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Machine Automation

Motion Total Solution

EtherCAT®

Remote Motion Solutions

PC-Based Motion Control Cards

PAC & Motion Module Solutions

Ethernet Remote Motion Solutions

Serial Communication Motion Control

Motionnet Serial Motion Control

MA

Vol. MABR 4.07.08-EN

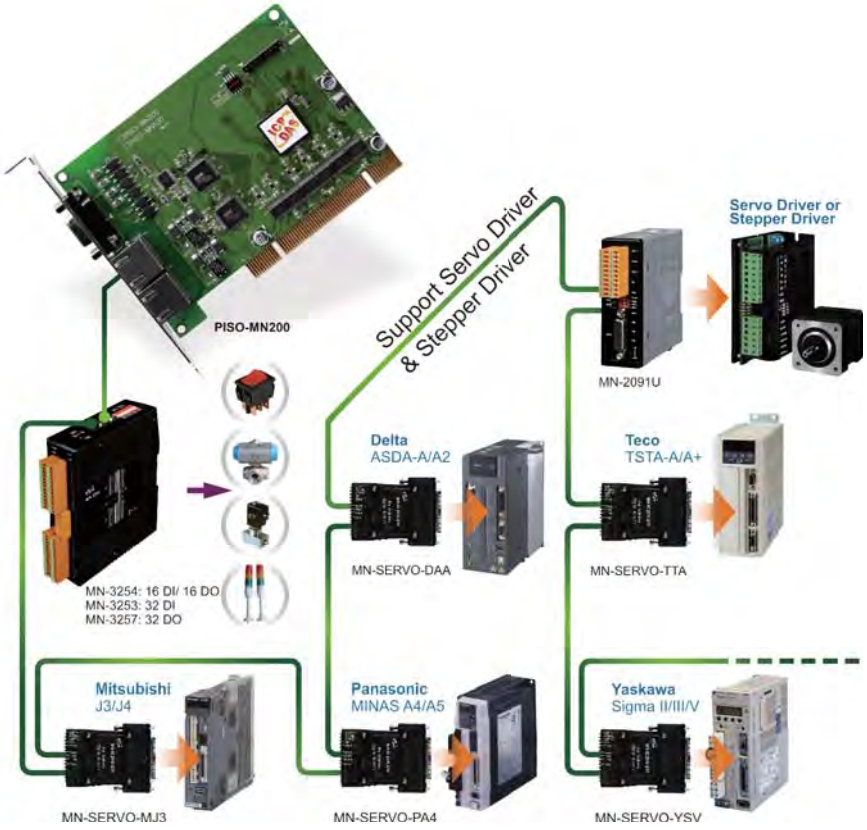
Remote Motion Solutions

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)

Related Products:

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 / TTA: 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
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
Hub Modules	**MN-HUB4(EC)**	Distributed Motionnet 4 port Hub module with RJ-45 Jack (RoHS) (EC: with e-CON Mini-Clamp connector)

PISO-MN200/PISO-MN200T/PISO-MN200EC

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

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.

Specifications:

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	PISO-MN200: RJ-45 x 2 PISO-MN200T: 5-pin terminal block PISO-MN200EC: 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
Operating Temp.	0 ~ +60 °C
Storage Temp.	-20 ~ +80 °C
Operating Humidity	10 ~ 85%; non-condensing
Storage Humidity	5 ~ 95%; non-condensing

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 Input and 4 Output channels
- Optional quadrature encoder input for linear scale or manual pulse generator input

Software Support:

Windows Driver/DLL/Lib	Windows 7 32/64-bit Windows XP/2000 32-bit
Programming Tools	VC/VB/BCB

Ordering Information/Accessories:

Model No.	Description
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)**
MN-SERVO Series CR MN-SERVO EC Series CR	Distributed Motionnet Single-axis Motion Control Modules (With Spring Type Terminal Blocks; EC: with e-CON Mini-Clamp connector) (RoHS)
MN-HUB4 CR MN-HUB4EC CR	Distributed Motionnet 4 port Hub Module (RoHS)
MN-2091U CR MN-2091U-T CR	Distributed Motionnet Single-axis Universal Motion Control Modules (RoHS)
MN-3254 CR MN-3254T CR	Distributed Motionnet 16-ch Isolated DI, 16-ch Isolated DO Module (RoHS)
MN-3253 CR MN-3253T CR	Distributed Motionnet 32-ch Isolated DI Module (RoHS)
MN-3257 CR MN-3257T CR	Distributed Motionnet 32-ch Isolated DO Module (RoHS)

MN-SERVO / MN-SERVO EC Series

Distributed Motionnet Single-axis Motion Control Modules

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
- Programmable 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)
- The standard module equipped with Terminal Blocks for easy wiring (additional terminal board is not required)
- The EC module equipped with Mini-Clamp connector provide for an easier and debris-free wire termination process.

Introduction:

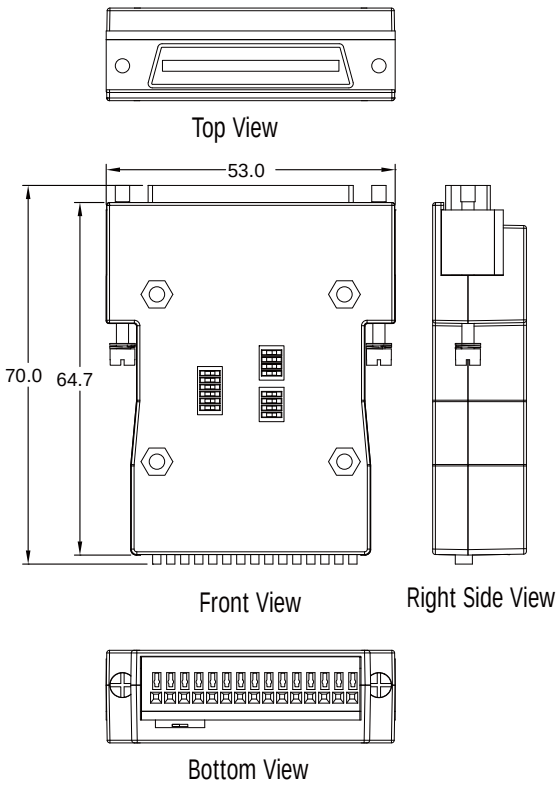
The **MN-SERVO-xxx(-EC) series** is used to expand the number of axes for distributed motion control on a Motionnet field bus. These extension slave modules can be directly connect to the servo driver and are serially connected to the controller using a simple and affordable Cat.5 LAN cable, reducing the amount of wiring required between the drivers and the controller, making this a highly suitable solution for integrated machine automation applications.

After the module is connected to the servo driver, all you need to do is connect a serial LAN cable 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+.

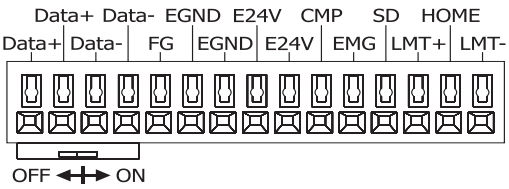
Specifications:

Communication Speed	2.5, 5, 10, 20 Mbps
Maximum Pulse Output Frequency	6.6 Mpps
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
Operating Temperature	0 ~ +60 °C
Storage Temperature	-20 ~ +80 °C
Operating Humidity	10 ~ 85%; non-condensing
Storage Humidity	5 ~ 95%; non-condensing

Dimensions: (Units : mm)



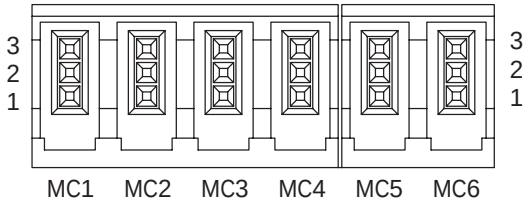
MN-SERVO Series Pin Assignments:



No.	Name	Description	Signal Direction
1 ~ 2	Data+	Serial communication data+	Both
3 ~ 4	Data-	Serial communication data-	Both
5	FG	Frame ground	None
6 ~ 7	EGND	External ground	Input
8 ~ 9	E24V	External power 24V	Input
10	CMP	High speed position compare	Output
11	EMG	Emergency stop	Input
12	SD	Slowdown	Input
13	LMT+	Positive end limit	Input
14	HOME	Home position	Input
15	LMT-	Negative end limit	Input

Wire Range: 28~20 AWG
Wire Strip Length: 10 mm

MN-SERVO EC Series Pin Assignments:



Connector	No.	Name	Description	Signal Directon
MC1	3	Data-	Serial communication data-	Both
	2	Data+	Serial communication data+	Both
	1	F.G.	Frame ground	None
MC2	3	Data-	Serial communication data-	Both
	2	Data+	Serial communication data+	Both
	1	F.G.	Frame ground	None
MC3	3	E24V	External power 24V	Input
	2	EGND	External ground	Input
	1	F.G.	Frame ground	None
MC4	3	E24V	External power 24V	Input
	2	EGND	External ground	Input
	1	F.G.	Frame ground	None
MC5	3	CMP	High speed position compare	Output
	2	EMG	Emergency stop	Input
	1	SD	Slowdown	Input
MC6	3	LMT+	Positive end limit	Input
	2	HOME	Home position	Input
	1	LMT-	Negative end limit	Input

Ordering Information/Accessories:

Model No.	Description
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)**
MN-SERVO-TTA CR MN-SERVO-TTA-EC CR	**Distributed Motionnet Single-axis Motion Control Module with Spring Type Terminal Blocks (EC: with e-CON Mini-Clamp connector) for Teco TSTA-A/A+ (RoHS)**

Part No.	Picture	Description	Part No.	Picture	Description
4POPP-003F		Pink Cord-End Terminal	4POPP-003G		Turquoise Cord-End Terminal

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

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

MN-2091U / MN-2091U-T

Distributed Motionnet Single-axis Universal Motion Control Module

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
- Programmable 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)
- Suitable for controlling a variety of servo drivers and stepper drivers

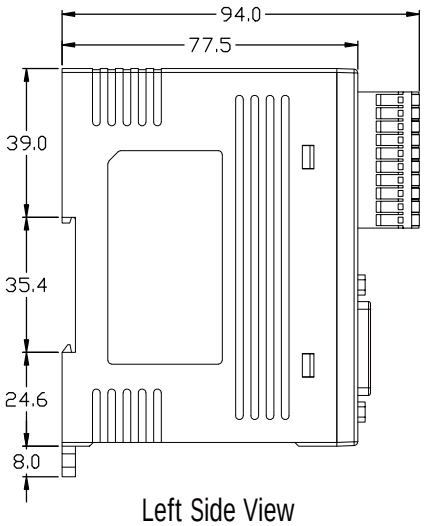
Introduction:

The **MN-2091U(-T)** is used to expand the number of axes for distributed motion control on a Motionnet field bus. These extension slave modules are serially connected to the controller using a simple and affordable Cat.5 LAN cable, and one serial line can support up to 64 single-axis modules. The 26-pin HD D-Sub connector 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.

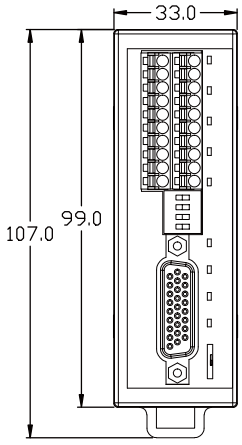
Specifications:

Communication Speed	2.5, 5, 10, 20 Mbps
Maximum Pulse Output Frequency	6.6 Mpps
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	5V TTL or 24V open collector
LED Diagnostics	Communication state (Link, Error) Mechanic Switch Input Internal 3.3V Power Termination Resistor Switch
Communication Connector	MN-2091U: RJ-45 x 2 MN-2091U-T: 5-pin terminal block
Operating Temperature	0 ~ +60 °C
Storage Temperature	-20 ~ +80 °C
Operating Humidity	10 ~ 85%; non-condensing
Storage Humidity	5 ~ 95%; non-condensing

Dimensions: (Units: mm)



Left Side View

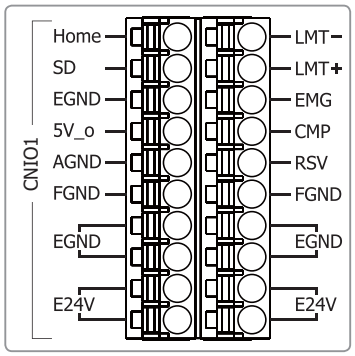


Front View

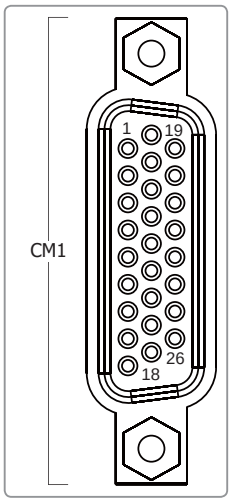
MN-2091U MN-2091U-T

Bottom View

Pin Assignments:



Pin No.	Pin Name	Description	I/O Define.	Pin No.	Pin Name	Description	I/O Define.
CNIO1B (Left) Pin Assignments				CNIO1A (Right) Pin Assignments			
1	HOME	Home position	Input	1	LMT-	Negative end limit	Input
2	SD	Slowdown	Input	2	LMT+	Positive end limit	Input
3	EGND	External ground	Input	3	EMG	Emergency stop	Input
4	5V_o	Internal 5V power derived from 24V supply	Output	4	CMP	High-speed position compare	Output
5	AGND	Optional analog ground, no internal connection	Connect to CM1 only	5	RSV	Reserved signal (no internal connection)	Connect to CM1 only
6	FGND	Frame ground	None	6	FGND	Frame ground	None
7 ~ 8	EGND	External ground	Input	7 ~ 8	EGND	External ground	Input
9 ~ 10	E24V	External power 24V	Input	9 ~ 10	E24V	External power 24V	Input



Pin No.	Pin Name	Description	I/O Define.	Pin No.	Pin Name	Description	I/O Define.
1	SRV_ON	Servo On	Output	15	AGND	Optional analog ground (no internal connection)	Connect to CNIO1 only
2	INP	In Position	Input				
3	ERC	Error Counter Clear	Output	16	B-	Encoder B-phase pulse	Input
4	RDY	Servo Ready	Input	17	B+		Input
5	P-	Forward rotation pulse train (differential line driver)	Output	18	N.C.	No internal connection	N.C.
6	P+		Output	19	EMG	Emergency stop	Input
7	A-	Encoder A-phase pulse	Input	20	RSV	Reserved signal (no internal connection)	Connect to CNIO1 only
8	A+		Input				
9	N.C.	No internal connection	N.C.	21	EGND	External ground	Input
10	RESET	Alarm Reset	Output	22	EGND	External ground	Input
11	ALARM	Servo Alarm	Input	23	N-	Forward rotation pulse train (differential line driver)	Output
12	E24V	External power 24V	Input	24	N+		Output
13	EGND	External ground	Input	25	Z-	Encoder Z-phase pulse	Input
14	N.C.	No internal connection	N.C.	26	Z+		Input

Ordering Information:

Model No.	Description
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)**

Accessories:

Model No.	Description
CA-PC26M	26-pin HD D-Sub solder cup Male connector with plastic cover
CA-26-DAB2-15/30/50	26-pin HD D-Sub Male cable for Delta B2 servo amplifier, 1.5/3/5 M (for ASDA-B2 series)
CA-26-FFW-15/30/50	26-pin HD D-Sub Male cable for Fuji servo amplifier, 1.5/3/5 M (for FALDIC-W and ALPHA5 Smart series)
CA-26-MJ3-15/30/50	26-pin HD D-Sub Male cable for Mitsubishi servo amplifier, 1.5/3/5 M (for MELSERVO-J3/J4 series)
CA-26-YSV-15/30/50	26-pin HD D-Sub Male cable for Yaskawa servo amplifier, 1.5/3/5 M (for Sigma II/III/V series)
CA-26-PA4-15/30/50	26-pin HD D-Sub Male cable for Panasonic servo amplifier, 1.5/3/5 M (for MINAS A4/A5 series)
CA-26-DAA2-15/30/50	26-pin HD D-Sub Male cable for Delta A2 servo amplifier, 1.5/3/5 M (for ASDA-A2 series)
CA-26-TTA-15/30/50	26-pin HD D-Sub Male cable for Teco servo amplifier, 1.5/3/5 M (for TSTA-A/A+ series)

MN-3253 / MN-3254 / MN-3257
MN-3253T / MN-3254T / MN-3257T

Distributed Motionnet Isolated DI/DO Module

Features:

- Maximum communication speed: 20 Mbps
- MN-3253(T): 32-ch isolated DI
  MN-3254(T): 16-ch isolated DI, 16-ch isolated DO
  MN-3257(T): 32-ch isolated DO
- Each Motionnet transfer line: connect modules up to 64
- Designing isolation protection: power, communication, I/O
- LED Diagnostics for communication and I/O status
- Each port can be specified as NPN or PNP (12~24 V)
- The internal flywheel diode of each output ports can be connect to different sources of power individually.
- High current sinking capability (200 mA)

Introduction:

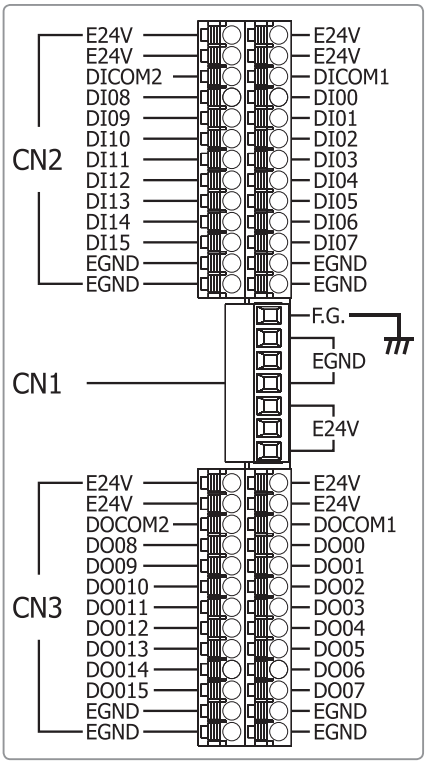
The **MN-325x Series** is an I/O expansion device for Motionnet systems, and is equipped with **up to 32 isolated digital input channels and up to 32 isolated digital output channels**. Each Motionnet communication line can be connected to up to 64 modules, meaning that the I/O can be expanded to up to 1024 input channels and 1024 output channels. The communication time required by each MN-325x is 15.1 us. If 64 modules have been connected, signals for 2048 points on 64 modules can be sent and received within 0.97 msec. 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. Each input port can be specified as either NPN or PNP (12~24 V), and the internal flywheel diodes of each output port can be individually connected to different sources of power (each port is comprised of 8 I/O signals).

Specifications:

Models	MN-3253(T)	MN-3254(T)	MN-3257(T)
Digital Output			
Output Channels	0	16	32
Output Type	Open Collector (Sink), with internal flywheel diode		
Load Voltage	+30 VDC max.		
Load Current	200 mA max. for each channel		
Isolation Voltage	3000 Vrms		
Digital Input			
Input Channels	32	16	0
Input Type	Sink/Source (NPN/PNP)		
On Voltage Level	+10 ~ 30 VDC		
Off Voltage Level	+3 VDC max.		
Input Impedance	4.7 KΩ		
Isolation Voltage	3000 Vrms		
Interface			
LED Indicators	Communication state(Link, Error) Input/output state Internal 3.3 V Power Termination resistor switch		
Communication Speed	Selectable 2.5, 5, 10 or 20 Mbps via DIP Switch.		

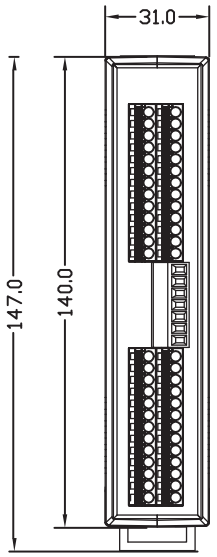
Models	MN-3253(T)	MN-3254(T)	MN-3257(T)
Cyclic Scan Time	15.1 µs per device (20 Mbps)		
Communication Connector	MN-325x : RJ-45 x2 MN-325xT : 5-pin terminal block		
I/O Connector	13-Pin pluggable Terminal block x 4		
Power			
Voltage Range	24 VDC (1000 V isolated)		
Power Consumption	2 W max.		
Protection	Reverse voltage and overcurrent protection		
Connection	7-pin removable terminal block		
Mechanical			
Case	Plastic		
Dimensions (W x H x D)	31 mm x 140 mm x 126.6 mm		
Installation	DIN-rail mounting		
Environmental			
Operating Temperature	0 ~ +60°C		
Storage Temperature	-20 ~ +80°C		
Operating Humidity	10 ~ 85%; Non-condensing		
Storage Humidity	5 ~ 95%; Non-condensing		

Pin Assignments of MN-3254(T):

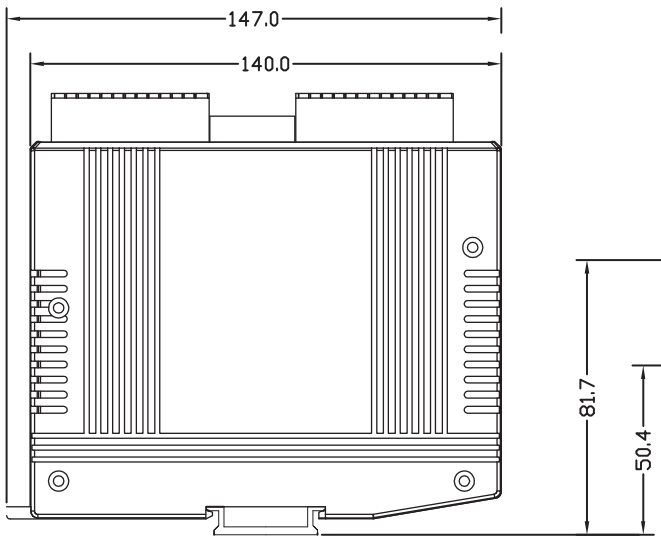


NO.	Pin Define.	Specifications	I/O Define.
CN1 Pin Assignments			
1	FG	Frame Ground	-
2 ~ 4	EGND	External Ground	Input
5 ~ 7	E24V	External 24V(+)	Input
CN2A (Right) Pin Assignments			
1 ~ 2	E24V	External 24V(+)	Connect to CN1
3	DICOM1	Common terminal of DI00~DI07	Input
4 ~ 11	DI00~DI07	Digital input channels 00~07	Input
12~13	EGND	External Ground	Connect to CN1
CN2B (Left) Pin Assignments			
1 ~ 2	E24V	External 24V(+)	Connect to CN1
3	DICOM2	Common terminal of DI08~DI15	Input
4 ~ 11	DI08~DI15	Digital input channels 08~15	Input
12~13	EGND	External Ground	Connect to CN1
CN3A (Right) Pin Assignments			
1 ~ 2	E24V	External 24V(+)	Connect to CN1
3	DOCOM1	Common Anode for Flywheel Diodes of DO00~DO07	Input
4 ~ 11	DO00~DO07	Digital output channels 00~07	Output
12~13	EGND	External Ground	Connect to CN1
CN3B (Left) Pin Assignments			
1 ~ 2	E24V	External 24V(+)	Connect to CN1
3	DOCOM2	Common Anode for Flywheel Diodes of DO08~DO15	Input
4 ~ 11	DO08~DO15	Digital output channels 08~15	Output
12~13	EGND	External Ground	connect to CN1

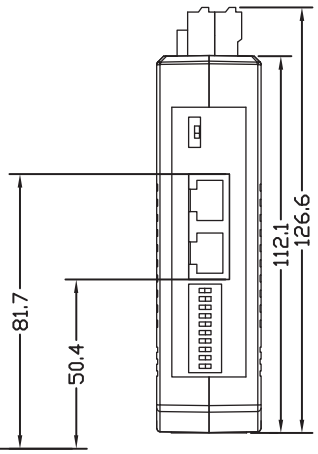
Dimensions: (Units : mm)



Front View



Right Side View



Top View

Ordering Information:

Model No.	Description
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)**

MN-D604-DIN
MN-D622-DIN
MN-D640-DIN

Distributed Motionnet Isolated DI/DO Module with Mini-clamp Connector

Features:

- Maximum communication speed: 20 Mbps
- MN-D622-DIN: 16-ch isolated DI, 16-ch isolated DO
  MN-D640-DIN: 32-ch isolated DI
  MN-D604-DIN: 32-ch isolated DO
- 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)
- Fast Output Response Time within 0.5 μs

Introduction:

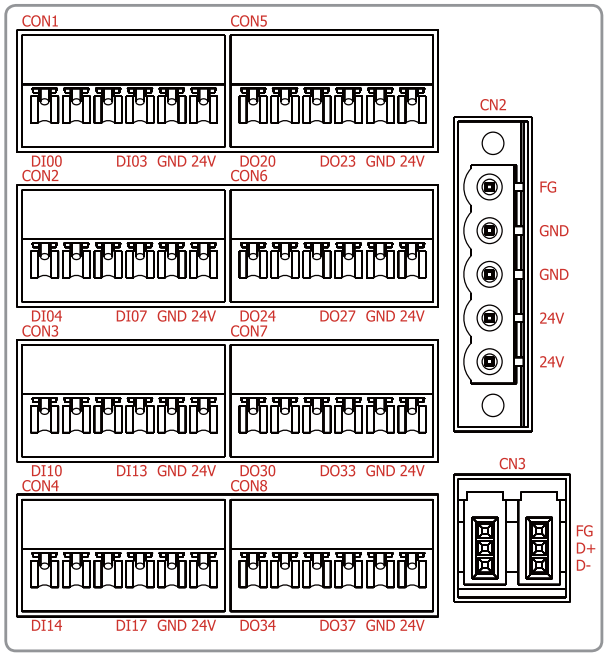
The **MN-D6xx-DIN** series is an I/O expansion device for Motionnet systems, and is equipped with **up to 32 isolated digital input channels and up to 32 isolated digital output channels**. Each Motionnet communication line can be connected to up to 64 modules, meaning that the I/O can be expanded to up to 1024 input channels and 1024 output channels. The communication time required by each **MN-Dxx-DIN** is 15.1 us. If 64 modules have been connected, signals for 2048 points on 64 modules can be sent and received within 0.97 msec. 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.

Specifications:

Models	MN-D604-DIN	MN-D622-DIN	MN-D640-DIN
Digital Input			
Input Channels	0	16	32
Input Type	NPN		
On Voltage Level	+10 ~ 24 VDC		
Off Voltage Level	+3 VDC max.		
Input Impedance	4.7 KΩ		
Isolation Voltage	2500 Vrms		
Digital Output			
Output Channels	32	16	0
Output Type	Open Collector (Sink), with internal flywheel diode		
Load Voltage	+30 VDC max.		
Load Current	200 mA max. for each channel		
Isolation Voltage	2500 Vrms		
Interface			
LED Indicators	Communication state(Link, Error) Input/output state Internal 3.3 V Power External 24 V Power		
Communication Speed	Selectable 2.5, 5, 10 or 20 Mbps by DIP Switch.		

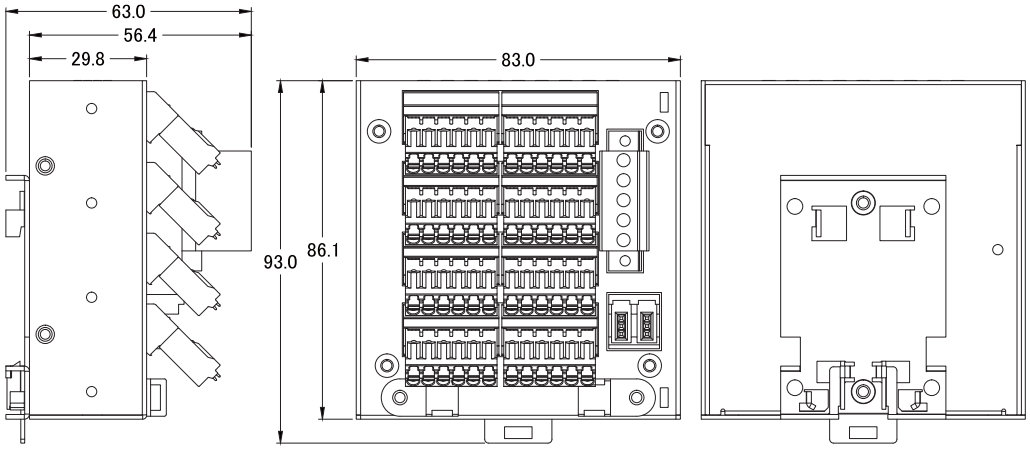
Models	MN-D604-DIN	MN-D622-DIN	MN-D640-DIN
Cyclic Scan Time	15.1 μs per device (20 Mbps)		
Communication Connector	Mini-clamp Connector x 2		
I/O Connector	6-Pin pluggable Terminal block x 8		
Power			
Voltage Range	24 VDC (1000 V isolated)		
Power Consumption	2 W max.		
Protection	Reverse voltage and overcurrent protection		
Connection	5-pin removable terminal block		
Mechanical			
Case	Aluminum		
Dimensions	83 mm x 93 mm x 63 mm (W x H x D)		
Installation	DIN-Rail mounting		
Environmental			
Temperature	Operating: 0 ~ + 60°C		
	Storage: -20 ~ +80°C		
Operating Humidity	10 ~ 85%; Non-condensing		
Storage Humidity	5 ~ 95%; Non-condensing		

Pin Assignments of MN-D622-DIN:



NO.	Pin Define.	Specifications	I/O Define.
CN3 Pin Assignments			
1	F.G.	Frame Ground	-
2	Data+	Positive terminal of differential communication signal	Bidirectional
3	Data−	Negative terminal of differential communication signal	Bidirectional
CN2 Pin Assignments			
1	F.G.	Frame Ground	-
2~3	GND	External Ground	Input
4~5	24V	External 24V(+)	Input
CON1~4 Pin Assignments			
1~4	DIxx	Digital input channels 00~15	Input
5	GND	External Ground	Connect to CN2
6	24V	External 24V(+)	Connect to CN2
CON5~8 Pin Assignments			
1~4	DOxx	Digital output channels 00~15	Output
5	GND	External Ground	Connect to CN2
6	24V	External 24V(+)	Connect to CN2

Dimensions: (Units: mm)



Ordering Information:

Model No.	Description
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)**
PISO-MN200(T/EC) CR	PCI Bus, Dual-Line Motionnet Master Control Card (RoHS)
MN-SERVO Series CR MN-SERVO -EC Series CR	Distributed Motionnet Single-axis Motion Control Modules (with Spring Type Terminal Blocks; EC: with e-CON Mini-Clamp Connector) (RoHS)
MN-2091U CR MN-2091U-T CR	Distributed Motionnet Single-axis Universal Motion Control Module (RoHS)

Accessories:

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)
4PKD1O00000001	Gray	37103-2206-000FL	20 – 22	0.3 – 0.5	1.6 – 2.0
4PKD1O00000002	Red	37103-3101-000FL	24 – 26	0.14 – 0.3	0.8 – 1.0
4PKD1O00000003	Orange	37103-3163-000FL	24 – 26	0.14 – 0.3	1.2 – 1.6

MN-HUB4 / MN-HUB4EC

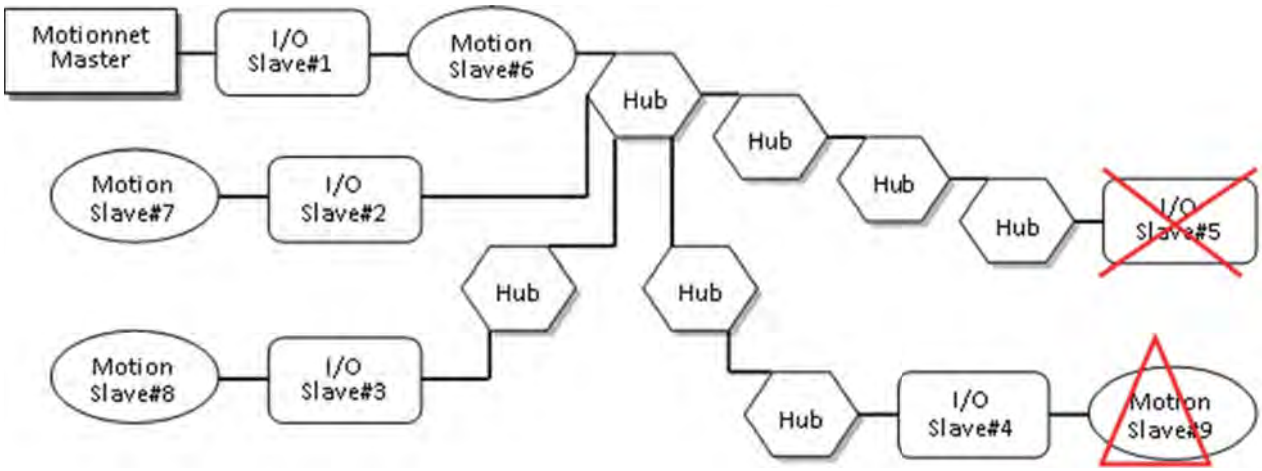
Distributed Motionnet 4 Port Hub Module

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 while the 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.



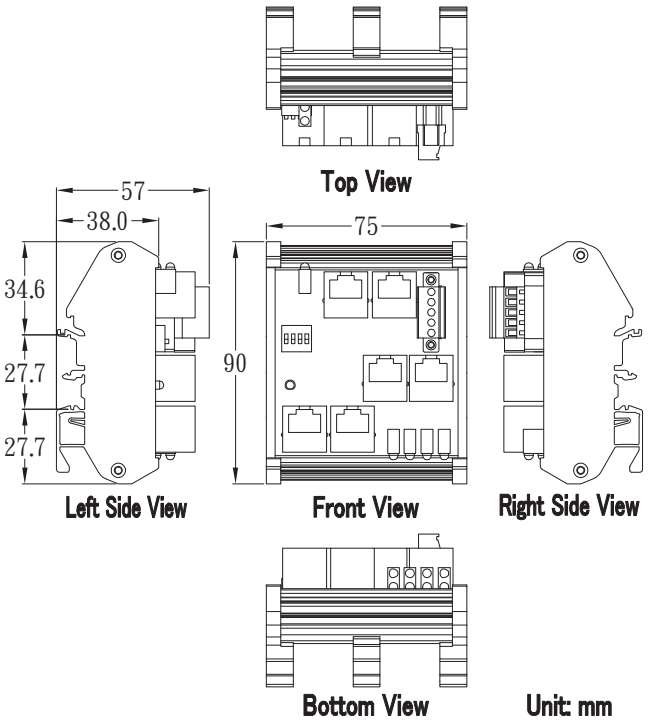
Module ID	No. of Layers to Master	Accessible	Module ID	No. of Layers to Master	Accessible
1 (I/O)	0	Yes	6 (Motion)	0	Yes
2 (I/O)	1	Yes	7 (Motion)	1	Yes
3 (I/O)	2	Yes	8 (Motion)	2	Yes
4 (I/O)	3	Yes	9 (Motion)	3	Yes
5 (I/O)	4	No			

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

Specifications:

Communication Speed	2.5, 5, 10, 20 Mbps
No. of Connection Line	Main Line (same layer): 2 Branch Line (to next layer): 4
Communication Speed	100 M Max. (20 Mbps; up to 32 modules) 50 M Max. (20 Mbps; up to 64 modules) 100 M Max. (10 Mbps; up to 64 modules)
Max. Layers between Modules	I/O or independent axis: 3 Between two interpolation axes: 2
Power Input	12 - 24 V
Operating Temperatures	0 °C ~ + 60 °C
Storage Temperatures	-20 °C ~ +80 °C
Operating Humidity	10 ~ 85%, Non-condensing
Storage Humidity	5 ~ 95%, Non-condensing

Dimensions: (Units: mm)



Ordering Information:

Model No.	Description
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)**
MN-HUB4EC-O CR	**Distributed Motionnet 4 port Hub module and 6 "4PKD1O0000003" Orange e-CON Mini-Clamp connector**
MN-HUB4EC-R CR	**Distributed Motionnet 4 port Hub module and 6 "4PKD1O0000002" Red e-CON Mini-Clamp connector**

Related Products:

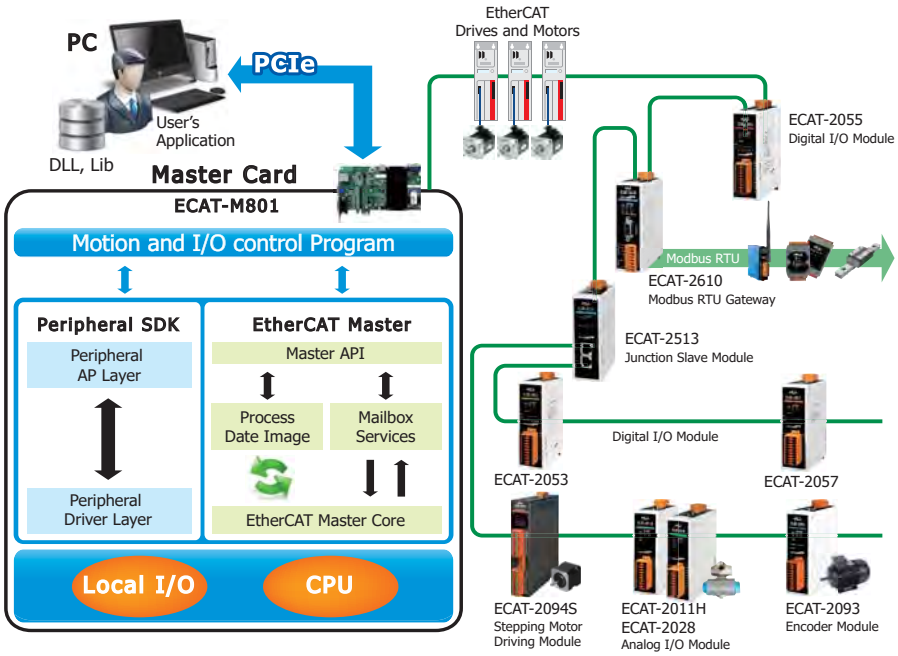
Model No.	Description
PISO-MN200(T/EC) CR	PCI Bus, Dual-Line Motionnet Control Master Card (RoHS)
MN-SERVO Series CR	MN-SERVO-MJ3 / PA4 / YSV / DAA / TTA: Distributed Motionnet Single-axis Motion Control Modules (RoHS)
MN-SERVO -EC Series CR	Distributed Motionnet Single-axis Motion Control Module with e-CON Mini-Clamp connector (RoHS)
MN-3254(T) CR	Distributed Motionnet 16-ch Isolated DI, 16-ch Isolated DO Module (RoHS)
MN-3253(T) CR	Distributed Motionnet 32-ch Isolated DI Module (RoHS)
MN-3257(T) CR	Distributed Motionnet 32-ch Isolated DO Module (RoHS)

Accessories:

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

Remote Motion Solutions

EtherCAT Motion Control Solutions



Introduction:

EtherCAT (Ethernet for Control Automation Technology) 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. It needs a master to control many slaves. ICP DAS provides PC master cards for users to build their motion related applications. This card can offer multi-axis motion and I/O control functions by its own built-in CPU. In this way, the CPU loading of PC can be reduced dramatically. In the mean while, ICP DAS also provides many I/O slave modules for users to choose from. Since EtherCAT technology is an industrial standard, those modules can work together in a system with 3rd-party EtherCAT slaves as well.

- **Versatile Motion Functions**
  P-to-P, Line, circle, 3D-arc, helix and other motion functions are provided.

- **Flexible and Easy Wiring**
  EtherCAT is a network technology which makes the system wiring easy and cost effective. Various coupler and junction slaves are provided for flexible wiring and less cabling.

- **Networking Standards**
  ECAT-M801 Master card is based on EtherCAT and CiA402 standards for precise multi-axis control. Third-party EtherCAT I/O slaves are also supported.

- **Programming API**
  Fast application implementation is enabled by using motion API provided by ICP DAS.

Applications:

- Semiconductor machinery and equipment
- Packaging
- Material handling
- Printing and automotive applications
- Machine tools
- Robotics
- Industrial automation

Related Products:

EtherCAT Solution Products of Remote Motion Solutions		
Master Cards	**ECAT-M801**	PCIe EtherCAT Master Card
Motion Control Modules	**ECAT-2092T** **ECAT-2093**	EtherCAT Encoder Modules
	ECAT-2091S **ECAT-2094S**	EtherCAT Stepping Motor Driving Modules
I/O Modules	**ECAT-2011H** **ECAT-2012H** **ECAT-2015** **ECAT-2016** **ECAT-2019**	EtherCAT Analog Input Modules
	ECAT-2024 **ECAT-2028**	EtherCAT Analog Output Modules
	ECAT-204x **ECAT-205x** **ECAT-206x**	EtherCAT Digital Input/Output Modules
Converters	**ECAT-2511-A** **ECAT-2511-B**	EtherCAT to Single-mode Fiber Converters
Junction Slave Modules	**ECAT-2512** **ECAT-2513**	EtherCAT Junction Slave Modules
Gateways	**ECAT-2610** **ECAT-2611**	EtherCAT Gateway Modules

EtherCAT Master Cards:

Inside the ECAT-M801 card, the internal CPU and firmware take care of the essential part of real-time motion control. Unless there is a special application, with this card, there is no need to purchase additional third-party Real-time plug-in software , such as RTX or INtime.

ECAT-M801	
Built-in DI/DO, Encoder Interface	**Multi-Axis Group Motion**
13 DI and 13 DO	Add/Remove axis from a group easily
2 Encoder interface with compare-trigger capability	Interpolated motion (PV, PT, PVT)
Handling of Slaves	2D/3D Circular motion
Dedicated utility program for configuring network	Helix motion
Support SDO and PDO communication for accessing data	Profile motion
Provide APIs to directly access slaves from ICP DAS	Continuous interpolated motion with up to 2000 data buffered
Max. 64 slaves	
Single-axis Motion Control functions	Supporting 3 types of command mode: Buffered, Aborting and Blending
Axis number can map to any slave number	
CiA402 servo drives and ICP DAS stepping motor drives (ECAT-2091S and ECAT-2094S) are supported	Max. 4 groups
	Others
Auto Homing function	1. Inside this card, 10 PID control loops are provided for process control
Point to point and constant velocity motion	
Profile motion with Max. 16 Profile data supported. Each profile data can contain up to 3000 position data.	2. High speed data logging: Any two out of the "Position command", "Velocity command", "Position response" and "Velocity response" can be selected for data logging. Max. 100000 pieces of data can be recorded.
Synchronous motion (E-GEAR, E-CAM)	
Virtual axes	
Touch probe function of CiA402 servo drive	
Max. 32 axes	

EtherCAT Motion Control Modules:

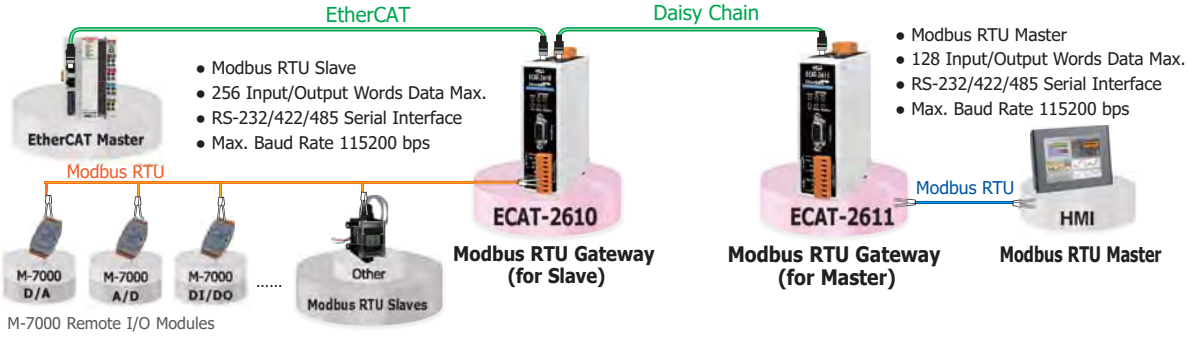
Encoder Module

Model Name	Axis	Type	Operating Voltage	Speed	Counter	Compare Trigger Out	Hardware Latch	Hardware Reset
ECAT-2092T	2	1. A/B Phase 2. CW/CCW 3. Pulse/Dir.	5/24 V (Jumper Select)	6 MHz (5V)	32-bit	2 (Open Collector)	Yes	Yes
ECAT-2093	3					-	-	-

Stepping Motor Driving Module

Model Name	Driver					Encoder				
	Axis	Type	Resolution	Output Current	Voltage Range	Axis	Type	Operating Voltage	Resolution	Speed
ECAT-2091S	1	2-phase stepper motor	200 x 256	2A per axis	5 ~ 40 V	1	A/B Phase	5 V	32-bit	1 MHz
ECAT-2094S	4					4	A/B Phase	5 V	32-bit	1 MHz

EtherCAT Gateway Module



EtherCAT I/O Modules:

Analog Input Module

Model Name	Channel	Input Range	Resolution	Accuracy	Output Capability
ECAT-2011H	8/16	0 ~ 10 V, ±10 V, ±5 V, ±2.5 V, 0 ~ 20 mA, ±20 mA or 4 ~ 20 mA (Software selectable)	12-bit	0.2% of FSR	1k Hz (per channel)
ECAT-2012H		0 ~ 10 V, ±12 V, ±10 V, ±5 V, ±2.5 V, 0 ~ 20 mA, ±20 mA or 4 ~ 20 mA (Software selectable)	16-bit		
ECAT-2015	6	Pt100, Pt1000, Ni120, Cu50, Cu100, Cu1000	16-bit	0.1% of FSR	10 Hz (Total)
ECAT-2016	2	Full-Bridge Strain Gauge	16-bit	0.05% of FSR	2/10 Hz (Total)
ECAT-2019	8	J, K, T, E, R, S, B, N, C, L, M, LDIN43710,±20 mA, 0 ~ +20 mA, +4 ~ +20 mA, ±15 mV,±50 mV,±150 mV, ±500 mV, ±1 V, ±2.5 V,±5 V,±10 V (Jumper Software selectable)	16-bit	0.1% of FSR	10 Hz (Total)

Analog Output Module

Model Name	Channel	Output Range	Resolution	Accuracy	Output Capability
ECAT-2024	4	±10 V, ±5V, 0~10 V,0 ~ 5V	12-bit	± 2 LSB	10 V @ 5mA
ECAT-2028	8				

Digital I/O Module

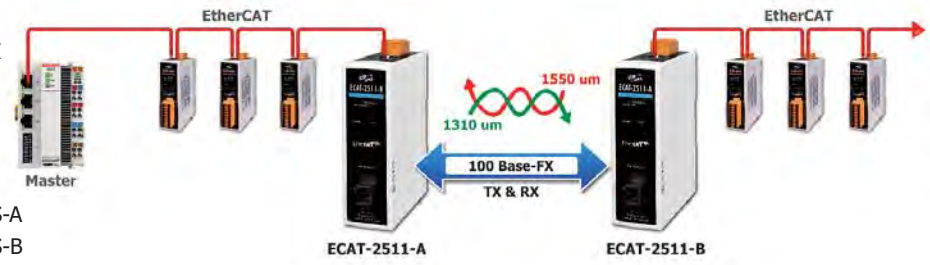
Model Name	Digital Input		Digital Output		
	Channels	Type	Channels	Type	Max. Load
ECAT-2057	-	-	16	Open Collector (Source)	100 mA
ECAT-2057-32	-	-	32	Open Collector (Source)	100 mA
ECAT-2057-PNP	-	-	16	Open Emitter (Sink)	100 mA
ECAT-2057-8P8N	-	-	8	Open Collector (Sink)	100 mA
			8	Open Emitter (Source)	100 mA
ECAT-2045	-	-	16	Open Collector (Sink)	700 mA
ECAT-2045-PNP	-	-	16	Open Collector (Source)	700 mA
ECAT-2045-32	-	-	32	Open Collector (Sink)	600 mA
ECAT-2051	16	Dry (Source), Wet (Sink/Source)	-	-	-
ECAT-2051-32	32	Dry (Source), Wet (Sink/Source)	-	-	-
ECAT-2050	13	Dry (Source), Wet (Sink/Source)	4	Open Collector/ Emitter by Jumper Selectable	100 mA
ECAT-2052	8	Wet (Sink/Source)	8	Open Collector (Source)	100 mA
ECAT-2052-NPN				Open Collector (Sink)	
ECAT-2053	16	Wet (Sink/Source)	-	-	-
ECAT-2055	8	Dry (Source), Wet (Sink/Source)	8	Open Collector (Sink)	700 mA
ECAT-2055-32	16	Dry (Source), Wet (Sink/Source	16	Open Collector (Sink)	700 mA
ECAT-2060	6	Dry (Source), Wet (Sink/Source)	6	Relay, Form A (SPST-NO)	5 A
ECAT-2061	-	-	16	Relay, Form A (SPST-NO)	5 A

EtherCAT Converter Modules: NEW

ECAT-2511-A **ECAT-2511-B**	**EtherCAT to Single-mode Fiber Converter**

The ECAT-2511-A and ECAT-2511-B a pair of converters for converting signals between EtherCAT and single mode fiber. Optic fiber prolongs the distance of transmission. It not only provides secure data transmission but also prevents interference from EMS/RFI.

- EtherCAT Type: RJ45, 100 Base-TX
- Fiber Type: SC, Single mode, 100 Base-FX
- Fiber Cable: 8.3/125, 8.7/125, 9/125 or 10/125 μm
- Max. transmission distance up to 25 km
- Fiber Wavelength:
  - Tx: 1310 nm, Rx: 1550 nm for I-2533CS-A
  - Tx: 1550 nm, Rx: 1310 nm for I-2533CS-B



EtherCAT Junction Slave Modules: NEW

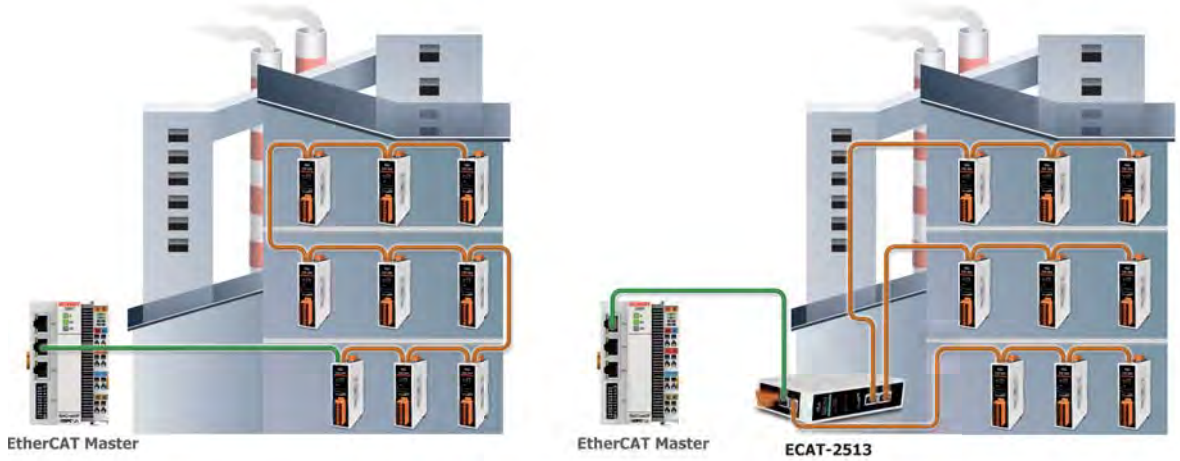
ECAT-2512 ECAT-2513	Junction Slave

ECAT-2512 and ECAT-2513 are 1-to-2 port and 1-to-3 port EtherCAT junction slaves, respectively. They are designed for realizing flexible wiring by daisy chain and branch.

Model Number	ECAT-2512 	ECAT-2513 
No. of Port	3 x RJ45 (1 in, 2 out)	4 x RJ45 (1 in, 3 out)
No. of Node	1	2

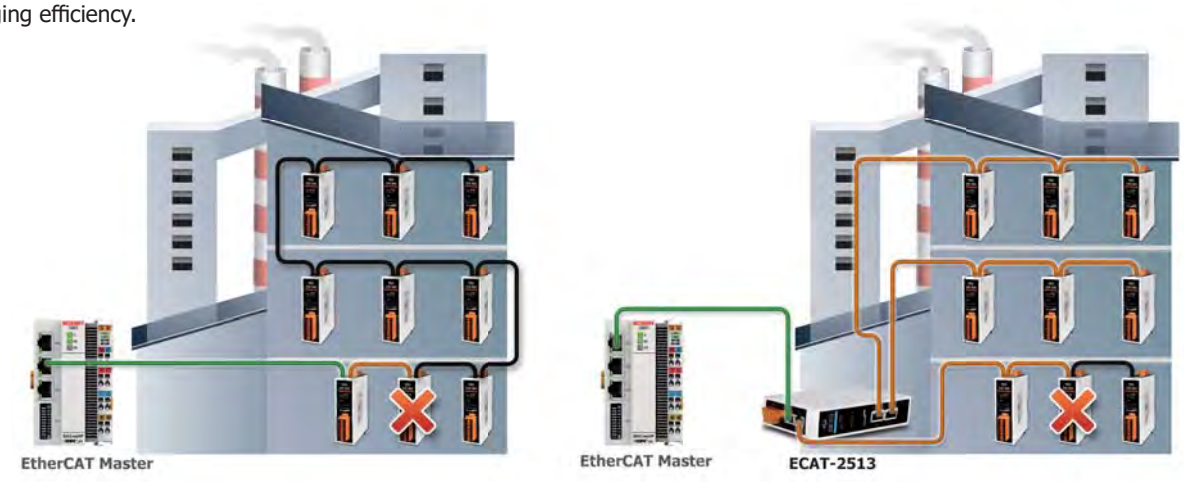
Benefit 1: Translate Daisy-chain to Branch Topology

EtherCAT junction slaves can realize branch topology. This make the cabling easier than daisy-chain topology.

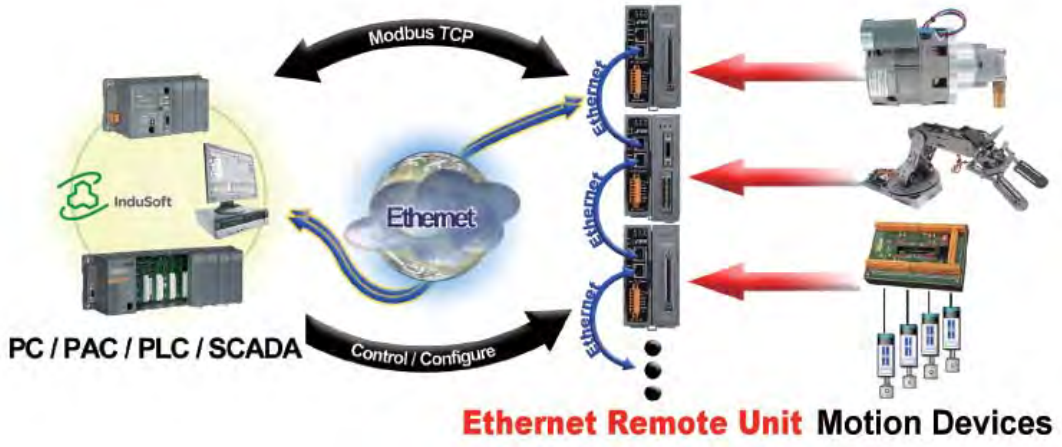


Benefit 2: Improving the Debugging Efficiency

If a slave device is not working or the cable is disconnected, all the following slave devices on the same network can not communicate with the master controller. With EtherCAT junction slaves, all slave devices can be wired as separated sections. If one slave device failed, only the slave devices on the same section will be influenced. The EtherCAT junction slave keeps the slave devices on other sections communicate with the master controller. Debugging can be done separately, thus improving the debugging efficiency.



Ethernet Motion Control Solutions

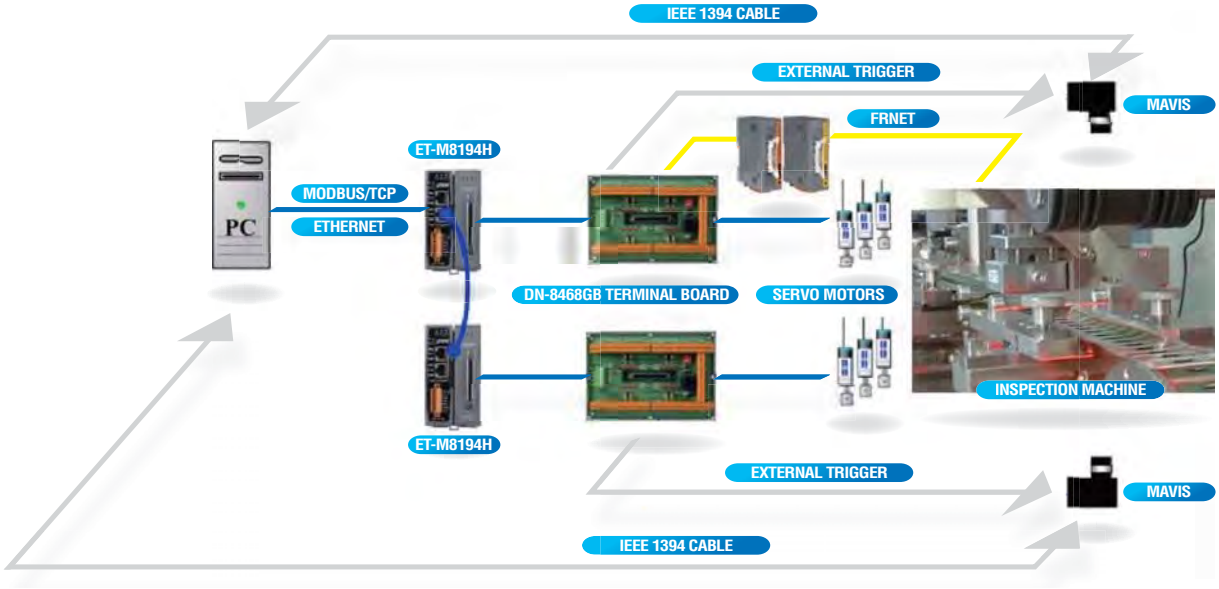


Introduction:

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.

Application Notes:

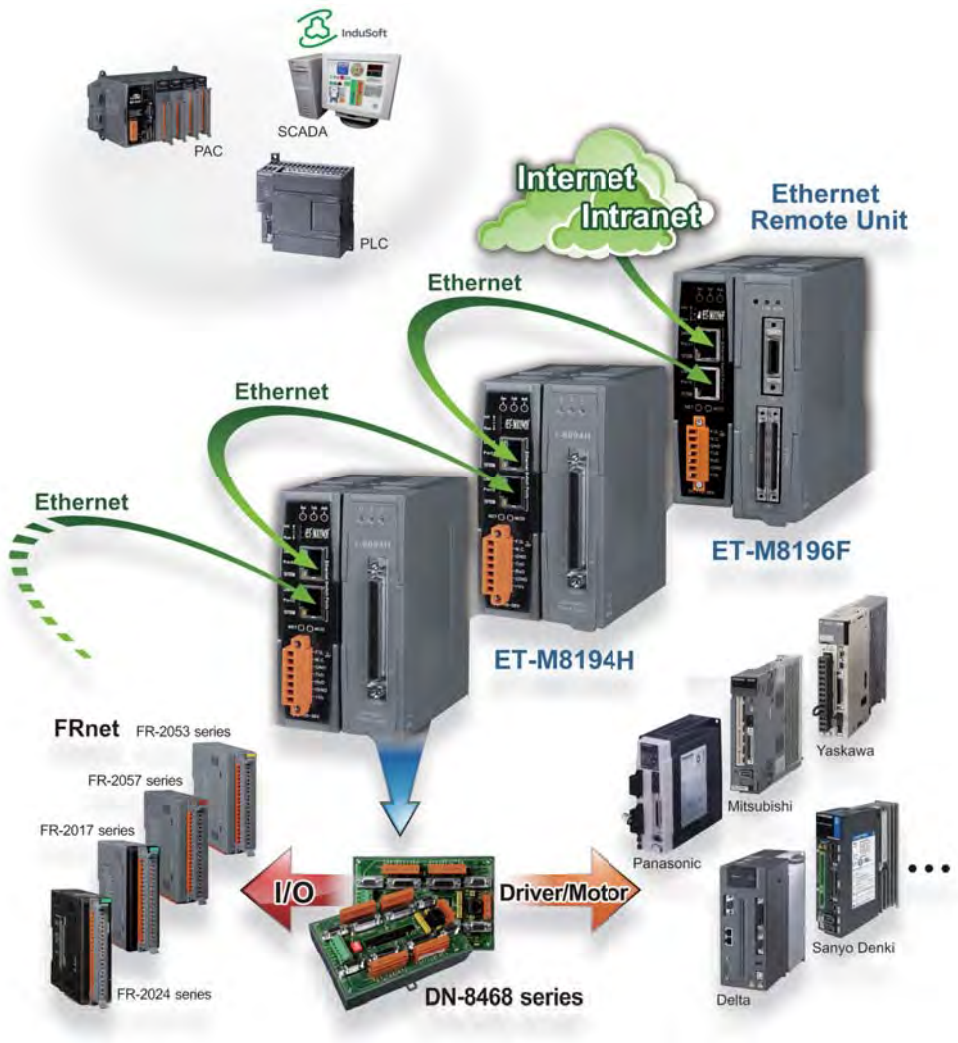
In a recent case, ET-M8194H units were installed on machines performing IC inspection. Each machine was equipped with two ET-M8194H modules to coordinate six motors by taking advantage of the embedded Ethernet switching ports on the ET-M8194H. Therefore six axes motion control could be easily implemented 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.



Application Structure and Features:

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

- Supports the Modbus TCP protocol
- Easy integration into a SCADA, PAC or PLC Modbus TCP network
- The device can be set as a remote or stand-alone motion controller
- ET-M8194H supports 4-axis motion control: 2/3-axis linear interpolation, etc.
- ET-M8196F supports 6-axis motion control: 2- to 6-axis linear/2- To 3-axis circular interpolation, etc.
- Supports high-speed FRnet I/O: 128 digital outputs and 128 digital inputs
- Supports macro programming (for ET-M8194H only)
- Includes the EzMove utility for system configuration and macro program editing (for ET-M8194H only)
- Supports FRnet DI or event triggered macro program execution (for ET-M8194H only)



Related Products:

Ethernet Communication Solution Products of Remote Motion Solutions		
Ethernet Communication 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

ET-M8194H

Ethernet Remote Unit with High-speed 4-axis Motion Control Module

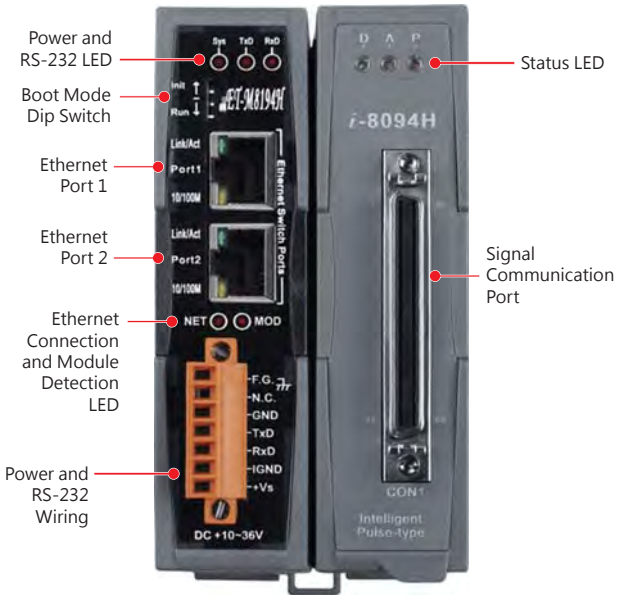
Features:

- Remote control via Modbus TCP
- Can be controlled using SCADA, PAC or PLC, etc.
- Can be integrated into multi-station, multi-axis applications
- 4-axis motion control capability
- 2/3-axis linear interpolation function
- 2-axis circular interpolation function
- Programmable automatic homing function
- EzMove Utility for configuration and macro programming
- Test motion functions via EzMove without compilation
- Library for rapid development of applications
- Easy wiring for multi-station applications
- Can be set as a remote or stand-alone motion controller
- Supports high-speed FRnet I/O: 128 DO and 128 DI

Introduction:

The **ET-M8194H** is a new product from ICP DAS that can be used to implement remote control functionality via the Ethernet and includes an I-8094H module (a 4-axis stepping/pulse-type servo motor control module with an embedded CPU) and an Ethernet communication interface. The intelligent ET-M8194H can provide users with the ability to develop a wide range of remote motion control applications, and can be integrated in any system where the host platform is built on the Modbus TCP protocol (for example: PC, PAC or PLC). In addition, implementing a multi-station, multi-axis motion control solution can easily be achieved by cascading several ET-M8194H devices using Ethernet cables, either with or without Ethernet switches. ICP DAS also provides the EzMove Utility and an API Library that can be used to configure the ET-M8194H and to rapidly develop customized control applications.

Hardware:



ET-M8194H Interface Functions

Software Supported: ET-M8194H SDK

EzMove Utility

EzMove is a configuration utility developed by ICP DAS for the ET-M8194H controller. It is intended to perform motion control tasks and movement test on equipment without the need to first create customized applications. As the EzMove Utility is a Modbus client, it can be used to create and edit Macro Programs (MP), which can then be uploaded to the ET-M8194H. The EzMove Utility can also display and plot position/velocity of all four axes as well as display Modbus TCP messages for easy reference.

API Library

The ET-M8194H API Library is composed of nine groups of functions, which can be utilized to edit Macro Programs (MP) and send Modbus TCP commands required to control or configure the I-8094H. The library provides users with the ability to simultaneously control a large number of ET-M8194H from the PC.

DLL and libraries for the following development environments are provided:

- Visual C++
- BCB 5.0, 6.0
- C#, VB.NET
- Visual Basic 6.0

Specifications:

Interpolation Functions	Linear Interpolation (Interpolation Speed: 4 Mpps): 32-bit max. for any single command Circular Interpolation (Interpolation Speed: 4 Mpps): 32-bit max. for any single command Continuous Interpolation (Interpolation Speed: 2 Mpps): Yes
Drive Speed Curve	Maximum Drive Speed: 4 Mpps Constant Speed Driving Trapezoidal Acc/Dec Driving Asymmetrical Trapezoidal Driving S-curve Acc/Dec Driving Asymmetrical S-curve Driving
Position Control	Logic Position Counter/Bit Length for output pulse: 32-bit Real Position Counter/Bit Length for output pulse: 32-bit Position Compare Register Number/Axis: 2 Software Limit Position Counter Variable Ring
Auto-Home Search	Individual configuration (4-step) for each axis including irregular operation handling
Synchronous Action	10 activation factors (provocatives or events) and 14 actions
External Signal for Driving	Fixed/Continuous Pulse Output Manual Pulse
Other Functions	Drive Speed/Output Pulse Number Change during Driving Triangle Form Prevention of Speed Curve
Servo Motor Signal	Servo Ready and Alarm Input Signals/Axis Servo Enable Output/Axis
Other Input Signals	IN0 (Near Home), IN1 (Home), IN2 (Z-phase), IN3/Axis Emergency Signal
Input Signal Integral Type Filter	Filter Time Constant: 2 ~ 16 ms, 8 stages
Environmental	Operating Temperature: -20 ~ +75°C Storage Temperature: -30 ~ +85°C Operating Humidity: 10 ~ 85% RH, non-condensing Storage Humidity: 5 ~ 90% RH, non-condensing
FRnet Interface	Max. 128 DI and 128 DO channels Hardware auto-scan I/O every 0.72 ms Two-wire Serial Bus to reduce wiring needs Max. communication distance: 100 M A wide range of FRnet I/O terminal boards and modules are available

Applications:

- X-Y-Z Table
- Fix-Pitch Stamping Machine
- Transfer Machine
- Spinner
- Loader/Unloader

Ordering Information/Accessories:

Model No.	Description
ET-M8194H	**Ethernet Remote Automation Unit with High-speed 4-axis Motion Control Module**
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-H CA-SCSI30-H CA-SCSI50-H	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

Ethernet Remote Unit with High-speed, DSP-based, 6-axis Motion Control Module

Features:

- Remote control via Modbus TCP
- DSP-based motion control module
- Maximum pulse output frequency: 4 MHz
- Maximum Encoder input frequency: 12 MHz
- Independent 6-axis motion control
- 2- to 6-axis linear/ 2- to 3-axis circular/ helical interpolation function
- Continuous interpolation
- 4-step home mode with auto-searching
- Synchronized start motion
- Programmable T/S-curve acceleration and deceleration
- Software limit protection
- Software FIFO for arbitrary curve motion
- High-speed position latch
- High-speed compare trigger and auto-increment compare mode
- Expandable remote I/O: 128 DI and 128 DO via a two-wire FRnet interface.

Introduction:

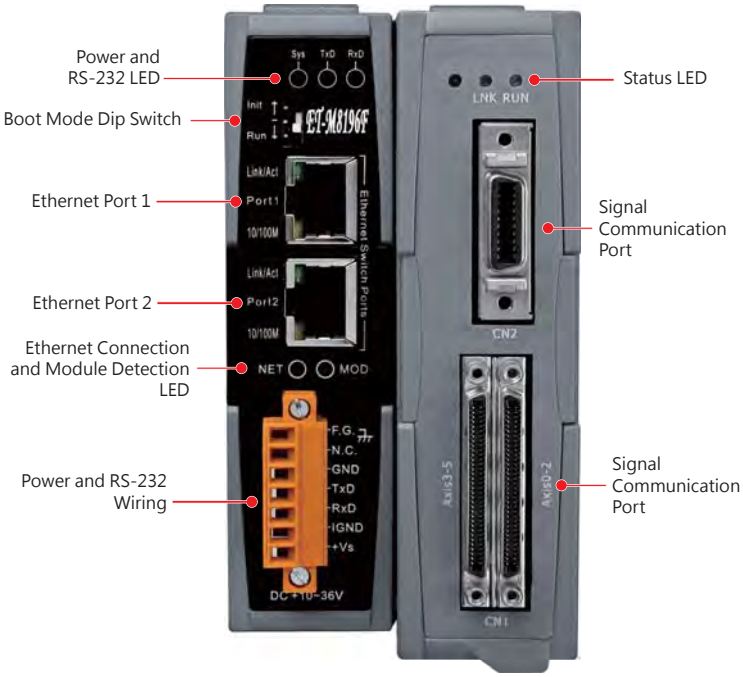
The ET-M8196F is a compact remote motion control device which uses Modbus TCP as its communication protocol. The ET-M8196F acts as a server in a Modbus TCP network and supports all standard Modbus function codes defined by the Modbus TCP protocol. Nowadays many PCs have got limited PCI slots; therefore the ET-M8196F can be used to replace PCI motion control cards. The ET-M8196F has got two Ethernet ports which allow daisy chaining.

The motion controller of the ET-M8196F consists of an Ethernet communication module and a 6-axis motion control card. A digital signal processor (DSP) is the brain of the motion controller which calculates the commanded move trajectory and manages supervisory control by monitoring the limits and emergency stops to ensure safe operation. I/O control output (e.g. latch, compare, encoder counter etc.) is realized in a Field Programmable Gate Array (FPGA).

The motion controller is suitable for general-purpose motion control applications. 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- or 3-axis circular interpolation, helical interpolation, T/S-curve acceleration/deceleration, and automatic home search, etc.

In addition the ET-M8196F acts as an FRnet master and can control up to 128 digital outputs and 128 digital inputs. FRnet is a two-wire serial bus and has a scan interval of 0.72 ms and it is specifically designed for easy and cost effective wiring. ICPDAS provides a large range of FRnet I/O terminal boards and modules.

An application programming interface (API) for communicating with the ET-M8196F motion controller is being provided. This enables the user's program on the host computer to easily interact with the motion controller. A software utility for Ethernet configuration and basic motion settings and execution is part of the software package.



ET-M8196F Interface Functions

Specifications:

Communication Protocol	Modbus TCP Modbus TCP server
Number of Axes	6
Maximum Pulse Output Rate	4 MHz
Command Type	Pulse Command
Pulse Output Mode	CW/CCW, PULSE/DIR, A/B pulse
Linear Interpolation	Any 2- to 6-axis
Circular/Helical Interpolation	Any 2- or 3-axis
Speed Curve Profile	T/S-curve
Mechanical Switch Input	Home, LMT+/-, NHOME, LTC, EMG
Servo I/O Interface	Input: INP, ALM, RDY Output: SVON, ALM_RST, ERC
Ring Counter Mode	32-bit
Position Control Mode	Relative and absolute position
Position Compare Trigger	4 MHz
Encoder Interface	A/B pulse, Up/Down
Encoder Counter	32-bit
Encoder Counting Rate	12 MHz
Digital Input Channels	Local: 12 DI Expandable: 128 DI
Digital Output Channels	Local: 3 DO Expandable: 128 DO
I/O Isolation (with DN-8368)	2500 Vrms optical isolation
Connector	68-pin VHDCI Connector and 20-pin SCSI-II
Power Consumption	+24V
Environmental	
Operating Temperature	0 ~ +60 °C
Storage Temperature	-20 ~ +80 °C
Ambient Relative Humidity	5 ~ 90 % RH, non-condensing

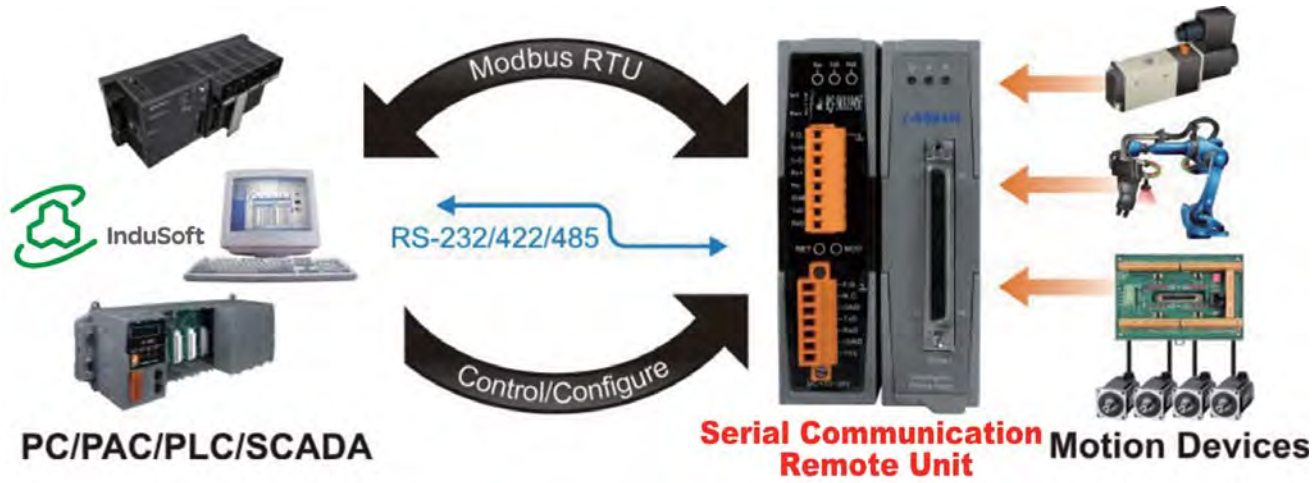
Software Support:

Windows 10 Windows 8 Windows 7 Windows XP	32/64 bit: Visual C++ lib/DLL C#, VB.Net DLL Delphi LabVIEW Visual Basic 6.0 BCB 5.0, 6.0 Configuration utility Demo programs

Ordering Information/Accessories:

Model No.	Description
ET-M8196F	**Ethernet Remote Unit with High-speed, DSP-based, 6-axis Motion Control Module**
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 M / 3 M / 5 M.
CA-26-MJ3-15/30/50	26-pin HD D-Sub Male Cable for Mitsubishi Servo Amplifier, 1.5/3/5 M. (for MELSERVO-J3/J4 Series)
CA-26-PA4-15/30/50	26-pin HD D-Sub Male Cable for Panasonic Servo Amplifier, 1.5/3/5 M. (for MINAS A4/A5 Series)
CA-26-YSV-15/30/50	26-pin HD D-Sub Male Cable for Yaskawa Servo Amplifier, 1.5/3/5 M. (for Sigma II/III/V Series)
CA-26-TTA-15/30/50	26-pin HD D-Sub Male Cable for Teco Servo Amplifier, 1.5/3/5 M. (for TSTA-A/A+ Series)
CA-26-DAA2-15/30/50	26-pin HD D-Sub Male Cable for Delta A2 Servo Amplifier, 1.5/3/5 M. (for ASDA-A2 Series)
CA-26-DAB2-15/30/50	26-pin HD D-Sub Male Cable for Delta B2 Servo Amplifier, 1.5/3/5 M. (for ASDA-B2 Series)
CA-26-FFW-15/30/50	26-pin HD D-Sub Male Cable for Fuji Servo Amplifier, 1.5/3/5 M. (for FALDIC-W and ALPHA5 Smart Series)

Serial Communication Motion Control Solutions



Introduction:

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.

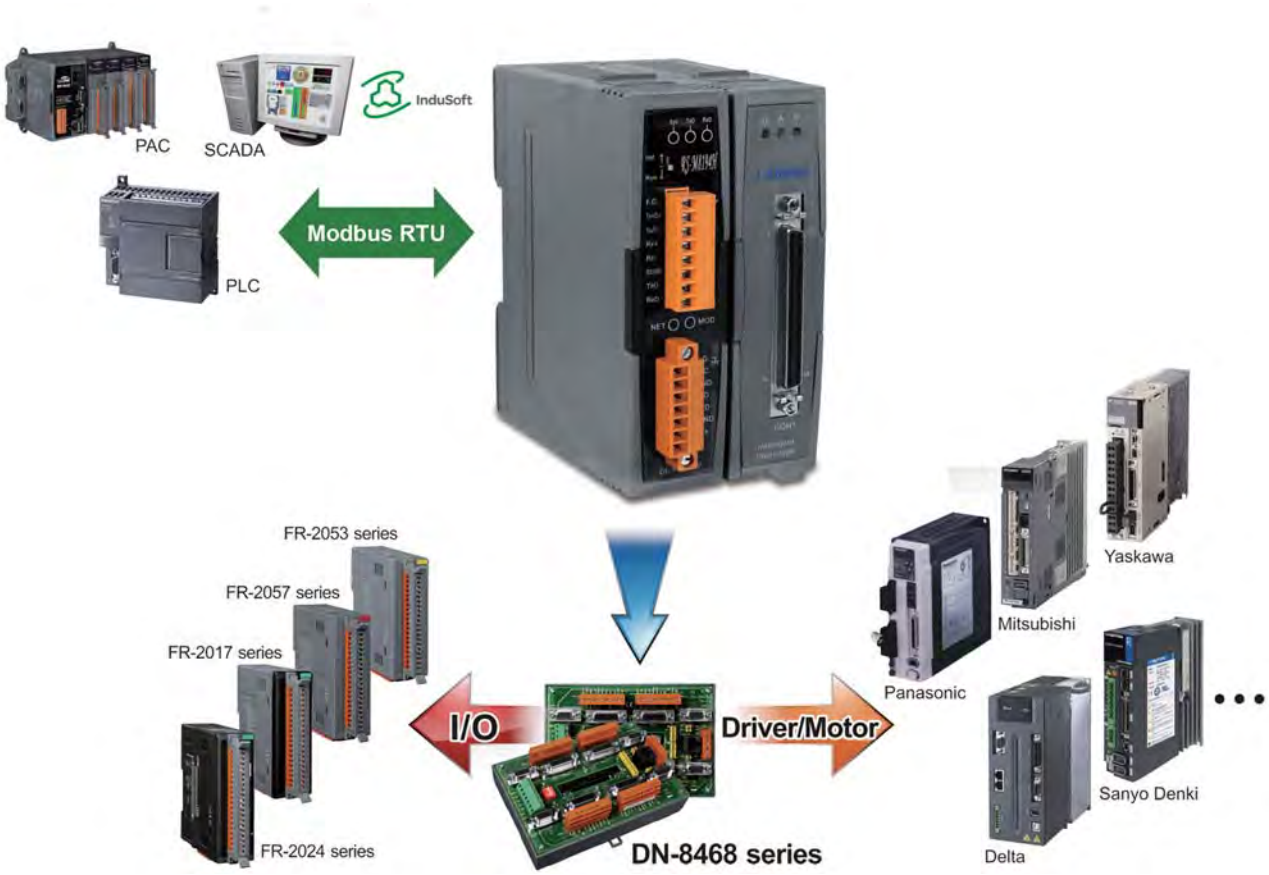
Application Notes:

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.

Application Structure and Features:

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

- Supports the Modbus RTU protocol
- Easy integration into a SCADA, PAC or PLC Modbus RTU network
- The device can be set as a remote or stand-alone motion controller
- RS-M8194H supports 4-axis motion control: 2/3-axis linear interpolation, etc.
- RS-M8196F supports 6-axis motion control: 2- to 6-axis linear/2- to 3-axis circular interpolation, etc.
- Supports high-speed FRnet I/O: 128 digital outputs and 128 digital inputs
- Supports macro programming (for RS-M8194H only)
- Includes the EzMove utility for system configuration and macro program editing (for RS-M8194H only)
- Supports FRnet DI or event triggered macro program execution (for RS-M8194H only)



Related Products:

Serial Communication Solution Products of Remote Motion Solutions		
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

RS-M8194H

Serial Communication Remote Unit with High-speed 4-axis Motion Control Module

Features:

- Remote control via Modbus RTU
- Can be controlled using SCADA, PAC or PLC, etc.
- Can be integrated into a multi-station, multi-axis applications
- 4-axis motion control capability
- 2/3-axis Linear Interpolation Function
- 2-axis Circular Interpolation Function
- Programmable Automatic Homing function
- EzMove Utility for configuration and macro programming
- Test motion functions via EzMove without compilation
- API Library for rapid development of applications
- Easy wiring for multi-station applications
- Can be set as a remote or stand-alone motion controller
- Supports high-speed FRnet I/O: 128 DO and 128 DI

Introduction:

The **RS-M8194H** is a new product from ICP DAS that can be used to implement remote control functionality via the serial communication and includes an I-8094H module (a 4-axis stepping/pulse-type servo motor control module with an embedded CPU) and a serial communication interface. The intelligent RS-M8194H can provide users with the ability to develop a wide range of remote motion control applications, and can be integrated in any system where the host platform is built on the Modbus RTU protocol (for example: PC, PAC or PLC). ICP DAS also provides the EzMove Utility and an API Library that can be used to configure the RS-M8194H and to rapidly develop customized control applications.

Hardware Interface:

Software:

EzMove Utility

EzMove is a configuration utility developed by ICP DAS for the RS-M8194H controller. It is intended to perform motion control tasks and movement test on equipment without the need to first create customized applications. As the EzMove Utility is a Modbus client, it can be used to create and edit Macro Programs (MP), which can then be uploaded to the RS-M8194H. The EzMove Utility can also display and plot position/velocity of all four axes as well as display Modbus RTU messages for easy reference.

API Library

The RS-M8194H API Library is composed of nine groups of functions, which can be utilized to edit Macro Programs (MP) and send Modbus RTU commands required to control or configure the I-8094H. The library provides users with the ability to simultaneously control a large number of RS-M8194H from the PC. DLL and libraries for the following development environments are provided:

- Visual C++
- BCB 5.0, 6.0
- C#, VB.NET
- Visual Basic 6.0

Specifications:

Interpolation Functions	Linear Interpolation (Interpolation Speed: 4 Mpps): 32-bit max. for any single command Circular Interpolation (Interpolation Speed: 4 Mpps): 32-bit max. for any single command Continuous Interpolation (Interpolation Speed: 2 Mpps): Yes
Drive Speed Curve	Maximum Drive Speed: 4 Mpps Constant Speed Driving Trapezoidal Acc/Dec Driving Asymmetrical Trapezoidal Driving S-curve Acc/Dec Driving Asymmetrical S-curve Driving
Position Control	Logic Position Counter/Bit Length for output pulse: 32-bit Real Position Counter/Bit Length for output pulse: 32-bit Position Compare Register Number/Axis: 2 Software Limit Position Counter Variable Ring
Auto-Home Search	Individual configuration (4-step) for each axis including irregular operation handling
Synchronous Action	10 activation factors (provocatives or events) and 14 actions
External Signal for Driving	Fixed/Continuous Pulse Output Manual Pulse
Other Functions	Drive Speed/Output Pulse Number Change during Driving Triangle Form Prevention of Speed Curve
Servo Motor Signal	Servo Ready and Alarm Input Signals/Axis Servo Enable Output/Axis
Other Input Signals	IN0 (Near Home), IN1 (Home), IN2 (Z-phase), IN3/Axis Emergency Signal
Input Signal Integral Type Filter	Filter Time Constant: 2 ~ 16 ms, 8 stages
Environmental	Operating Temperature: -20 ~ +75°C Storage Temperature: -30 ~ +85°C Operating Humidity: 10 ~ 85% RH, non-condensing Storage Humidity: 5 ~ 90% RH, non-condensing
FRnet Interface	Max. 128 DI and 128 DO channels Hardware auto-scan I/O every 0.72 ms Two-wire Serial Bus to reduce wiring needs Max. communication distance: 100 M A wide range of FRnet I/O terminal boards and modules are available

Applications:

- X-Y-Z Table
- Fix-Pitch Stamping Machine
- Transfer Machine
- Spinner
- Loader/Unloader

Ordering Information/Accessories:

Model No.	Description
RS-M8194H	**Serial Communication Remote Automation Unit with High-speed 4-axis Motion Control Module**
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-H CA-SCSI30-H CA-SCSI50-H	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

RS-M8196F Serial Communication Remote Unit with High-speed 6-axis Motion Control Module

Features:

- Remote control via Modbus RTU
- DSP-based motion control module
- Maximum pulse output frequency: 4 MHz
- Maximum encoder input frequency: 12 MHz
- Independent 6-axis motion control
- 2- to 6-axis linear/ 2- to 3-axis circular/ helical interpolation function
- Continuous interpolation
- 4-step home mode with auto-searching
- Synchronized start motion
- Programmable T/S-curve acceleration and deceleration
- Software limit protection
- Software FIFO for arbitrary curve motion
- High-speed position latch
- High-speed compare trigger and auto-increment compare mode
- Expandable remote I/O: 128 DI and 128 DO via a two-wire FRnet interface

Introduction:

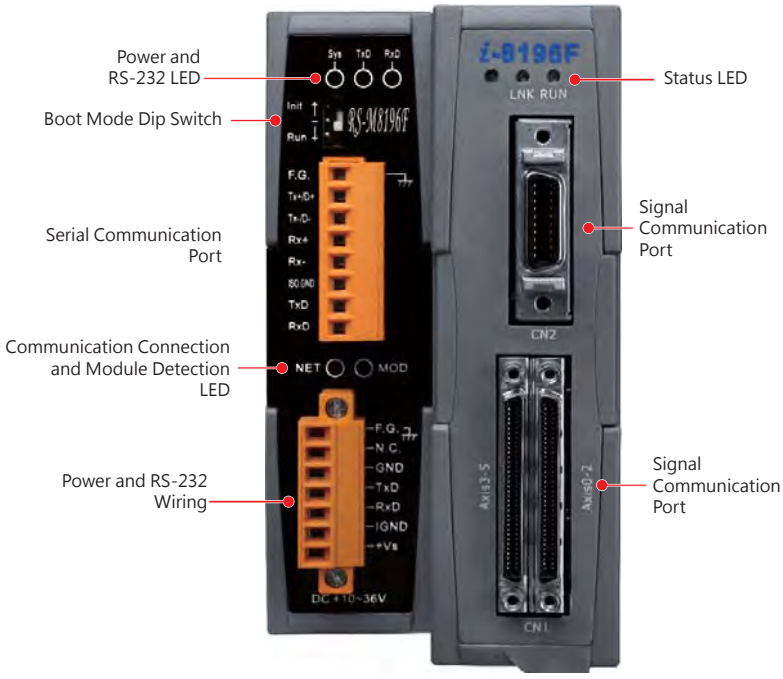
The **RS-M8196F** is a remote serial 6-axis stepping/pulse-type servo motion controller which uses Modbus RTU as its communication protocol. The RS-M8196F is a slave in a Modbus RTU network and supports all standard Modbus function codes. Three serial interfaces are provided (RS232, RS485 and RS422) and the user can select any of the three serial interfaces for communication. The RS-M8196F can expand a PLC system by adding 6-axis motion control support.

The motion controller of the RS-M8196F consists of a serial communication module and a motion control card. A digital signal processor (DSP) is the brain of the motion controller which calculates the commanded move trajectory and manages supervisory control by monitoring the limits and emergency stops to ensure safe operation. A Field Programmable Gate Array (FPGA) controls the input/output (e.g. latch, compare, encoder counter etc.).

The motion controller is suitable for general-purpose motion control applications. 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- and 3-axis circular interpolation, 3-axis helical interpolation, T/S-curve acceleration/deceleration, and automatic home search, etc.

In addition the RS-M8196F acts as an FRnet master and can control up to 16 remote DIO slaves (128 digital outputs and 128 digital inputs). FRnet is a two-wire serial bus and has a scan interval of 0.72 ms and it is specifically designed for easy and cost effective wiring. ICPDAS provides a large range of FRnet I/O terminal boards and modules.

DLL, software utilities and demo programs for Win7, Win8 and Win10 are provided.



RS-M8196F Interface Functions

Specifications:

Communication Protocol	Modbus RTU
Number of Axes	6
Maximum Pulse Output Rate	4 MHz
Command Type	Pulse Command
Pulse Output Mode	CW/CCW, PULSE/DIR, A/B pulse
Linear Interpolation	Any 2- to 6-axis
Circular/Helical Interpolation	Any 2- or 3-axis
Speed Curve Profile	T/S-curve
Mechanical Switch Input	Home, LMT+/-, NHOME, LTC, EMG
Servo I/O Interface	Input: INP, ALM, RDY Output: SVON, ALM_RST, ERC
Ring Counter Mode	32-bit
Position Control Mode	Relative and absolute position
Position Compare Trigger	4 MHz
Encoder Interface	A/B pulse, Up/Down
Encoder Counter	32-bit
Maximum Encoder Counting Rate	12 MHz
Digital Input Channels	Local: 12 DI Expandable: 128 DI
Digital Output Channels	Local: 3 DO Expandable: 128 DO
I/O Isolation (with DN-8368)	2500 Vrms optical isolation
Connector	68-pin VHDCI Connector and 20-pin SCSI-II
Power Consumption	+24V
Environmental	
Operating Temperature	0 ~ +60 °C
Storage Temperature	-20 ~ +80 °C
Ambient Relative Humidity	5 ~ 90 % RH, non-condensing

Software Support:

Windows 10 Windows 8 Windows 7 Windows XP	32/64 bit: Visual C++ lib/DLL Configuration utility Demo programs

Ordering Information/Accessories:

Model No.	Description
RS-M8196F	**Remote serial communication unit with high-speed, DSP-based, 6-axis motion control card**
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 M / 3 M / 5 M.
CA-26-MJ3-15/30/50	26-pin HD D-Sub Male Cable for Mitsubishi Servo Amplifier, 1.5/3/5 M. (for MELSERVO-J3/J4 Series)
CA-26-PA4-15/30/50	26-pin HD D-Sub Male Cable for Panasonic Servo Amplifier, 1.5/3/5 M. (for MINAS A4/A5 Series)
CA-26-YSV-15/30/50	26-pin HD D-Sub Male Cable for Yaskawa Servo Amplifier, 1.5/3/5 M. (for Sigma II/III/V Series)
CA-26-TTA-15/30/50	26-pin HD D-Sub Male Cable for Teco Servo Amplifier, 1.5/3/5 M. (for TSTA-A/A+ Series)
CA-26-DAA2-15/30/50	26-pin HD D-Sub Male Cable for Delta A2 Servo Amplifier, 1.5/3/5 M. (for ASDA-A2 Series)
CA-26-DAB2-15/30/50	26-pin HD D-Sub Male Cable for Delta B2 Servo Amplifier, 1.5/3/5 M. (for ASDA-B2 Series)
CA-26-FFW-15/30/50	26-pin HD D-Sub Male Cable for Fuji Servo Amplifier, 1.5/3/5 M. (for FALDIC-W and ALPHA5 Smart Series)

PC-based Solutions

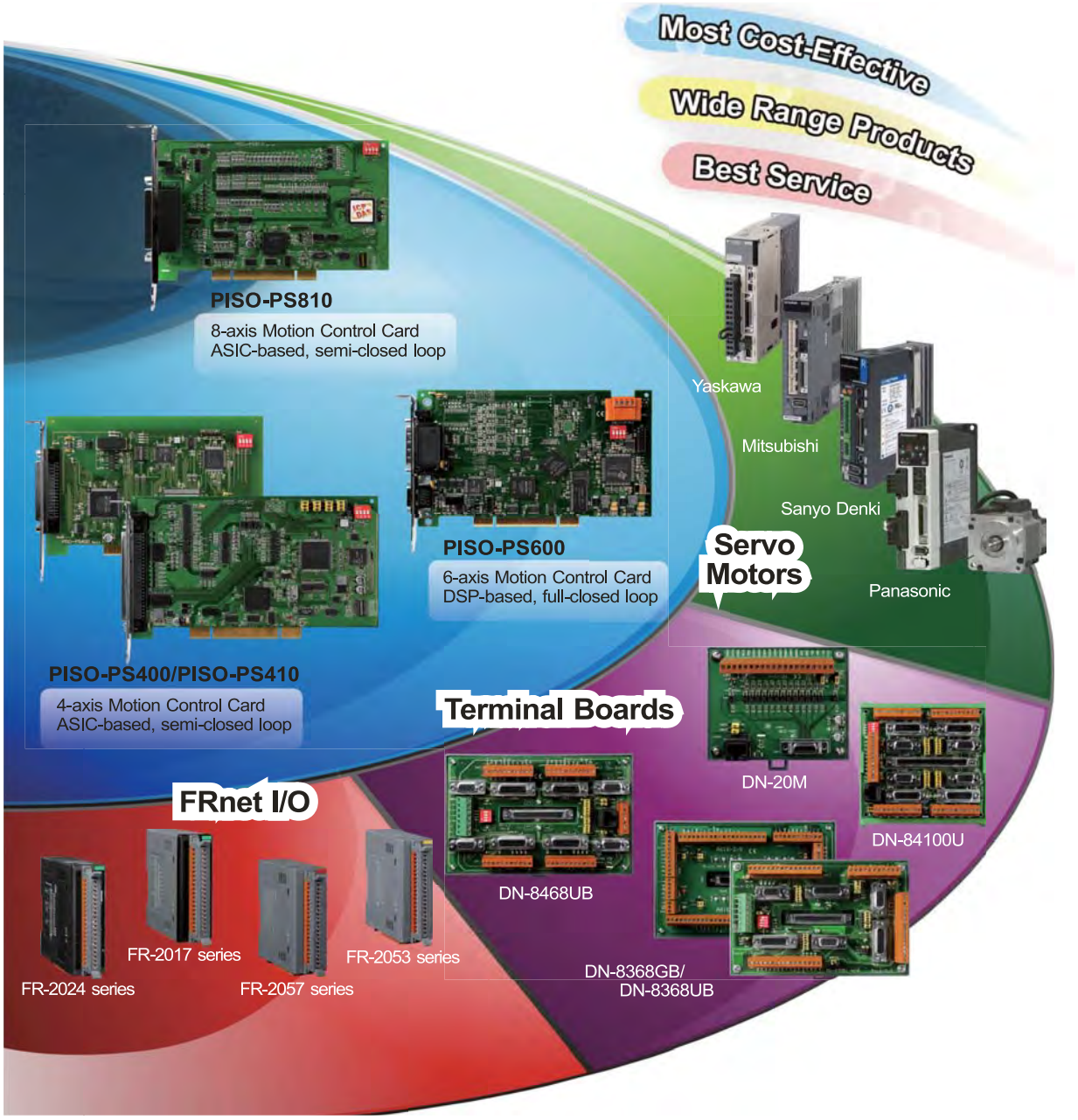
PC-based Motion Control Cards

Overview

Introduction

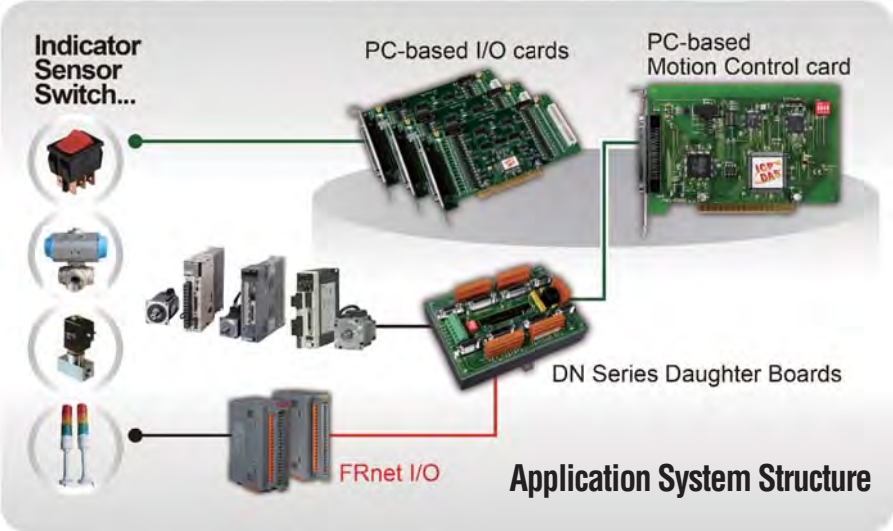
As a leading automation solutions provider, ICP DAS not only provides PAC solutions, but also develops PC-based solutions for machine automation applications, including the PCI bus motion control cards and the ISA bus motion control cards series.

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.



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



Selection Guide : PC-based PCI/ISA Bus Motion Control Cards and Terminal Boards

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-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		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
ISA Bus Motion Control Cards		
Encoder300		ISA Bus, 3-axis Encoder Interface Card
STEP-200		ISA Bus, 2-axis High-speed Stepper Motor Control Card (Limited Function and Economical)
SERVO-300		ISA Bus, 3-axis High-speed Servo Motor Control Card (V Command)

Terminal Boards for Machine Automation Products		
	DB-8R	Relay Board for Servo-300 and PISO-PS300U
	DB-200	Encoder Input Board for Servo-300
	DN-68 CR	Encoder Input Board for PISO-ENCODER300U/PISO-ENCODER600U
~New~	DN-20M	Manual-Pulse-Generator (MPG) and FRnet Input Board for PISO-PS600/VS600/PMDK
	DN-8237 Series	**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
~New~	**DN-8368 Series**	**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	**Photo-isolated Terminal Board for ICP DAS 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
~New~	DN-84100U	Universal Snap-on Wiring Terminal Board for PISO-PS410 and PISO-PS810

PISO-PS400

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

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 Mpps 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 & 128 DO via a two-wire FRnet interface

Introduction:

The **PISO-PS400** is a **4-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 **2/3-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-PS400** 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-PS400** 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:

Number of Axes	4
Slot Interface	5 V PCI bus
Maximum Pulse Output Rate	4 MHz
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
Motion Relative I/O	Home, LMT+/-, NHOME, EMG, INP, ALM, SVON
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
Encoder Interface	A/B pulse, Up/Down
Encoder Counter	32-bit
Encoder Rate	4 MHz
Digital Input Channels	Expandable : 128 DI
Digital Output Channels	Expandable : 128 DO
I/O Isolation (With DN-8468)	2500 Vrms optical isolation
Connector	68-pin SCSI-II connector
Power Consumption	+5 V @ 500 mA
Environmental	
Operating Temperature	-20 ~ +75°C
Storage Temperature	-30 ~ +85°C
Ambient Relative Humidity	5 ~ 90% RH, non-condensing

Software Support:

Windows Driver/DLL/Lib	Windows 7 32/64-bit Windows XP/2000 32-bit
DOS Library	-
Labview Development Kit	Labview 5.0 ~ Labview 8.x
Linux Library	-

Ordering Information/Accessories:

Model No.	Description
PISO-PS400	**PCI Bus, High-speed 4-axis Motion Control Card with FRnet Master**
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-H /SCSI30-H /SCSI50-H	68-pin SCSI-II Male-Male Connector Cable, Length 1.5 M / 3 M / 5 M.

PISO-PS410

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

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 compare 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.

Software Support:

Windows Driver/DLL/Lib	Windows 7 32/64-bit Windows XP/2000 32-bit
DOS Library	-
Labview Development Kit	-
Linux Library	-

Specifications:

Number of Axes	4
Slot Interface	Universal PCI Bus
Maximum Pulse Output Rate	4 MHz
Command Type	Pulse Command
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
Mechanical Switch Input	Home, LMT+/-, NHOME, EMG
Servo I/O Interface	Input : INP, ALM Output: SVON, ALM_RST, ERC
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
Encoder Counting Rate	4 MHz
Digital Input Channels	Local : 4 DI Expandable : 128 DI
Digital Output Channels	Local : 4 DO Expandable : 128 DO
I/O Isolation	2500 Vrms optical isolation
Connector	100-pin SCSI-II
Power Consumption	+5 V @ 500 mA
Environmental	
Operating Temperature	-20 ~ +75 °C
Storage Temperature	-30 ~ +85 °C
Ambient Relative Humidity	5 ~ 90 % RH, non-condensing

Ordering Information/Accessories:

Model No.	Description
PISO-PS410	**PCI Bus, High-speed 4-axis Motion Control Card with FRnet Master**
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

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

Features:

- DSP-based motion control card with PCI interface
- Independent 6-axis motion control
- Support both full-closed and semi-closed control modes
- Maximum pulse output frequency: 4 Mpps
- 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 a 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.

Software Support:

Windows Driver/DLL/Lib	Windows 7 32/64-bit Windows XP/2000 32-bit
DOS Library	-
Labview Development Kit	-
Linux Library	-

Specifications:

Number of Axes	6
Slot Interface	Universal PCI Bus
Maximum Pulse Output Rate	4 MHz
Command Type	Pulse Command
Servo Update Rate	2 KHz
Pulse Output Mode	CW/CCW, PULSE/DIR, A/B pulse
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
Speed Curve Profile	T/S-curve
Mechanical Switch Input	Home, LMT+/-, NHOME, LTC, EMG
Servo I/O Interface	Input: INP, ALM, RDY Output: SVON, ALM_RST, ERC
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
Digital Input Channels	Local: 12 DI Expandable: 128 DI
Digital Output Channels	Local: 3 DO Expandable: 128 DO
I/O Isolation (with DN-8368)	2500 Vrms optical isolation
Connector	68-pin VHDCI Connector and 20-pin SCSI-II
Power Consumption	+5 V @ 500 mA
Environmental	
Operating Temperature	0 ~ +60 °C
Storage Temperature	-20 ~ +80 °C
Ambient Relative Humidity	5 ~ 90 % RH, non-condensing

Ordering Information/Accessories:

Model No.	Description
PISO-PS600	**PCI Bus, High-Speed, DSP-based, 6-axis Motion Control Card with FRnet Master**
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

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

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 & 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.

Software Support:

Windows Driver/DLL/Lib	Windows 7 32/64-bit Windows XP/2000 32-bit
DOS Library	-
Labview Development Kit	-
Linux Library	-

Specifications:

Number of Axes	8
Slot Interface	Universal PCI bus
Maximum Pulse Output Rate	4 MHz
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
Motion Relative I/O	Home, LMT+/-, NHOME, EMG, INP, ALM, SVON, ALM_RST, ERC
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
Encoder Rate	4 MHz
Digital Input Channels	Local : 8 DI Expandable : 128 DI
Digital Output Channels	Local : 8 DO Expandable : 128 DO
I/O Isolation	2500 Vrms optical isolation
Connector	100-pin VHDCI
Power Consumption	+5 V @ 500 mA
Environmental	
Operating Temperature	-20 ~ +75 °C
Storage Temperature	-30 ~ +85 °C
Ambient Relative Humidity	5 ~ 90 % RH, non-condensing

Ordering Information/Accessories:

Model No.	Description
PISO-PS810	**PCI Bus, High-speed 8-axis Motion Control Card with FRnet Master**
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

PAC Solutions

PAC Solutions - Motion Modules

Introductions:

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 control modules based on the PAC products. There is a variety of development software such as VC, C#, VB .NET or ISaGRAF supporting the PAC Solutions that apply to the PAC motion control systems.

Motion Control Modules For PAC Motion Control Solutions

Models	Encoder Input				Command Pulse Output				Daughter Board	Other Functions	Supported PAC	Supported Drivers or Software
	Axis	Counter (bits)	Counting Rate (cps)	Signal	Axis	Speed (pps)	Counter (bits)	Signal				
I-8092F-G	2	32	4 M	CW/CCW, A/B	2	4 M	32	CW/CCW, PULSE/DIR	DN-8237	FRnet Master	XP-8000 WP-8000 iP-8000	VC C# VB .NET ISaGRAF (ISaGRAF supports the ISaGRAF XPAC ONLY)
I-8094-G	4				4				DN-8468	-		
I-8094F-G										FRnet Master		
I-8094A-G										CPU Inside		
I-8094H-G										FRnet Master, CPU Inside		
I-8196F	6		12 M		6			CW/CCW, PULSE/DIR, A/B	DN-8368	FRnet Master	XP-8000 WP-8000	
I-9196F											XP-9000 WP-9000	

Note: I-8094A-G, I-8094H-G, I-8196F, and I-9196F do not support ISaGRAF PAC.

Models	Encoder Input					Compare Trigger Output	
	Axis	Counter (bits)	Counting Rate (cps)	Signal	Hardware Latch/Reset	Channel	Type
I-8093W	3	32	4 M (CW/CCW, Pulse/Dir) 1 M (A/B)	CW/CCW, PULSE/DIR, A/B	-	-	-
I-9093	3		6 M (CW/CCW, Pulse/Dir) 2 M (A/B)		3	3	Open collector

Note: I-9093 do not support ISaGRAF PAC.

- I-8K Motion Control Modules: http://www.icpdas.com/root/product/solutions/remote_io/rs-485/i-8k_i-87k/i-8k_i-87k_motion.html
- I-9K Motion Control Modules: http://www.icpdas.com/root/product/solutions/remote_io/i-9k_i-97k/i-9k_i-97k_motion.html

Selection Guide: PAC

XP-9000 and WP-9000 Series		OS	CPU	Flash	SDRAM	VGA Resolution	Ethernet	Serial	I/O Slot
XP-9171-WES7		WES7	E3827 1.75 GHz dual core	32 GB	DDR3 x 2 GB	1280 x 1024 to 1920 x 1080 (16:9); 640 x 480 to 1024 x 768 (4:3)	2	4	1
XP-9371-WES7									3
XP-9771-WES7									7
XP-9181-WES7		WES7	E3845 1.91 GHz quad core	32 GB	DDR3 x 4 GB	1280 x 1024 to 1920 x 1080 (16:9); 640 x 480 to 1024 x 768 (4:3)	2	4	1
XP-9381-WES7									3
XP-9781-WES7									7
WP-9221-CE7		CE 7.0	Cortex-A8, 1.0 GHz	256 MB	DDR3 x 512 MB	1024 x 768	2	4	2
WP-9421-CE7									4
WP-9821-CE7									8

XP-8000 Series XPAC		OS	CPU	Flash	SDRAM	VGA Resolution	Ethernet	Serial	I/O Slot
XP-8031-WES7		WES7	x86 CPU, 1 GHZ, dual-core	32 GB	DDR3 x 2 GB	1600 x 1200	2	4	0
XP-8131-WES7									1
XP-8331-WES7									3
XP-8731-WES7									7
XP-8031-CE6		CE 6.0	x86 CPU, 1 GHZ, dual-core	32 GB	DDR3 x 2 MB	1024 x 768			0
XP-8131-CE6									1
XP-8331-CE6									3
XP-8731-CE6									7

WP-8000 Series WinPAC		OS	CPU	Flash	SDRAM	VGA Resolution	Ethernet	Serial	I/O Slot
WP-8121-CE7		CE 7.0	Cortex-A8, 1.0 GHz	512 MB DDR3	512 MB DDR3	1024 x 768	2	2	1
WP-8421-CE7								4	4
WP-8821-CE7									8

iP-8000 Series iPAC		OS	CPU	Flash	SRAM	Expansion Memory	Ethernet	Serial	I/O Slot
iP-8411		MiniOS7	80186, 80 MHz	512 KB	512 KB	microSD	-	4	4
iP-8811									8
iP-8441					768 KB	microSD	2		4
iP-8841									8
iP-8441-FD						microSD + 256 MB NAND Flash			4
iP-8841-FD									8

ISaGRAF Series XPAC	Pre-Installed Software	OS	CPU	Flash	DDR SDRAM	VGA Resolution	Ethernet	Serial	I/O Slot
XP-8037-CE6	ISaGRAF	CE 6.0	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

I-8092F-G

High-speed 2-axis Motion Control Module with FRnet Master

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 pulse output rate of 4 Mpps 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 I-8092F is a **2-axis** stepping/pulse-type servo motor control module that can be used on any of the ICP DAS I-8000 and PAC series controllers, and is suitable for general-purpose motion control applications. The I-8092F is equipped with one FRnet master, which allows fast remote I/O to be easily expanded. The two-wire FRnet interface can be used automatically scan its 128 DI and 128 DO channels with a scan 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, and others. A major advantage is that the majority of the I-8092F motion control functions are performed by the high-performance motion ASIC with little load on the processor. While driving the motors, the motion status, and the status of the other I/O channels on the I-8000 or PAC modules, can still be monitored.

As a result of the low CPU loading requirements of the I-8092F, one or more motion modules may be used on a single I-8000 or PAC controller. ICP DAS provides a wide range of functions and examples that can be used to reduce the need for programming by users, making it a highly cost-effective solution for motion control application developers.

Specifications:

Number of Axes	2
Maximum Pulse Output Rate	4 MHz
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
Motion Relative I/O	Home, LMT+/-, NHOME, EMG, INP, ALM, SVON
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
Encoder Rate	4 MHz
Digital Input Channels	Expandable: 128 DI
Digital Output Channels	Expandable: 128 DO
I/O Isolation (with DN-8237)	2500 Vrms optical isolation
Connector	37-pin D-sub
Power Consumption	+5 V @ 500 mA
Environmental	
Operating Temperature	-20 ~ +75°C
Storage Temperature	-30 ~ +85°C
Ambient Relative Humidity	5 ~ 90% RH, non-condensing

Ordering Information/Accessories:

Module	Description
I-8092F-G	**High-speed 2-axis Motion Control Module with FRnet Master**
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 (180°), Length 1.5 M / 3.0 M / 5.0 M

I-8094 / I-8094F

High-speed 4-axis Motion Control Module (I-8094F with FRnet Master)

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 Mpps 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
- Position comparison management and software limits
- A wide range of synchronous actions (event-triggered actions)

Introduction:

The I-8094 is a **4-axis** stepping/pulse-type servo motor control module that can be used on any of the ICP DAS I-8000 and PAC series controllers, and is suitable for general-purpose motion 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, a range of synchronous actions, automatic homing, and others.

A major advantage is that the majority of the I-8094 motion control functions are performed by the high-performance motion ASIC with little load on the processor. While driving the motors, the motion status, and the status of other I/O channels on the I-8000 or PAC modules, can still be monitored. As the CPU loading requirements of the I-8094 is minimal, one or more motion modules may be used with a single I-8000 or PAC controller. ICP DAS also provides a wide range 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:

Number of Axes	4
Maximum Pulse Output Rate	4 MHz
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
Motion Relative I/O	Home, LMT+/-, NHOME, EMG, INP, ALM, SVON
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
Encoder Interface	A/B pulse, Up/Down
Encoder Counter	32-bit
Encoder Rate	4 MHz
Digital Input Channels	Expandable: 128 DI (I-8094F only)
Digital Output Channels	Expandable: 128 DO (I-8094F only)
I/O Isolation (with DN-8468)	2500 Vrms optical isolation
Connector	68-pin SCSI-II connector
Power Consumption	+5 V @ 500 mA
Environmental	
Operating Temperature	-20 ~ +75°C
Storage Temperature	-30 ~ +85°C
Ambient Relative Humidity	5 ~ 90% RH, non-condensing

Ordering Information/Accessories:

Module	Description
I-8094-G	**High-speed 4-axis Motion Control Module**
I-8094F-G	**High-speed 4-axis Motion Control Module with FRnet Master**
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-H/CA-SCSI30-H/CA-SCSI50-H	68-pin SCSI-II Male-Male Connector Cable, Length 1.5 M / 3.0 M / 5.0 M

I-8196F / I-9196F

High-speed, DSP-based, 6-axis Motion Control Module with FRnet Master

Features:

- Expansion card for ICPDAS programmable automation controller (PAC)
- DSP-based motion control module
- Maximum pulse output frequency: 4 MHz
- Maximum Encoder input frequency: 12 MHz
- Independent 6-axis motion control
- 2- to 6-axis linear/ 2- to 3-axis circular/ helical interpolation function
- Continuous interpolation
- 4-step home mode with auto-searching
- Synchronized start motion
- Programmable T/S-curve acceleration and deceleration
- Software limit protection
- Software FIFO for arbitrary curve motion
- High-speed position latch
- High-speed compare trigger and auto-increment compare mode
- Expandable remote I/O: 128 DI and 128 DO via a two-wire FRnet interface.

Introduction:

The I-8196F and I-9196F are 6-axis stepping/ pulse-type servo motor control modules. Both modules are expansion units for the programmable automation controller (PAC) series provided by ICPDAS. The I-8196F module is an expansion card for the XP-8000 and WP-8000 series. The I-9196F module is a plug-in card for the XP-9000 and WP-9000 series.

A digital signal processor (DSP) calculates the commanded move trajectory and manages supervisory control by monitoring the limits and emergency stops to ensure safe operation. I/O control output (e.g. latch, compare, encoder counter etc.) is realized in a Field Programmable Gate Array (FPGA).

The motion controller is suitable for general-purpose motion control applications. 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- and 3-axis circular interpolation, helical interpolation, T/S-curve acceleration/deceleration, and automatic home search, etc.

The motion controller uses FRnet as a communication protocol to control distributed remote I/O modules. In an FRnet network the motion controller acts as a master and can control up to 128 digital outputs and 128 digital inputs. The FRnet scan interval is 0.72 ms. FRnet is a two-wire serial bus and is specifically designed for easy and cost effective wiring. ICPDAS provides a large range of FRnet I/O terminal boards and modules.

Libraries and DLL are provided for the following operation systems: Windows embedded, WinCE 5.0 and 6.0. A software utility enables the user to initialize the motion controller and execute motion commands.

Specifications:

Number of Axes	6	
Maximum Pulse Output Rate	4 MHz	
Command Type	Pulse command	
Pulse Output Mode	CW/CCW, PULSE/DIR, A/B pulse	
Linear Interpolation	Any 2- to 6-axis	
Circular/Helical Interpolation	Any 2- or 3-axis	
Speed Curve Profile	T/S-curve	
Mechanical Switch Input	Home, LMT+/-, NHOME, LTC, EMG	
Servo I/O Interface	Input: INP, ALM, RDY Output: SVON, ALM_RST, ERC	
Ring Counter Mode	32-bit	
Position Control Mode	Relative and absolute position	
Position Compare Trigger	4 MHz	
Encoder Interface	A/B pulse, Up/Down	
Encoder Counter	32-bit	
Maximum Encoder Counting Rate	12 MHz	
Digital Input Channels	Local: 12 DI	Expandable: 128 DI
Digital Output Channels	Local: 3 DO	Expandable: 128 DO
I/O Isolation (with DN-8368)	2500 Vrms optical isolation	
Connector	68-pin VHDCI connector and 20-pin SCSI-II	
Power Consumption	+5 V @ 500 mA	
Environmental		
Operating Temperature	0 ~ +60 °C	
Storage Temperature	-20 ~ +80 °C	
Ambient Relative Humidity	5 ~ 90 % RH, non-condensing	

Software Support:

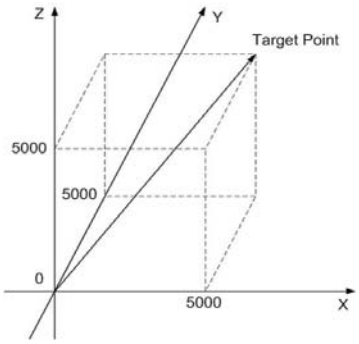
WES WinCE	32 bit: Visual C++ lib/DLL, C#, VB.Net, LabVIEW, Configuration utility, Demo programs

Ordering Information/Accessories:

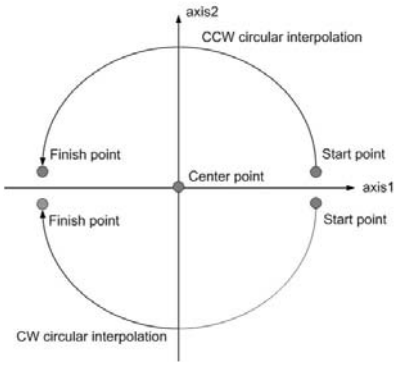
Model No.	Description
I-8196F	**High-Speed 6-axis Motion Control Module with FRnet Master (For XP-8000/WP-8000 PAC)**
I-9196F	**High-Speed 6-axis Motion Control Module with FRnet Master (For XP-9000/WP-9000 PAC)**
DN-8368UB	Photo-isolated Universal Snap-on wiring terminal board
DN-8368GB	Photo-isolated 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 / -M3 /-M5	20-pin SCSI-II Male connector cable (for Mitsubishi J2 series motor), Length 1 M / 3 M / 5 M.

Features of Motion Function

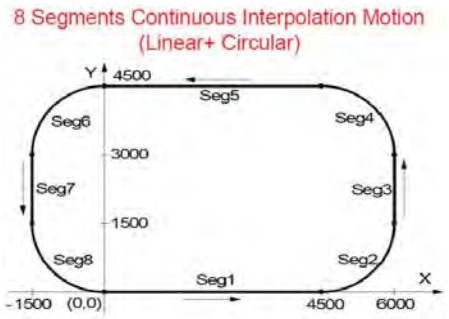
1. Linear Interpolation



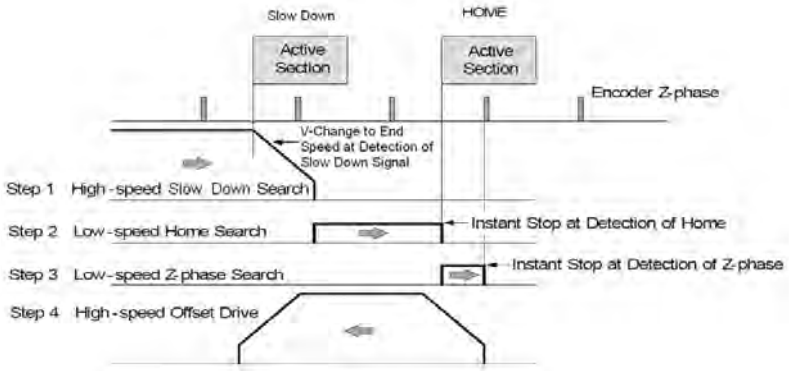
2. Circular Interpolation



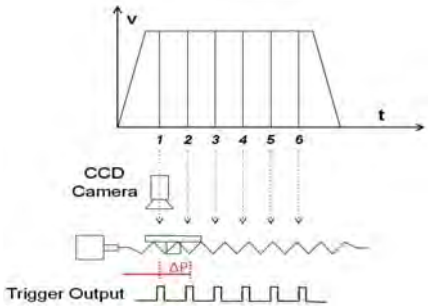
3. Continuous Interpolation



4. Four Steps Automatic Home Searching



5. High Speed Position Compare



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

Motion Products	Features of Motion Functions					
Model	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
PC-based Motion Control Cards						
PISO-PS200	2-axis	2-axis	Constant Vector Speed	Yes	-	-
PISO-PS400	3-axis				Yes	
PISO-PS410						
PISO-PS600	6-axis	3-axis	With Acc. and Dec.			Yes
PISO-PS810	2 Groups 3-axis	2 Groups 2-axis	Constant Vector Speed			-
Motion Control Modules for PAC						
I-8092F	2-axis	2-axis	Constant Vector Speed	Yes	-	-
I-8094/I-8094F	3-axis				Yes	
I-8196F/9196F	6-axis	3-axis	With Acc. and Dec.			Yes

I-8093W

High-speed 3-axis Encoder Module

Features:

- 3-axis Encoder Inputs
- 1 MHz Input Rate for Quadrant Input Mode
- 4 MHz Input Rate for Pulse/Direction and cw/ccw Input Modes
- 32-bit Count Range
- 2500 Vrms Optical Isolation

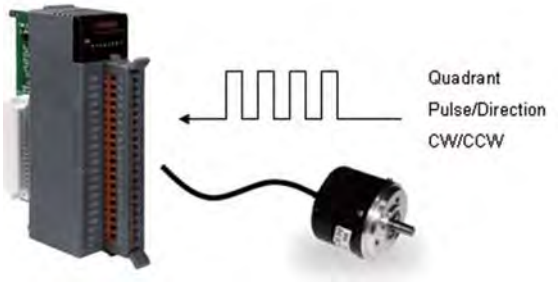
Introduction:

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.

Applications:

• Position Measure of Motion System



System Specifications:

Display	
LED Display	1 LED as Power Indicator 9 LED as Status Indicator
Isolation	
Intra-module Isolation, Field to Logic	2500 Vrms
ESD Protection	4 KV Contact for each channel
Power	
Power Consumption	2 W Max
Mechanical	
Dimensions (W x L x H)	30 mm x 102 mm x 115 mm
Environment	
Operating Temperature	-25 ~ 75 °C
Storage Temperature	-30 ~ 85 °C
Humidity	5 ~ 95 % RH, Non-condensing

I/O Specifications:

Encoder Input	
Input Axis	3-axis
Encoder Counter	32-bit
Counting Mode	1. Quadrant Counting 2. CW/CCW 3. Pulse/Dir
Maximum Counting Rate	1. Quadrant Counting : 1 MHz 2. CW/CCW : 4 MHz 3. Pulse/Dir : 4 MHz

Ordering Information:

Module	Description
I-8093W	**High-speed 3-axis Encoder Module**

I-9093

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

Features:

- 3-axis Encoder Inputs
- 32-bit encoder counters
- Encoder pulse input types: A/B phase, CW/CCW, Pulse/Dir
- Compare Trigger Output

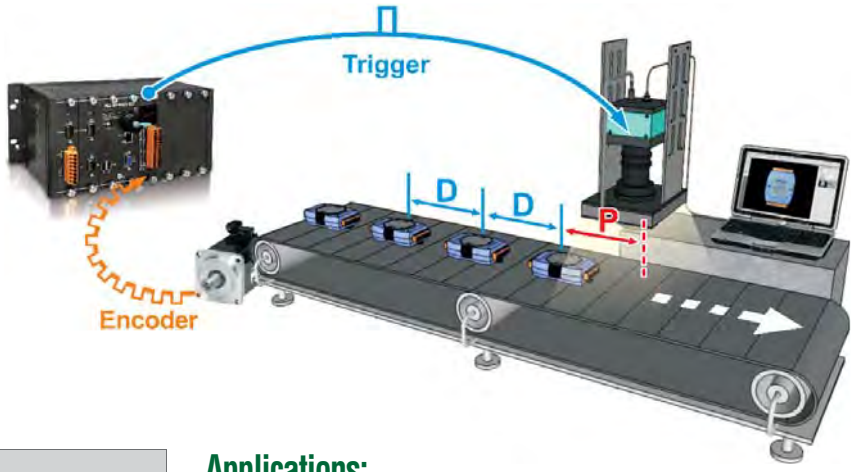
Introduction:

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.



System Specifications:

LED Display	
System LED Indicator	1 LED as Power Indicator 12 LED as Status Indicator
Isolation	
Intra-module Isolation, Field to logic	3000 VDC
ESD(IEC 61000-4-2)	±4 kV Contact for Each Terminal
	±8 kV Air for Random Point
Power	
Power Consumption	2 W Max.
Mechanical	
Dimensions (L x W x H)	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

Applications:

- Data acquisition operation
- Optical inspection line-scan systems
- Image capture
- Position Measure

I/O Specifications:

Encoder with Compare Trigger Output	
Encoder Axis	3
Encoder Counter	32-bit
Counting Mode	Quadrant , CW/CCW , Pulse/Dir
Counting Rate	Quadrant (2MHz) CW/CCW, Pulse/Dir (6MHz)
Compare Trigger Out	3 (open collector)

Ordering Information:

Module	Description
I-9093-G CR	**High-speed 3-axis Encoder Module with Compare Trigger Output**

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