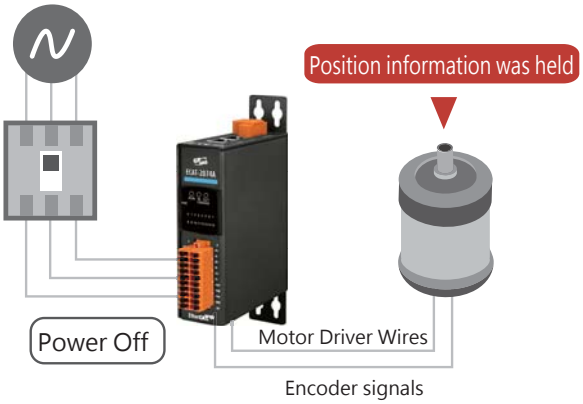
X — Function
T: Comparison Trigger

Comparison Table

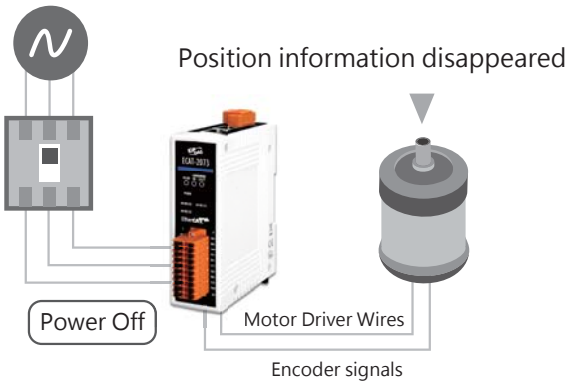
Model	EtherCAT		Encoder Input					External Latch Input	Compare Trigger Output
	Cycle Time	DC	Type	Channels	Resolution/ Serial Input	Frequeency (MHz)	Counting Mode	Channels	Channels
ECAT-2072IT	0.5 ms	v	Incremental	2	32-bit	4 MHz	AB Phase CW/CCW Pulse/Dir	2	2
ECAT-2073I	0.5 ms		Incremental	3				3	-
ECAT-2074A	0.5 ms		Absolute	4	40-bit	10 MHZ	BiSS-C SSI	-	-

Absolute VS Incremental Encoder

Incremental encoders increase or decrease the number of pulses according to the direction of motion to provide the relative position and direction of motion. Absolute encoders provide non-repetitive encoding of position or angle, giving the current accurate position even when power is turned off and on again. Please select the suitable encoder type and match it with the right module.



Absolute Encoder System



Incremental Encoder System

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EtherCAT Absolute Encoder Counters



ECAT-2074A

- 4 channel absolute encoder
- Support SSI and BiSS-C modes
- Anti-interference design

Encoder Input	
Encoder Input Number	4 encoder counters (D+,D-,Cl+,Cl-) differential
Counter Resolution	40 bit
Encoder Mode	SSI, BiSS-c
Maximum transmission pulse frequency	10 MHz

The ECAT-2074A absolute encoder can be connected to an absolute encoder with SSI (Synchronous Serial Interface)/ BiSS-C. Both single-turn and multi-turn encoders are supported. The 5V power supply for the encoder can be supplied via the terminal connection points. A wide range of parameterizations allows adaptation to different encoder types.

EtherCAT Incremental Encoder Counters



ECAT-2073I

- 3 channel encoder
- Support multiple counting modes
- Differential signal interface for anti-interference
- Built-in digital filter

Encoder Input	
Encoder Input Number	3 encoder counters (A, B, Z), differential or single action
Counter Resolution	32 bit
Encoder Mode	A/B Phase, CW/CCW, Pulse/Dir
Maximum transmission pulse frequency	4 MHz
Programmable Digital Filter	1 ~ 250 μs
External Latch Input	
Channel	3 (use the Z signal)
Input Level	Z signal interface

ECAT-2073I is a three-channel high-speed encoder interface module designed for reading the pulse sequence generated by the incremental encoder, which is primarily used for position feedback. If you require the position latch function, you can use the phase C signal to trigger it, but there is no dedicated DI to trigger it.



ECAT-2072IT

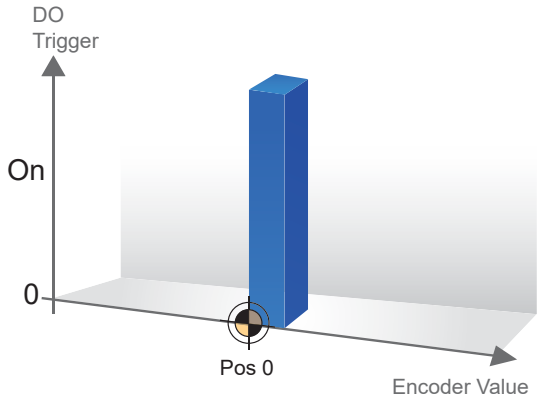
- 2 channel encoder
- Support Multiple counting modes
- Differential signal interface for anti-interference
- Built-in digital filter
- 2 comparison trigger channels

Encoder Input	
Encoder Input Number	2 encoder counters (A, B, Z), differential or single action
Counter Resolution	32 bit
Encoder Mode	A/B Phase, CW/CCW, Pulse/Dir
Maximum Input Frequency	4 MHz
Programmable Digital Filter	1 ~ 250 μs
External Latch Input	
Channel	2 (Use dedicated DI)
Input Level	5V / 12V / 24V (jumper optional)
Compare Trigger Output	
Channels	2
Trigger Output	Open Collector, 5 V ~ 48 V
Pulse width trigger	2 ~ 32,767 μs
Trigger Method	Fixed distance or set array distance data
Enable / Disable	Software command or DI hardware control

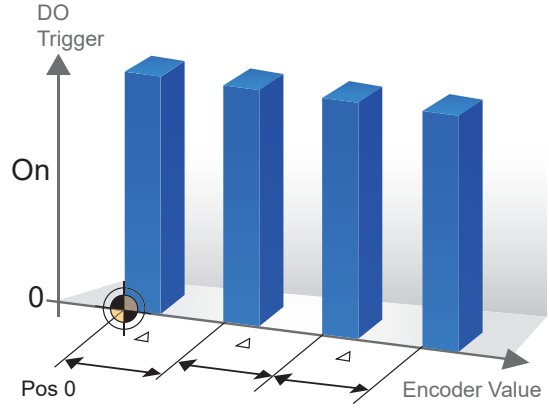
The ECAT-2072IT is a two-channel high-speed encoder module. In addition to reading the encoder position, it has a dedicated DI trigger that can record the position when triggered. When the encoder counter reaches the comparison position, the comparison function can be executed by triggering the dedicated DO output. The comparison trigger function enables the user to control external devices such as the camera to take images and the pulse width of the pulse laser to control the emission energy. The trigger output pulse width must be set before the comparison operation can begin.

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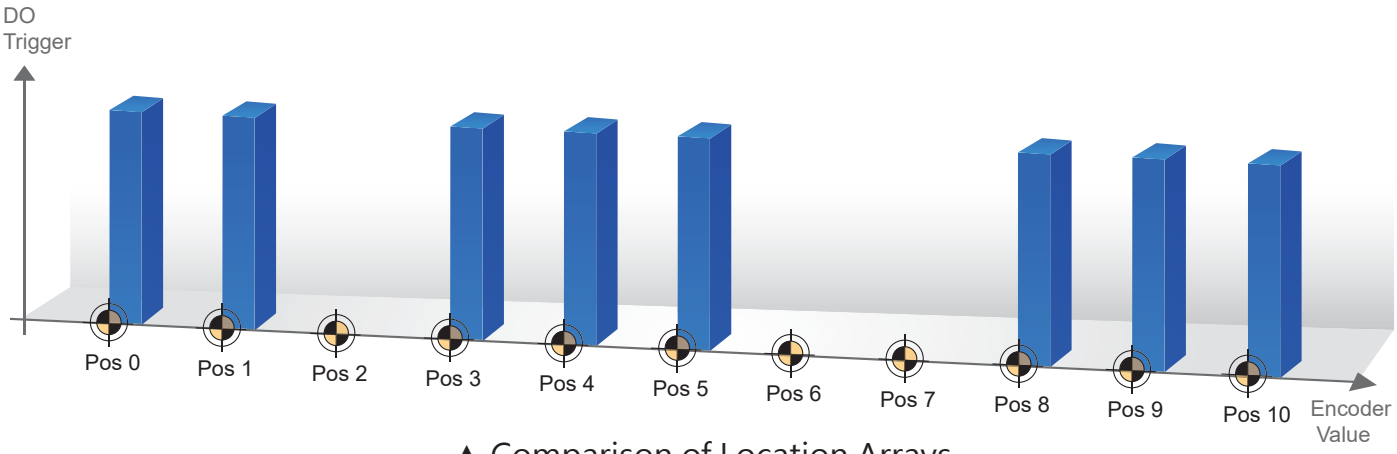
ECAT-2072IT Supports Three Different Types of Position Comparison Trigger Functions



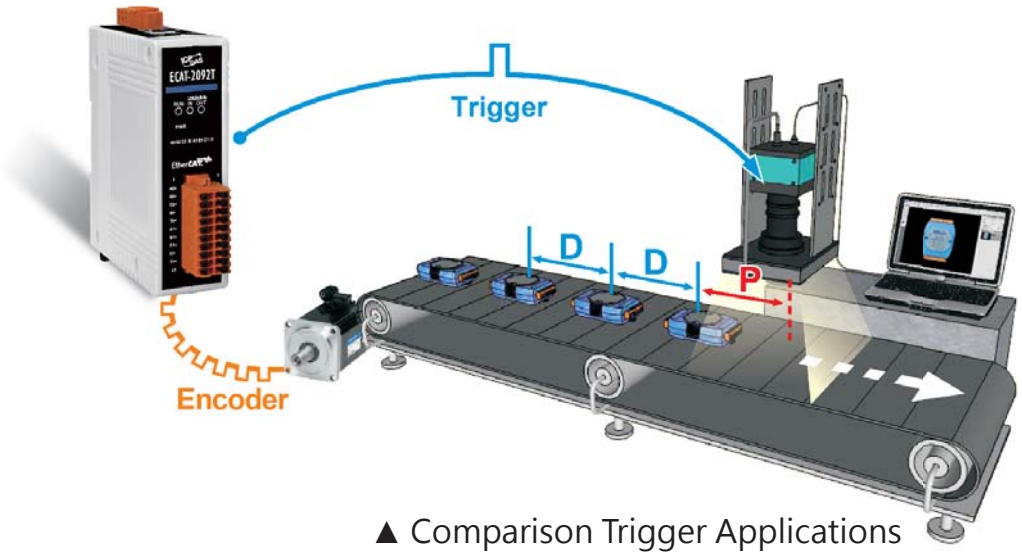
▲ Comparison of Single Point Location



▲ Comparison of Automatic Incremental



▲ Comparison of Location Arrays



▲ Comparison Trigger Applications

The location comparison function can be accessed via software or through a dedicated DI. By connecting its DO to the DI of the ECAT-2072IT, an external PLC or controller can enable/disable the comparison function of the ECAT-2072IT. The image on the left depicts a simple location comparison application with a comparison function that can be enabled/disabled via software or hardware.

The ECAT-2072IT is ideal for industrial inspection applications that require continuous high-speed trigger signals, such as control surface and line scan cameras. Its array comparison function is extremely useful for area scanning cameras that need to check specifi c parts. It is also used in other fi elds, such as laser micromachining for photomask repair or semiconductor repair trigger control.

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EtherCAT I/O Overview

ICP DAS provides a full range of fieldbus modules that ranges from general bus terminal modules to high anti-noise protection modules for all common input/output signals and fieldbus systems. In addition to modules for conventional bus systems, ICP DAS also offers integrated product line that helps to optimize EtherCAT systems.

ECAT-2_

ECAT-2000 Series



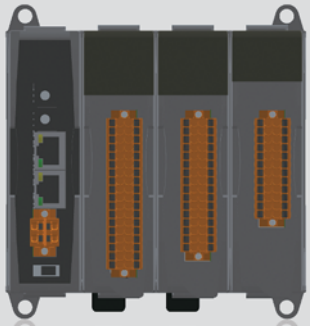
EC1 Series



EC2 Series



EP-800 Series



Distributed Module

- Independent module design
- Compact
- Can be installed in the chassis

Plug-in Module

- Compact EtherCAT I/O system that can be plugged into the signal distribution board
- Optimize mass production
- A dedicated port can be planned for specific application
- Use integrated cable to avoid wiring errors and save wiring time

Compact Expansion Module

- I/O expandable system that is open & independent to fieldbus
- Nearly 10 different Bus Terminals
- Compact chassis provides 4/6/8 slots for expansion







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Comparison table for ICP DAS slave stations:

Module				
Series	**EC1 Series**	**EC2 Series**	**ECAT-2000 Series**	**EP-800 Series**
Type	Plug-in	Distributed	Distributed	Central- distributed
Casing	Metal(Anti-interference)	Metal(Anti-interference)	Plastic	Plastic
Interface	ICP DAS plug-in terminal	RJ45 x 2	RJ45 x 2	RJ45 x 2
Performance	100 µs (Typical)	100 µs (Typical)	1 ms (Typical)	100 µs (Typical)
I/O points	DIO: max. 32	DIO: max. 32	DIO: max. 32 AI: max. 16 AO: max. 8	DIO: max. 32*11 AI: max. 16*11 AO: max. 8*11
FOE online update	V	V	-	V
Explicit Device ID	V	V	-	V
Connector	-	Detachable	Detachable	Detachable
LED Indicator	V	V	V	V
Lockable RJ45	user-designed	V	-	-
Dimensions (WxLxH)	20 x 98 x 84 mm	83 x 112 x 65 mm	33 x 127 x 108 mm 31 x 157 x 126 mm	

Efficient Distributed Modules

- Independent modular design
- Compact
- Can be installed in the chassis
- Metal casing provides high anti-noise ability
- Fastest control cycle can reach 100 us

Customized modules

- Specific casing can be customized
- Specific I/O channel numbers can be customized
- Specific functions can be customized
- EtherCAT I/O slave planning consultation



- **Comprehensive modular I/O for all signal types and fieldbus systems**
- **Offer universal product lines to optimize EtherCAT applications**
- **As a professional provider in I/O, ICP DAS develops a variety of terminal modules**

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EtherCAT Plug-in Modules EC1 Series

Novel I/O solution using PCB Bus Terminals



Plug-in I/O modules can be connected directly to custom PCBs, combining the advantages of standard and customized I/O modules.

The EC1 series EtherCAT plug-in module enables more efficient medium to large-scale production. The EC1 series EtherCAT plug-in modules are electronically based on the well-known EtherCAT I/O system and their design allows them to be directly plugged into a circuit board. The circuit board is a specific signal distribution board that distributes signals and power supply to individual plug connectors in order to connect the controller to other machine modules. Elaborate manual wiring of single wires, common in conventional control cabinet construction, is replaced by simply plugging in prefabricated cable harnesses. The labor cost in wiring deployment and installation can be reduced and the risk of incorrect wiring can be minimized to the least by using coded components. In addition, the EC1 series EtherCAT plug-in module adopts a full-metal housing design, which is more resistant to noise in complex and harsh environments. The EC1 series, combined with the signal distribution board and pre-assembled cables, can truly implements the concept of plug-and-play.



EC1-P32

EtherCAT Plug-In I/O Module with Isolated 32-ch DI

- ICP DAS plug-in terminal
- 32-channel digital input
- I/O status LED indicator
- Cycle time up to 100 µs

EC1-C32

EtherCAT Plug-In I/O Module with Isolated 32-ch DO

- ICP DAS plug-in terminal
- 32-channel digital output (Sink Type)
- I/O status LED indicator
- Cycle time up to 100 µs

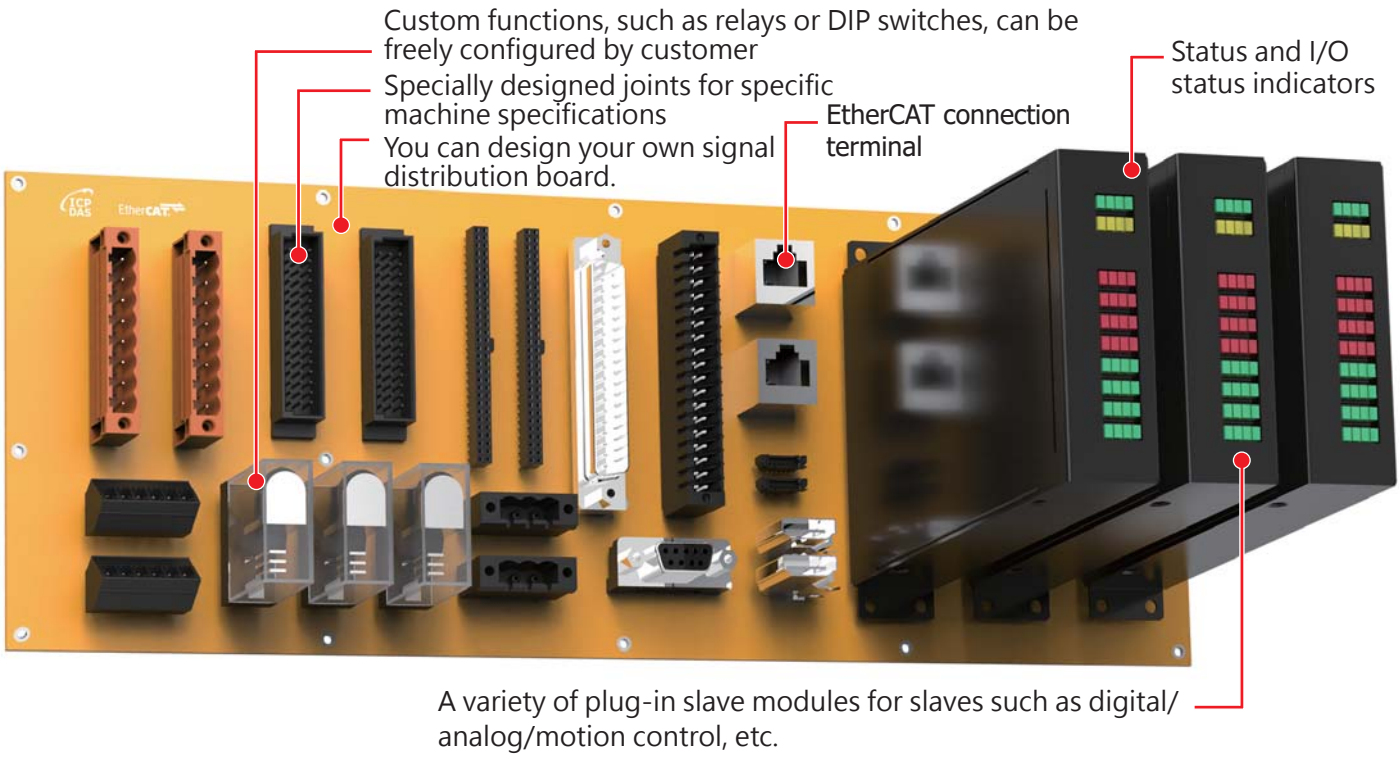
EC1-P16C16

EtherCAT Plug-In I/O Module with Isolated 16-ch DI and Isolated 16-ch DO

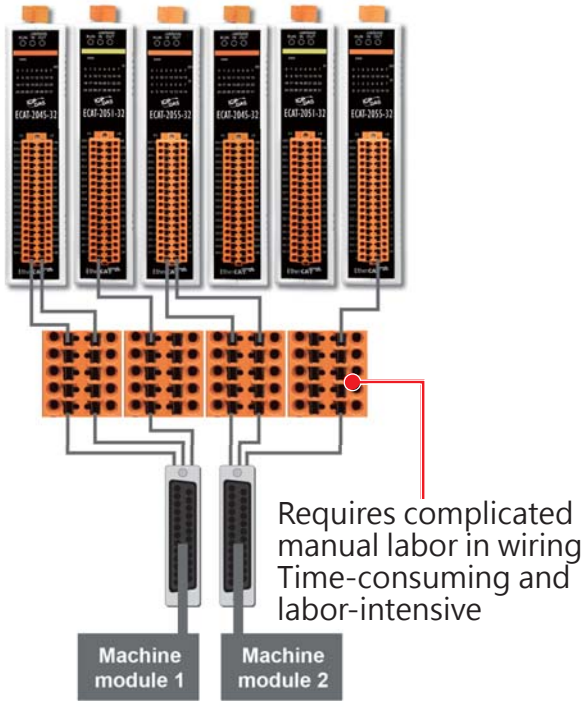
- ICP DAS plug-in terminal
- 32-channel digital output (Sink type)
- 16-channel digital input
- I/O status LED indicator
- Cycle time up to 100 µs

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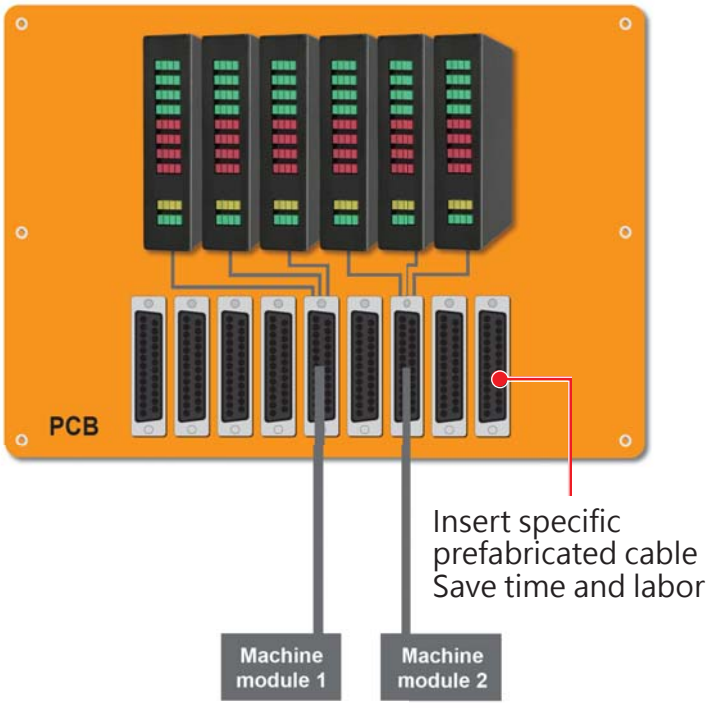
EC1 series modules are installed on user-designed signal distribution boards.



Comparison of Different Wiring Method



▲ Traditional EtherCAT Slave Module



▲ Plug-in EtherCAT Slave Module

The Benefits

- Reduce equipment costs
- Reduce installation time
- Save the cabinet space
- Enhance troubleshooting efficiency

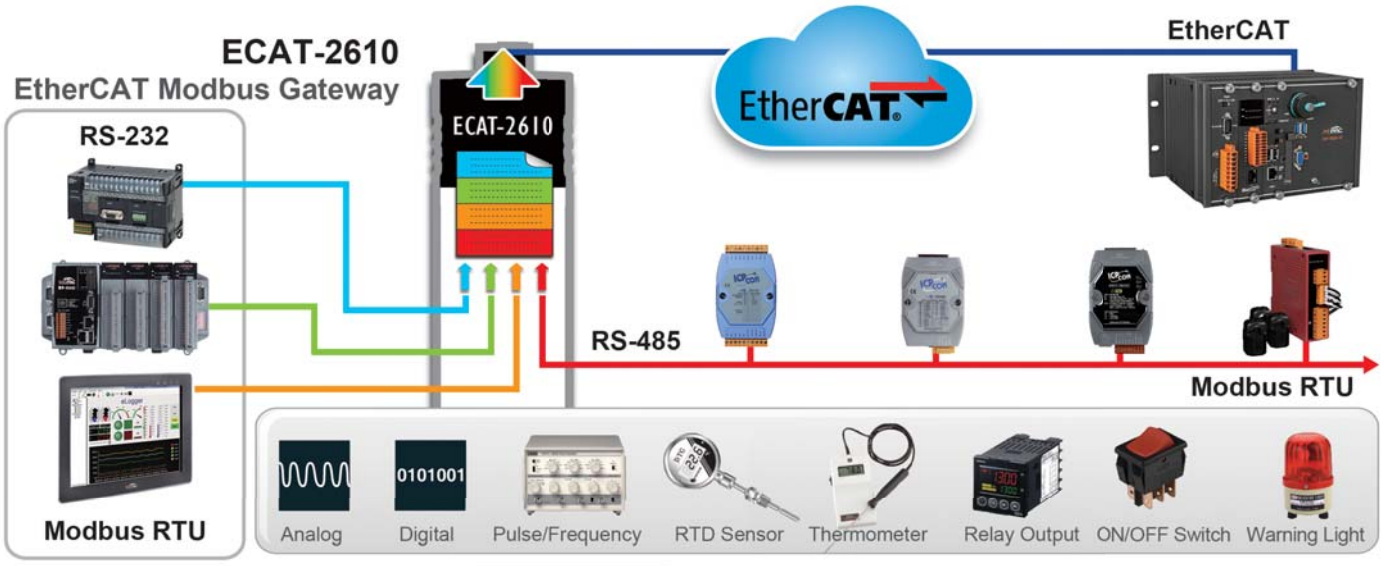
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Connecting Modbus RTU to EtherCAT

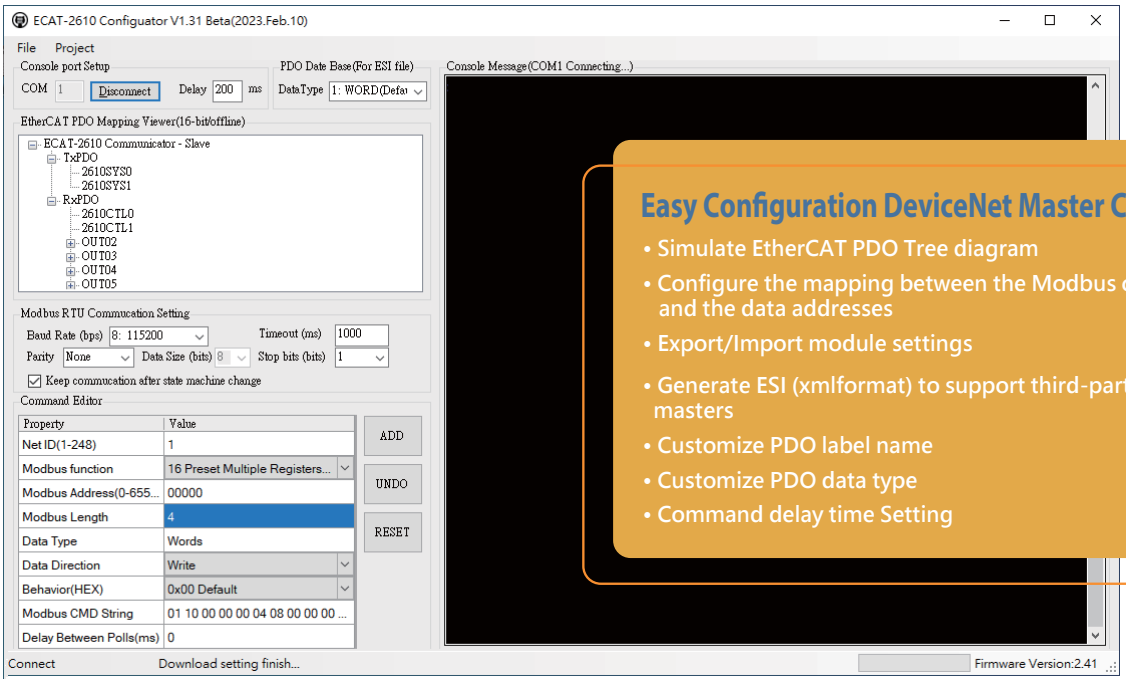


ECAT-2610(M)

- Supports Modbus RTU
- RS-232/422/485 interface
- 115200 bps. maximum baudrate
- No need to change equipment Settings
- Up to 256 In/Out WORDs
- Configuration using a XML format file
- Provides quick configuration tools



▲Anything can be connected to the EtherCAT master via ECAT-2610 as long as it is a Modbus RTU device



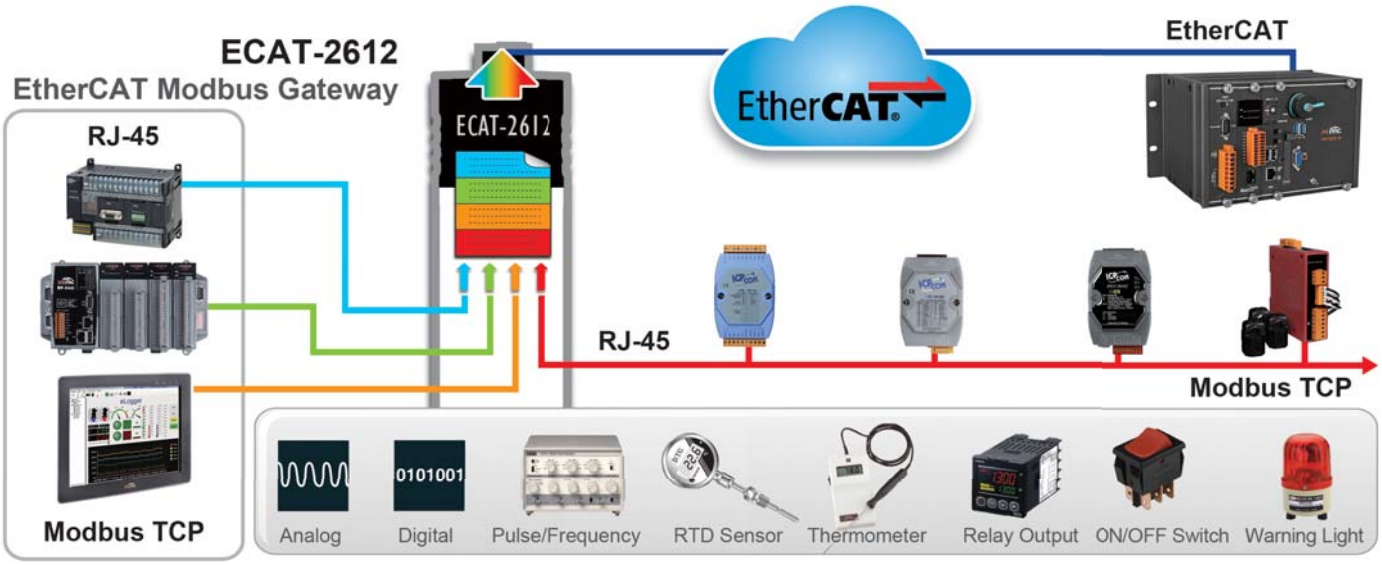
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Connecting Modbus TCP to EtherCAT



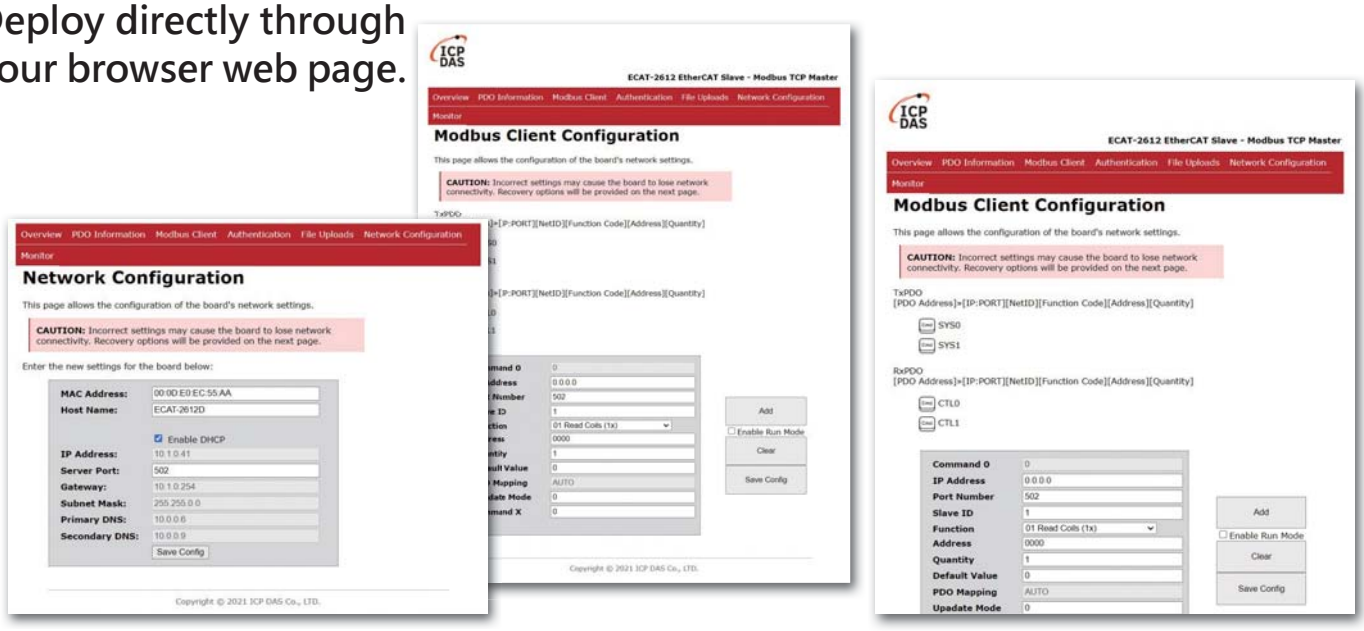
ECAT-2612 Available Soon

- Supports Modbus TCP
- Ethernet interface
- Up to 72 connections
- No need to change equipment Settings
- Up to 256 In/Out WORDs
- Configuration using a XML format file
- Provides quick configuration tools



▲Anything can be connected to the EtherCAT master via ECAT-2612 as long as it is a Modbus TCP device

Deploy directly through your browser web page.



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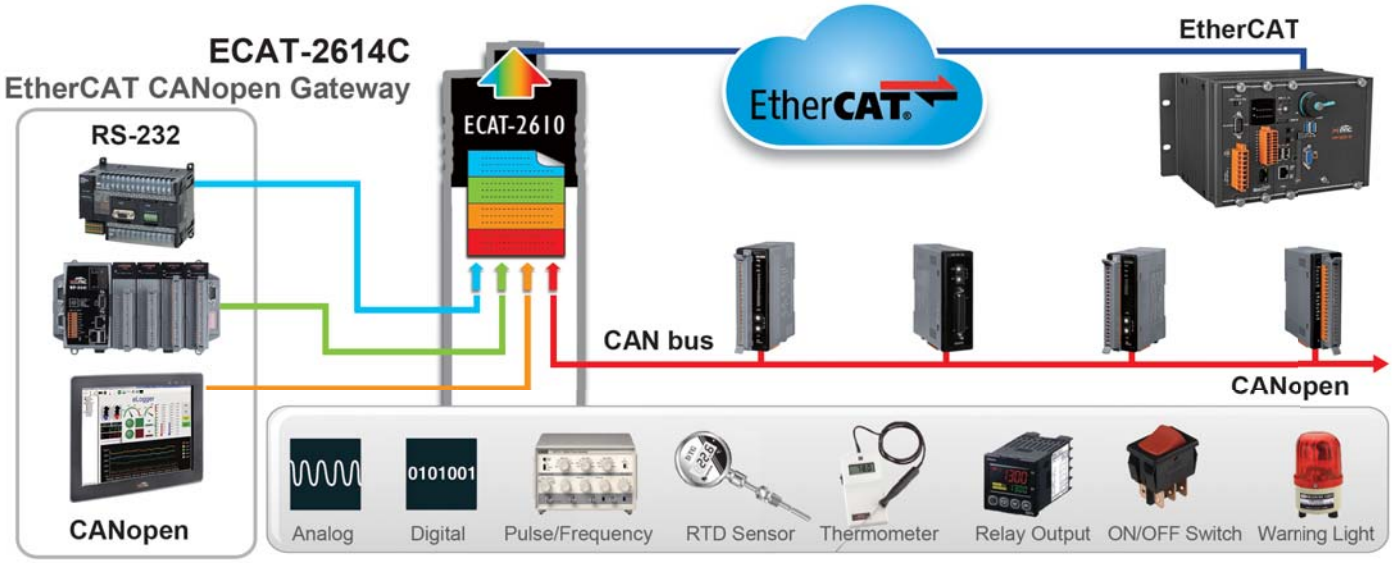
Connecting CANopen to EtherCAT



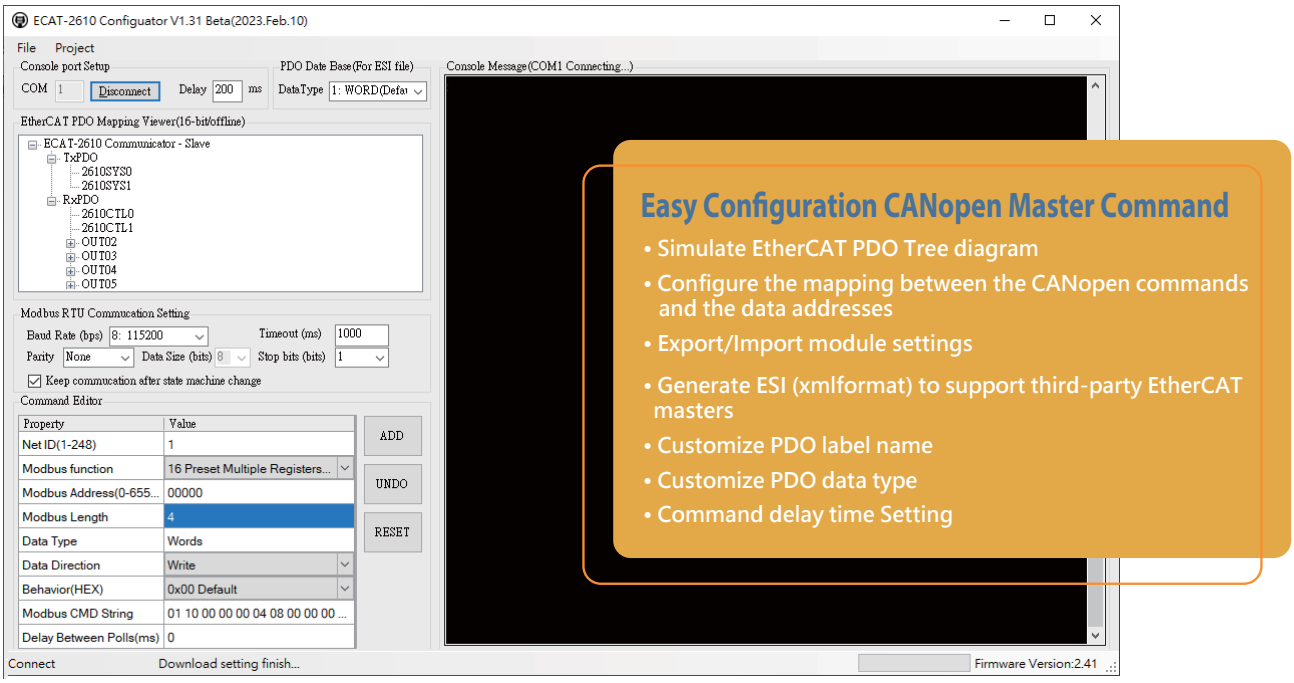
ECAT-2614C

Available Soon

- Supports CANopen
- RS-232/422/485 interface
- 1M bps. maximum baudrate
- No need to change equipment Settings
- Up to 256 In/Out WORDs
- Configuration using a XML format file
- Provides quick configuration tools



▲Anything can be connected to the EtherCAT master via ECAT-2614C as long as it is a CANopen device



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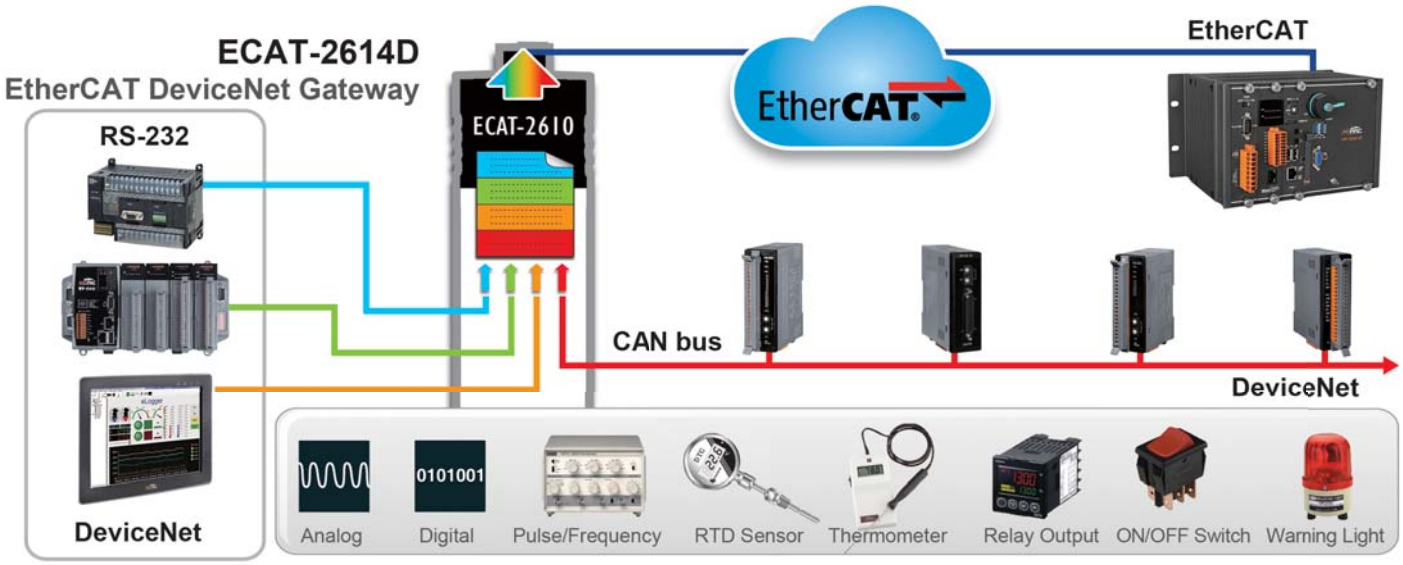
Connecting DeviceNet to EtherCAT



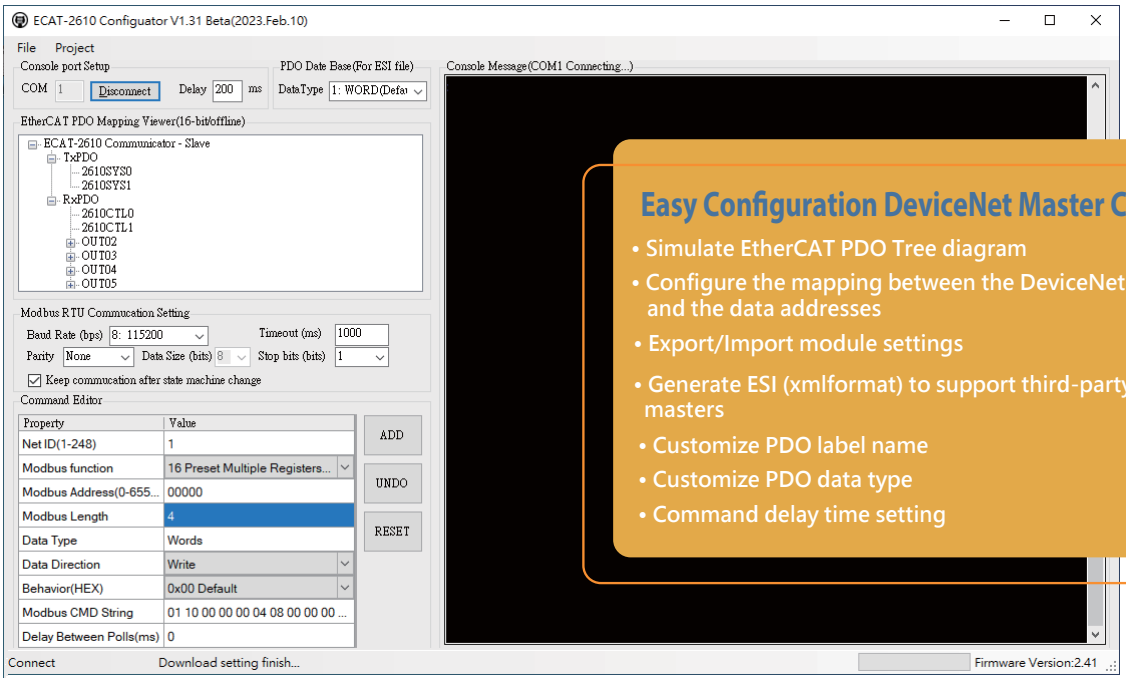
ECAT-2614D

Available Soon

- Supports DeviceNet
- RS-232/422/485 interface
- 500k bps. maximum baudrate
- No need to change equipment Settings
- Up to 256 In/Out WORDs
- Configuration using a XML format file
- Provides quick configuration tools



▲Anything can be connected to the EtherCAT master via ECAT-2614D as long as it is a DeviceNet device



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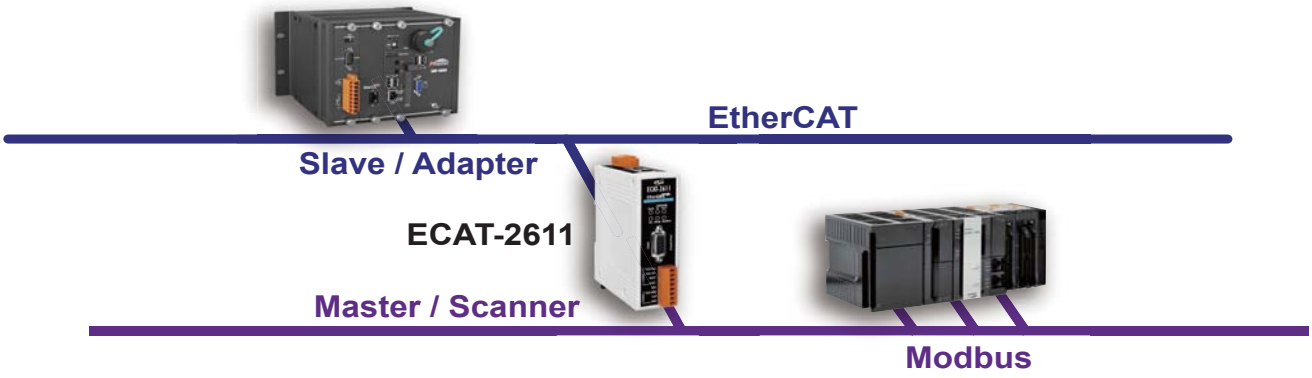
Data exchange between Modbus RTU and EtherCAT

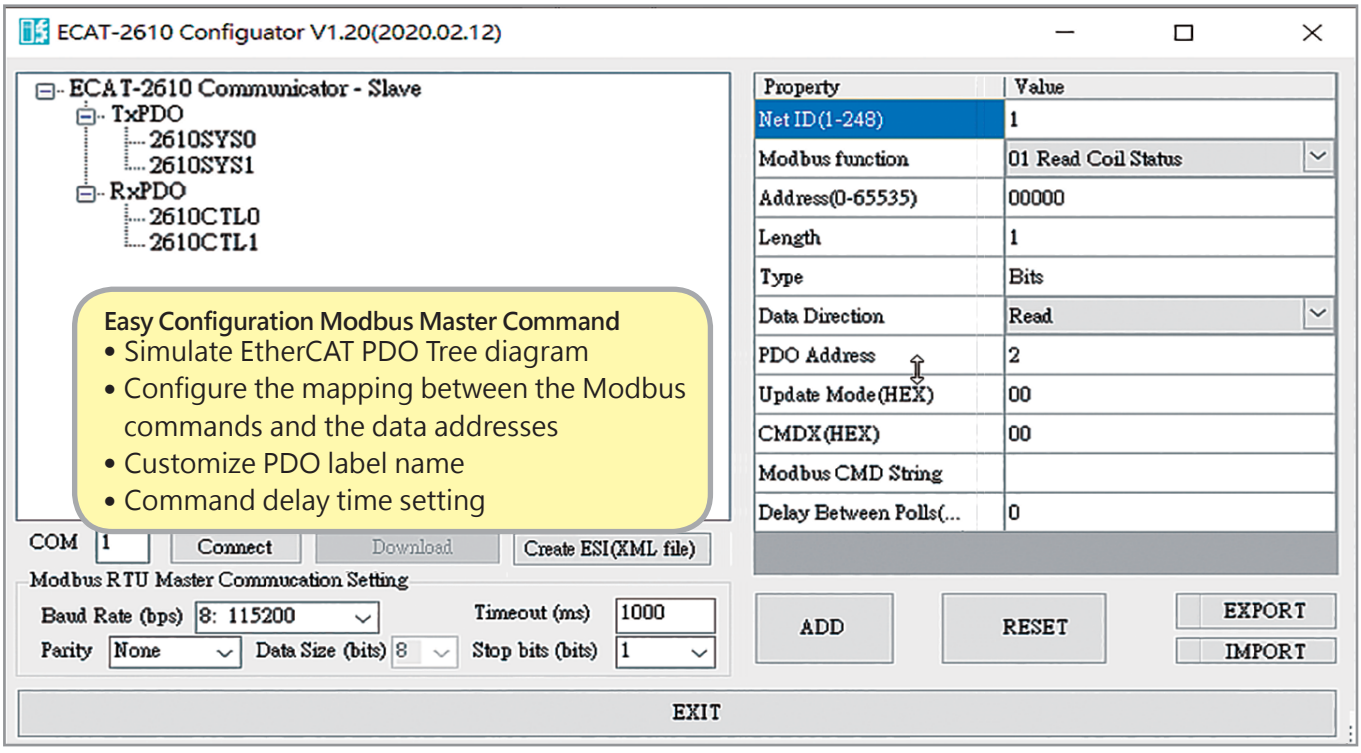


ECAT-2611(M)

- Supports Modbus RTU
- RS-232/422/485 interface
- 115200 bps. maximum baudrate
- Enabling data exchange between the networks
- Compatible with all leading PLCs
- Up to 256 In/Out WORDs
- No programming required, "one key-click" configuration.

ECAT-2611 Connects the master of EtherCAT and Modbus Industrial Systems Efficiently.





▲ ECAT-2611 provides a Modbus RTU command deployment tool that can be configured in 5 minutes.

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Data exchange between Modbus TCP and EtherCAT



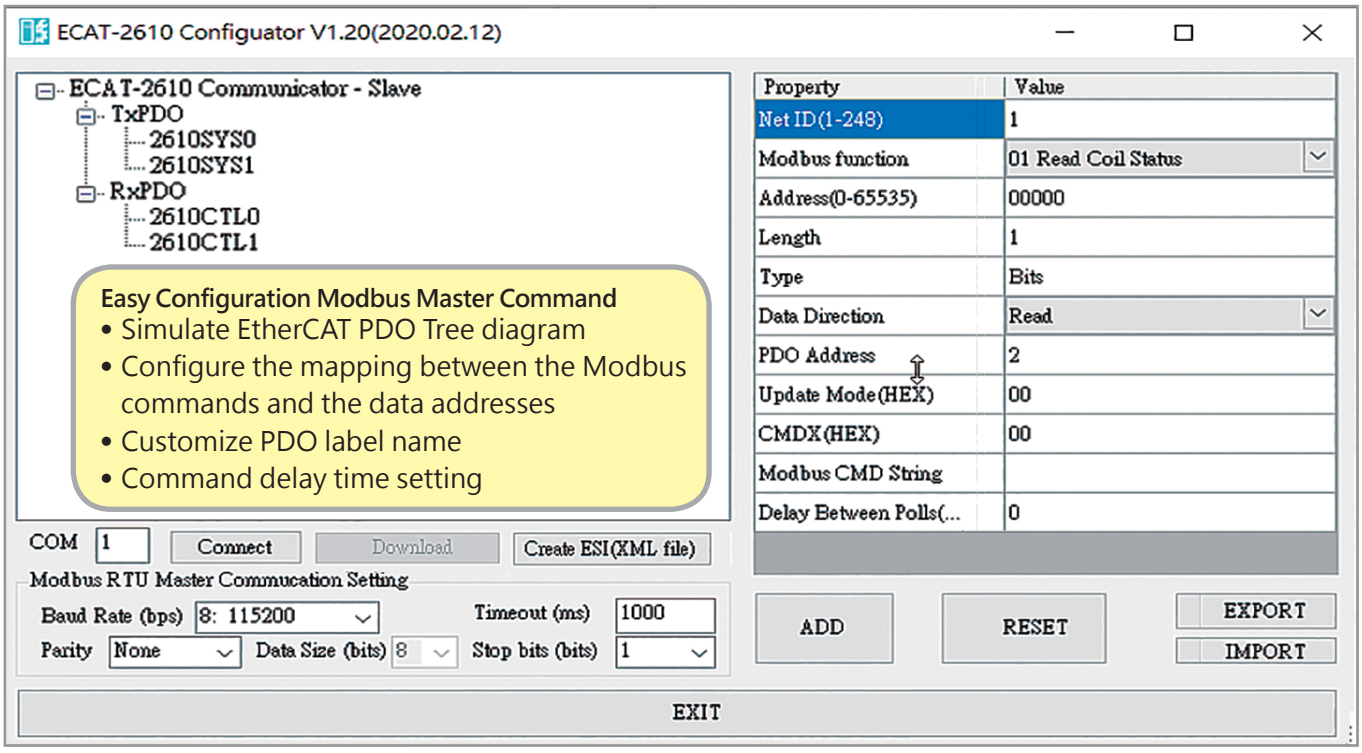
ECAT-2613

Available Soon

- Supports Modbus TCP
- Ethernet interface
- Up to 72 connections
- Enabling data exchange between the networks
- Compatible with all leading PLCs
- Up to 256 In/Out WORDs
- No programming required, "one key-click" configuration.

ECAT-2613 Connects the master of EtherCAT and Modbus Industrial Systems Efficiently.





▲ ECAT-2613 provides a Modbus TCP command deployment tool that can be configured in 5 minutes.

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Data exchange between CANopen and EtherCAT

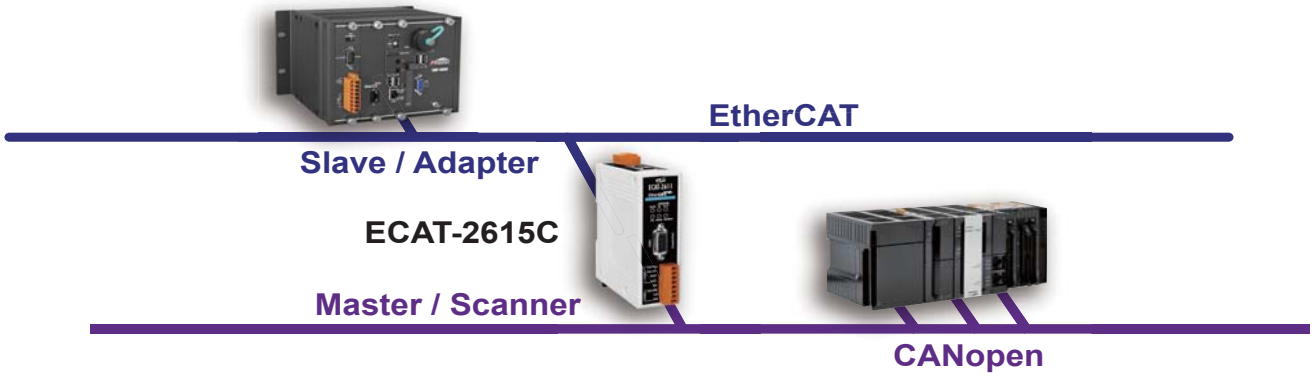


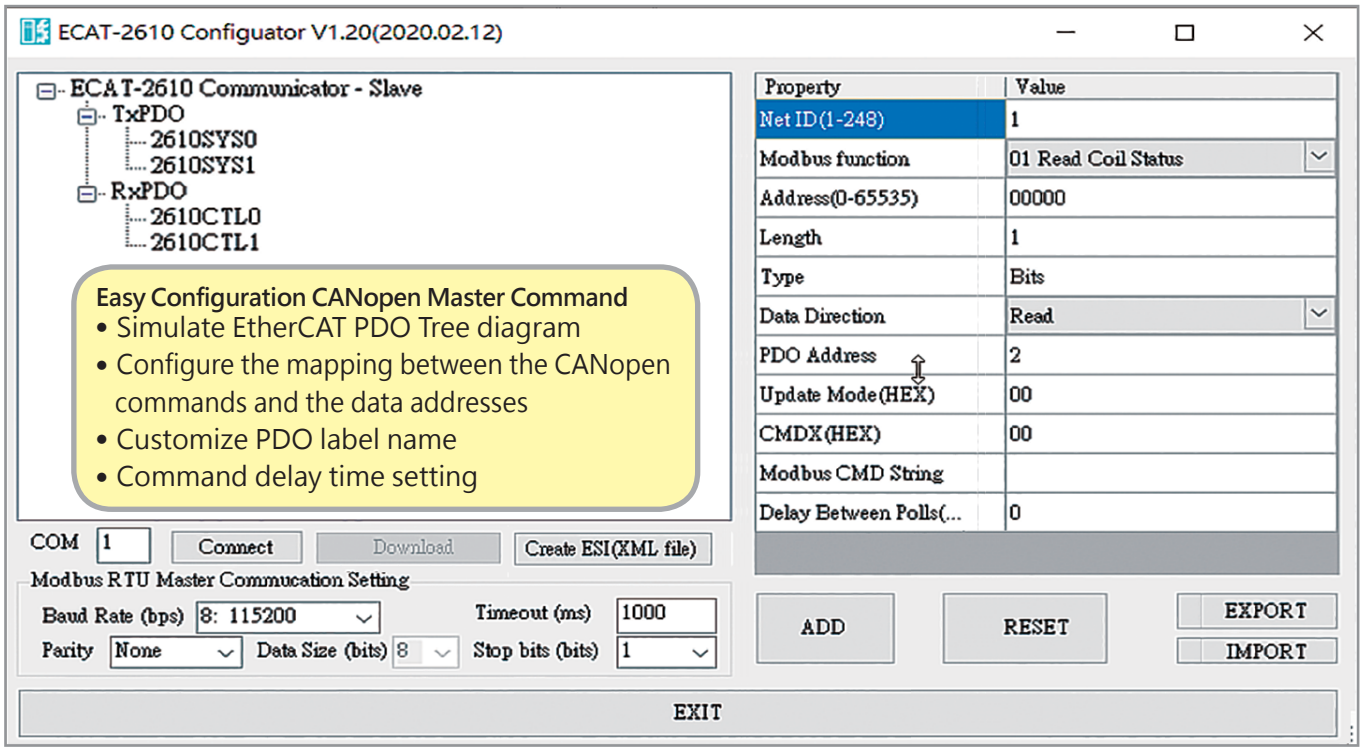
ECAT-2615C

Available Soon

- Supports CANopen
- RS-232/422/485 interface
- 1M bps. maximum baudrate
- Enabling data exchange between the networks
- Compatible with all leading PLCs
- Up to 256 In/Out WORDs
- No programming required, "one key-click" configuration.

ECAT-2615 Connects the master of EtherCAT and CANopen Industrial Systems Efficiently.





▲ ECAT-2615C provides a CANopen command deployment tool that can be configured in 5 minutes.

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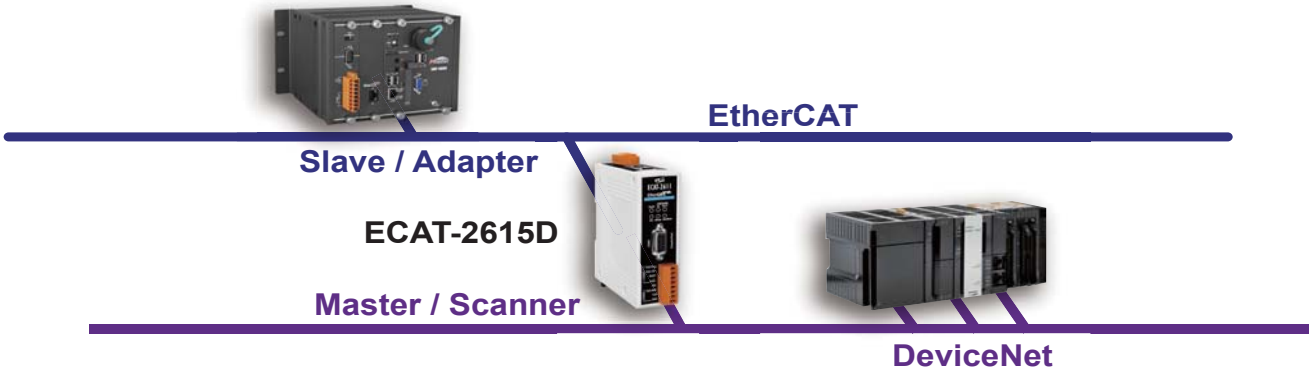
Data exchange between DeviceNet and EtherCAT

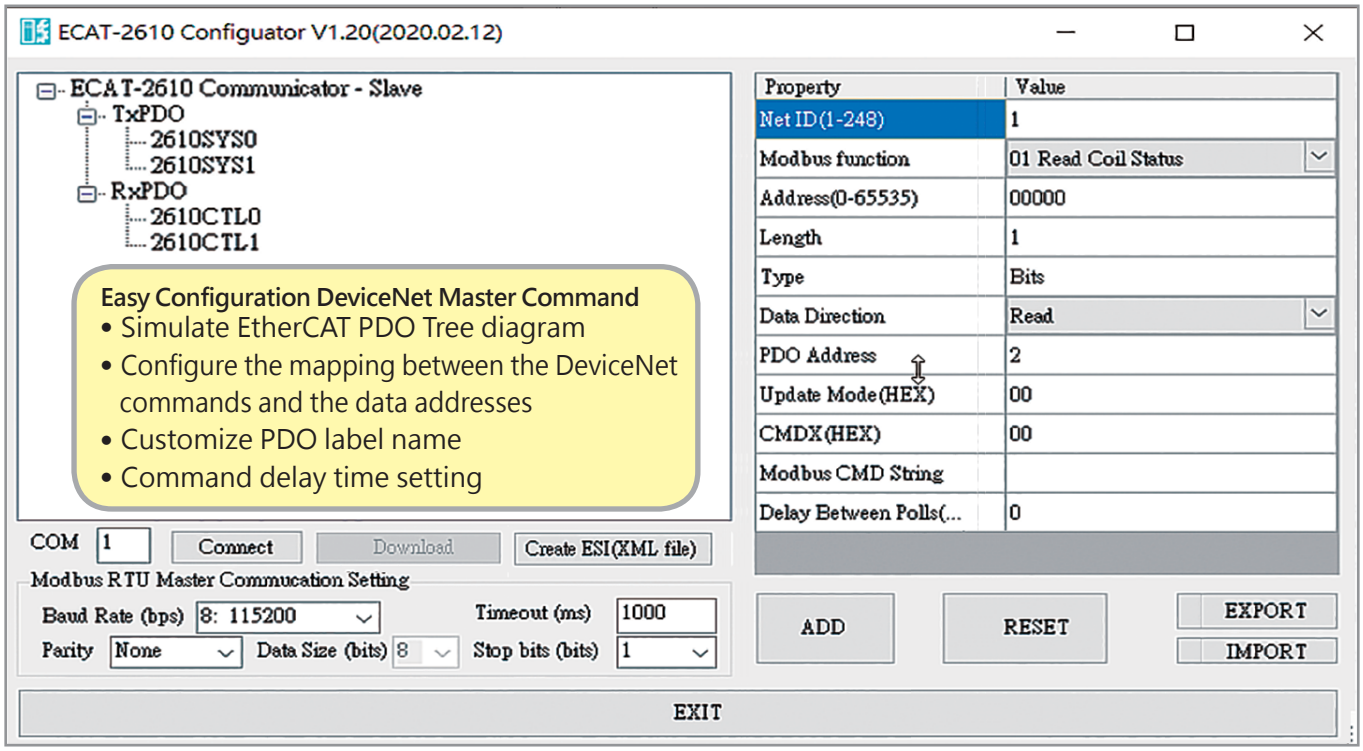


ECAT-2615D Available Soon

- Supports DeviceNet
- RS-232/422/485 interface
- 500k bps. maximum baudrate
- Enabling data exchange between the networks
- Compatible with all leading PLCs
- Up to 256 In/Out WORDs
- No programming required, "one key-click" configuration.

ECAT-2615 Connects the master of EtherCAT and DeviceNet Industrial Systems Efficiently.





▲ ECAT-2615D provides a DeviceNet command deployment tool that can be configured in 5 minutes.

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EtherCAT Junction Modules

The EtherCAT modules can support most topology, including linear, tree, and star. If the star topology necessitates a branch at a specific point, an EtherCAT junction can be used to replace multiple slave devices. The IN port is the network's input port. The OUTx port can be used to connect additional EtherCAT slave modules.



ECAT-2513



ECAT-2515

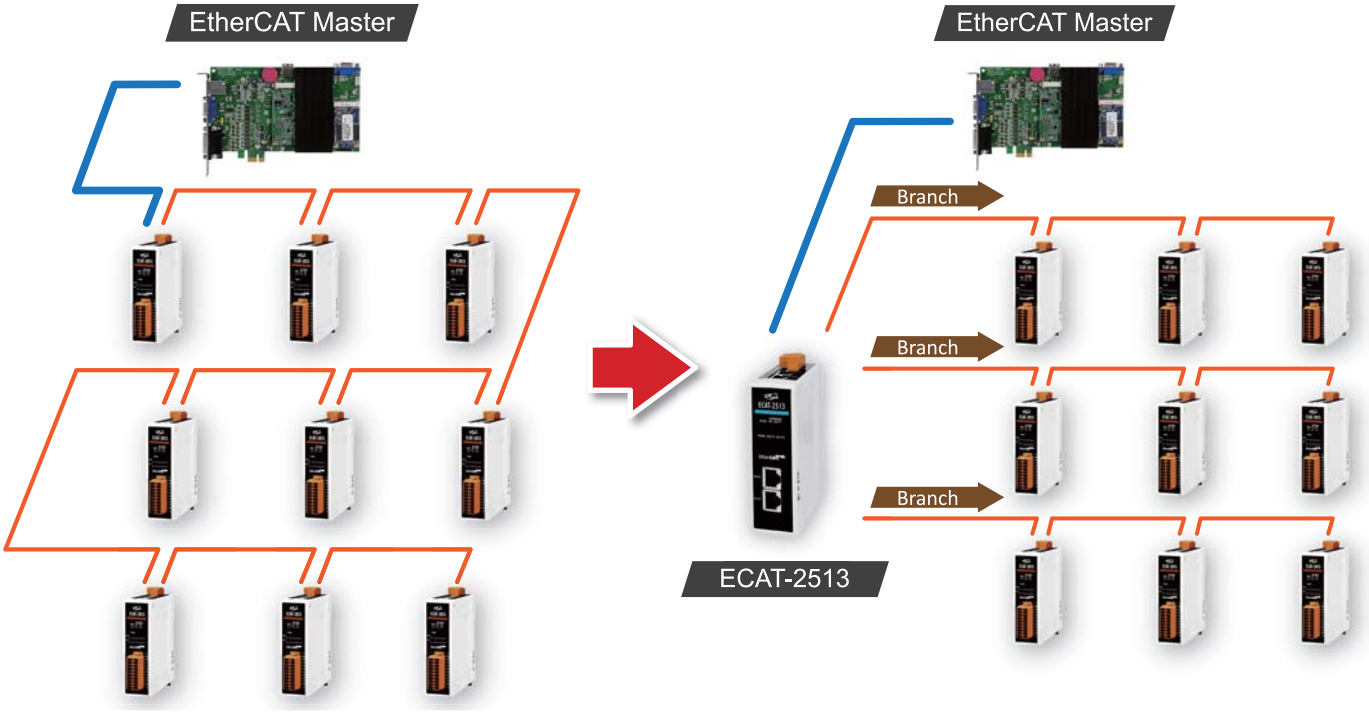


ECAT-2517

Model	Ports	Nodes	Redundant Cable groups	Distance between Stations	Reverse Polarity Protection	Input Range	Redundant Power Input	Power Consumption
ECAT-2513	4 x RJ-45 (1IN/3OUT)	2	1	Max. 100 m (100BASE-TX)	Yes	+10 ~ +30 VDC	Yes	0.06 A @ 24 VDC
ECAT-2515	6 x RJ-45 (1IN/5OUT)	4	2					
ECAT-2517	8 x RJ-45 (1IN/7OUT)	6	3					

Greatly reduce wiring installation work

Convert the Daisy-Chain multi-way tap topology (Branch) directly using the EtherCAT junction to simplify wiring.



▲Daisy chaining connection

▲Convert to branching connection

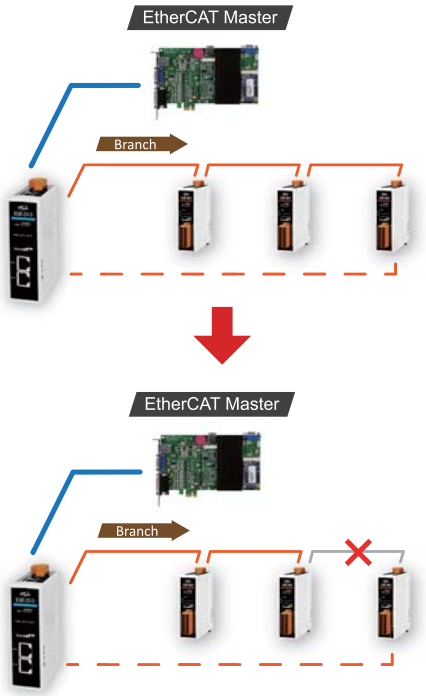
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Cable redundancy ensures no system downtime

The cable redundancy provides a continuous connection even if part of the EtherCAT network is disconnected.This feature allows you to fix a disconnection without stopping the machine and the production line.

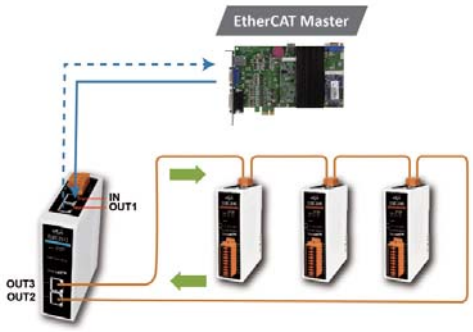


▲If there is no diverter, the module will stop working when the cable disconnects.

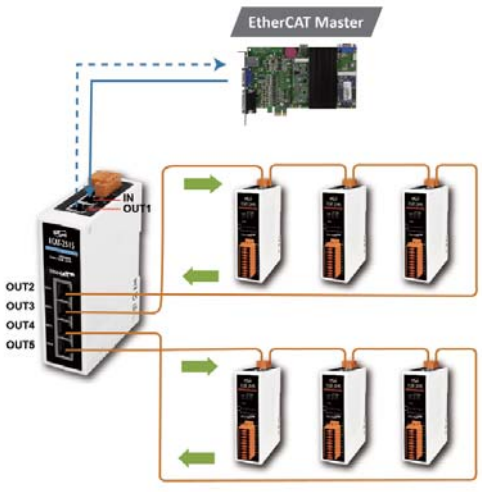


▲When a diverter is available, the module can return to normal operation through cable redundancy.

Provides up to three cable redundant groups

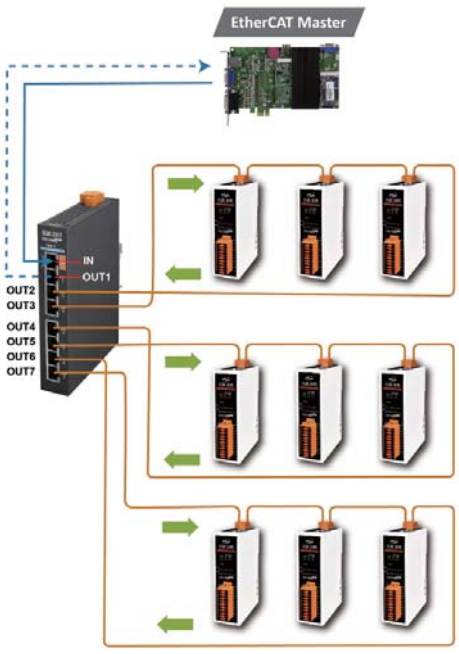


▲ECAT-2513



▲ECAT-2515

Model	Redundant Cable groups (Max.)
ECAT-2513	1
ECAT-2515	2
ECAT-2517	3



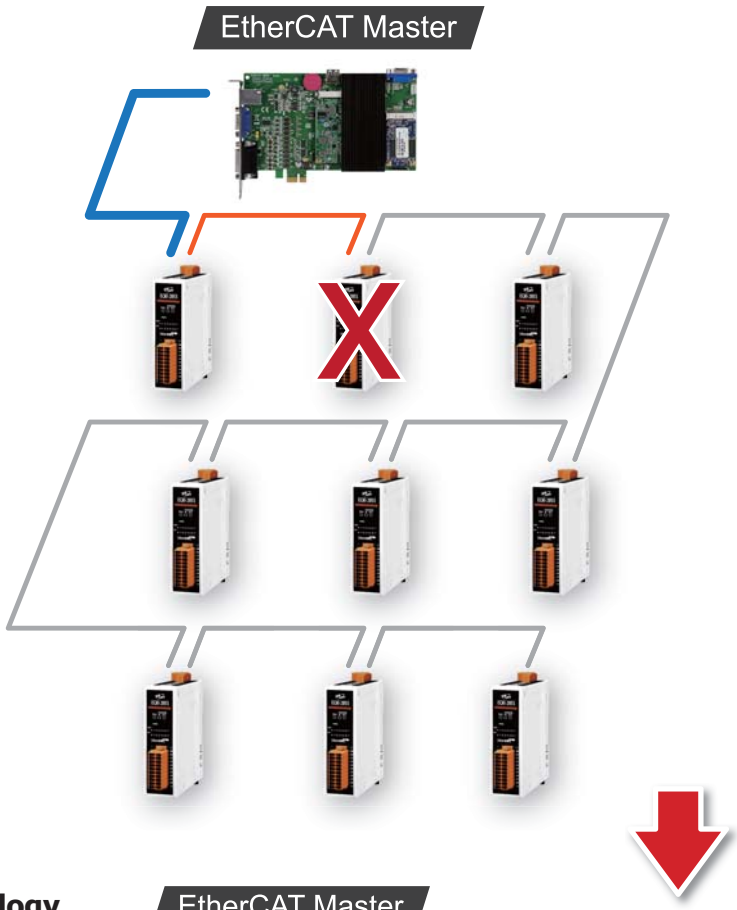
▲ECAT-2517

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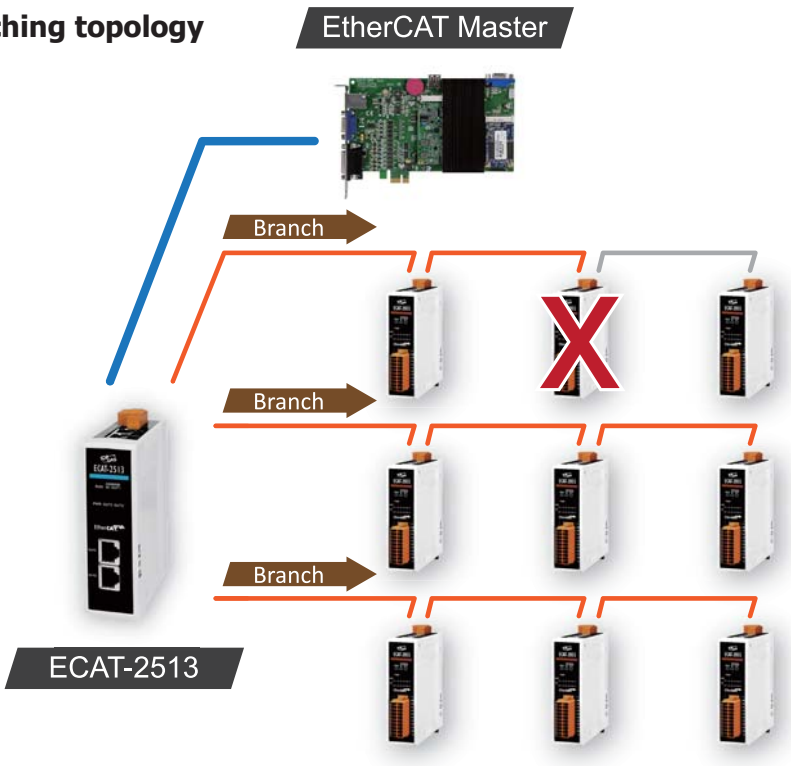
Improve Debugging Efficiency And Reduce Losses

In the daisy chain topology, if one slave device fails, all subsequent devices will shut down. If there is an EtherCAT junction that can help divide the network into different areas, only specific area will be affected, leaving the other areas canbe operate normally. Furthermore, the debugging function can be separated to improve debugging and troubleshooting efficiency.

▲Daisy Chaining connection



▲Convert to branching topology connection



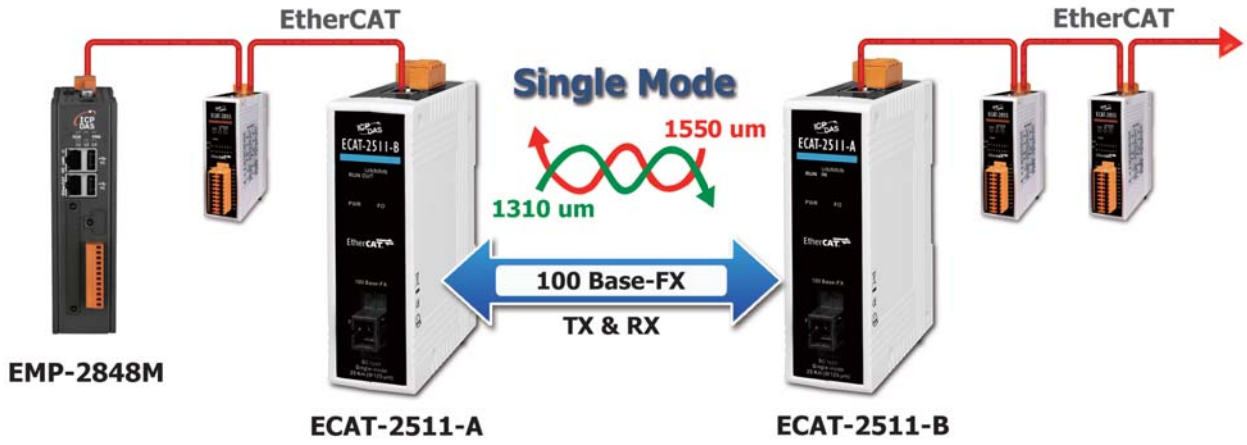
EtherCAT Fiber Converter Modules

The **ECAT-2511-A** and **ECAT-2511-B** are signal converters that connect EtherCAT to single-mode optical fiber, allowing the optical fiber to extend the transmission distance. Because of the benefits of optical fiber, ECAT-2511-A and ECAT-2511-B transmit data via optical fiber to ensure data transmission safety and to assist the EtherCAT network in avoiding EMS / RFI noise interference.

- EtherCAT category: RJ45, 100 Base-TX
- Fiber type: SC, single mode, 100 Base-FX
- Optical fiber cable: 8.3/125, 8.7/125, 9/125, 10/125 μm
- Maximum transmission distance is 25 kilometers
- Fiber wavelength:

★ Tx: 1310 nm, Rx: 1550 nm (I-2533CS-A)

★ Tx: 1550 nm, Rx: 1310 nm (I-2533CS-B)



Fiber Converter	ECAT-2511-A/B	Other Brands
Fiber Type	Single Mode	Multi Mode
Transmission Distance	Long (up to 25 km)	Short
Wire Costs	Low	High

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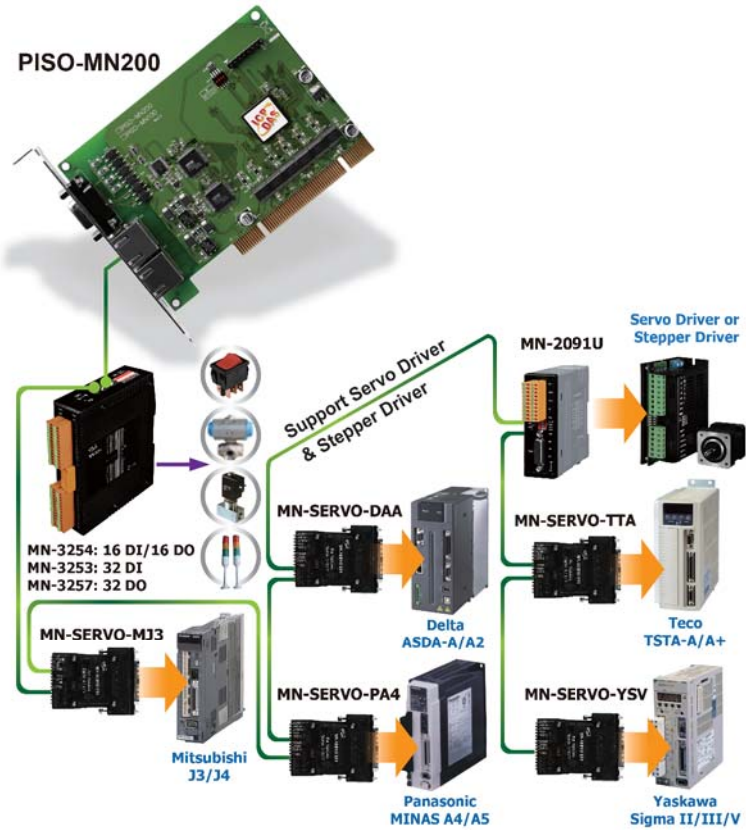
PC-Based Remote Motion Solutions

2. Motionnet Solutions

Introduction:

Motionnet is a high-speed serial communication system that includes a Master card and Slave modules. ICP DAS provides two categories of Slaves: the first is used for Digital I/O, and the other is used for motion control. There are 3 main types of digital I/O modules: 32-ch Input, 32-ch Output and 16-ch Input/Output. Using these Slave devices, customers' actuators/sensors can easily be directly connected. Motion control modules can be used together with either a Servo motor or a Stepping motor from a variety of vendors.

Motionnet communication between a Master and the Slaves is based on a proprietary RS-485 technology (Multi-drop, Half-duplex) and provides the advantage of reduced wiring requirements together with the capability of long-distance and high-speed communication. Data transfer for the I/O modules is cyclical and time deterministic, so can be widely used for industrial automation applications.



Features:

- Communication Speed: Max. 20 Mbps
- Communication Distance: Max. 100 m
- Controllable Modules: 64 modules per line
- Data Transfer Rate:
  * 15.1 µsec/module
    (each module provides 32 I/O points)
  * 2048 points in 0.97 ms
    (when 64 modules are connected)

Selection Guide:

Motionnet Solution Products of Remote Motion Solutions		
PCI Master Cards	**PISO-MN200(T/EC)**	PCI Bus, Dual-Line Motionnet Master Card
Motion Control Modules	**MN-SERVO-xxx Series**	MN-SERVO-MJ3 / PA4 / YSV / DAA: Distributed Motionnet Single-axis Motion Control Modules
	MN-SERVO-xxx-EC Series	Distributed Motionnet Single-axis Motion Control Modules with e-CON Mini-Clamp connector
	MN-2091U(-T)	Distributed Motionnet Single-axis Universal Motion Control Module
	MN-MP4U-DIN	Distributed Motionnet Four-axis Universal Motion Control Module (Available Soon!)
Digital I/O Modules	**MN-3254(T)**	Distributed Motionnet 16-ch Isolated DI, 16-ch Isolated DO Module
	MN-3253(T)	Distributed Motionnet 32-ch Isolated DI Module
	MN-3257(T)	Distributed Motionnet 32-ch Isolated DO Module
	MN-D622-DIN	Distributed Motionnet 16-ch Isolated DI, 16-ch Isolated DO Module with Mini-clamp Connector
	MN-D640-DIN	Distributed Motionnet 32-ch Isolated DI Module with Mini-clamp Connector
	MN-D604-DIN	Distributed Motionnet 32-ch Isolated DO Module with Mini-clamp Connector
Analog I/O Modules	**MN-AD8-DIN**	Distributed Motionnet 8-ch AI Module
	MN-DA2-DIN	Distributed Motionnet 2-ch AO Module
Hub Modules	**MN-HUB4(EC)**	Distributed Motionnet 4 port Hub module with RJ-45 Jack (EC: with e-CON Mini-Clamp connector)

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Motionnet Master Card:

PCI Bus, Dual-line Motionnet Master Card (For Distributed Motion & I/O Control)



PISO-MN200



PISO-MN200T



PISO-MN200EC

Introduction:

The **PISO-MN200(T/EC)** is a PCI Master card that provides two Motionnet serial communication lines for distributed motion and I/O control in machine automation applications. The Master card can be used to connect up to 128 Slave modules (64 x 2 lines). If one of the Motionnet lines is only used for I/O control, it can send/ receive signals to/from 2048 points on 64 local devices within 0.97 msec. When it is used to control motors, it can control up to 64 axes, which can be used to execute continuous positioning motion, zero return and even multi-axis interpolation operations. In addition to serial communication, the PISO-MN200(T/EC) is also equipped with parallel I/O ports (8 input channels and 4 output channels) for rapid and instinctive I/O control.

Selection Guide:

Model	PISO-MN200	PISO-MN200T	PISO-MN200EC
General			
Bus	32-bit/33 MHz universal PCI-Bus		
Communication Speed	2.5, 5, 10, 20 Mbps (Software controlled)		
Interface	Half-duplex RS-485		
Communication Length	Max. 100 M (20 Mbps; 32 Slave modules) Max. 50 M (20 Mbps; 64 Slave modules) Max. 100 M (10 Mbps; 64 Slave modules)		
Communication Connector	RJ-45 x 2	5-pin terminal block	Mini-Clamp connector x 2
I/O Connector	HD D-Sub 15-pin x 1		
Parallel I/O	Digital input: 8-ch Photo-coupler Isolated (12-24 V, NPN or PNP) Digital output: 4-ch Photo-coupler Isolated (NPN or PNP)		
LED Diagnostics	Connection (green) Communication Error (red)		
Interrupts	Input Change of State, Communication Error		
Environmental			
Operating Temperature	0 °C ~ + 60 °C		
Storage Temperature	-20 °C ~ +80 °C		
Operating Humidity	10 ~ 85% ; non-condensing		
Storage Humidity	5 ~ 95%, ; non-condensing		
Software Support			
Windows Driver/DLL/Lib	Windows 7/10 32/64 位元 Windows XP/2000 32 位元		
Programming Tools	VC/VB/BCB		

Features:

- Maximum communication speed: 20 Mbps
- Distributed motion control up to 128 axes
- Distributed I/O points up to 4096 points
- Easy connection using RJ-45 phone jack, removable terminal block or Mini-Clamp connector
- Parallel I/O ports: 8 inputs and 4 outputs channels
- Optional quadrature encoder interface for linear scale or manual pulse generator input

Ordering Information:

PISO-MN200 CR	PCI Bus, Dual-line Motionnet Master Card with RJ-45 (RoHS)
PISO-MN200T CR	PCI Bus, Dual-line Motionnet Master Card with Terminal Block (RoHS)
PISO-MN200EC CR	PCI Bus, Dual-Line Motionnet Master Card with Mini-Clamp connector (RoHS)

Accessories:



4PKD1O0000001	4PKD1O0000002	4PKD1O0000003
		
Gray Mini Clamp Wiremount Plug	Red Mini Clamp Wiremount Plug	Orange Mini Clamp Wiremount Plug

Mini Clamp Wiremount Plug			Applicable Wire		
ICP DAS Part No.	Cover Color	3M Part No.	AWG No.	Cross-sectional Area (mm2)	Finished External Diameter Φ (mm)
4PKD1O0000001	Gray	37103-2206-000FL	20 – 22	0.3 – 0.5	1.6 – 2.0
4PKD1O0000002	Red	37103-3101-000FL	24 – 26	0.14 – 0.3	0.8 – 1.0
4PKD1O0000003	Orange	37103-3163-000FL	24 – 26	0.14 – 0.3	1.2 – 1.6

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Motionnet Motion Control Modules



PCIe-MN200

Features:

- Maximum Communication Speed: 20 Mbps
- Distributed motion control up to 128 axes
- Distributed I/O points up to 4096 points
- Easy connection using RJ-45 phone jack connector
- Parallel 1/0 Ports: 8 Input and 4 Output channels
- Optional quadrature encoder input for linear scale or manual pulse generator input

Introduction:

The **PCIe-MN200** is a Motion Control Module that provides two Motionnet serial communication lines for distributed motion and I/O control in machine automation applications. The Master card can be used to connect up to 128 Slave modules (64 x 2 lines). If one of the Motionnet lines is only used for I/O control, it can send/receive signals to/from 2048 points on 64 local devices within 0.97 msec. When it is used to control motors, it can control up to 64 axes, which can be used to execute continuous positioning motion, zero return, and even multi-axis interpolation operations. In addition to serial communication, the PCIe-MN200 is also equipped with parallel I/O ports (8 input channels and 4 output channels) for rapid and instinctive I/O control.

Selection Guide:

Model	PCIe-MN200
Software	
OS Support	Windows 7/10 32/64-bit Windows XP/2000 32-bit
Development	VC/VB/BCB
Utility	EzGo Utility
Hardware	
Connector	HD D-Sub 15-pin x 1
LED Indicators	
Status	Connection (green) Communication Error (red)
General	
Interrupts	Input Change of State, Communication Error
Digital Input	
Channels	8
Type	12-24 V, NPN or PNP
Isolation	3000 Vrms
Input Impedance	4.7 KΩ
Digital Output	
Channels	4

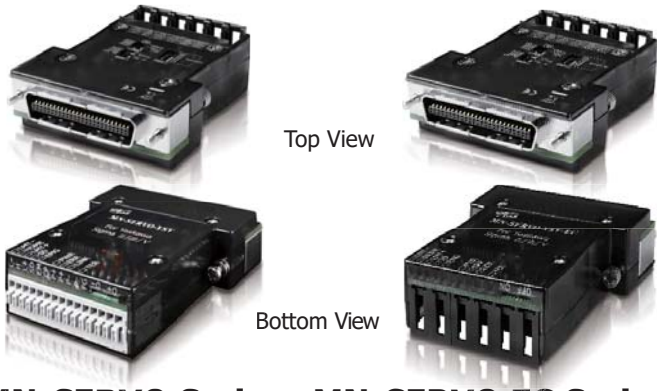
Model	PCIe-MN200
Type	NPN or PNP
Isolation	3000 Vrms
PC Bus	
Type	PCI Express x1
Motionnet	
Communication Connectors	RJ-45 x 2
Transfer Speed	2.5, 5, 10, 20 Mbps (Software controlled)
Length	Max. 100 M (20 Mbps; 32 Slave modules) Max. 50 M (20 Mbps; 64 Slave modules) Max. 100 M (10 Mbps; 64 Slave modules)
Protocol	Motionnet (Half-duplex RS-485)
Power	
Consumption	+3.3 V @ 600 mA
Environment	
Operating Temperature	0 ~ +60 ° C
Storage Temperature	20 ~ +80 ° C
Humidity	5 ~ 85% RH, Non-condensing

Ordering Information:

PCI Express Bus	
PCIe-MN200 CR	PCI Express Bus, Dual-line Motionnet Motion Control Module with RJ-45 (RoHS)

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Motionnet Motion Control Modules



MN-SERVO Series **MN-SERVO EC Series**

Features:

- Maximum communication speed: 20 Mbps
- Maximum pulse output frequency: 6.6 Mpps
- Control up to 64 axes per line
- Multi-axis linear interpolation function
- 2-axis circular interpolation function
- T/S-curve acceleration and deceleration
- Change speed and position on the fly
- Slow down sensor, home sensor, positive and negative limit sensors for each axis
- Software limit and compare trigger output
- Three-way isolation for power, communication and I/O. (Provide better noise immunity and device protection)

Introduction:

The **MN-SERVO** series is used to expand the number of axes for distributed motion control in Motionnet field bus. These extension slave modules can be directly plugged into the servo driver and being connected serially to the controller by a simple and aff ordable Cat.5 LAN cable, reducing the wiring effort between drivers and controller. This is very suitable for highly integrated machine automation applications. After the module is plugged into the servo driver, all you need to do is make the serial LAN cable connect between the modules. One serial line can support up to 64 single-axis modules. ICP DAS provides a variety of motion control modules suitable for a range of brands of servo drivers, such as Mitsubishi MELSERVO-J3/J4, Yaskawa Sigma II/III/V, Panasonic MINAS A4/A5, Delta ASDA-A/A2 and Teco TSTA-A/A+.

Selection Guide:

Model	MN-SERVO Series	MN-SERVO-EC Series
Communication Speed	2.5, 5, 10, 20 Mbps	
Maximum Pulse Output Frequency	6.6 MHz	
Pulse Output Interface	OUT/DIR, CW/CCW	
Pulse Output Counter	28-bit	
Encoder Interface	CW/CCW, A/B phase	
Encoder Counter	28-bit	
Speed Profile	Trapezoidal/S Shaped Acc/Dec Driving	
Home Mode	13 Types	
Mechanical Switch Input	LMT+, LMT-, HOME, SD, EMG	
Servo I/O Interface	Input : ALM, RDY, INP Output : SVON, ERC, ALM_RST	
High-Speed Position Compare Output	5 V TTL or 24 V open collector	
LED Diagnostics	Communication state (Link, Error) Mechanic Switch Input Internal 3.3 V Power Termination Resistor Switch	
Communication connector	Spring terminal	e-CON Mini-Clamp connector

Ordering Information:

Special type	
MN-SERVO-MJ3 CR **MN-SERVO-MJ3-EC CR**	Distributed Motionnet Single-axis Motion Control Module with Spring Type Terminal Blocks (EC: with e-CON Mini-Clamp connector) for Mitsubishi MELSERVO-J3/J4 (RoHS)
MN-SERVO-PA4 CR **MN-SERVO-PA4-EC CR**	Distributed Motionnet Single-axis Motion Control Module with Spring Type Terminal Blocks (EC: with e-CON Mini-Clamp connector) for Panasonic MINAS A4 (RoHS)
MN-SERVO-YSV CR **MN-SERVO-YSV-EC CR**	Distributed Motionnet Single-axis Motion Control Module with Spring Type Terminal Blocks (EC: with e-CON Mini-Clamp connector) for Yaskawa Sigma II/III/V (RoHS)
MN-SERVO-DAA CR **MN-SERVO-DAA-EC CR**	Distributed Motionnet Single-axis Motion Control Module with Spring Type Terminal Blocks (EC: with e-CON Mini-Clamp connector) for Delta ASDA-A/A2 (RoHS)

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Motionnet Motion Control Modules



MN-2091U/MN-2091U-T MN-MP4U-DIN

Features:

- Maximum communication speed: 20 Mbps
- Maximum pulse output frequency: 6.6 Mpps
- Control up to 64 axes per line
- Multi-axis linear interpolation function
- 2-axis circular interpolation function
- T/S-curve acceleration and deceleration
- Change speed and position on the fly
- Slow down sensor, home sensor, positive and negative limit sensors for each axis
- Software limit and compare trigger output
- Three-way isolation for power, communication and I/O (Provide better noise immunity and device protection)

Introduction:

The **MN-2091U(-T)** and **MN-MP4U-DIN** are used to expand the number of axes for distributed motion control in Motionnet fieldbus and one serial line can support up to 64 axes.

The 26-pin HD D-Sub connector on MN-2091U(-T) and MN-MP4U-DIN can be used to easily connect with various servo drivers and stepper drivers. ICP DAS also provides a variety of cables suitable for a range of brands of servo drivers, which further reduces the amount of wiring required between the drivers and the controller, making this an ideal solution for highly integrated machine automation applications.

Selection Guide:

Model	MN-2091U	MN- 2091U-T	MN-MP4U-DIN
Communication Speed	2.5, 5, 10, 20 Mbps		
Maximum Pulse Output Frequency	6.6 MHz		
Pulse Output Interface	OUT/DIR, CW/CCW		
Pulse Output Counter	28-bit		
Encoder Interface	CW/CCW, A/B phase		
Encoder Counter	28-bit		
Speed Profile	Trapezoidal/S Shaped Acc/Dec Driving		
Home Mode	13 Types		
Mechanical Switch Input	LMT+, LMT-, HOME, SD, EMG		
Servo I/O Interface	Input : ALM, RDY, INP Output : SVON, ERC, ALM_RST		
High-Speed Position Compare Output	5 V TTL or 24 V open collector		
LED Diagnostics	Communication state (Link, Error) Mechanic Switch Input Internal 3.3 V Power Termination Resistor Switch		
Communication connector	RJ-45 x 2	5-pin Screw terminal	RJ-45 x2

Ordering Information:

Universal	
MN-2091U CR	Distributed Motionnet Single-axis Universal Motion Control Module with RJ-45 Connector (RoHS)
MN-2091U-T CR	Distributed Motionnet Single-axis Universal Motion Control Module with Terminal Block (RoHS)
MN-MP4U-DIN	Distributed Motionnet Four-axis Universal Motion Control Module with RJ-45 Connector. Includes 4 x "CA-PC26M" (RoHS)

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Motionnet Digital I/O Modules



MN-325x(T) Series

Features:

- Maximum communication speed: 20 Mbps
- Each Motionnet transfer line: connect modules up to 64
- Designing isolation protection: power communication, I/O
- LED Diagnostics for communication and I/O status
- High current sinking capability: 200 mA

Introduction:

MN-325x(T) Series is an I/O expansion device for Motionnet communication systems. Each Motionnet communication line can be connected to up to 64 modules. The communication time required by each Motionnet device is 15.1 µsec to complete sending and receiving signals. The update of the I/O status is completed automatically through the Motionnet system at a constant interval, and setting interrupts for specific input points that the customer wants to monitor can help prevent CPU time from being wasted by repetitive polling when there is nothing else for the issuing process to do.

Selection Guide:

Digital I/O Modules	Input Channels	Type	Output Channels	Type	Communication connector	Case
MN-3253	DI x 32	Sink/Source (NPN/PNP)	-	-	MN-325x: RJ-45 x 2 MN-325xT: 5-pin Screw terminal	Plastic
MN-3253T						
MN-3254	DI x 16	Sink/Source (NPN/PNP)	DO x 16	Sink/Source (NPN/PNP)		
MN-3254T						
MN-3257	-	-	DO x 32	Sink/Source (NPN/PNP)		
MN-3257T						

Ordering Information:

Digital I/O Modules	
MN-3253 CR **MN-3253T CR**	Distributed Motionnet 32-ch Isolated DI Module (with RJ-45 Connector; T: with Terminal Block) (RoHS)
MN-3254 CR **MN-3254T CR**	Distributed Motionnet 16-ch Isolated DI, 16-ch Isolated DO Module (with RJ-45 Connector; T: with Terminal Block) (RoHS)
MN-3257 CR **MN-3257T CR**	Distributed Motionnet 32-ch Isolated DO Module (with RJ-45 Connector; T: with Terminal Block) (RoHS)

Accessories:

Mini Clamp Wiremount Plug				Applicable Wire		
	ICP DAS Part No.	Cover Color	3M Part No.	AWG No.	Cross-sectional Area (mm2)	Finished External Diameter Φ (mm)
	4PKD1O0000001	Gray	37103-2206-000FL	20 – 22	0.3 – 0.5	1.6 – 2.0
	4PKD1O0000002	Red	37103-3101-000FL	24 – 26	0.14 – 0.3	0.8 – 1.0
	4PKD1O0000003	Orange	37103-3163-000FL	24 – 26	0.14 – 0.3	1.2 – 1.6

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Motionnet Digital I/O Modules



MN-D6xx-DIN Series

Features:

- Maximum communication speed: 20 Mbps
- Each Motionnet transfer line: connect modules up to 64
- Designing isolation protection: power communication, I/O
- LED Diagnostics for communication and I/O status
- High current sinking capability: 100 mA

Introduction:

MN-D6xx-DIN Series is an I/O expansion device for Motionnet communication systems. Each Motionnet communication line can be connected to up to 64 modules. The communication time required by each Motionnet device is 15.1 μsec to complete sending and receiving signals. The update of the I/O status is completed automatically through the Motionnet system at a constant interval, and setting interrupts for specific input points that the customer wants to monitor can help prevent CPU time from being wasted by repetitive polling when there is nothing else for the issuing process to do.

Selection Guide:

Digital I/O Modules	Input Channels	Type	Output Channels	Type	Communication connector	Case
MN-D604-DIN	-	-	DO x 32	Sink (NPN)	Mini-clamp Connector x 2	Aluminum
MN-D622-DIN	DI x 16	Sink (NPN)	DO x 16	Sink (NPN)		
MN-D640-DIN	DI x 32	Sink (NPN)	-	-		

Ordering Information:

Digital I/O Modules	
MN-D622-DIN CR	Distributed Motionnet 16-ch Isolated DI, 16-ch Isolated DO Module with Mini-clamp Connector (RoHS)
MN-D640-DIN CR	Distributed Motionnet 32-ch Isolated DI Module with Mini-clamp Connector (RoHS)
MN-D604-DIN CR	Distributed Motionnet 32-ch Isolated DO Module with Mini-clamp Connector (RoHS)

Accessories:

Mini Clamp Wiremount Plug				Applicable Wire		
	ICP DAS Part No.	Cover Color	3M Part No.	AWG No.	Cross-sectional Area (mm2)	Finished External Diameter Φ (mm)
	4PKD1O0000001	Gray 	37103-2206-000FL	20 – 22	0.3 – 0.5	1.6 – 2.0
	4PKD1O0000002	Red 	37103-3101-000FL	24 – 26	0.14 – 0.3	0.8 – 1.0
	4PKD1O0000003	Orange 	37103-3163-000FL	24 – 26	0.14 – 0.3	1.2 – 1.6

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Motionnet Analog I/O Modules



MN-ADx-DIN / MN-DAx-DIN Series

Features:

- Dual channel +/- 10 V analog output and 8 channel +/- 10 V analog input
- RJ-45 communication port
- 2 way isolation on power, communication
- Tiny design(90×75×57mm), DIN rail compatible
- MN-DA2-DIN provide software offset/gain calibration
- MN-AD8-DIN provide hardware offset/gain calibration with EEPROM data storage

Introduction:

The **MN-DA2-DIN** is a Motionnet 2-channel analog output module while the MN-AD8-DIN is a Motionnet 8-channel analog input module. The max devices can be loaded on each Motionnet communication line is 64 modules. Thus, each line can expend up to 128 analog output or 512 analog input at once. The 16 bit high precision resolution analog input/output is provided in +/- 10V range, calibration in offset and gain is also provided for ease of use to our customers.

Selection Guide:

Model	MN-AD8-DIN	MN-DA2-DIN
Input Channels	AI x 8	-
Voltage Level	+/- 10 V	-
Sampling Frequency	250k sps	-
Output Channels	-	AO x 2
Voltage Level	-	+/- 10 V
Load Current	-	+/- 20 mA Max per channe
Response Speed	-	Slew rate = 20 V / us
Output Accuracy	-	DNL = +/- 1 LSB INL = +/- 3 LSB
Calibration Function	Offset: provided by hardware Gain: provided by hardware	Offset: provided by software Gain: provided by software
LED Indicators	Communication stats(Link, Error) Internal 3.3 V Power Terminal resistor rwitch	
Communication Speed	Selectable 2.5, 5, 10 or 20 Mbps by DIP Switch	
Cyclic Scan Time	15.1 µs per device (20 Mbps)	
Voltage Range	24VDC +/-5% (1000 V isolated)	
Protection	Reverse voltage and overcurrent protection	
Connection	5-Pin removable terminal block	
Case	Plastic	
Flammability	UL 94V-0 housing	

Ordering Information:

Analog I/O Modules	
MN-AD8-DIN CR	Distributed Motionnet 8-ch Analog Input Module (RoHS)
MN-DA2-DIN CR	Distributed Motionnet 2-ch Analog Output Module (RoHS)

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Motionnet Hub Modules



MN-HUB4



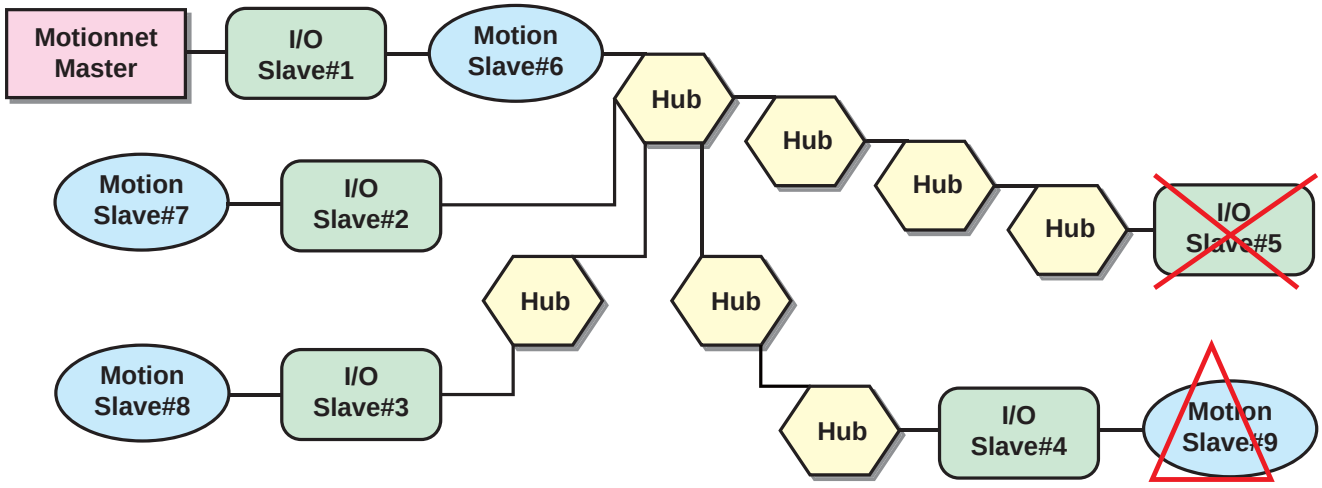
MN-HUB4EC

Features:

- True Motionnet Star Wiring Hub
- Independent Motionnet transceiver for each channel
- Maximum communication speed: 20 Mbps
- LEDs for indicating each Motionnet activity
- RJ-45 jack for standard module
- EC module equipped with Mini-Clamp connector
- DIN-Rail Mounting

Introduction:

In some user's application, users may encounter some difficulty in wiring since the standard Motionnet only support daisy-chain topology. The **MN-HUB4** series modules can help users to use star or tree topology during wiring which not only can make the wiring more easier but also reduce the total wiring distance and cost.



Module ID	No. of Layers to Master	Accessible	Module ID	No. of Layers to Master	Accessible
1 (I/O)	0	Yes	6 (Motion)	0	Yes
2 (I/O)	1	Yes	7 (Motion)	1	Yes
3 (I/O)	2	Yes	8 (Motion)	2	Yes
4 (I/O)	3	Yes	9 (Motion)	3	Yes
5 (I/O)	4	No			

Motion Modules	No. of Layers between Modules	Interpo-lation	Motion Modules	No. of Layers between Modules	Interpolation
6 , 7	1	Yes	7 , 8	2	Yes
6 , 8	2	Yes	7 , 9	3	No
6 , 9	3	No	8 , 9	4	No

Ordering Information:

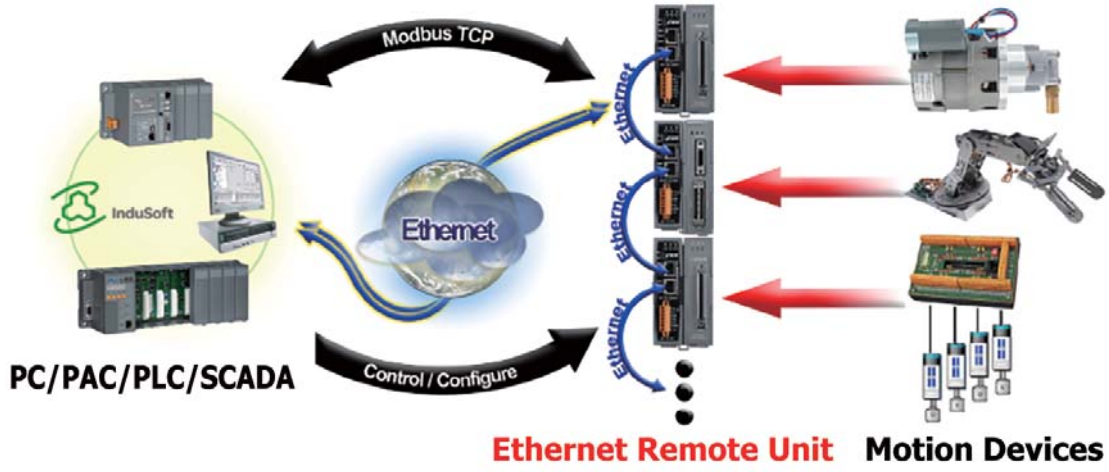
MN-HUB4 CR	Distributed Motionnet 4 port Hub module (with RJ-45 Jack)
MN-HUB4EC CR	Distributed Motionnet 4 port Hub module (with e-CON Mini-Clamp connector)

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3. Ethernet/Serial Motion Control Solution

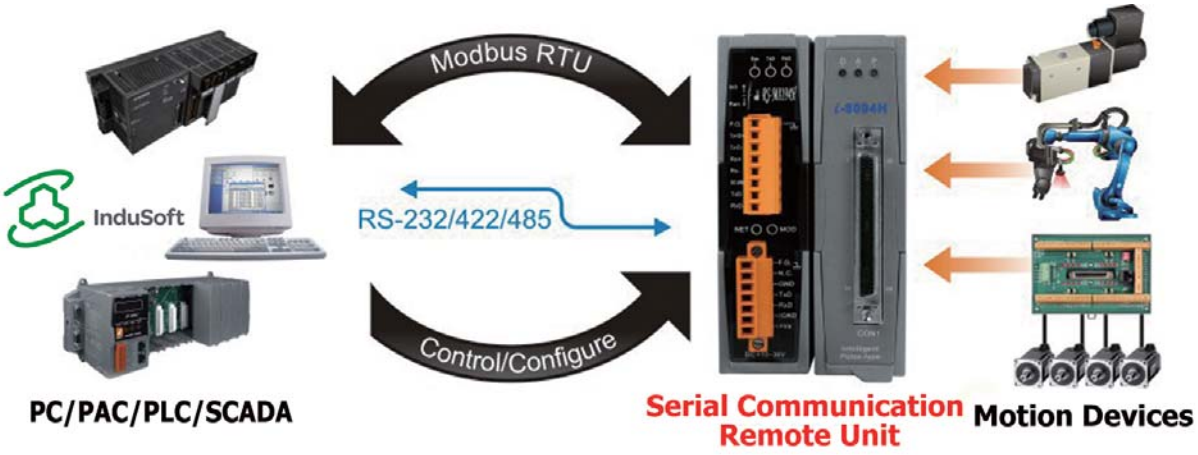
Ethernet Remote Motion Solutions:

ICP DAS remote Ethernet motion control series consist of a four axis (ET-M8194H) and a six axis (ET-M8196F) stepping/pulse-type servo motion controller. Each motion control device is equipped with an Ethernet communication module and uses Modbus TCP/IP as its communication protocol. In a Modbus TCP network the ET-M8194H/ET-M8196F acts as a server. All standard Modbus function codes are supported and therefore any Modbus TCP master (e.g. PC, PLC, HMI, PAC, etc.) can access the remote motion controller. Each device is equipped with two Ethernet ports which allow daisy chain Ethernet wiring; multiple devices can be connected together in sequence without an additional Ethernet switch. This intelligent motion controller has a variety of built in motion control functions, such as multi-axis linear interpolation, circular interpolation, T/S-curve acceleration/deceleration, various synchronous actions and automatic homing. A software utility assists the user in configuring the Ethernet module and motion card and provides some basic motion commands for testing. An application programming interface (API) allows the programmer to develop an application program to remotely control the motion device.



Serial Communication Motion Control Solutions:

ICP DAS provides two types of remote serial motion controller: 4 and 6 axes stepping/pulse-type motion controller. Both controller types support RS232, RS485 and RS422 serial communication and uses Modbus RTU as a communication protocol. Serial communication speed can be set by selecting a standard baud rate. The remote controllers are defined as a Modbus slave. The standard Modbus functions are supported which enables the user to easily integrate the motion controller into an existing Modbus network. PC, HMI, PAC, PLC and other devices which support Modbus RTU can access, control and monitor the motion controller. Software utilities are provides which allows the user to configure the device and execute simple motion commands for testing purposes. Windows APIs for developing motion control application are included in the software package.



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Remote Motion Unit:



ET-M8194H



RS-M8194H



ET-M8196F



RS-M8196F

Model	ET-M8194H	RS-M8194H	ET-M8196F	RS-M8196F
Communication	**Ethernet**	**RS-232/422/485**	**Ethernet**	**RS-232/422/485**
Number of Axes	**4 axes**		**6 axes**	
Motion Control				
Motion Control Type	IC chip based		DSP-based	
Pulse Output Rate	4 Mpps			
Linear Interpolation	2/3 axes		2/6 axes	
Circular Interpolation	2 axes		2/3 axes	
Helical Interpolation	-		3 axes	
Encoder Counting Rate	(4 Mhz)		(12 MHz Max.)	
Position Compare Trigger	-		(4 Mhz)	
Software Support				
Software Utility	EzMove Utility		EzGo Utility	
Macro Programming	Yes		-	

Software Supported:

Utility

A software utility is used for configuring the motion controller and executing single and multiple axis motion commands.
Basic settings like the pulse output mode, encoder mode or the active level and filter setting of each digital inputs signals (hardware limits, home, near home) can be directly done via the utility. In addition, basic operations like home search or simple point to point motion as well as more advanced motion control commands such as two and three dimensional interpolation commands (linear, circular) with different velocity profiles are supported. The status of the remote FRnet digital input and output modules are displayed and up to 128 digital outputs can be directly controlled.





API Library

The API library is developed for the Windows operation system and allows the user to directly call the motion command for the remote motion control units. All the Modbus communication is internally controlled by the library and no Modbus knowledge is required. The library is setup in such a way that it can simultaneously control a large number off remote motion control units.
APIs and demo programs are provided for the following operation systems and programming languages:
Windows XP / 7 / 8 / 10
32/64 bit:

- Visual C++ lib/DLL
- C#, VB.Net DLL
- Delphi
- Visual Basic 6.0
- BCB 5.0, 6.0

Ethernet Remote Motion Solutions Products:		
Ethernet Remote Unit	**ET-M8194H**	Ethernet Remote Unit with High-speed 4-axis Motion Control Module
	ET-M8196F	Ethernet Remote Unit with High-speed 6-axis Motion Control Module
Serial Communication Remote Motion Solutions Products:		
Serial Communication Remote Unit	**RS-M8194H**	Serial Communication Remote Unit with High-speed 4-axis Motion Control Module
	RS-M8196F	Serial Communication Remote Unit with High-speed 6-axis Motion Control Module

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Application Structure and Features:

- ☑ Compact Size
- ☑ Easy to Use
- ☑ Stand-alone





Terminal Boards/Accessories:



ET-M8194H/RS-M8194H Accessories:

DN-8468UB	Photo-isolated Universal Snap-on Wiring Terminal Board
DN-8468GB	Photo-isolated General Purpose Wiring Terminal Board
DN-8468MB	Photo-isolated Snap-on Wiring Terminal Board for Mitsubishi MELSERVO-J2 Servo Amplifier
DN-8468PB	Photo-isolated Snap-on Wiring Terminal Board for Panasonic MINAS A4/A5 Servo Amplifier
DN-8468YB	Photo-isolated Snap-on Wiring Terminal Board for Yaskawa Sigma II/III/V Servo Amplifier
DN-8468DB	Photo-isolated Snap-on Wiring Terminal Board for Delta ASDA-A Servo Amplifier
DN-8468FB	Photo-isolated Snap-on Wiring Terminal Board for Fuji FALDIC-W Servo Amplifier
CA-SCSI15-H3 **CA-SCSI30-H3** **CA-SCSI50-H2**	68-pin SCSI-II Connector Cable; Length 1.5 M 68-pin SCSI-II Connector Cable; Length 3.0 M 68-pin SCSI-II Connector Cable; Length 5.0 M

ET-M8196F/RS-M8196F Accessories:

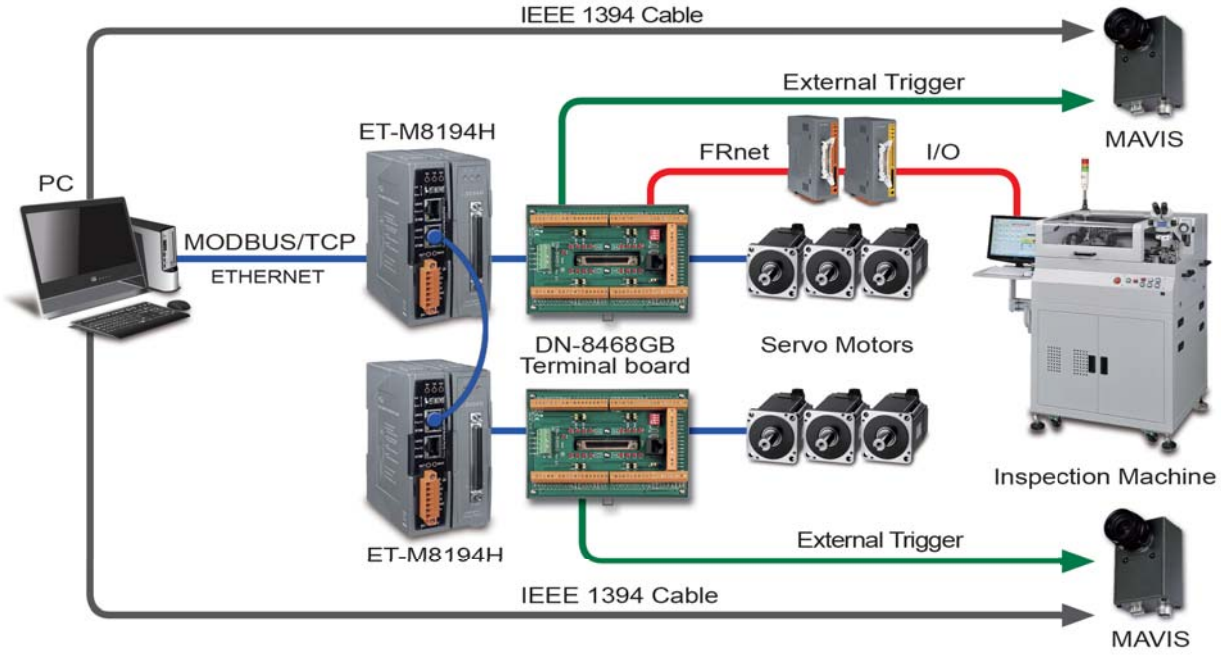
DN-8368UB	Photo-isolated Universal Snap-on Wiring Terminal Board
DN-8368GB	Photo-isolated General-Purpose Wiring Terminal Board
DN-8368MB	Photo-isolated Snap-on Wiring Terminal Board for Mitsubishi MELSERVO-J2 Servo Amplifier
DN-20M	General Purpose Digital Input and Remote Digital I/O (FRnet) Extension Board
CA-MINI68-15	68-pin VHDCI to SCSI-II Connector Cable, Length 1.5 M
CA-SCSI20-M1/M3/M5	20-pin SCSI-II Male Connector Cable (for Mitsubishi J2 Series Motor), Length 1/3/5 M
CA-26-XXX-15/30/50 (1.5/3/5 M)	
CA-26-MJ3-15/30/50	26-pin HD D-Sub Male Cable for Mitsubishi Servo Amplifier (for MELSERVO-J3/J4 Series)
CA-26-PA4-15/30/50	26-pin HD D-Sub Male Cable for Panasonic Servo Amplifier (for MINAS A4/A5 Series)
CA-26-YSV-15/30/50	26-pin HD D-Sub Male Cable for Yaskawa Servo Amplifier (for Sigma II/III/V Series)
CA-26-TTA-15/30/50	26-pin HD D-Sub Male Cable for Teco Servo Amplifier (for TSTA-A/A+ Series)
CA-26-DAA2-15/30/50	26-pin HD D-Sub Male Cable for Delta A2 Servo Amplifier (for ASDA-A2 Series)
CA-26-DAB2-15/30/50	26-pin HD D-Sub Male Cable for Delta B2 Servo Amplifier (for ASDA-B2 Series)
CA-26-FFW-15/30/50	26-pin HD D-Sub Male Cable for Fuji Servo Amplifier (for FALDIC-W and ALPHA5 Smart Series)

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Application Notes:

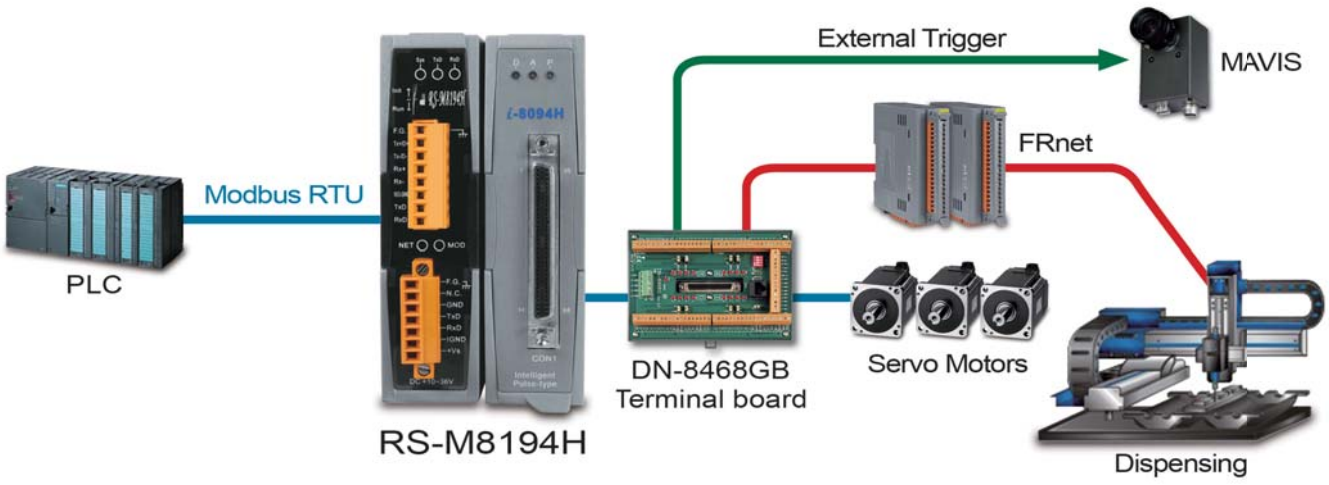
• Ethernet Motion Control Application

In a recent case, ET-M8194H units were installed on machines performing IC inspection. Each machine was equipped with two ET-M8194H modules to coordinate six motors by taking advantage of the embedded Ethernet switching ports on the ET-M8194H. Therefore six axes motion control could be easily implemented by connecting two ET-M8194H modules in series (daisy-chain topology). The supervisory host PC was used to issue commands and collect information through the Ethernet without the need for additional wiring. The application can also be accomplished by using the ET-M8196F.



• Serial Communication Motion Control Application

In a recent case, a PLC together with a RS-M8194H was used to control the dispensing path of an automated dispensing system. With the three-axis interpolation function provided by RS-M8194H it was possible to move two dispensing nozzles synchronous along predefined curves with varying velocities. It was a requirement to change the velocity on the fly in order to ensure a set dispensing thickness along the motion path.



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4. CANopen Motion Solutions

Introduction:

The **CAN (Controller Area Network) bus** is one of the safest industrial network systems, and CANopen is the standard industrial communication protocol on the CAN bus. CANopen technology has been used in a wide range of application fields, including medical equipment, vehicles, railway applications or building automation. ICP DAS provides a motion control library (CiA 402) for CANopen Master products meaning that users can now integrate motion control systems into a CANopen network, providing the ability to control CANopen-based motors and remote I/O devices within the same network, making wire connections and control easier and more efficient.

The CANopen Motion Library is compliant with the CANopen standard CiA 402, and provides a variety of motion control functions, such as position control, velocity control, torque control, synchronous action etc.

The CiA 402 is one of the standard CANopen application profiles, and is specially designed for motion control systems. In addition to making the management of the CANopen-based motors easy, the CANopen protocol, which is based on the CAN bus, can help to reduce the need for wire connections between the controller and the motors, and provides rapid troubleshooting functions.



A large number of CANopen-based motors can be linked together so that multi-axis motion control via a single host becomes achievable.While controlling the motors,CANopen-based remote I/O modules that comply with the CiA 402 standard can also be accessed at the same time. Therefore, developing a motion control application becomes easier and more convenient.

Features:

- Compliant with the CiA 402 v1.1 Standard
- Supports a max. of 127 motors in a single network
- Absolute and relative position control
- Velocity, torque or jog control
- Supports synchronous action for a maximum of 127 motors
- Supports various homing control methods
- Supports torque limitation via CANopen commands
- Supports the node guarding and heartbeat protocols
- Supports dynamic PDO object configuration
- Bus distance ranges between 25 m to 5000 m
- Supports baud rates of 10 Kbps, 20 Kbps, 50 Kbps, 125 Kbps, 250 Kbps, 500 Kbps, 800 Kbps and 1 Mbps.

Benefits:

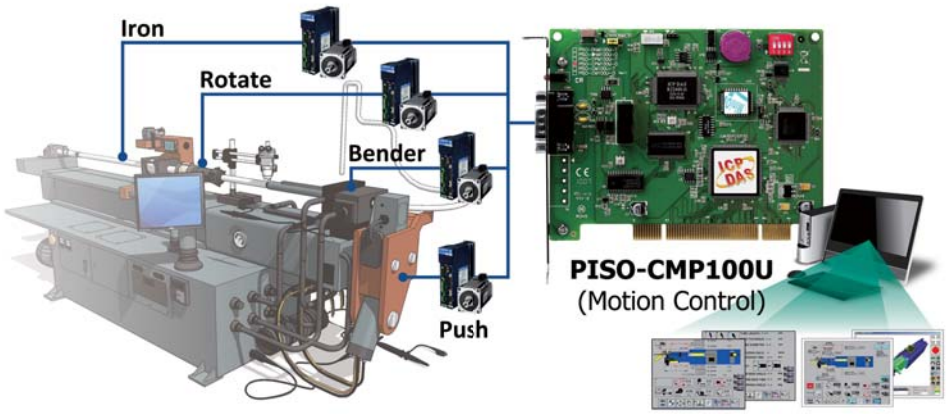
- Suitable for distributed multi-axis motion control systems. E.g., distributed sun tracker systems, conveyer transmission control systems, and so on.
- Reduces the cost of wiring, especially time requirements.
- Choose from a range of motors with no limit on certain types.
- The CAN hardware has a range of error detection and error correction mechanisms, which provides the safest communication bus.
- Able to use different CANopen I/O modules and motors in the same CANopen network.
- The range of the CANopen bus can be extended for long distance applications. For example, for solar or wind farm application systems.
- The CANopen bus can be converted to fiber to protect against high noise interference.

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CANopen Motion Applications:

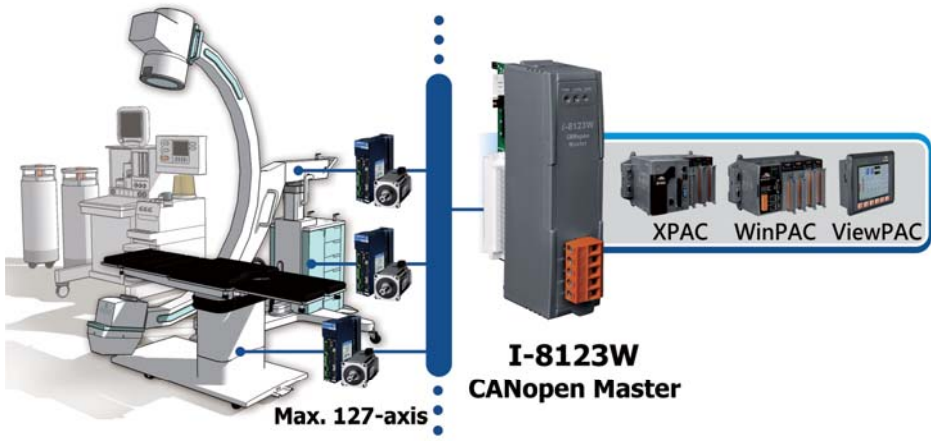
• The Tube Bender Built-in the CANopen Motion Control

With the trend of precision machine design, metal machining requires higher accuracy and fewer defects. Traditional machines have also been upgraded to the level of precision machinery. In the tube bender in this application case, the controller was originally designed by PLC. Now it is changed to the industrial PC. After adopting CANopen motion control, the complexity of control is greatly reduced.



In the machine, there are six-axis motors which use distributed CANopen motion control. During the tube bending process, the two axes of the feeding and radial bending are designed to be interpolation motion. The cycled processes are designed to prevent the metal tube broken and rebound. It greatly improves the yield of bending. The CANopen motion also help to shorten the development time at the design stage.

• Professional electric surgical bed and chair with CANopen motion control



There are various surgical needs in modern operating rooms. The ergonomic surgical bed provides patients with the comfort and safety during surgery. In addition to the basic operations, professional surgical bed must provide multi-axis interpolation actions. When otating, it can fix a certain positioning point or fix the tumor position. The position still staying in the original space and was not shifted by rotating the patient. This surgical bed uses the CANopen interpolation technology to synchronize all motors every 20ms period, in the 3D space at a speed of 0.8 degrees of tilting the bed surface per second, and still keep the deviation of the positioning point within 2mm. The CANopen motion control can simplify the complexity of design and achieve safe control and precise positioning for the cont inuously improved medical technology.

CANopen Solutions: CANopen Remote Motion Control

The CAN (Controller Area Network) bus is one of the safest industrial network systems, and ICP DAS now provides a motion control library (CiA 402) for CANopen Master products meaning that users can now integrate motion control systems into a CANopen network.

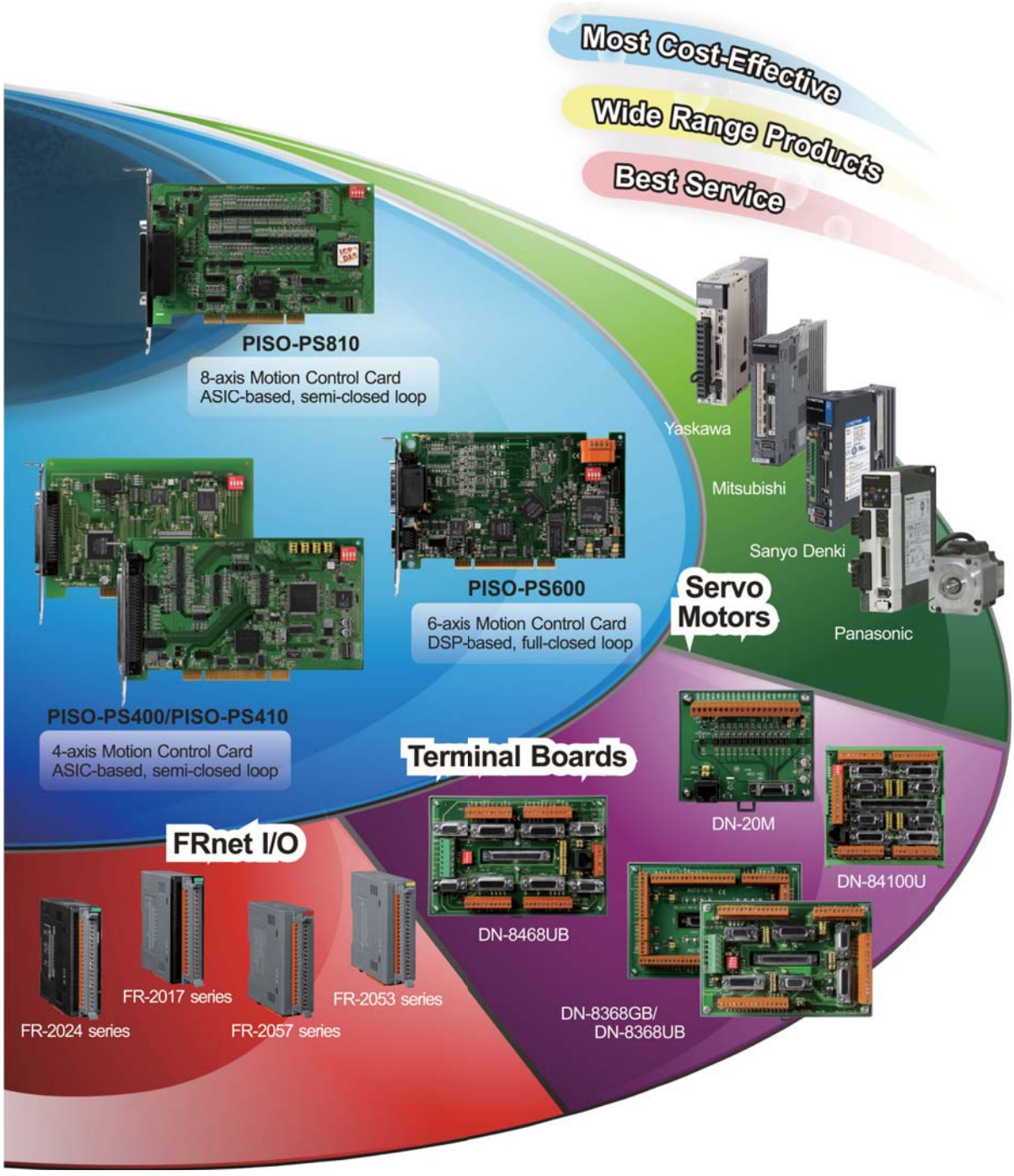
CANopen Solutions	
PISO-CPM100U	1 Port Intelligent CANopen Master Universal PCI Board
I-7565-CPM	USB to CANopen Master Converter
I-8123W	1 Port High Performance Intelligent CANopen Master Module
CAN-8x23 Series **CAN-2000C Series**	CANopen Remote I/O Expantion Unit & Remote I/O Modules

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5. PCI Express/PCI Bus Motion Control Cards

Introduction

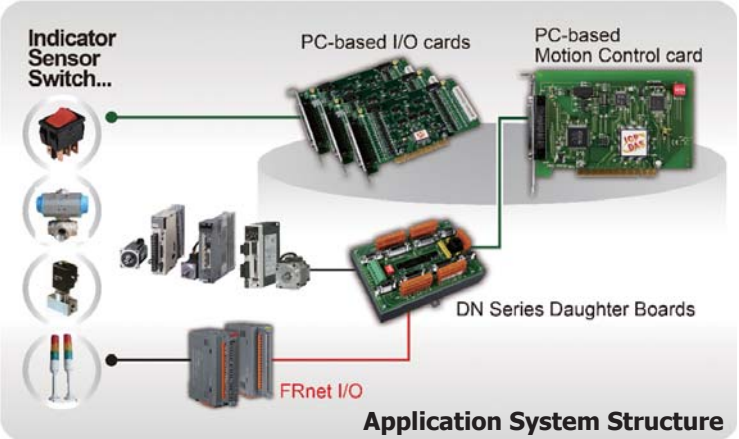
As a leading automation solutions provider, ICP DAS not only provides PAC solutions, but also develops PC-based solutions for machine automation applications, including the PCI bus motion control cards and the ISA bus motion control cards series. In addition, we also offer a variety of quick-connect terminal blocks for a range of servo motors, including Mitsubishi, Panasonic, Yaskawa, Delta, etc., which helps customers quickly implement the installation and reduce the potential for using the incorrect wiring.



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Applications

- Semiconductor Manufacturing
- Component Inspection
- Manufacturing Quality Control
- Food and Beverage Inspection
- Microscopy and Medical Imaging
- Biometrics Applications
- X-Y-Z Table
- Fix-pitch Stamping Machinery
- Transfer Machinery
- Spinner
- Load/Unload



Application System Structure

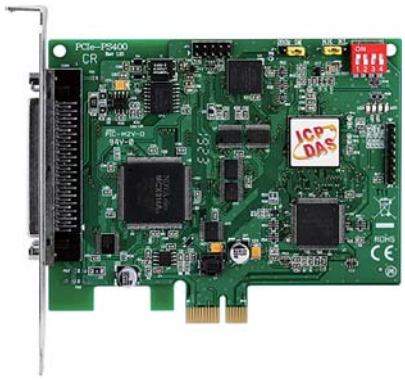
Selection Guide:

PC-based PCI Express/PCI Bus Motion Control Cards and Terminal Boards

PCI Express Bus Motion Control Cards	
PCIe-PS400	PCI Express Bus, High-speed 4-axis Motion Control Card (Available Soon!)
PCIe-ENCODER300	PCI Express Bus, 3-axis Encoder Input Card
PCIe-ENCODER600	PCI Express Bus, 6-axis Encoder Input Card
PCI Bus Motion Control Cards	
PISO-PS200	PCI Bus, High-speed 2-axis Motion Control Card with FRnet Master
PISO-PS400	PCI Bus, High-speed 4-axis Motion Control Card with FRnet Master
PISO-PS400U	Universal PCI Bus, High-speed 4-axis Motion Control Card with FRnet Master
PISO-PS410	PCI Bus, High-speed 4-axis Motion Control Card with FRnet Master (Available Soon!)
PISO-PS600	PCI Bus, High-speed, DSP-based, 6-axis Motion Control Card with FRnet Master
PISO-PS810	PCI Bus, High-speed 8-axis Motion Control Card with FRnet Master (Available Soon!)
PISO-ENCODER300U	PCI Bus, 3-axis Encoder Input Card
PISO-ENCODER600U	PCI Bus, 6-axis Encoder Input Card
PISO-PS300U	PCI Bus, 3-axis Stepper Motor/Servo Control Card (Limited Function and Economical)
PMDK	PCI Bus, DSP-based Professional Motion Development Kit
Terminal Boards	
DB-8R	Relay Board for PISO-PS300U
DN-68	Encoder Input Board for PISO-ENCODER300U/PISO-ENCODER600U
DN-20M	Manual-Pulse-Generator (MPG) and FRnet Input Board for PISO-PS600/VS600/PMDK
DN-8237 Series	**ICP DAS Photo-isolated Terminal Board for 2-axis Stepper/Servo Motion Controller**
DN-8237UB	Universal Snap-on Wiring Terminal Board
DN-8237GB	General Purpose Wiring Terminal Board
DN-8237MB	Snap-on Wiring Terminal Board for Mitsubishi MELSERVO-J2 Servo Amplifier
DN-8237PB	Snap-on Wiring Terminal Board for Panasonic MINAS A4/A5 Servo Amplifier
DN-8237YB	Snap-on Wiring Terminal Board for Yaskawa Sigma II/III/V Servo Amplifier
DN-8237DB	Snap-on Wiring Terminal Board for Delta ASDA-A Servo Amplifier
DN-8368 Series	**ICP DAS Photo-isolated Terminal Board for PISO-PS600/VS600/PMDK**
DN-8368UB	Universal Snap-on Wiring Terminal Board
DN-8368GB	General Purpose Wiring Terminal Board
DN-8368MB	Snap-on Wiring Terminal Board for Mitsubishi MELSERVO-J2 Servo Amplifier
DN-8468 Series	**ICP DAS Photo-isolated Terminal Board for 4-axis Stepper/Servo Motion Controllers**
DN-8468UB	Universal Snap-on Wiring Terminal Board
DN-8468GB	General Purpose Wiring Terminal Board
DN-8468MB	Snap-on Wiring Terminal Board for Mitsubishi MELSERVO-J2 Servo Amplifier
DN-8468PB	Snap-on Wiring Terminal Board for Panasonic MINAS A4/A5 Servo Amplifier
DN-8468YB	Snap-on Wiring Terminal Board for Yaskawa Sigma II/III/V Servo Amplifier
DN-8468DB	Snap-on Wiring Terminal Board for Delta ASDA-A Servo Amplifier
DN-8468FB	Snap-on Wiring Terminal Board for Fuji FALDIC-W Servo Amplifier
DN-84100U	Universal Snap-on Wiring Terminal Board for PISO-PS410 and PISO-PS810

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PCI Express Bus, High-speed 4-axis Motion Control Card



PCIe-PS400

Features:

- Independent 4-axis motion control
- Support for hand wheel and jog functions
- 2/3-axis linear / 2-axis circular interpolation function
- Continuous interpolation function
- Programmable T/S-curve acceleration and deceleration
- A maximum pulse output rate of 4 MHz for each axis
- Pulse output types: CW/CCW or PULSE/DIR
- 32-bit encoder counter for each axis
- Encoder pulse input types: A/B phase or Up/Down
- Programmable automatic homing for each axis
- Programmable software limits
- A wide range of synchronous actions (event-triggered actions)

Introduction:

The **PCIe-PS400** is a 4-axis stepping/pulse-type servo motor control card that can be used on any IPC with PCI Express bus, and is suitable for general-purpose motion control applications.

In addition to its wide speed range, this intelligent motion controller also has a variety of motion control functions built in, such as 2/3-axis linear interpolation, 2-axis circular interpolation, T/S-curve acceleration/deceleration, numerous synchronous actions, automatic homing, and others. A major advantage is that the majority of the PS400 series motion control functions are performed by the high-performance motion ASIC with little load on the processor. The motion status and the other I/O cards on the IPC can still be monitored while driving the motors.

As the low CPU loading requirements of the PS400 series is minimal, one or more motion cards can be used with a single IPC. ICP DAS also provides a variety of functions and examples that can be used to reduce the need for additional programming, making it a highly cost-effective solution for motion control application developers.

Specifications:

Model	PCIe-PS400
General	
Number of Axes	4
Slot Interface	PCI Express x1
Pulse Output Rate	4 MHz (Max.)
Command Type	Pulse Command
Resolution	32-bit
Pulse Output Mode	CW/CCW, PULSE/DIR
Operation Mode	Semi-closed Loop
Linear Interpolation	Any 2 to 3 of 4 axes
Circular Interpolation	Any 2 axes
Speed Curve Profile	T/S-curve
Synchronous Action	10 activation factors and 14 actions
Ring Counter Mode	32-bit
Position Control Mode	Incremental mode and Absolute mode
Position Compare Trigger	10 KHz (X and Y only)
Encoder Interface	A/B pulse, Up/Down

Model	PCIe-PS400
Encoder Counter	32-bit
Encoder Counting Rate	4 MHz (Max.)
I/O Isolation	2500 Vrms optical isolation
Connector	68-pin SCSI-II
Motion Relative I/O	
Mechanical Switch Input	Home, LMT+/-, NHOME, EMG
Servo I/O Interface	Input : INP, ALM, Output: SVON
Digital Input	
Digital Input Channels	Local: 4 DI
Digital Output	
Digital Output Channels	-
Power	
Power Consumption	+12 V @ 200 mA, +3.3 V @ 500 mA
Environmental	
Operating Temperature	-20 ~ +75°C
Storage Temperature	-30 ~ +85°C
Humidity	5 ~ 85% RH, Non-condensing

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PCI Express Bus, 3-axis Encoder Input Card



PCIe-ENCODER300

Features:

- 3-axis encoder counter
- True 32-bit counter
- Encoder Counting Rate: 4 MHz (Max.)
- Third-order internal digital filter
- Counting Mode: Quadrant, CW/CCW, PULSE/DIR
- A+, A-, B+, B-, C+, C- inputs
- Programmable reset counter function
- Index (C channel) reset counter function
- Hardware reset (HR1 ~ HR6), reset counter function
- 68-pin SCSI-II connector

Introduction:

The **PCIe-ENCODER300** contains a 3-axis encoder counterand each axis has a 32-bit true counter with a maximum encoder counting rate of 4 MHz. The counting mode can be selected from three types: 1. Quadrant mode, 2. CW/CCW mode, and 3. PULSE/ DIR mode. There are also three 3 kinds of counter reset modes provided: 1. Register Reset, 2. Index Reset, and 3. Hardware Reset. The "Index Reset" mode resets by using a C+/C- channel, which will reset the counter on each revolution. The "Hardware Reset" mode resets the counter using an external pin (HR1 ~ HR6). The HR1 to HR6 pins can also be used as digital input.

The **PCIe-ENCODER300** also provides 8-channel digital outputs. 2500 Vrms photo-couplers are used to isolate the digital I/O to prevent high voltages from affecting the system. Device drivers and function libraries for DOS, Windows 7, and Windows XP/2000 are provided.

Specifications:

Model	PCIe-ENCODER300
General	
No. of Axes	3
Encoder Input	
Mode	Quadrant, CW/CCW, PULSE/DIR
Counting Rate	4 MHz (Max.)
Pulse Output	
Counter Width	32-bit
Digital Input	
Channels	6
Isolation	2500 Vrms optical isolation
Digital Output	
Channels	8
Isolation	2500 Vrms optical isolation
PC Bus	
Type	PCI Express x 1

Model	PCIe-ENCODER300
Software	
OS Support	Windows 7/10 32/64-bit Windows XP/2000 32-bit
SDK	DOS 6.2 , Linux 2.6 Labview 8.5 and above
Hardware	
Connector	68-pin SCSI-II female connector
Power	
Consumption	+12 V @ 200 mA, +3.3 V @ 500 mA
Mechanical	
Dimensions (mm)	120.4 mm x 90.8 mm
Environment	
Operating Temperature	0 ~ +60° C
Storage Temperature	-20 ~ +80° C
Humidity	5 ~ 85% RH, non-condensing

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PCI Express Bus, 6-axis Encoder Input Card



PCIe-ENCODER600

Features:

- 6-axis encoder counter
- True 32-bit counter
- Encoder Counting Rate: 4 MHz (Max.)
- Third-order internal digital filter
- Counting Mode: Quadrant, CW/CCW, PULSE/DIR
- A+, A-, B+, B-, C+, C- inputs
- Programmable reset counter function
- Index (C channel) reset counter function
- Hardware reset (HR1 ~ HR6), reset counter function
- 68-pin SCSI-II connector

Introduction:

The **PCIe-ENCODER600** contains a 6-axis encoder counterand each axis has a 32-bit true counter with a maximum encoder counting rate of 4 MHz. The counting mode can be selected from three types: 1. Quadrant mode, 2. CW/CCW mode, and 3. PULSE/ DIR mode. There are also three 3 kinds of counter reset modes provided: 1. Register Reset, 2. Index Reset, and 3. Hardware Reset. The "Index Reset" mode resets by using a C+/C- channel, which will reset the counter on each revolution. The "Hardware Reset" mode resets the counter using an external pin (HR1 ~ HR6). The HR1 to HR6 pins can also be used as digital input.

The **PCIe-ENCODER600** also provides 8-ch digital outputs. 2500 Vrms photo-couplers are used to isolate the digital I/O to prevent high voltages from affecting the system. Device drivers and function libraries for DOS, Windows 7, and Windows XP/2000 are provided.

Specifications:

Model	PCIe-ENCODER600
General	
No. of Axes	6
Encoder Input	
Mode	Quadrant, CW/CCW, PULSE/DIR
Counting Rate	4 MHz (Max.)
Pulse Output	
Counter Width	32-bit
Digital Input	
Channels	6
Isolation	2500 Vrms optical isolation
Digital Output	
Channels	8
Isolation	2500 Vrms optical isolation
PC Bus	
Type	PCI Express x 1

Model	PCIe-ENCODER600
Software	
OS Support	Windows 7/10 32/64-bit Windows XP/2000 32-bit
SDK	DOS 6.2 , Linux 2.6 Labview 8.5 and above
Hardware	
Connector	68-pin SCSI-II female connector
Power	
Consumption	+12 V @ 200 mA, +3.3 V @ 500 mA
Mechanical	
Dimensions (mm)	120.4 mm x 90.8 mm
Environment	
Operating Temperature	0 ~ +60° C
Storage Temperature	-20 ~ +80° C
Humidity	5 ~ 85% RH, non-condensing

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PCI Bus, High-speed 2-axis Motion Control Card with FRnet Master



PISO-PS200

Features:

- Independent 2-axis motion control
- Support for hand wheel and jog functions
- 2-axis linear / 2-axis circular interpolation function
- Continuous interpolation function
- Programmable T/S-curve acceleration and deceleration
- A maximum of 4 MHz pulse output rate for each axis
- Pulse output types: CW/CCW or PULSE/DIR
- 32-bit encoder counter for each axis
- Encoder pulse input types: A/B phase or Up/Down
- Programmable automatic homing for each axis
- Programmable software limits
- Expandable Remote I/O:
  128 DI and 128 DO via a two-wire FRnet interface

Introduction:

The **PISO-PS200** is a 2-axis stepping/pulse-type servo motor control card that can be used on any IPC with a 5 V PCI bus, and is suitable for general-purpose motion control applications. This card equipped with one FRnet Master which allows the fast remote I/O of the IPC to be expanded easily. The two-wired FRnet interface allows a maximum 128 DI and 128 DO channels, which are automatically scanned within a period of 2.88 ms.

In addition to its wide speed range, this intelligent motion controller also has a variety of motion control functions built in, such as 2-axis linear interpolation, 2-axis circular interpolation, T/S-curve acceleration/deceleration, numerous synchronous actions, automatic homing, and others. A major advantage is that the majority of the PISO-PS200 motion control functions are performed by the high-performance motion ASIC with little load on the processor. The motion status, FRnet I/O, and the other I/O cards on the IPC can still be monitored while driving the motors.

As the low CPU loading requirements of the PISO-PS200 is minimal, one or more motion cards can be used with a single IPC. ICP DAS also provides a variety of functions and examples that can be used to reduce the need for additional programming, making it a highly cost-effective solution for motion control application developers.

Specifications:

Model	PISO-PS200
General	
Number of Axes	2
Slot Interface	5 V PCI bus
Pulse Output Rate	4 MHz (Max.)
Command Type	Pulse command
Resolution	32-bit
Pulse Output Mode	CW/CCW, PULSE/DIR
Operation Mode	Semi-closed Loop
Linear Interpolation	2 axes
Circular Interpolation	2 axes
Speed Curve Profile	T/S-curve
Synchronous Action	-
Ring Counter Mode	32-bit
Position Control Mode	Incremental mode
Position Compare Trigger	-
Encoder Interface	A/B pulse, Up/Down
Encoder Counter	32-bit

Model	PISO-PS200
Encoder Counting Rate	4 MHz (Max.)
I/O Isolation (with DN-8237)	2500 Vrms optical isolation
Connector	37-pin D-Sub
Motion Relative I/O	
Mechanical Switch Input	Home, LMT+/-, NHOME, EMG
Servo I/O Interface	Input: INP, ALM; Output: SVON
Digital Input	
Digital Input Channels	Local: 2 DI Expandable: 128 DI
Digital Output	
Digital Output Channels	Local: 2 DO Expandable: 128 DO
Power	
Power Consumption	+5 V @ 500 mA
Environmental	
Operating Temperature	-20 ~ +75°C
Storage Temperature	-30 ~ +85°C
Humidity	5 ~ 85% RH, Non-condensing

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PCI Bus, High-speed 4-axis Motion Control Card with FRnet Master



PISO-PS400



PISO-PS400U

Features:

- Independent 4-axis motion control
- Support for hand wheel and jog functions
- 2/3-axis linear / 2-axis circular interpolation function
- Continuous interpolation function
- Programmable T/S-curve acceleration and deceleration
- A maximum pulse output rate of 4 MHz for each axis
- Pulse output types: CW/CCW or PULSE/DIR
- 32-bit encoder counter for each axis
- Encoder pulse input types: A/B phase or Up/Down
- Programmable automatic homing for each axis
- Programmable software limits
- A wide range of synchronous actions (event-triggered actions)
- Expandable Remote I/O: 128 DI and 128 DO via a two-wire FRnet interface

Introduction:

The **PISO-PS400(U)** are 4-axis stepping/pulse-type servo motor control card that can be used on any IPC with PCI bus, and is suitable for general-purpose motion control applications. These card equipped with one FRnet Master which allows the fast remote I/O of the IPC to be expanded easily. The two-wired FRnet interface allows a maximum 128 DI and 128 DO channels, which are automatically scanned within a period of 2.88 ms.

In addition to its wide speed range, this intelligent motion controller also has a variety of motion control functions built in, such as 2/3-axis linear interpolation, 2-axis circular interpolation, T/S-curve acceleration/deceleration, numerous synchronous actions, automatic homing, and others. A major advantage is that the majority of the PS400 series motion control functions are performed by the high-performance motion ASIC with little load on the processor. The motion status, FRnet I/O, and the other I/O cards on the IPC can still be monitored while driving the motors.

As the low CPU loading requirements of the PS400 series is minimal, one or more motion cards can be used with a single IPC. ICP DAS also provides a variety of functions and examples that can be used to reduce the need for additional programming, making it a highly cost-effective solution for motion control application developers.

Specifications:

Model	PISO-PS400	PISO-PS400U
General		
Number of Axes	4	
Slot Interface	5 V PCI bus	3.3 V/5 V Universal PCI
Pulse Output Rate	4 MHz (Max.)	
Command Type	Pulse Command	
Resolution	32-bit	
Pulse Output Mode	CW/CCW, PULSE/DIR	
Operation Mode	Semi-closed Loop	
Linear Interpolation	Any 2 to 3 of 4 axes	
Circular Interpolation	Any 2 axes	
Speed Curve Profile	T/S-curve	
Synchronous Action	10 activation factors and 14 actions	
Ring Counter Mode	32-bit	
Position Control Mode	Incremental mode and Absolute mode	
Position Compare Trigger	10 KHz (X and Y only)	
Encoder Interface	A/B pulse, Up/Down	
Encoder Counter	32-bit	

Model	PISO-PS400	PISO-PS400U
Encoder Counting Rate	4 MHz (Max.)	
I/O Isolation (with DN-8468)	2500 Vrms optical isolation	
Connector	68-pin SCSI-II connector	
Motion Relative I/O		
Mechanical Switch Input	Home, LMT+/-, NHOME, EMG	
Servo I/O Interface	Input: INP, ALM; Output: SVON	
Digital Input		
Digital Input Channels	Local: 4 DI Expandable: 128 DI	
Digital Output		
Digital Output Channels	Expandable: 128 DO	
Power		
Power Consumption	+5 V @ 500 mA	
Environmental		
Operating Temperature	-20 ~ +75°C	
Storage Temperature	-30 ~ +85°C	
Humidity	5 ~ 85% RH, Non-condensing	

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PCI Bus, High-speed 4-axis Motion Control Card with FRnet Master



PISO-PS410

Features:

- Independent 4-axis motion control
- Support for hand wheel and jog functions
- 4-step home modes with auto-searching
- 2/3-axis linear interpolation function
- 2-axis circular interpolation function
- Programmable T/S-curve acceleration and deceleration
- Programmable ring counter
- Alarm reset and error counter clear output (ERC)
- High-speed auto incremental and auto reloadable output (CMP)
- Expandable Remote I/O:
  128 DI and 128 DO via a two-wire FRnet interface

Introduction:

The **PISO-PS410** is a 4-axis stepping/pulse-type servo motor control card that can be used on any IPC with a 5 V or 3.3 V PCI bus, and is suitable for general-purpose motion control applications. This card equipped with one FRnet Master which allows the fast remote I/O of the IPC to be expanded easily. The two-wired FRnet interface allows a maximum 128 DI and 128 DO channels, which are automatically scanned within a period of 0.72 ms.

In addition to its wide speed range, this intelligent motion controller also has a variety of motion control functions built in, such as 2/3-axis linear interpolation, 2-axis circular interpolation, T/S-curve acceleration/deceleration, numerous synchronous actions, automatic homing, and others. A major advantage is that the majority of the PISO-PS410 motion control functions are performed by the high-performance motion ASIC with little load on the processor. The motion status, FRnet I/O, and the other I/O cards on the IPC can still be monitored while driving the motors.

As the low CPU loading requirements of the PISO-PS410 is minimal, one or more motion cards can be used with a single IPC. ICP DAS also provides a variety of functions and examples that can be used to reduce the need for additional programming, making it a highly cost-effective solution for motion control application developers.

Specifications:

Model	PISO-PS410
General	
Number of Axes	4
Slot Interface	Universal PCI Bus
Pulse Output Rate	4 MHz (Max.)
Command Type	Pulse Command
Resolution	32-bit
Pulse Output Mode	CW/CCW, PULSE/DIR
Operation Mode	Semi-closed Loop
Linear Interpolation	Any 2 to 3 of 4 axes
Circular Interpolation	Any 2 axes
Speed Curve Profile	T/S-curve
Synchronous Action	10 activation factors and 14 actions
Ring Counter Mode	32-bit
Position Control Mode	Incremental mode and Absolute mode
Position Compare Trigger	4 MHz
Encoder Interface	A/B pulse, Up/Down
Encoder Counter	32-bit

Model	PISO-PS410
Encoder Counting Rate	4 MHz
I/O Isolation	2500 Vrms optical isolation
Connector	100-pin SCSI-II
Motion Relative I/O	
Mechanical Switch Input	Home, LMT+/-, NHOME, EMG
Servo I/O Interface	Input : INP, ALM Output: SVON, ALM_RST, ERC
Digital Input	
Digital Input Channels	Local: 4 DI Expandable: 128 DI
Digital Output	
Digital Output Channels	Local: 4 DO Expandable: 128 DO
Power	
Power Consumption	+5 V @ 500 mA
Environmental	
Operating Temperature	-20 ~ +75°C
Storage Temperature	-30 ~ +85°C
Humidity	5 ~ 85% RH, Non-condensing

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PCI Bus, High-speed DSP-based, 6-axis Motion Control Card with FRnet Master



PISO-PS600

Features:

- DSP-based motion control card with PCI interface
- Independent 6-axis motion control
- Support both full-closed and semi-closed control modes
- Pulse Output Rate: 4 MHz (Max.)
- Maximum Encoder input frequency: 12 MHz
- 4-step home mode with auto-searching
- 2- to 6-axis linear/2- to 3-axis circular interpolation function
- Programmable T/S-curve acceleration and deceleration
- Change speed and position on the fly
- High-speed position latch and compare trigger
- Fully-functional manual-pulse-generator and jog functions
- Expandable Remote I/O:
  128 DI and 128 DO via the two-wire FRnet interface

Introduction:

The **PISO-PS600** controller combines a new generation 1600 MIPS digital signal processor with a 9526 logic element FPGA (Field Programmable Gate Array), I/O buffering circuitry, and motion control characterization software to control the position of 6-axis pulse command servo/stepper motors. The PISO-PS600 not only realizes motion control using full-closed loop (or semi-closed loop) operations and error handling, but also adopts feed-forward gain to reduce the speed profile following errors to achieve position control.

The PISO-PS600 can be used on any IPC with a PCI bus, and is suitable for general-purpose motion control applications. This card also contains one FRnet port which allows the fast digital I/O of the IPC to be easily expanded. This two-wired FRnet interface allows a maximum 128 DI and 128 DO channels, which are automatically scanned within a period of 0.72 ms. In additions to its wide speed range, this intelligent motion controller also has a variety of built-in motion control functions, such as 2- to 6-axis linear interpolation, 2- to 3-axis circular interpolation, T/S-curve acceleration/deceleration, and automatic homing, etc.

Specifications:

Model	PISO-PS600
General	
Number of Axes	6
Slot Interface	Universal PCI Bus
Pulse Output Rate	4 MHz (Max.)
Command Type	Pulse Command
Servo Update Rate	2 KHz
Pulse Output Mode	CW/CCW, PULSE/DIR
Operation Mode	Full-closed Loop/ Semi-closed Loop
Linear Interpolation	Any 2 to 6 of 6 axes
Circular Interpolation	Any 2 to 3 of 6 axes
Helical Interpolation	Any 3 of 6 axes
Speed Curve Profile	T/S-curve
Ring Counter Mode	32-bit
Position Control Mode	Incremental mode and Absolute mode
Position Compare Trigger	4 MHz
Encoder Interface	A/B pulse, Up/Down
Encoder Counter	32-bit
Encoder Counting Rate	12 MHz (Max.)

Model	PISO-PS600
I/O Isolation (with DN-8368)	2500 Vrms optical isolation
Connector	68-pin VHDCI Connector and 20-pin SCSI-II
Motion Relative I/O	
Mechanical Switch Input	Home, LMT+/-, NHOME, LTC, EMG
Servo I/O Interface	Input: INP, ALM, RDY Output: SVON, ALM_RST, ERC
Digital Input	
Digital Input Channels	Local: 12 DI Expandable: 128 DI
Digital Output	
Digital Output Channels	Local: 3 DO Expandable: 128 DO
Power	
Power Consumption	+5 V @ 500 mA
Environmental	
Operating Temperature	0 ~ +60 °C
Storage Temperature	-20 ~ +80 °C
Humidity	5 ~ 85% RH, Non-condensing

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PCI Bus, High-speed 8-axis Motion Control Card with FRnet Master



PISO-PS810

Features:

- Independent 8-axis motion control
- Support for hand wheel and jog functions
- 4-step home modes with auto-searching
- 2/3-axis linear interpolation function
- 2-axis circular interpolation function
- Programmable T/S-curve acceleration and deceleration
- Programmable ring counter
- Alarm reset and error counter clear output (ERC)
- High-speed auto-incremental and auto-reloadable compare output (CMP)
- Expandable Remote I/O:
  128 DI and 128 DO via a two-wire FRnet interface

Introduction:

The **PISO-PS810** is a 8-axis stepping/pulse-type servo motor control card that can be used on any IPC with a 5 V or 3.3 V PCI bus, and is suitable for general-purpose motion applications. This card equipped with one FRnet Master which allows the fast remote I/O of the IPC to be expanded easily. The two-wired FRnet interface allows a maximum 128 DI and 128 DO channels, which are automatically scanned within a period of 0.72 ms.

In addition to its wide speed range, this intelligent motion controller also has a variety of motion control functions built in, such as 2/3-axis linear interpolation, 2-axis circular interpolation, T/S-curve acceleration/deceleration, numerous synchronous actions, automatic homing, and others. A major advantage is that the majority of the PISO-PS810 motion control functions are performed by the high-performance motion ASIC with little load on the processor. The motion status, FRnet I/O, and the other I/O cards on the IPC can still be monitored while driving the motors.

As the low CPU loading requirements of the PISO-PS810 is minimal, one or more motion cards can be used with a single IPC. ICP DAS also provides a variety of functions and examples that can be used to reduce the need for additional programming, making it a highly cost-effective solution for motion control application developers.

Specifications:

Model	PISO-PS810
General	
Number of Axes	8
Slot Interface	Universal PCI Bus
Pulse Output Rate	4 MHz (Max.)
Command Type	Pulse Command
Resolution	32-bit
Pulse Output Mode	CW/CCW, PULSE/DIR
Operation Mode	Semi-closed Loop
Linear Interpolation	2 groups of 2 to 3 axes Interpolation
Circular Interpolation	2 groups of 2 axes Interpolation
Speed Curve Profile	T/S-curve
Synchronous Action	10 activation factors and 14 actions
Ring Counter Mode	32-bit
Position Control Mode	Incremental mode and Absolute mode
Position Compare Trigger	4 MHz
Encoder Interface	A/B pulse, Up/Down
Encoder Counter	32-bit

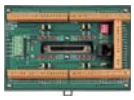
Model	PISO-PS810
Encoder Counting Rate	4 MHz (Max.)
I/O Isolation	2500 Vrms optical isolation
Connector	100-pin VHDCI
Motion Relative I/O	
Mechanical Switch Input	Home, LMT+/-, NHOME, EMG
Servo I/O Interface	Input: INP, ALM Output: SVON, ALM_RST, ERC
Digital Input	
Digital Input Channels	Local: 8 DI Expandable: 128 DI
Digital Output	
Digital Output Channels	Local: 8 DO Expandable: 128 DO
Power	
Power Consumption	+5 V @ 500 mA
Environmental	
Operating Temperature	-20 ~ +75°C
Storage Temperature	-30 ~ +85°C
Humidity	5 ~ 85% RH, Non-condensing

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Ordering Information:

PISO-PS200	PCI Bus, High-speed 2-axis Motion Control Card with FRnet Master
PISO-PS400	PCI Bus, High-speed 4-axis Motion Control Card with FRnet Master
PISO-PS400U	Universal PCI Bus, High-speed 4-axis Motion Control Card with FRnet Master
PCIe-PS400 CR	PCI Express Bus, High-speed 4-axis Motion Control Card (RoHS)
PISO-PS410	PCI Bus, High-speed 4-axis Motion Control Card with FRnet Master
PISO-PS600	PCI Bus, High-Speed, DSP-based, 6-axis Motion Control Card with FRnet Master
PISO-PS810 CR	PCI Bus, High-speed 8-axis Motion Control Card with FRnet Master (RoHS)

Terminal Boards / Accessories:



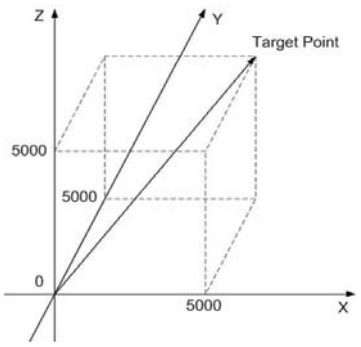

PISO-PS200	DN-8237UB	Photo-isolated Universal Snap-on Wiring Terminal Board
	DN-8237GB	Photo-isolated General Purpose Wiring Terminal Board
	DN-8237MB	Photo-isolated Snap-on Wiring Terminal Board for Mitsubishi MELSERVO-J2 Servo Amplifier
	DN-8237PB	Photo-isolated Snap-on Wiring Terminal Board for Panasonic MINAS A4/A5 Servo Amplifier
	DN-8237YB	Photo-isolated Snap-on Wiring Terminal Board for Yaskawa Sigma II/III/V Servo Amplifier
	DN-8237DB	Photo-isolated Snap-on Wiring Terminal Board for Delta ASDA-A Servo Amplifier
	CA-3715DM-H CA-3730DM-H CA-3750DM-H	37-pin D-Sub Male-Male Cable for Terminal Board (180º) Length 1.5 M / 3.0 M / 5.0 M.
PISO-PS400(U) PCIe-PS400	DN-8468UB	Photo-isolated Universal Snap-on Wiring Terminal Board
	DN-8468GB	Photo-isolated General Purpose Wiring Terminal Board
	DN-8468MB	Photo-isolated Snap-on Wiring Terminal Board for Mitsubishi MELSERVO-J2 Servo Amplifier
	DN-8468PB	Photo-isolated Snap-on Wiring Terminal Board for Panasonic MINAS A4/A5 Servo Amplifier
	DN-8468YB	Photo-isolated Snap-on Wiring Terminal Board for Yaskawa Sigma II/III/V Servo Amplifier
	DN-8468DB	Photo-isolated Snap-on Wiring Terminal Board for Delta ASDA-A Servo Amplifier
	DN-8468FB	Photo-isolated Snap-on Wiring Terminal Board for Fuji FALDIC-W Servo Amplifier
	CA-SCSI15-H3 CA-SCSI30-H3 CA-SCSI50-H2	68-pin SCSI-II Male-Male Connector Cable, Length 1.5 M / 3 M / 5 M
PISO-PS410	DN-84100U	Universal Snap-on Wiring Terminal Board for PISO-PS410 and PISO-PS810
	CA-SCSI100-15	SCSI-II 100-pin & 100-pin Male Connector Cable, Length 1.5 M
PISO-PS600	DN-8368UB	Photo-isolated Universal Snap-on wiring terminal board
	DN-8368GB	Photo-isolated General-purpose wiring terminal board
	DN-8368MB	Photo-isolated Snap-on wiring terminal board for Mitsubishi MELSERVO-J2 servo Amplifier
	DN-20M	Manual-Pulse-Generator (MPG) and FRnet Input Board for PISO-PS600/VS600/PMDK (RoHS)
	CA-MINI68-15	68-pin VHDCI to SCSI-II Connector Cable, Length 1.5 M
	CA-SCSI20-M1 CA-SCSI20-M3 CA-SCSI20-M5	20-pin SCSI-II Male connector cable (for Mitsubishi J2 series motor), Length 1 M / 3 M / 5 M
PISO-PS810	DN-84100U	Universal Snap-on Wiring Terminal Board for PISO-PS410 and PISO-PS810
	CA-MINI100-15	100-pin VHDCI to SCSI-II Connector Cable, Length 1.5 M

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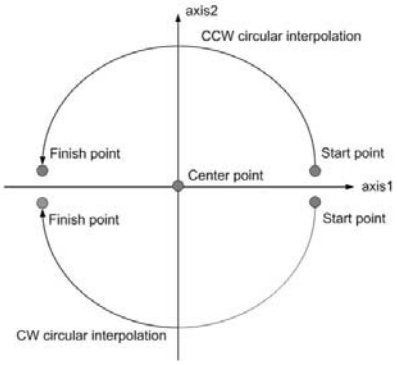
Features of Motion Function:

Motion product	Features of Motion Function					
Model	1. Linear	2. Circular	3. Continuous	4. Steps Automatic Home Searching	5. High Speed Position Compare	6. Huge Command Buffer and Real Time Coordinate Transformation Suitable for Robotic Control
	Interpolation					
PC-based Motion Control Cards						
PISO-PS200	2-axis	2-axis	Equal vector speed	Yes	-	-
PISO-PS400(U)	3-axis				Yes	
PCIe-PS400						
PISO-PS410						
PISO-PS600	6-axis	3-axis	With acceeration and deceleration			Yes
PISO-PS810	2 groups of 2 to 3 axes Interpolation	2 groups of 2 axes Interpolation	Equal vector speed			-

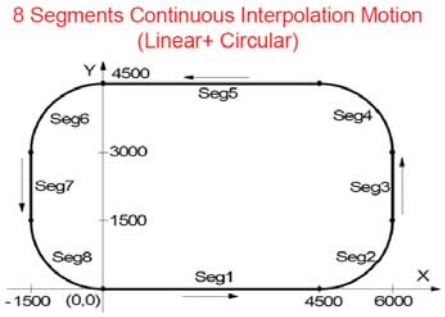
1. Linear Interpolation



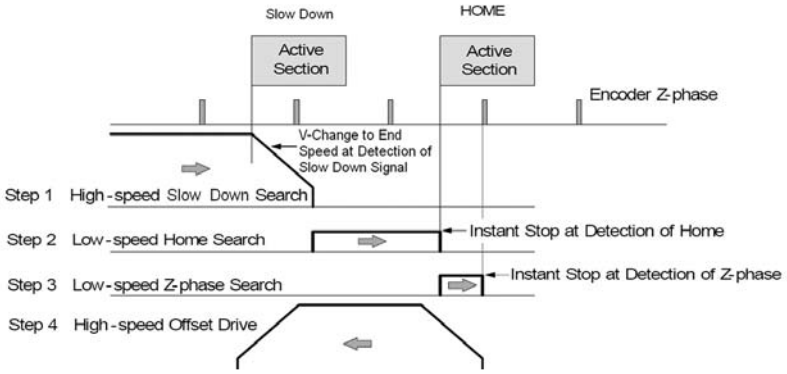
2. Circular Interpolation



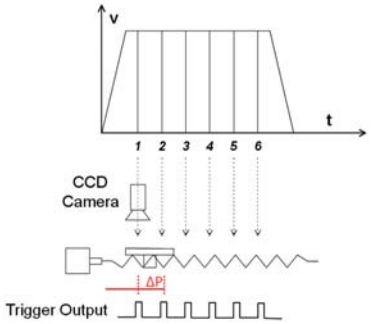
3. Continuous Interpolation



4.Steps Automatic Home Searching



5. High Speed Position Compare



6. Huge Command Buffer and Real Time Coordinate Transformation Suitable for Robotic Control



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PCI Bus, DSP-based Professional Motion Development Kit



PMDK

Features:

- DSP-based control card with PCI interface
- Capable of 6-axis motion control
- Pulse Output Rate: 4 MHz (Max.)
- Maximum Encoder Input Frequency: 12 Mpps
- High-speed position latching and comparing functions
- Home, positive and negative limit sensors for each axis
- Manual-pulse-generator (MPG) interface
- Expandable Remote I/O:
  128 DI & 128 DO via a two-wire FRnet interface

Introduction:

The **PMDK** is a DSP-based PCI motion control card suitable for the development of professional motion control applications, and can be used with any IPC that has a 5 V PCI bus. A wide range of applications can be implemented thanks to the integration of a high-speed DSP (TI C672x), an FPGA (Field Programmable Gate Array), and I/O buffering circuitry. A diverse array of I/O interfaces are incorporated into the PMDK, including 6 channels for pulse I/O, 6 channels for AI/AO and a variety of DI/DO channels. The card also includes a single two-wire FRnet port that can be used to remotely control up to 128 DI and 128 DO channels, which, together with the numerous software samples that are provided, allows the rapid development of custom programs.

The PMDK enables users to implement a variety of cost-effective motion control functions, including multi-axis linear and circular interpolation with acceleration/deceleration processing. A variety of synchronous actions are also possible through programming. The included sample software can be used to design custom motion functions which can then be appended to the original motion command set. DSP programs are developed based on a real-time kernel (DSP/BIOS), meaning that motion status, FRnet I/O status and the status of other I/O interfaces can still be monitored while driving operations are being performed, and, as the loading on the CPU is very low, one or more motion cards can be used on a single IPC.

If the PMDK is to be used for signal processing, users can refer to a range of samples provided by ICP DAS illustrating how to implement FFT, FIR and IIR, together with the resources provided by TI. In the future, ICP DAS will be providing a wider library of functions and examples that will further reduce the level of programming required by users in order to implement their custom applications. In summary, the PMDK is a highly cost-effective solution for users intending to develop custom applications for motion control, process control, I/O logic control, digital processing, and applications in a wide range of other domains.

Specifications:

Model	PMDK
Number of Axes	6
Slot Interface	Universal PCI Bus
Pulse Output Rate	4 MHz (Max.)
Command Type	Pulse command, V command
Resolution	32-bit
Servo Update Rate	User Programmable
Pulse Output Mode	CW/CCW, PULSE/DIR
Position Compare Trigger	User Programmable
Encoder Interface	A/B pulse, Up/Down
Encoder Counter	32-bit
Encoder Counting Rate	12 MHz
I/O Isolation (with DN-8368)	2500 Vrms optical isolation
Connector	68-pin SCSI-II connector & 20-pin SCSI-II
Motion Relative I/O	
Mechanical Switch Input	Home, LMT+/-, NHOME, LTC, EMG
Servo I/O Interface	Input: INP, ALM, RDY Output: SVON, ALM_RST, ERC
Digital Input Channels	Expandable: 128 DI
Digital Output Channels	Expandable: 128 DO
Power	
Power Consumption	1.5 A
Environmental	
Operating Temperature	-20 ~ +75°C
Storage Temperature	-30 ~ +85°C
Humidity	5 ~ 85% RH, Non-condensing

Terminal Boards/Accessories:

PMDK	DN-8368UB	Photo-isolated Universal Snap-on Wiring Terminal Board
	DN-8368GB	Photo-isolated General Purpose Wiring Terminal Boar
	DN-8368MB	Photo-isolated Snap-on Wiring Terminal Board for Mitsubishi MELSERVO-J2 Servo Amplifier
	DN-20M	Manual-Pulse-Generator (MPG) and FRnet Input Board for PMDK/VS600/PMDK
	CA-MINI68-15	68-pin VHDCI to SCSI-II Connector Cable, Length 1.5 M
	CA-SCSI20-M1/CA-SCSI20-M3/ CA-SCSI20-M5	20-pin SCSI-II Male Connector Cable for Mitsubishi J2 Series Motor, Length 1 M/3M/5M
	CA-2P4C-0100	The Cable for FRnet Modules, Length 100 M

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PCI Bus,Encoder Input Card



PISO-ENCODER300U
(3-axis)



PISO-ENCODER600U
(6-axis)

Features:

- Universal PCI bus
- 3-axis/6-axis encoder counter
- True 32-bit counter
- Encoder Counting Rate: 4 MHz (Max.)
- Third-order internal digital filter
- Counting Mode: Quadrant, CW/CCW, PULSE/DIR
- A+, A-, B+, B-, C+, C- inputs
- Programmable reset counter function
- Index (C channel) reset counter function
- Hardware reset (HR1 ~ HR6), reset counter function

Introduction:

PISO-ENCODER300U is a 3-axis encoder counter and **PISO-ENCODER600U** is a 6-axis encoder counter and each axis has a 32-bit, true counter with a Encoder Counting Rate of 4 MHz (Max.). The counting mode can be selected from three types: 1. Quadrant mode, 2. CW/CCW mode, and 3. PULSE/DIR mode.

There are also three 3 kinds of counter reset modes provided: 1. Register Reset, 2. Index Reset, and 3. Hardware Reset.The "Index Reset" mode resets by using a C+/C- channel, which will reset the counter on each revolution. The "Hardware Reset" mode resets the counter using an external pin (HR1 ~ HR6). The HR1 ~ HR6 pins can also be used as digital input.

provides 8-ch digital outputs. 2500Vrms photo-couplers are used to isolate the digital I/O to preventhigh voltages from affecting the system. Device drivers andfunction libraries for DOS, Windows 7/10 and Windows XP/2000 are provided.

Selection Guide:

Model	PISO-ENCODER300U	PISO-ENCODER600U
Number of Axes	3	6
Slot Interface	Universal PCI bus	
Resolution	32-bit	
Encoder Interface	Quadrant , CW/CCW , PULSE/DIR	
Encoder Counting Rate	4 MHz (Max.)	
I/O Isolation	2500 Vrms optical isolation	
Connector	68-pin SCSI-II female connector	
Digital Output Channels	8	
Power Consumption	+5 V @ 950 mA	
Environmental		
Operating Temperature Storage Temperature	0 ~ +60°C / -20 ~ +80°C	
Humidity	5 ~ 85% RH, Non-condensing	
Dimensions	120.4 mm x 90.8 mm	
Software Support		
Windows Drivers/DLL/lib	Windows 7/10 32/64-bit Windows XP/2000 32-bit	
DOS Library	DOS 6.2	
Labview Development Kit	Labview 8.5 and above	
Linux Library	Linux 2.6	

Ordering Information:

PISO-ENCODER300U CR	Universal PCI Bus 3-axis Encoder Input Card (RoHS) Includes: CA-SC68, SCSI-II 68-pin Male Connector (Solder Type) with Cover
PISO-ENCODER600U CR	Universal PCI Bus 6-axis Encoder Input Card (RoHS) Includes: CA-SC68, SCSI-II 68-pin Male Connector (Solder Type) with Cover

Terminal Boards/Accessories:

PISO-ENCODER300U **PISO-ENCODER600U**	DN-68	Encoder Input Board for PISO-ENCODER300U/PISO-ENCODER600U

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PCI Bus,Stepper Motor/Servo Control Card (Limited Functions)

(Limited Functions and Economical Not Recommended for New Design)



PISO-PS300U

(3-axis)

Features:

- Universal PCI Bus
- 3-axis pulse command servo motor board
- Embedded CPU
- Max. Pulse Rate: 1 MHz
- 3-axis linear interpolation, circular interpolatio
- Programmable trapezoidal speed profile
- Programmable DDA cycle
- Hardware emergency stop
- Drivers for DOS, Windows XP/2000 and Windows 7
- 8 DI, 7 DO channels

Introduction:

PISO-PS300U is a 3-axis pulse command, servo motor control board. The embedded CPU of the PISO-PS300U performs the motion commands transferred from a Host PC via a 2 KB FIFO buffer. It also sends the position and status to the Host PC via a second 2 KB FIFO buffer. These buffers provide time buffer and they are very suitable for Windows operating systems. Device drivers and function libraries for DOS, Windows 7 and Windows XP/2000 are provided.

Selection Guide:

Model	PISO-PS300U
Number of Axes	3
Slot Interface	Universal PCI bus
Pulse Output Rate	1 MHz (Max.)
Command Type	Pulse Command
Resolution	32-bit
Pulse Output Mode	CW/CCW,PULSE/DIR
Operation Mode	Semi-closed Loop
Linear Interpolation	Any 2 to 3 of 3 axes
Circular Interpolation	Any 2 axes
Speed Curve Profile	T-curve
Synchronous Action	-
Ring Counter Mode	-
Position Control Mode	Incremental mode
Position Compare Trigger	-
Encoder Interface	A/B phase, CW/CCW, PULSE/DIR
Encoder Counter	32-bit

Model	PISO-PS300U
Counting Rate	1 MHz (Max.)
I/O Isolation	2500 Vrms optical isolation
Connector	9-pin male and 25-pin female D-Sub
Motion Relative I/O	
Mechanical Switch Input	Home, forward, backward limit, EMG
Servo I/O Interface	Input : - Output: SVON
Digital Input Channels	8
Digital Output Channels	7
Power	
Power Consumption	+5 V @ 950 mA
Software Support	
Windows Driver/DLL/Lib	Windows 7/XP/2000 32-bit only
DOS Library	DOS 6.2

Ordering Information:

PISO-PS300U CR	Universal PCI Bus, 3-axis Stepper Motor/Servo Control Card (Limited Functions and Economical) Includes: CA-9-2502 (9-pin Male and 25-pin Female D-Sub Cable, Length 0.2 M) CA-PC09F (9-pin Female D-Sub Connector with Plastic Cover) CA-PC09M (9-pin Male D-Sub Connector with Plastic Cover) CA-PC25M (25-pin Male D-Sub Connector with Plastic Cover)

Terminal Boards/Accessories:

PISO-PS300U	DB-8R	Relay Board for PISO-PS300U

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6. PAC Motion Control Modules Solutions

Programmable automatic controller (PAC) is the hardware core of PC-based control technology. ICP DAS provides PACs suitable for any motion control application. These PCs are based on open standards, so that a single configuration can meet a wide range of control requirements.

Whether it is used in the form of compact embedded PAC for DIN rail installation, control cabinet PAC, ICP DAS' internal motherboard development can quickly respond to IT trends and customer specific requirements.



EtherCAT EMP-9000 series Motion PAC



- Up to Inetl i5 CPU
- Anti-noise metal housing
- EtherCAT/Ethernet/RS-232/422/485
- Expandable FRnet communication
- Up to 3 I/O expansion slots
- OS: Windows 10 IoT
- Standard Edition/WinGRAF PLC Edition

High-speed XP-9000 series Motion PAC



- Up to Intel Atom E3845 CPU
- Anti-noise metal housing
- EtherCAT/Ethernet/RS-232/422/485
- Expandable FRnet communication
- Up to 7 I/O expansion slots
- OS: Windows 10 IoT/WES7
- Standard Edition/WinGRAF PLC/Indusoft Edition

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+886-3-597-3366 info@icpdas.com / sales@icpdas.com

Motion Control Modules



Model	Encoder Input					Compare Trigger Output	
	Axis	Counter	Counting Rate (cps)	Signal	Hardware Latch/Reset	Channels	Type
I-9093	3	32-bit	6 M (CW/CCW, Pulse/Dir) 2 M (A/B)	CW/CCW, Pulse/Dir, A/B	3	3	Open collector

Model	Encoder Input				Command Pulse Output			
	Axis	Counter	Counting Rate (cps)	Signal	Axis	Speed (pps)	Counter	Signal
I-9094F	4	32-bit	4 M	CW/CCW, A/B	4	4 M	32-bit	CW/CCW, Pulse/Dir
I-9196F	6		12 M		6			CW/CCW, Pulse/Dir, A/B

Analog Input Modules



Model	Analog Input		
	Channels	Input Range	Sensor
I-9012	8	±5 V, ±10 V	-
I-9014	8/16	±10 V, ±5 V, ±2.5 V, ±1.25 V, ±20 mA (Optional external 125 Ω resistor)	
I-9014C	8	±20 mA (Internal 125 Ω resistor)	
I-97015	8	-	Pt100, Pt1000, Ni100, Ni120, Cu50, Cu100, Cu1000
I-9017Z	10/20	±150 mV, ±500 mV, ±1 V, ±5 V, ±10 V, 0 ~ 20 mA, 4 ~ 20 mA, ±20 mA (Jumper selectable)	-
I-9017	8/16	±10 V, ±5 V, ±2.5 V, ±1.25 V, ±20 mA (Optional external 125 Ω resistor)	
I-9017-15	15/30		
I-9017C-15	15	±20 mA (Internal 125 Ω resistor)	
I-97018	8	±2.5 V , ±1 V, ±500 mV, ±100 mV, ±50 mV, ±15 mV, ±20 mA, 0 ~ 20 mA, 4 ~ 20 mA (Jumper selectable)	Thermocouple: J, K, T, E, R, S, B, N, C, L, M, $L_{DIN43710}$
I-97019	8	±15 mV, ±50 mV, ±100 mV, ±150 mV, ±500 mV, ±1 V, ±2.5 V, ±5 V, ±10 V, 0 ~ 20 mA, 4 ~ 20 mA, ±20 mA (Jumper selectable)	

Analog Output Modules



Model	Analog Outputs			
	Channels	Resolution	Output Range	Wiring Current Output
I-9024	4	14-bit	±10 V, 0 ~ 20 mA	Sink
I-9024U		16-bit	0 ~ 5 V, ±5 V, 0 ~ 10 V, ±10 V, 0 ~ 20 mA, 4 ~ 20 mA	Source
I-97024U				
I-9028U	8	16-bit	0 ~ 5 V, ±5 V, 0 ~ 10 V, ±10 V, 0 ~ 20 mA, 4 ~ 20 mA	Source
I-97028U				

Digital Modules



Model	Digital Input			Digital Output			
	Channels	Sink/Source	ON Voltage Level	Channels	Type	Sink/Source	Max. Load
I-9037P	-	-	-	15	Open Collector	Source	700 mA/Channel
I-9040P	32	Sink/Source	19 ~ 30 VDC	-	-	-	-
I-9041P	-	-	-	32	Open Collector	Sink	100 mA/Channel
I-9048	8	Sink/Source with Interrupt	+4 V ~ +30 V	-	-	-	-
I-9053P	16	Sink/Source	19 ~ 30 VDC	-	-	-	-
I-9057P	-	-	-	16	Open Collector	Sink	200 mA/Channel
I-9064	-	-	-	8	Power Relay	Form A	5 A/Channel

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High-speed motion controller

The 9000 series is a compact (3U), solid high-speed motion controller by ICP DAS. In addition to adopting a metal shell design to obtain better anti-interference ability, it also provides more CPU, OS and software development tools. , So that customers can choose an appropriate controller for different needs.

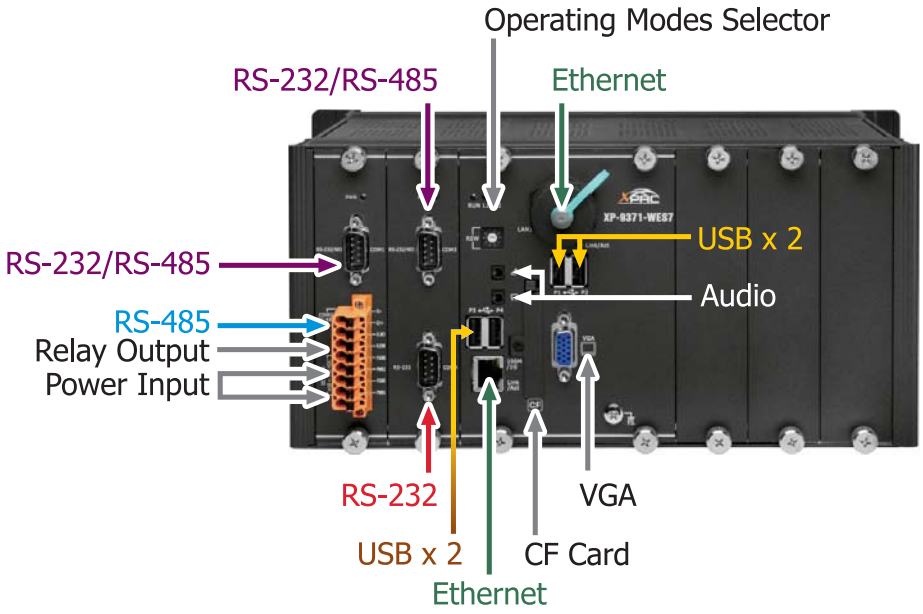


Features

- All metal shell enhances anti-interference ability
- 3U size rack design
- Up to 7 I/O modules can be expanded
- Diversified communication interfaces (Ethernet, RS-232/RS-485, FRnet)
- Diversified software support eLogger HMI/Indusoft/ Win-GRAF

Application Field

- Factory automation
- Building automation
- Equipment automation
- Laboratory automation
- chemical industry
- Environmental monitoring
- M2M
- IIoT
- Industry 4.0



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XP-9 X X X - OS

Number of I/O slots:
1/3/7

CPU
8: E3845
9: E3950

IoT
Win10 IoT Enterprise
WES7
Windows Embedded Standard 7

XP-9000-IoT has a built-in Windows 10 IoT Enterprise operating system, which can support Universal Windows App and traditional Windows applications at the same time. For software development tools, it can maintain maximum sharing with Window 10, and applications can be quickly ported to XP- On the 9000-IoT, it is used in a variety of harsh environments.

Model	CPU	RAM	Flash	Expansion Memory	I/O Slot
XP-9171-WES7	E3827 (1.75 GHz, 2C2T)	2 GB	32 GB (mSATA)	16 GB CF	1
XP-9371-WES7					3
XP-9771-WES7					7
XP-9181-IoT	E3845 (1.91 GHz, 4C4T)	4 GB	64 GB (mSATA)	32 GB CF	1
XP-9381-IoT					3
XP-9781-IoT					7
XP-9191-IoT	E3950 (1.6 GHz, 4C4T)	8 GB			1
XP-9391-IoT					3
XP-9791-IoT					7

WP-9 X X X - CE7

Number of I/O slots:
2/4/8

CPU
2: AM3354
6: i.MX6Quad

Software
1: standard
8: Win-GRAF
9: Indusoft

WP-9000 built-in Windows CE 7.0 operating system and built-in commonly used MS software, such as FTP server, HTTP server, ASP (Java/VB script), SQL Server embedded 3.5 and compact .NET Framework 3.5, and supports a wealth of software Development method: VB.Net2005/2008, Visual C#.NET 2005/2008, Win-GRAF, InduSoft. In addition to the small core of Windows CE 7.0, its hardware real-time (Hard Real-time) and deeper interrupt processing capabilities are very suitable for more stable control.

Model	CPU	RAM	Flash	Expansion Memory	I/O Slot
WP-9221-CE7	AM 3354 (1.0 GHz, single-core)	512 MB	256 MB	4 GB microSD	2
WP-9421-CE7					4
WP-9821-CE7					8
WP-9261-CE7	i.MX6Quad (1.2 GHz, quad-core)	1 GB	8 GB		2
WP-9461-CE7					4
WP-9861-CE7					8

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High Speed Motion Control Module



I-8092F
High-speed 2-axis (with FRnet Master)

I-8094/I-9094
High-speed 4-axis

I-8094A
High-speed 4-axis (with Internal CPU)

I-8094F/I-9094F
High-speed 4-axis (with FRnet Master)

I-8094H
High-speed 4-axis (with Internal CPU, Rnet Master)

I-8196F/I-9196F
High-speed DSP-based 6-axis (with FRnet Master)

Selection Guide:

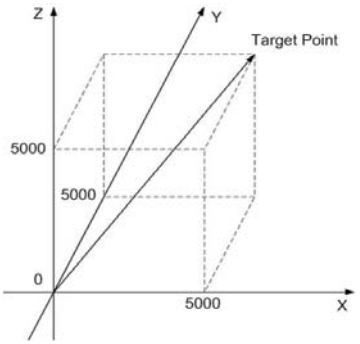
Model	I-8092F	I-8094/I-9094, I-8094A	I-8094F/I-9094F, I-8094H	I-8196F/I-9196F
Pulse Output				
Number of Axes	2	4		6
Pulse Output Rate	4 MHz (Max.)			
Pulse Output Mode	CW/CCW, PULSE/DIR			CW/CCW, PULSE/DIR, A/B pulse
Command Type	Pulse command			
Resolution	32-bit			
Operation Mode	Semi-closed Loop			
Linear Interpolation	2 axes	Any 2 to 3 of 4 axes		Any 2- to 6-axis
Circular Interpolation	2 axes	Any 2 axes		Any 2- or 3-axis
Helical Interpolation	-			Any 2- or 3-axis
Speed Curve Profile	T/S-curve			
Synchronous Action	-	10 activation factors and 14 actions		-
Position Control Mode	Incremental mode	Incremental mode and absolute mode		Relative and absolute position
Position Compare Trigger	-	10 KHz		4 MHz
I/O Isolation	2500 Vrms optical isolation (with DN-8237)	2500 Vrms optical isolation (With DN-8468)		2500 Vrms optical isolation (with DN-8368)
Connector	37-pin D-Sub	68-pin SCSI-II connector		68-pin VHDCI connector and 20-pin SCSI-II
Motion Relative I/O				
Mechanical Switch Input	Home, LMT+/-, NHOME, EMG, INP, ALM, SVON			Home, LMT+/-, NHOME, LTC, EMG
Servo I/O Interface				Input : INP, ALM, RDY Output : SVON, ALM_RST, ERC
Digital Input				
Digital Input Channels	Expandable: 128 DI	-	Expandable: 128 DI	Local: 12 DI Expandable: 128 DI
Digital Output				
Digital Output Channels	Expandable: 128 DO	-	Expandable: 128 DO	Local: 3 DO Expandable: 128 DO
Encoder Input				
Ring Counter Mode	32-bit			
Encoder Counter	32-bit			
Encoder Interface	A/B pulse, Up/Down			
Encoder Counting Rate	4 MHz (Max.)			12 MHz (Max.)

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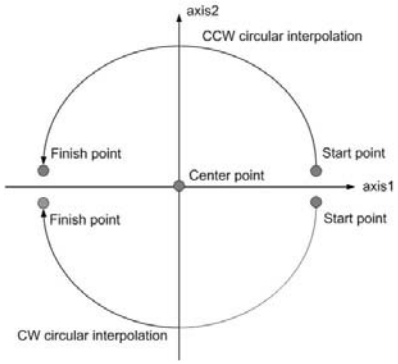
Features of Motion Function:

Motion Products	Features of Motion Functions					
Model	1. Linear	2. Circular	3. Continuous Interpolation	4. Four Steps Automatic Home Searching	5. High Speed Position Compare	6. Huge Command Buffer and Real Time Coordinate Transformation Suitable for Robotic Control
Motion Control Modules for PAC						
I-8092F	2-axis	2-axis	Constant Vector Speed	Yes	-	-
I-8094	3-axis				Yes	
I-8094F						
I-8196F	6-axis	3-axis	With Acc. and Dec.			Yes
I-9196F						

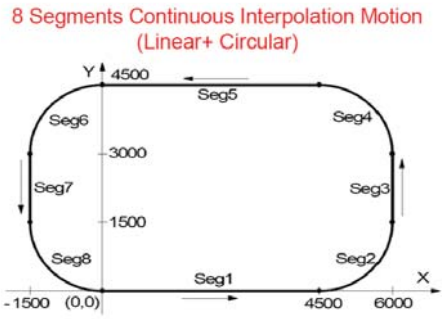
1. Linear Interpolation



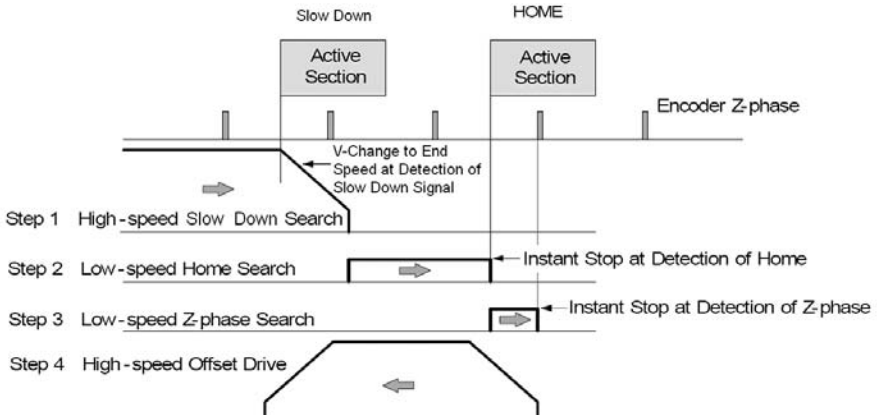
2. Circular Interpolation



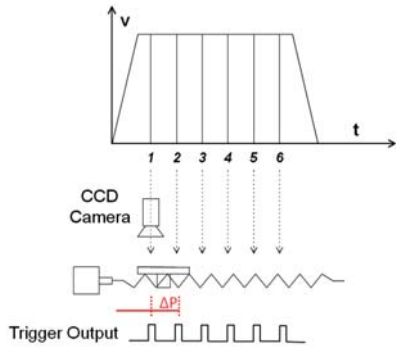
3. Continuous Interpolation



4. Four Steps Automatic Home Searching



5. High Speed Position Compare



6. Huge Command Buffer and Real Time Coordinate Transformation Suitable for Robotic Control



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High-Speed Encoder Module



I-8093W

High-speed 3-axis Encoder Module



I-9093

High-speed 3-axis Encoder Module (with Compare Trigger Output)

Selection Guide:

Model	I-8093W	I-9093
Encoder Input		
Input Axis	3-axis	3-axis
Encoder Counter	32-bit	32-bit
Counting Mode	1. Quadrant Counting 2. CW/CCW 3. Pulse/Dir	1. Quadrant 2. CW/CCW 3. Pulse/Dir
Maximum Counting Rate	1. Quadrant Counting : 1 MHz 2. CW/CCW : 4 MHz 3. Pulse/Dir : 4 MHz	1. Quadrant : 2 MHz 2. CW/CCW : 6 MHz 3. Pulse/Dir : 6 MHz
Compare Trigger Output	-	3 (open collector)
Display		
Power LED Indicator	1	1
Status LED Indicator	9	12
Isolation		
Intra-module Isolation, Field to Logic	2500 Vrms	3000 Vrms
ESD Protection (IEC 61000-4-2)	4 KV Contact for each channel	±4 kV Contact for Each Terminal ±8 kV Air for Random Point
Power		
Power Consumption	2 W Max	
Mechanical		
Dimensions (W x L x H)	30 mm x 102 mm x 115 mm	134 mm X 30.3 mm X 144 mm
Environment		
Operating Temperature	-25 ~ 75 °C	
Storage Temperature	-30 ~ 85 °C	
Humidity	5 ~ 95 % RH, Non-condensing	

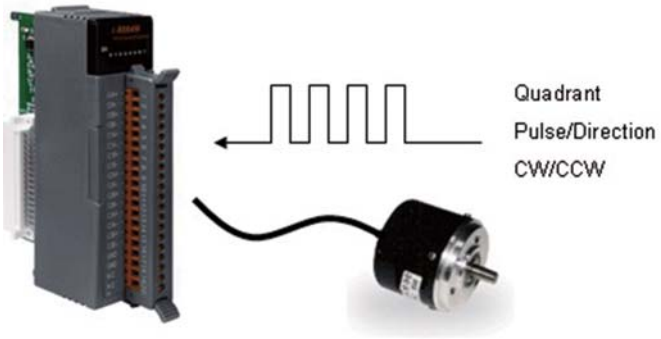
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Applications:

• Position Measure of Motion System

The I-8093W is a **3-axis** high speed encoder module. Its each axis can be independently configured as one of Quadrant, Pulse/Direction or CW/CCW input mode. The maximum input rate for Quadrant mode is 1 MHz, and for Pulse/Direction and CW/CCW modes is 4 MHz.

The high-end specifications of I-8093W and complete software support make it ideal for wide range applications in position measurement of motion systems for industrial and laboratory environment.



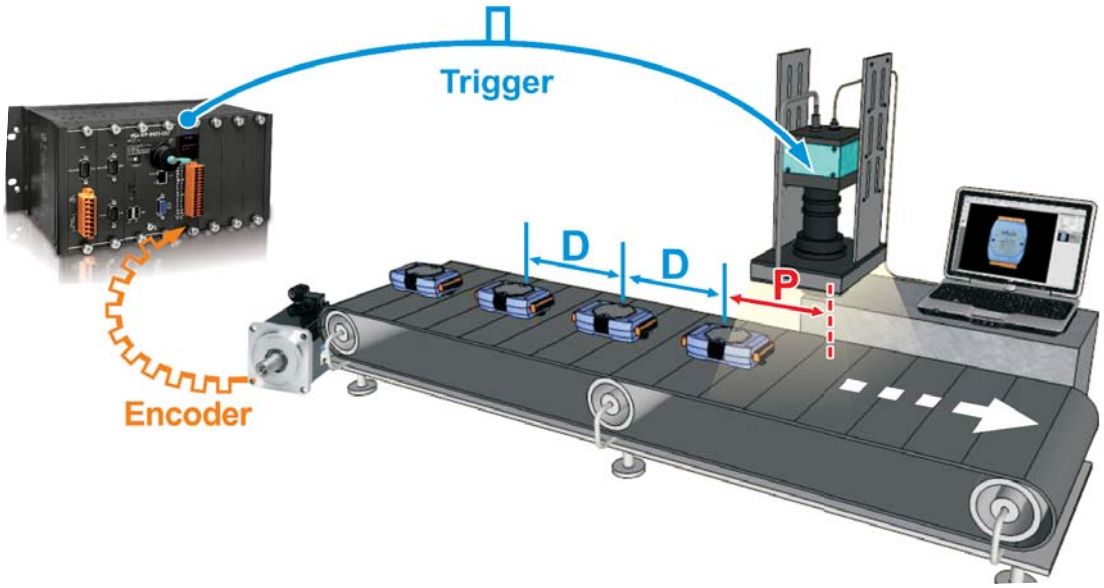
• Optical Inspection line-scan Systems

I-9093 includes three axes encoder with position matching circuit. I-9093 can generate a trigger signal when the motor reaches a specified position. The specified position is called a breakpoint and is similar to a switch that is triggered after the motor passes a certain position.

To use the position matching, you have to set an initial point (P) and a trigger period of the following points (D).

The trigger signal is an I/O line that can be used to fire another device. For example, when a motor reaches a certain position, the trigger signal can be used to fire the shutter of a camera to capture an image for the defect detection.

All operations of the position matching are automatically done by the hardware circuit. There is no software calculation effort when the system is operating. I-9093 makes the system design simpler, and significantly increases the system performance.



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Other Expansion Modules

Analog Input Modules



Model	Bus	Analog Input		
		Channels	Input Range	Sensor
I-87004W (*1)	Serial	4	-	DS18B20 (-55 ~ +125°C)
I-87005W (*2)		8	-	Thermistor
I-87013W		4	-	RTD: Pt100, Pt1000, Cu50, Ni120
I-87015W		7	-	RTD: Pt100, Pt1000, Cu50, Cu100, Cu1000, Ni120
I-87015PW				
I-8014W	Parallel	8/16	±10 V, ±5 V, ±2.5 V, ±1.25 V, ±20 mA (Optional external 125 Ω resistor)	-
I-8017HW		8/16	±10 V, ±5 V, ±2.5 V, ±1.25 V, ±20 mA (Optional external 125 Ω resistor)	-
I-8017HCW		8/16	±10 V, ±5 V, ±2.5 V, ±1.25 V, ±20 mA (Using Jumpers)	-
I-87017W **I-87017DW** **I-87017RW**	Serial	8 8/16 8	±10 V, ±5 V, ±1 V, ±0.5 V, ±150 mV, ±20 mA, 4 ~ 20 mA (Optional external 125 Ω resistor)	-
I-87017ZW		10/20	±10 V, ±5 V, ±1 V, ±0.5 V, ±150 mV, ±20 mA, 4 ~ 20 mA (Using Jumpers)	-
I-87017W-A5		8	±50 V, ±150 V	-
I-87017W-RMS		8	0 ~ +10 Vrms, 0 ~ +5 Vrms, 0 ~ 1 Vrms, 0 ~ 500 mVrms, 0 ~ 150 mVrms	-
I-87017RCW		8	0 ~ 20 mA, +4 ~ 20 mA, ±20 mA	-
I-87017MC-16		16	0 ~ 20 mA, +4 ~ 20 mA, ±20 mA (with 100,000 records for AI Data logger)	-
I-87018W **I-87018RW**		8	±2.5 V, ±1 V, ±500 mV, ±100 mV, ±50 mV, ±15 mV, ±20 mA (Optional external 125 Ω resistor)	Thermocouple (J, K, T, E, R, S, B, N. C, L, M)
I-87018PW		8	±2.5 V, ±1 V, ±500 mV, ±100 mV, ±50 mV, ±15 mV, ±20 mA, 0 ~ 20 mA, 4 ~ 2 0 mA (Optional external 125 Ω resistor)	
I-87018ZW		10		
I-87019PW		8	±2.5 V, ±1 V, ±500 mV, ±100 mV, ±50 mV, ±15 mV, ±20 mA, 0 ~ 20 mA, 4 ~ 20 mA (Using Jumpers)	
I-87019RW		8		
I-87019ZW		10		

(*1): I-87004 has 4 ports, each port can link 20x DS18B20, total 80 sensors
(*2): I-87005 also includes 8 channel DO (Open Collector, sink, 700 mA)

Analog Output Modules



Model	Bus	Analog Outputs				
		Channels	Resolution	Output Range	Wiring Current Output	Channel to Channel Isolation
I-87022W	Serial	2	12-bit	0 ~ 10 V, ±10 V, 0 ~ 20 mA, 4 ~ 20 mA	Sink	Yes, 3 kv
I-87024W		4	14-bit	0 ~ 5 V, ±5 V, 0 ~ 10 V, ±10 V, 0 ~ 20 mA, 4 ~ 20 mA		-
I-87024RW						
I-87024DW						
I-87024CW			12-bit	0 ~ 20 mA, 4 ~ 20 mA		Yes, 1 kv
I-87024UW			16-bit	0 ~ 5 V, ±5 V, 0 ~ 10 V, ±10 V, 0 ~ 20 mA, 4 ~ 20 mA	Source	-
I-87028CW		8	12-bit	0 ~ 20 mA, 4 ~ 20 mA	Sink	Yes, 1 kv
I-87028UW			16-bit	0 ~ 5 V, ±5 V, 0 ~ 10 V, ±10 V, 0 ~ 20 mA, 4 ~ 20 mA	Source	-
I-87028VW			12-bit	0 ~ 10 V	-	Yes, 2 kv
I-87028VW-20V				0 ~ 20 V		
I-8024W	Parallel	4	14-bit	±10 V, ±20 mA	Sink	-
I-8024DW						

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Digital Modules



Model	Bus	Digital Input			Digital Output			
		Channels	Contact	ON Voltage Level	Channels	Type	Sink/ Source	Max. Load
I-8040W	Parallel	32	Wet	10 ~ 30 VDC	-	-	-	-
I-8040PW				19 ~ 30 VDC	-	-	-	-
I-8046W		16	Dry	Connect to GND	-	-	-	-
I-8048W (Note 1)		8	Dry + Wet	4 ~ 30 VDC	-	-	-	-
I-8051W		16	Dry	Connect to GND	-	-	-	-
I-8052W		8	Wet	10 ~ 30 VDC	-	-	-	-
I-8053W		16			-	-	-	-
I-8053PW		16		19 ~ 30 VDC	-	-	-	-
I-8053W-A1		16		3.5 ~ 30 VDC	-	-	-	-
I-8058W		8		80 ~ 250 VAC	-	-	-	-
I-87040W	Serial	32	Wet	10 ~ 30 VDC	-	-	-	-
I-87040PW				19 ~ 30 VDC	-	-	-	-
I-87046W		16	Dry	Connect to GND	-	-	-	-
I-87051W					-	-	-	-
I-87052W		8	Wet	3.5 ~ 30 VDC	-	-	-	-
I-87058W			AC, Differential	80 ~ 250 VAC	-	-	-	-
I-87059W				10 ~ 80 VAC	-	-	-	-
I-87053W	Serial	16	Dry + Wet	3.5 ~ 30 VDC	-	-	-	-
I-87053PW				19 ~ 30 VDC	-	-	-	-
I-87053W-A2				19 ~ 50 VDC	-	-	-	-
I-87053W-A5				68 ~ 150 VDC	-	-	-	-
I-87053W-AC1			Wet	10 ~ 80 VAC	-	-	-	-
I-87053W-E5				68 ~ 150 VDC	-	-	-	-
I-8037W	Parallel	-	-	-	16	Open Collector	Source	100 mA
I-8041W		-	-	-	32		Sink	100 mA
I-8041AW		-	-	-			Source	100 mA
I-8057W		-	-	-	16	Open Collector	Sink	100 mA
I-8057PW		-	-	-				700 mA
I-87037W	Serial	-	-	-	16	Open Emitter	Source	700 mA
I-87041W		-	-	-	32	Open Collector	Sink	100 mA
I-87057W		-	-	-	16			100 mA
I-87057PW		-	-	-	16			700 mA
I-8042W	Parallel	16	Wet	10 ~ 30 VDC	16	Open Collector	Sink	100 mA
I-8050W (Note 2)								100 mA
I-8054W		8			8			700 mA
I-8055W			Dry	Connect to GND				100 mA
I-87042W	Serial	16	Wet	3.5 ~ 30 VDC	16	Open Collector	Sink	100 mA
I-87054W		8			8			700 mA
I-87055W			Dry	Connect to GND				100 mA

Note 1 : I-8048W is a 8-ch digital input interrupt module.
Note 2 : I-8050W is a 16-ch universal digital input/output module.

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Multi-Function/Strain Gauge Modules



Model	Bus	Analog Inputs	Analog Outputs	Digital Inputs	Digital Outputs
I-87016W	Serial	2 (Strain Gauges) (Full-bridge, Half-bridge, Quarter-bridge)	2 (Voltage, Current)	2 (Wet, Sink)	2 (Open Collector, Sink)
I-87026PW	Serial	6 (Voltage, Current)			
I-8026W	Parallel				

Relay Modules



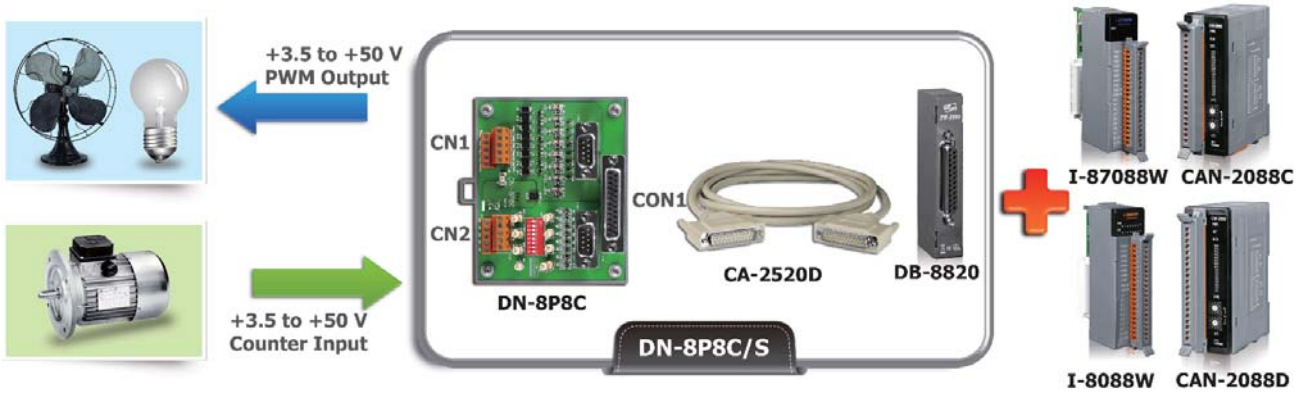
Model	Bus	Channels	Type	Contact	Load Current
I-8060W	Parallel	6	Power Relay	Form C	0.5 A @ 125 VAC, 0.25 A @ 250 VAC, 2 A @ 30 VDC
I-8063W (*)		4	Power Relay	Form C	Form A: 5 A @ 250 VAC/30 VDC Form C: 3 A @ 250 VAC/30 VDC
I-8064W		8	Power Relay	Form A	5 A @ 250 VAC, 5 A @ 30 VDC
I-8068W		8	Power Relay	Form A × 4 Form C × 4	Form A: 5 A @ 250 VAC/30 VDC Form C: 3 A @ 250 VAC/30 VDC
I-8069W		8	PhotoMOS	Form A	1 A @ 60 VDC
I-87061W	Serial	16	Power Relay	Form A	5.0 A @ 250 VAC/30 VDC
I-87063W (*)		4	Power Relay	Form C	Form A: 5 A @ 250 VAC/30 VDC Form C: 3 A @ 250 VAC/30 VDC
I-87064W		8	Power Relay	Form A	5.0 A @ 250 VAC/30 VDC
I-87065W		8	AC SSR	Form A	1.0 A @ 265 VAC
I-87066W		8	DC SSR	Form A	1.0 A @ 30 VDC
I-87068W		8	Power Relay	Form A × 4 Form C × 4	Form A: 8 A @ 250 VAC/30 VDC Form C: 3 A @ 250 VAC/30 VDC
I-87069W		8	PhotoMOS	Form A	0.13 A, 350 V Max. at DC/AC
I-87069PW		8	PhotoMOS	Form A	1.0 A, 80 V Max. at DC/AC

(*): I-8063W and I-87063W also have 4 DI (Wet contact, sink and source)

Counter/Frequency/PWM Modules



Model	Bus	Counter/Frequency Input					PWM Output		
		Channels	Counter	Signal	Speed	Frequency Accuracy	Channels	Type	
I-87082W	Serial	2	32-bit	Up	100 kHz	1 Hz	2	Open Collector	
I-8084W	Parallel	4/8	32-bit	Up, CW/CCW, A/B, Pulse/Dir	250 kHz	0.1 Hz	-	-	
I-87084W	Serial						-	-	
I-8088W	Parallel	-	-	-	-	-	8	PWM	Duty: 0.1 ~ 99.9%
I-87088W	Serial	8	32-bit	Up	1 MHz				Freq: 1 ~ 500 KHz



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Serial Communication Modules



Model	Bus	Ports	Type	Isolation	Connector	Accessories
I-8112iW	Parallel	2	RS-232	2500 Vrms	2 × D-Sub9	CA-0915
I-8114W		4		-	D-Sub 37	CA-9-3705
I-8114iW		4		2500 Vrms		
I-8142iW		2	RS-232/485		Terminal Block	-
I-8144iW		4				

CA-0915





CA-9-3705

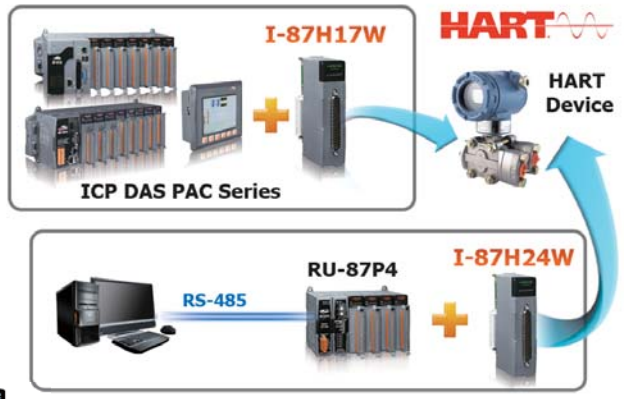
CAN/CANopen/DeviceNet Master Modules



Model	Bus	Ports	Max Speed	Protocol
I-8120W	Parallel	1	1 Mbps	CAN 2.0A/2.0B
I-8123W				CANopen
I-87123W	Serial			
I-8124W	Parallel		500 Kbps	DeviceNet
I-87124W	Serial			

HART Communication Modules

Model	Description
I-87H17W	HART Module with 8-ch analog inputs



3G/4G/GPS Modules



Model	Frequency (MHz)	GPS Interface	Max. Download Speed	AT Command	TCP/IP Protocol
I-8212W-3GWA	2G (GSM/GPRS): 850/900/1800/1900 3G (UMTS/HSDPA/HSUPA): 2100/1900/850	-	9.6 ~ 115.2 Kbps	Yes	Yes
I-8213W-3GWA	2G (GSM/GPRS): 850/900/1800/1900 3G (UMTS/HSDPA/HSUPA): 2100/1900/850	Yes			
I-8213W-4GE	2G (GSM/GPRS): 850/900/1800/1900 3G (UMTS/DC-HSPA+): 850/900/2100 4G (FDD LTE): B1/B3/B5/B7/B8/B20		100 Mbps		

Model	GPS Channels	SBAS	GPS Output Interface	GSM/ GPRS	Digital Output	Protocol/ Interface	Description
I-87211W	32	WAAS, EGNOS, MSAS	RS-232	-	2	DCON	GPS Receiver and 2 DO Module

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Economical 8000 Series PAC Selection Guide

XP-8000 Series XPAC		OS	Built-in Software	CPU	Flash	DDR SDRAM	VGA Resolution	Ethernet	Serial	I/O Slot
XP-8031-WES7		WES7	None	x86 CPU, 1 GHZ, dual-core	32 GB	2 GB DDR3	1600 x 1200	2	4	0
XP-8131-WES7										1
XP-8331-WES7										3
XP-8731-WES7										7

XP-8000-CE6 Series XPAC		OS	Built-in Software	CPU	Flash	DDR SDRAM	VGA Resolution	Ethernet	Serial	I/O Slot
XP-8031-CE6		CE 6.0	None	x86 CPU, 1 GHZ, dual-core	32 GB	2 GB DDR3	1024 x 768	2	4	0
XP-8131-CE6										1
XP-8331-CE6										3
XP-8731-CE6										7

ISaGRAF XP-8000-CE6 Series XPAC		OS	Built-in Software	CPU	Flash	DDR SDRAM	VGA Resolution	Ethernet	Serial	I/O Slot
XP-8037-CE6		CE 6.0	ISaGRAF	x86 CPU, 1 GHZ, dual-core	32 GB	2 GB DDR3	1024 x 768	2	4	0
XP-8137-CE6										1
XP-8337-CE6										3
XP-8737-CE6										7

WP-8000 Series WinPAC		OS	Built-in Software	CPU	Flash	SDRAM	VGA Resolution	Ethernet	Serial	I/O Slot
WP-8121-CE7		CE 7.0	None	Cortex-A8, 1.0 GHz	256 MB	512 MB DDR3	1024 x 768	2	2	1
WP-8421-CE7									4	4
WP-8821-CE7										8

iP-8000 Series iPAC		OS	Built-in software	CPU	Flash	SRAM	Expansion Memory	Ethernet	Serial	I/O Slot
iP-8411		MiniOS7	None	80186, 80 MHz	512 KB	512 KB	microSD	-	4	4
iP-8811										8
iP-8441						768 KB	microSD	2		4
iP-8841										8

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7. Accessories

Terminal Boards

DB-8R



Relay Board for PISO-PS300U

Features:

- 25-pin D-Sub Connector*1
- For Limit Switches, Digital Inputs/Outputs
- I/O Connector Block with Din-Rail Mounting
- Pin to Pin Screw Terminal for I/O Connected
- Screw Terminals for Easy Field Wiring

DN-68



Features:

- 68-pin SCSI-II Connector
- I/O Connector Block with Din-Rail Mounting
- Pin to Pin Screw Terminal for I/O Connected
- Screw Terminals for Easy Field Wiring

Encoder Input Board for PISO-ENCODER300U and PISO-ENCODER600U

DN-20M



Features:

- 20-pin SCSI-II Connector
- RJ-45 for FRnet Connector
- Pin to Pin Screw Terminal for I/O Connected
- Screw Terminals for Easy Field Wiring

Manual-Pulse-Generator (MPG) and FRnet Input Board for PISO-PS600/VS600/PMDK

Power	DB-8R, DN-68/20M	DN-8237 Series
Nominal Load	0.1 A /24 V_{DC}	0.5 A /24 V_{DC}
Input Power	20 ~ 26 V_{DC}, 0.1 A	20 ~ 26 V_{DC}, 0.5 A
Power Consumption	2.4 W (24 V_{DC})	12 W (24 V_{DC})
Environmental		
Operating Temperature	-20 °C ~ + 75 °C	
Storage Temperature	-30 °C ~ +85 °C	
Operating Humidity	20 ~ 80% RH, Non-condensing	
Storage Humidity	10 ~ 90% RH, Non-condensing	
Mechanical		
Dimensions	103 mm X 86 mm	110 mm X 107 mm

DN-8237 Series:

Photo-Isolated Terminal Board for ICP DAS 2-axis Stepper/Servo Motion Controller

Features:

- High Speed Photo-coupling Isolated.
- Supporting Pulse Command Type Step Motors or Servo Motors
- Providing Power LED and Other Status LEDs (Home, Limit Switches, ...)
- Providing FRnet Terminal for High-speed Serial I/O Expansion when the Controller Supports FRnet

DN-8237UB



Universal Snap-on wiring terminal board

DN-8237GB



General purpose wiring terminal board

DN-8237MB



Snap-on wiring terminal board for Mitsubishi MELSERVO-J2 servo amplifier

DN-8237PB



Snap-on wiring terminal board for Panasonic MINAS A4/A5 servo amplifier

DN-8237YB



Snap-on wiring terminal board for Yaskawa Sigma II/III/V servo amplifier

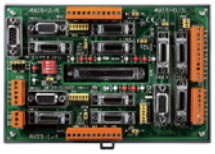
DN-8237DB



Snap-on wiring terminal board for Delta ASDA-A servo amplifier

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DN-8368 Series: Photo-isolated Terminal Board for PISO-PS600/VS600/PMDK

DN-8368UB	DN-8368GB	DN-8368MB
		
Photo-isolated Universal Snap-on Wiring Terminal Board	Photo-isolated General Purpose Wiring Terminal Board	Photo-isolated Snap-on Wiring Terminal Board for Mitsubishi MELSERVO-J2 Servo Amplifier

Features:	DN-8368 Series	DN-8468 Series	DN-84100U
• High Speed Photo-coupling Isolated	✓	✓	✗
• Supporting Pulse Command Type Step Motors or Servo Motors	✓	✓	✓
• Providing Power LED and Other Status LEDs (Home, Limit Switches, …)	✓	✓	✓
• Providing FRnet Terminal for High-speed Serial I/O Expansion when the Controller Supports FRnet	✗	✓	✓

Specifications:

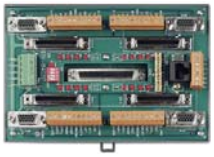
Power		
Nominal Load	0.5 A /24 V_{DC}	
Input Power	20 ~ 26 V_{DC}, 0.5 A	
Power Consumption	12 W (24 V_{DC})	
Environmental		
Operating Temperature	-20 °C ~ + 75 °C	
Storage Temperature	-30 °C ~ +85 °C	
Operating Humidity	20 ~ 80% RH, Non-condensing	
Storage Humidity	10 ~ 80% RH, Non-condensing	
Mechanical		
Dimensions	DN-8368 /8468 Series	162 mm X 107 mm
	DN-84100U	118 mm X 121 mm

DN-84100U

Universal Snap-on Wiring Terminal Board for PISO-PS410 and PISO-PS810

DN-8468 Series: Photo-Isolated Terminal Board for ICP DAS 4-axis Stepper/Servo Motion Controller

DN-8468UB	DN-8468GB	DN-8468MB
		
Photo-isolated Universal Snap-on Wiring Terminal Board	Photo-isolated General Purpose Wiring Terminal Board	Photo-isolated Snap-on Wiring Terminal Board for Mitsubishi MELSERVO-J2 Servo Amplifier

DN-8468PB	DN-8468YB	DN-8468DB	DN-8468FB
			
Photo-isolated Snap-on Wiring Terminal Board for Panasonic MINAS A4/A5 Servo Amplifier	Photo-isolated Snap-on Wiring Terminal Board for Yaskawa Sigma II/III/V Servo Amplifier	Photo-isolated Snap-on Wiring Terminal Board for Delta ASDA-A Servo Amplifier	Photo-isolated Snap-on Wiring Terminal Board for Fuji FALDIC-W Servo Amplifier

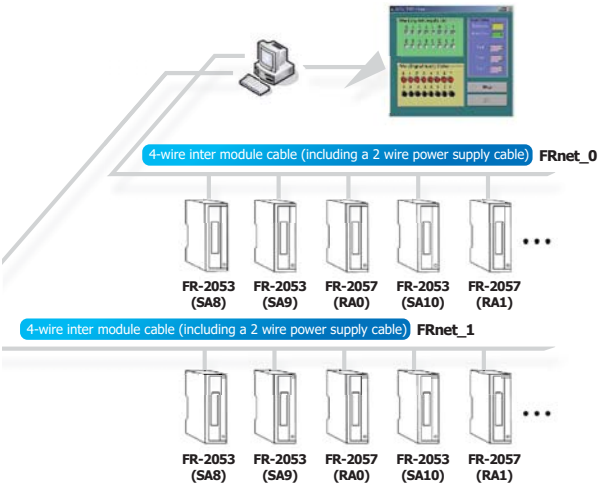
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FRnet Remote I/O Modules

FRnet High-speed Synchronous Remote Input/Output control module

Introduction:

FRnet is an innovative industrial fieldbus. It uses twisted pair cable as the transmission medium. Each FRnet port can link up to 128 DI and 128 DO channels. The whole I/O status are updated at a fixed cycle time (0.72 ms or 2.88 ms) no matter how many FRnet I/O modules are connected to the FRnet network. Furthermore, the update is done by the FRnet chip, there is no need for a communication protocol. Using FRnet, the user can easily and quickly implement high-speed distributed I/O control systems.



FRnet Specification	Normal speed	High-speed
Communication Speed	250 Kbps	1 Mbps
Cycle Time	2.88 ms	0.72 ms
Communication Distance	Max. 400 M	Max. 100 M
I/O Channels	128 DI / 128 DO	128 DI / 128 DO

Applications:

Building Automation, Machine Automation, Testing Equipment, etc.

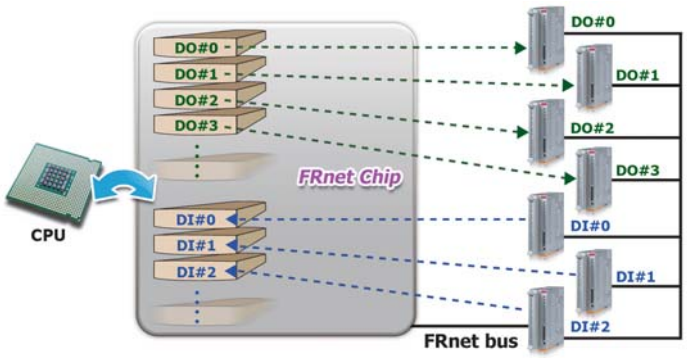
Features:

1. Token-stream Communication

The FRnet chip uses a simple token-stream communication mechanism to provide a fast and fixed cycle time I/O-scanning capability. It doesn't need any special transmission protocol; the chip takes care of the data transfer for every device. The most significant benefits of FRnet are:

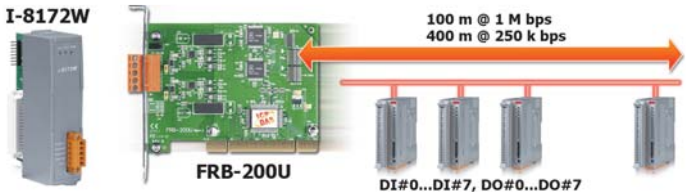
- **Fixed cycle time:**
  The cycle time is fixed at 2.88/0.72 ms no matter how many devices connected in the network.

- **Memory-Mapped I/O:**
  The data transfer is automatically done by the FRnet chip. The CPU of the host (PC or PAC) doesn't need to take care of the communication protocol. All I/O status are mapped to the memory of the FRnet chip.



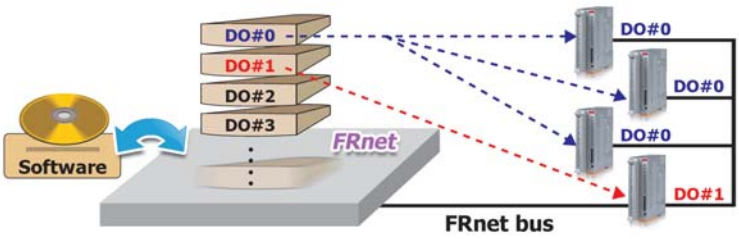
2. Multi-drop Networking

The physical connection is same as the standard RS-485 cabling to implement multi-drop networking. The maximum communication distance is up to 100/400 m at high/normal speed communication.



- **I/O expansion up to 128 DI and 128 DO channels:**
  Each FRnet chip addresses 8 DI and 8 DO groups which each group contains 16 DI or DO channels.

- **DO broadcasting:**
  Due to the broadcasting algorithm adopted, the DO group address is not required to be unique. Therefore, it is easy to build a data delivery from one group (16-bit data) to a multi-group.



3. Easy to Diagnose

There are several LED indicators to diagnose whether FRnet I/O modules work properly. And the built-in FRnet terminator switch can be used to improve communication signal quality.

4. Easy to Configure

All basic configurations (address, speed and input/output range of AI/AO modules) are set by DIP switches. The operator can use only one screwdriver to complete the configuration.

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FRnet Remote I/O Modules

16-Ch Isolated DI Module



- 16-ch Isolated Digital Input
- Isolated Communication line

FR-2053iT

數位輸入 隔離保護

16-Ch Isolated DI Module



- 16-ch Isolated Digital Input
- High-speed Version (For FR-2053HTA)

FR-2053HTA
FR-2053TA

數位輸入

16-ch Isolated DO Module



- 16-ch Isolated (Current Sinking, NPN)
- Isolated Communication line

FR-2057iT

數位輸出 隔離保護

16-ch Isolated DO Module



- 16-ch Isolated Digital Output (Current Source, PNP)
- High-speed Version (For FR-2057HTA)

FR-2057HTA
FR-2057TA

數位輸出

16-ch Isolated DO Module



- 16-ch Isolated Digital Output
- High Driving : 250 mA (Max.)

FR-2057TW

數位輸出

8/16-ch Isolated AI Module



- 8/16-ch Isolated Analog Input
- High Voltage Protection
- Isolated Communication Line

FR-2017iT

類比輸入 隔離保護

4-ch Isolated AO Module



- 4-ch Isolated Analog Output
- Isolated Communication line

FR-2024iT

類比輸出 隔離保護

32-ch Isolated DO Module



- 32-ch Relay Output
- Isolated Communication Line

FR-32R/DIN

繼電器輸出 隔離保護

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Cables and Connectors

For Universal Snap-on Wiring Terminal Board:

CA-26-DAA2-15 CA-26-DAA2-30 CA-26-DAA2-50	CA-26-DAA2-15B CA-26-DAA2-30B CA-26-DAA2-50B	CA-26-DAB2-15 CA-26-DAB2-30 CA-26-DAB2-50	CA-26-DAB2-15B	CA-26-FFW-15 CA-26-FFW-30 CA-26-FFW-50
				
26-pin HD D-Sub Male Cable for Delta A2 Servo Amplifier, 1.5/3/5 M (for ASDA-A2 Series)		26-pin HD D-Sub Male Cable for Delta B2 Servo Amplifier, 1.5/3/5 M (for ASDA-B2 Series)		26-pin HD D-Sub Male Cable for Fuji Servo Amplifier, 1.5/3/5 M (for FALDIC-W and ALPHA5 SmartSeries)
CA-26-PA4-30 CA-26-PA4-50	CA-26-PA4-15B	CA-26-YSV-50	CA-26-YSV-15B CA-26-YSV-30B	CA-26-TTA-15 CA-26-TTA-30 CA-26-TTA-50
				
26-pin HD D-Sub Male Cable for Panasonic Servo Amplifier, 1.5/3/5 M (for MINAS A4/A5/A6 Series)		26-pin HD D-Sub Male Cable for Yaskawa Servo Amplifier, 1.5/3/5 M (for Sigma II/III/V/7 Series)		26-pin HD D-Sub Male Cable for Teco Servo Amplifier, 1.5/3/5 M (for TSTA-A/A+ Series)

CA-26-MJ3-30 CA-26-MJ3-50	CA-26-MJ3-15B	26-pin HD D-Sub Male Cable for Mitsubishi Servo Amplifier, 1.5/3/5 M (for MELSERVO-J3/J4 Series)
		

For Motion Card/Module:

CA-SCSI100-15	CA-MINI100-15	CA-MINI68-15
		
SCSI-II 100-pin & 100-pin Male Connector Cable, 1.5 M	100-pin VHDCI to SCSI-II Connector Cable, 1.5 M	68-pin VHDCI to SCSI-II Connector Cable, 1.5 M
CA-3715DM-H CA-3730DM-H CA-3750DM-H	CA-SCSI15-H3 CA-SCSI30-H3 CA-SCSI50-H2	CA-SCSI50
		
37-pin D-Sub Male-Male Cable for Terminal Board (180º), 1.5/3/5 M	68-pin SCSI-II Male-Male Connector Cable, 1.5/3/5 M	SCSI-II 68-pin & 68-pin Male Connector Cable, 5 M (for PISO-ENCODER 600/600U/300/300U)

For FRnet Modules:

CA-2P4C-0100

2P4C Cable for FRnet Modules. Length: 100 M

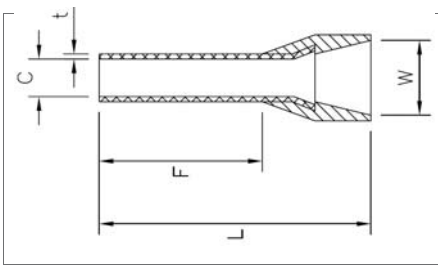
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For Snap-on Wiring Terminal Board:

CA-SCSI20-M1 CA-SCSI20-M3 CA-SCSI20-M5	CA-SCSI50-D1 CA-SCSI50-D3 CA-SCSI50-D5	CA-SCSI50-PY1 CA-SCSI50-PY3 CA-SCSI50-PY5
		
SCSI-II 20-pin & 20-pin Male Connector Cable, 1/3/5 M (for Mitsubishi J2 Series Motor)	SCSI-II 50-pin & 50-pin Male Connector Cable 1/3/5 M (for Delta ASDA A Series Motor)	SCSI-II 50-pin & 50-pin Male Connector Cable, 1/3/5 M (for Panasonic & Yaskawa Series Motor)

For Motionnet Module:

CA-PC26M		4POPP-003F		4POPP-003G	
	26-pin HD D-Sub Solder Cup Male Connector with Plastic Cover		Pink Cord-End Terminal		Turquoise Cord-End Terminal



4POPP-003F 4POPP-003G					
F	L	C	W	t	Wire Range (mm2)
8.0	12.0	0.80	1.90	0.15	0.34

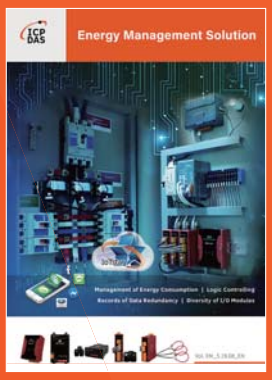
4PKD1O0000001		4PKD1O0000002		4PKD1O0000003	
	Gray Mini Clamp Wiremount Plug		Red Mini Clamp Wiremount Plug		Orange Mini Clamp Wiremount Plug

Mini Clamp Wiremount Plug			Applicable Wire		
ICP DAS Part No.	Cover Color	3M Part No.	AWG No.	Cross-sectional Area (mm^2)	Finished External Diameter Φ (mm)
4PKD1O0000001	Gray	37103-2206-000FL	20 – 22	0.3 – 0.5	1.6 – 2.0
4PKD1O0000002	Red	37103-3101-000FL	24 – 26	0.14 – 0.3	0.8 – 1.0
4PKD1O0000003	Orange	37103-3163-000FL	24 – 26	0.14 – 0.3	1.2 – 1.6

For CAN Card/Module:

CNT-CAN		CA-0910-C	
	CAN bus Connector		9-pin Female D-Sub and 3-wire CAN bus cable, 1M. (Pin Assignment)

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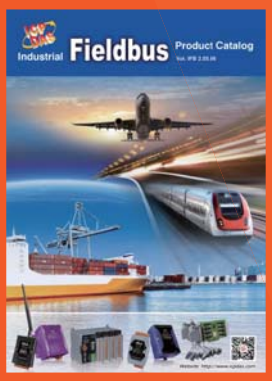
Energy Management Solution

- InduSoft SCADA Software
- Smart Power Meter Concentrator
- Smart Power Meter
- True RMS Input Module
- TouchPAD Devices - VPD Series



IIoT Product

- IoTstar : cloud management software
- UA-5200 : communication server
- WISE series : IIoT host
- iCAM series : IP camera
- MQ-7200M series : MQTT I/O module
- Sensors : temperature, humidity, CO2, PM2.5,...



Industrial Fieldbus

- RS-485
- Industrial Ethernet
- PROFINET
- CAN bus
- CANopen
- DeviceNet
- J1939
- PROFIBUS
- HART
- Ethernet/IP
- BACnet



IIoT Cloud Solution - UA SERIES : IIoT Communication Server

- Built-in OPC UA Server Service
- Built-in MQTT Broker Service
- Support Logic Control IFTTT
- Support IoT Cloud Platforms
- Connection and IoTstar Cloud Management
- IIoT Factory Application of MES
- Pumping Station IoT Application
- BA Smart Building IoT Application
- Robotic Arm Co-operation Application



Industrial Communication Products

- Multiport Serial Cards
- Serial Device Server
- Converter/Repeater/Hub/Splitter
- Termination Resistor/DC Bias Voltage
- Ethernet Switch
- Fieldbus Solution



Smart Building, Smart Home Automation

- Video Intercom & Access Control
- Touch HMI - TouchPAD Series
- Smart Lighting Control
- Energy Saving - PM/PMC Series
- Environmental - DL/CL Series
- Motion Detector - PIR Series
- Wi-Fi Wireless - WF Series
- Infrared Wireless - IR Series
- ZigBee Wireless - ZT Series
- IIoT Server & Concentrator
- LED Display - iKAN Series



TouchPAD HMI Solutions

- Introduction
- TPD/VPD Products Series
- Video Intercom & Access Control Series
- TPD/VPD Application



PC-based I/O Boards

- PCI Express Bus Data Acquisition Boards
- PCI Bus Data Acquisition Boards
- ISA Bus Data Acquisition Boards

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www.icpdas.com

ICP DAS CO., LTD.
Taiwan (Headquarters)
+886-3-597-3366

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