



Delta High-Speed Motion Control System

DMCNET™
Delta Motion Control Network

*We reserve the right to change the information in this catalogue without prior notice

Introduction to DMCNET™

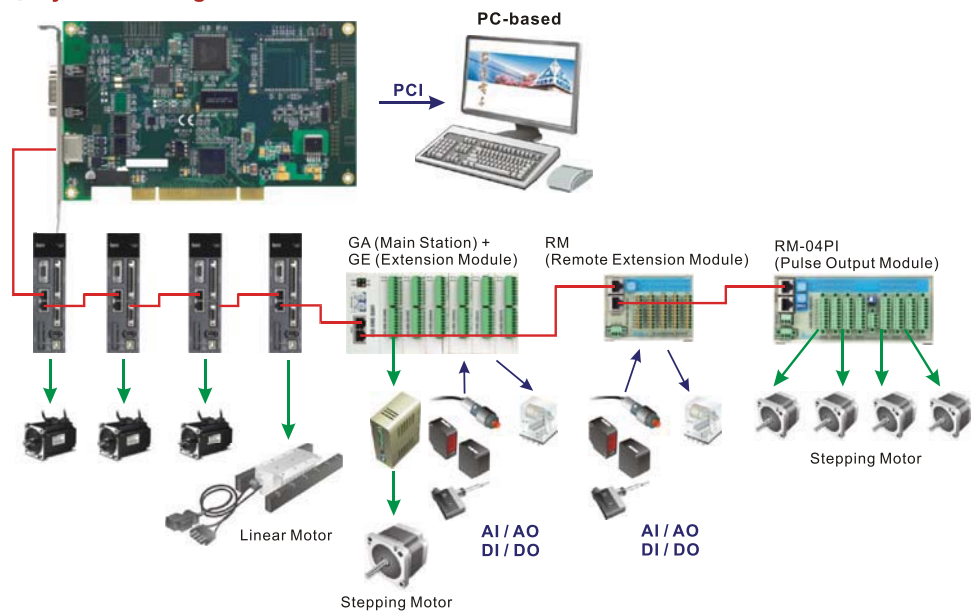
In response to positive market feedback on the ASDA-A2 series AC servo motors and drives, Delta has launched its brand-new, high-speed and cost-effective PCI-DMC-A01 motion control card which provides high performance and extended functions for multi-axis motion control. With the aid of the high precision and high functioning ASDA-A2-F series that features a 20-bit level resolution encoder, Delta provides an optimum motion control system for meeting the demanding requirements of a wide variety of industry applications.

Delta's new DMCNET™ motion control card facilitates motion control via communication. It is easy to set up, has good extension abilities and no extra I/O card is required. The commands are delivered with no pulse delay. The synchronization it achieves enhances the stability and efficiency of the system.

DMCNET™ is a high speed and real time communication system, capable of controlling up to 12 axes of servo system units within 1ms simultaneously. It can accept double precision floating point values 64-bits wide and provide up to 1,280,000 pulse/rev resolution so the servo system can make accurate calculations and provide operation flexibility. 35 homing modes are provided. 12 servo system units or 4 groups, 3-axis helical and linear interpolation or 6 groups, 2-axis linear and arc interpolation can be implemented synchronously. It also supports absolute commands, incremental commands, T-curve / S-curve velocity profiles, built-in position, speed and torque control modes for different uses. Simply by connecting the DMCNET™ to servo motors, linear motors, digital inputs and outputs (DI/DO), analog inputs and outputs (AI/AO) and other control devices such as stepping motors and manual pulse generators (MPG), enabling fast and cost-effective communication and control is easy.

DMCNET™ is the best integrated platform for multi-axis and synchronous motion control in a wide range of machine tools and industrial applications. It is also the ultimate solution that provides effortless wiring, enhanced stability, flexible extension capabilities and versatile operation for industry upgrading and adding value to products.

System Configuration



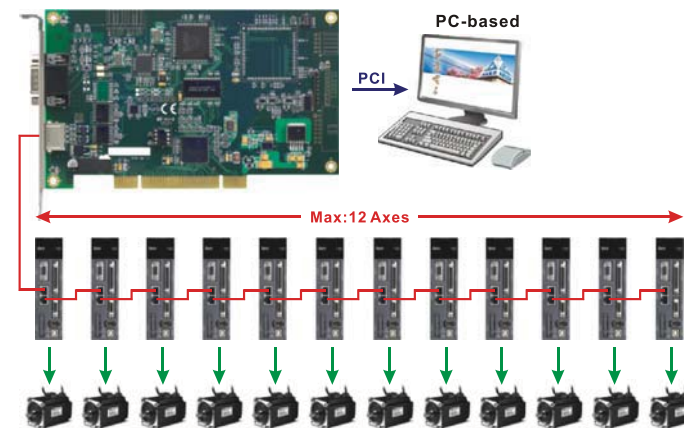
Features

High Integrated Capability

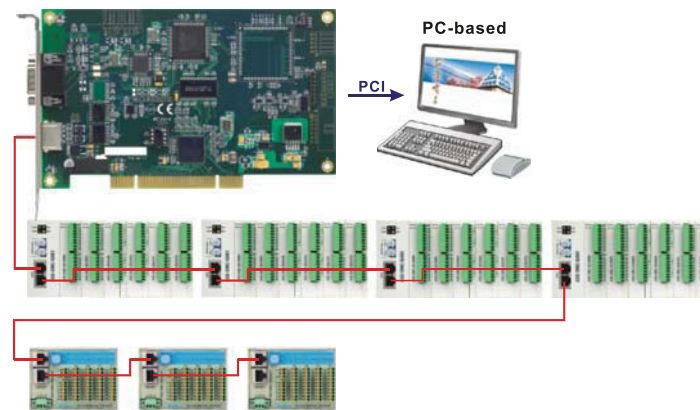
- ▶ With DMCNET™ networking structure, multiple control devices such as servo motors, remote digital and analog modules, stepping motors, elevator door control motors (VFD-DD series), and linear motors can be easily and quickly connected.
- ▶ Up to 20Mbps communication bandwidth is provided. Maximum distance for communication is 30m (98.4ft.)

Pure Motion Structure:

Data of 12 servo system units can be transferred within 1ms simultaneously.



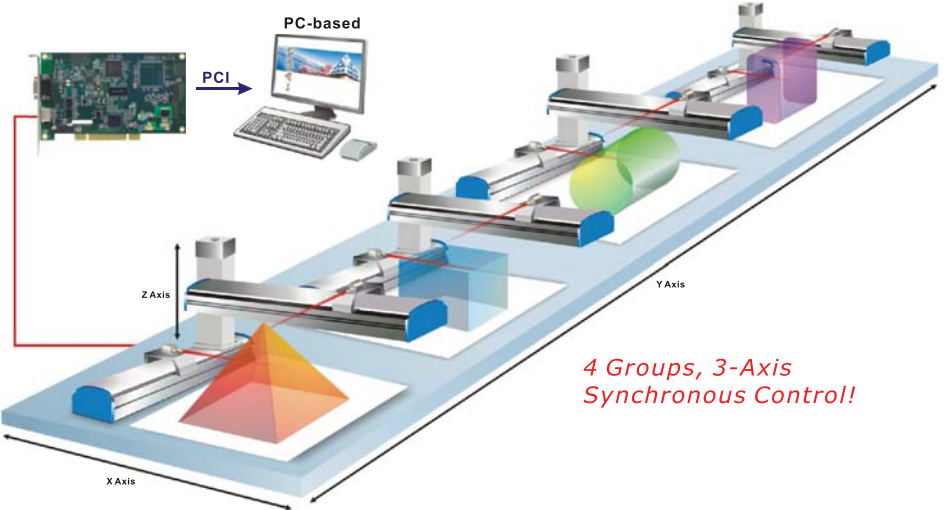
Pure I/O Structure:



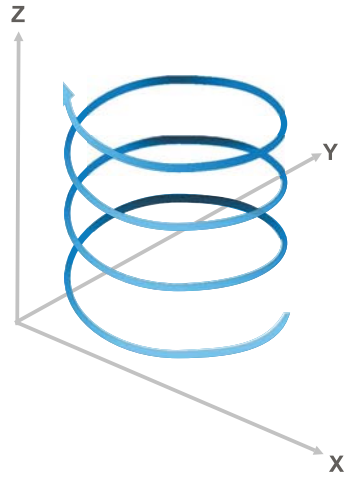
Synchronous Control

Simultaneous 3-axis linear interpolation, 2-axis arc interpolation, 3-axis helical interpolation and continuous interpolation can be implemented.

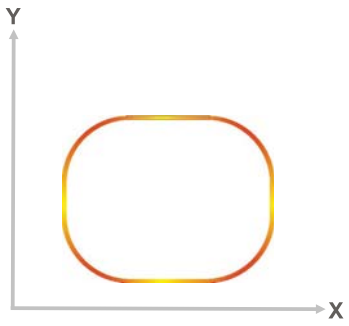
DMCNET™ is a motion control communication network which is able to update data every 1ms and offer the ability to control 12 servo system units or 4 groups, 3-axis interpolation algorithms synchronously. It is also capable of transferring the data of 12 servo motor units, or 768 digital inputs and outputs within 1ms simultaneously.



3-Axis Interpolation

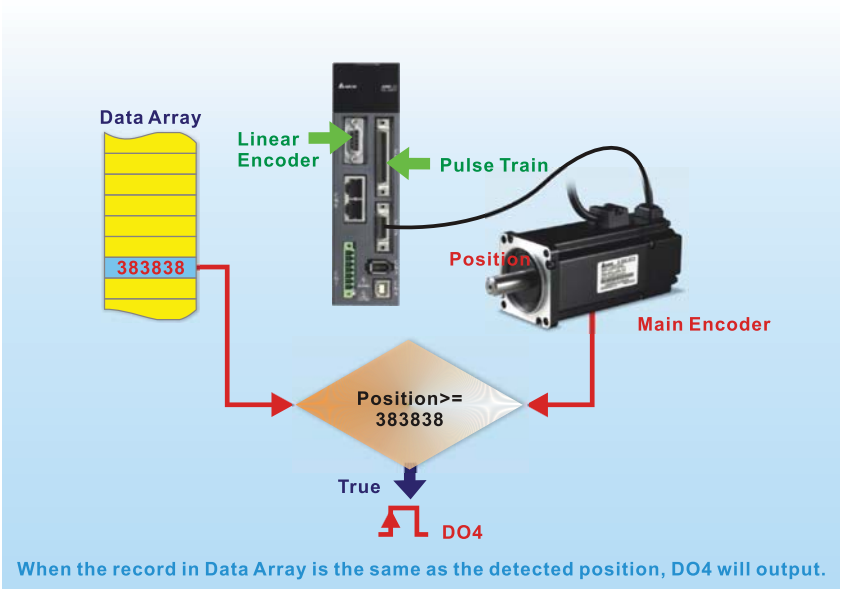
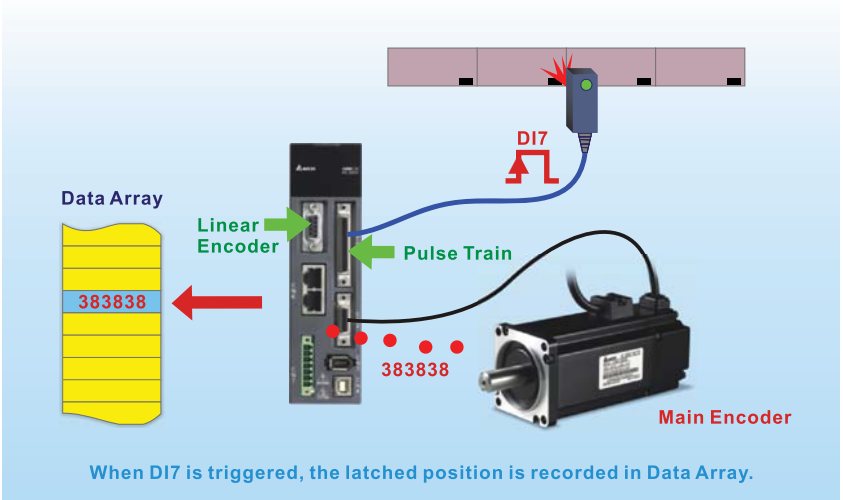


2-Axis Interpolation



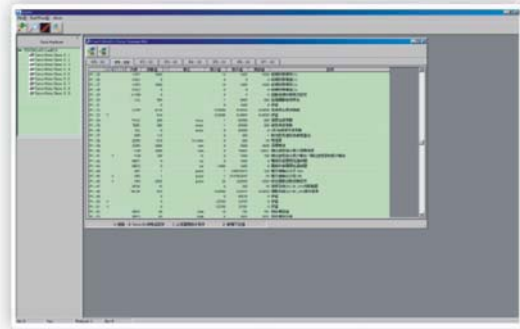
Capture (Position Latch) and Compare (Position Detection) Functions

The Capture and Compare functions can be applied to latch and detect a reference position which can be signals from the main encoder, linear encoder, or pulse train. It is possible to record 800 items with the maximum length of the data array.



EzDMC Software

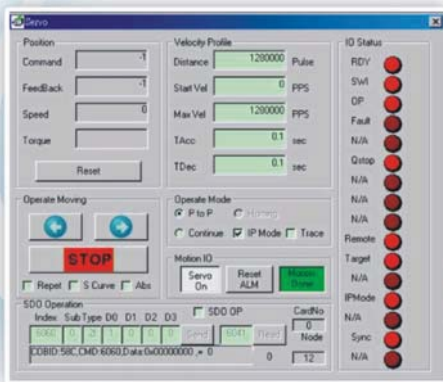
EzDMC software makes editing easier than ever and facilitates program development. Even users who use the Delta DMCNET motion control card for the first time are able to utilize the functions of this motion control card.



User-friendly Operator Interface

In EzDMC, a familiar user interface, clear images and easy-to-use dialog boxes helps users create and edit programs easily and quickly. Many example programs are contained on the CD packaged with the box. New programs are easily created just using the example programs.

Control gains can be automatically tuned to the optimum values via the servo tuning function provided in EzDMC.



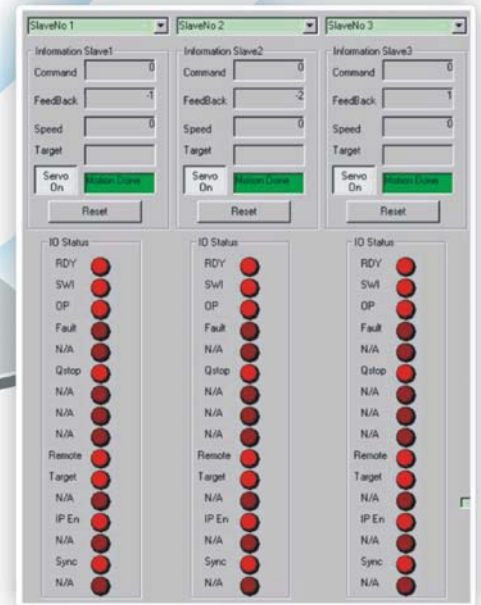
Independent Control Unit

When DMCNET serial communication is setup, users can read and write into the connecting servo drives and control the system from a PC.



Multi-axis Motion Control

In EzDMC, there are many example programs available for linear, arc and helical interpolation. Users can choose different control modes such as Linear2, Linear3, Heli, Circle, Circle2 and Circle3 to easily edit and program for multi-axis control.



Real Time Response

Monitoring and displaying the status of the connected servo drives through EzDMC is easy and simple.

Part Names and Functions

LED Display / Operation Panel / Charge LED

LED Display

The 5 digit, 7 segment LED displays the servo status or fault codes.

Operation Panel

Function keys used to perform status display, monitor and diagnostic, function and parameter setting.

Function Keys:

MODE : Press this key to select/change mode
SHIFT : Press this key to shift cursor to the left

UP : Press this key to increase values on the display
DOWN : Press this key to decrease values on the display
SET : Press this key to store data

Charge LED

A lit LED indicates that either power is connected to the servo drive or a residual charge is present in the drive's internal power components.



* Full-Closed Control Interface

Used to connect linear scale and encoder for controlling A, B, Z phase signals.

I/O Interface

Used to connect Delta's DVP series PLC or other external controllers for controlling I/O signals.

* High-speed Communication Port

Used to connect CANopen networks.
 1-in/1-out communication ports offer easy serial connection.
 CANbus interface, supporting motion modes for CANopen DS402 implementation.

Motor Encoder Interface

Used to connect the encoder of the servo motor

Serial Communication Port

Used to connect PLC, HMI, and other controllers for RS-485 / RS-232 serial communication.

USB Connection Port

Used to connect personal computers or notebooks.
 Ver 1.1 USB is equipped as standard.
 Direct connectivity to personal computers or notebooks, capable of accessing data through ASDA-Soft configuration software.
 Monitor speed upon software is up to 1Mbps.



Internal & External Regenerative Resistor Terminal / Control Circuit Terminal / Main Circuit Terminal

Internal & External Regenerative Resistor Terminal

- When using an external resistor, connect it to P⊕ and C, and ensure an open circuit between P⊕ and D.
- When using an internal resistor, ensure the circuit is closed between P⊕ and D, and the circuit is open between P⊕ and C. (Note: Please refer to the table of regenerative resistor specifications for the models with a built-in regenerative resistor.)

- When using an external braking unit, connect it to P⊕ and ⊖, and ensure an open circuit between P⊕ and D, and P⊕ and C

Control Circuit Terminal (L1c, L2c or DC24V, DC0V)

220V Series: L1c, L2c are used to connect 200~230Vac, 50/60Hz single-phase or three-phase power supply.

400V Series: DC24V, DC0V are used to connect 24Vdc ±10% power supply.

Main Circuit Terminal (R, S, T)
 220V Series: Used to connect 200~230Vac, 50/60Hz commercial power supply.
 400V Series: Used to connect 380~480Vac, 50/60Hz commercial power supply.

When using an external braking unit, connect it to P⊕ and ⊖.

Servo Motor Output (U, V, W)

Used to connect servo motor. Never connect the output terminal to main circuit power as the AC drive may be damaged beyond repair if incorrect cables are connected to the output terminals.

Ground Terminal

Used to connect grounding wire of power supply and servo motor.

Heatsink

Used to secure servo drive and for heat dissipation.

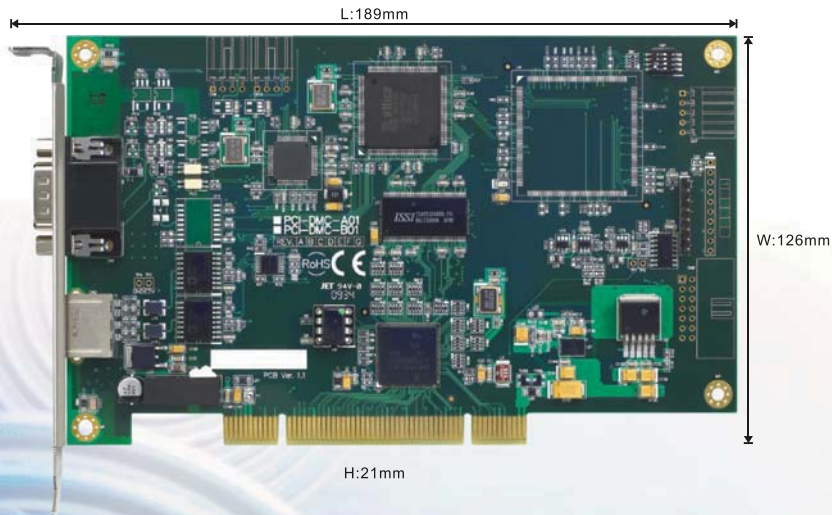


Please note:
 *This is a Delta optional part.

PCI-DMC-A01 Specifications

Items	PCI-DMC-A01
Supporting Servo Drive	Delta ASDA-A2-F series servo drives
Homing Mode	35 kinds of homing modes (set by parameters via DMCNET)
Velocity Profile	T-curve, S-curve
Interpolation Mode	Linear, Arc and Continuous
Number of Rings	1 Ring
Supporting Tool Language	VB, VC, BCB, DELPHI, C#, VB.NET
Communication Cable	Category 5e STP Ethernet cable (24AWG/4Pairs)
Communication Distance	Max. 30m (12 slave module)
Communication Interface	half duplex RS-485 with transformer isolation
PCI Specifications	ver.2.2, supports 32-bit, 3.3V/5VDC operation
Power Consumption	+5V DC at 0.5A typical
Noise Tolerance Threshold	Withstand (Peak) voltage: 1500VAC(Primary-secondary); 1500VAC(Primary-PE) ESD (IEC 61131-2, IEC 61000-4-2): 8KV Air Discharge EFT (IEC 61131-2, IEC 61000-4-4): Power Line: 2KV, Communication I/O: 1KV RS (IEC 61131-2, IEC 61000-4-3): 26MHz ~ 1GHz, 10V/m
Environment	Operating Temperature: 0°C ~ 50°C; Storage Temperature: -20°C ~ 70°C Humidity: 5 ~ 95% (non-condensing)

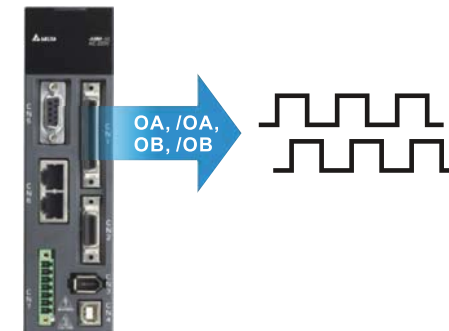
Dimensions



General Signals of Connector CN1

Signal	Pin No	Description
Analog Monitor Output	MON1	16
	MON2	15
Position Pulse Output	OA	21
	/OA	22
	OB	25
	/OB	23
	OZ	50
	/OZ	24
	OCZ	48
Power	VDD	17
	COM+	11
	COM-	45
		47
		49
	VCC	20
	GND	12,13, 19,44
Other	NC	14

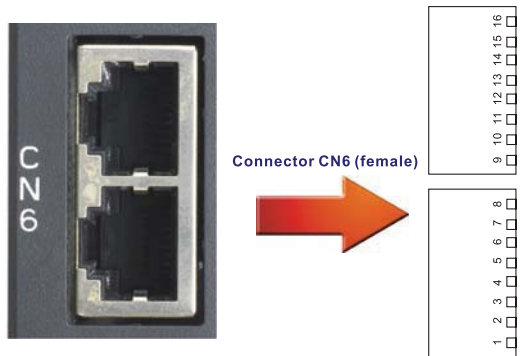
Monitoring Signals



Connector CN6 for DMCNET™ Communication

The connector CN6 accepts RJ45 connectors and isolated cables for connecting Delta's motion control card directly to servo drives and host controllers (external controllers). With this connector CN6, servo drives can connect to a DMCNET™ high-speed motion control system and perform position, speed and torque control. It also can be used to read and monitor the status of the servo drives through DMCNET™ communication.

The station numbers of DMCNET™ communication are the same as RS-232 and RS-485 communication and all are determined by parameter P3-00. The transmission speed can reach up to 20Mbps. There are two communication ports for connector CN6, one is for transmission and the other is for receiving, which is convenient for direct connection of more than one servo drive in serial. Be sure to connect a 120Ω termination resistor to the last connected servo drive.



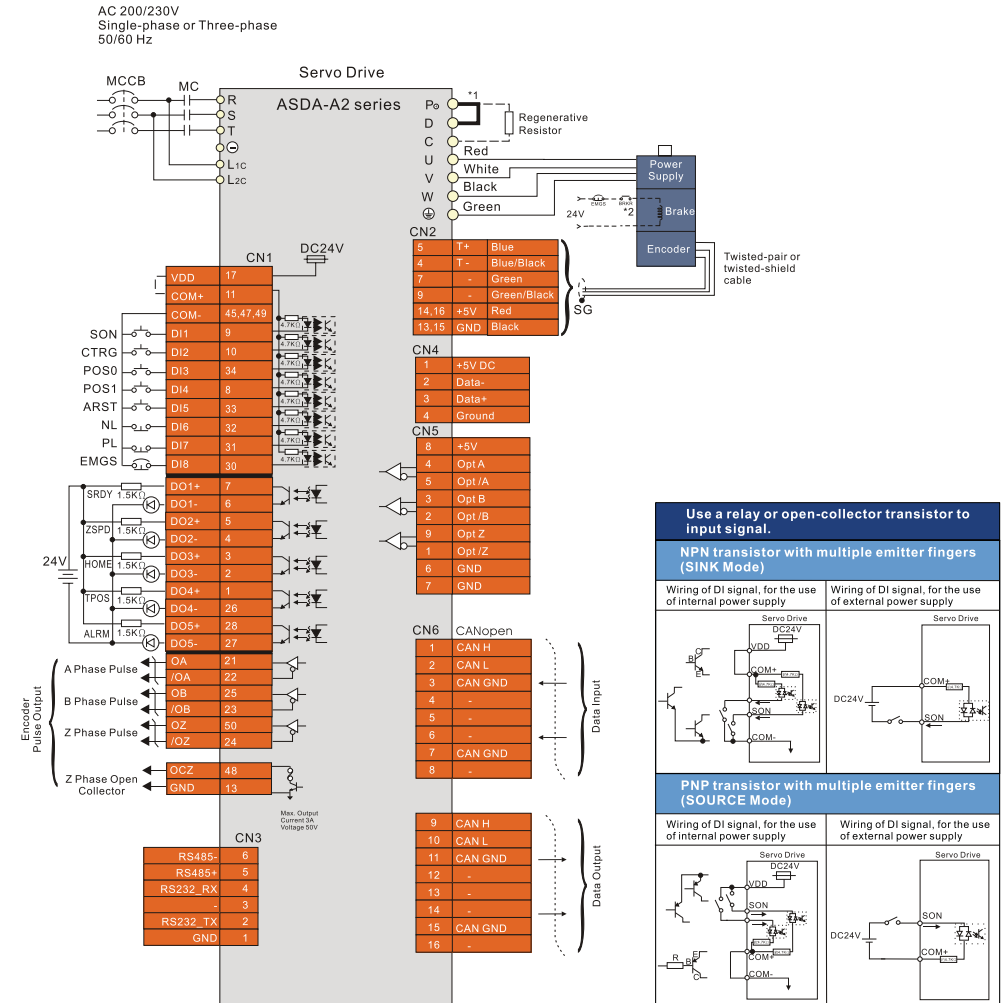
Pin No	Signal Name	Description
1, 9	DMCNET_1A	DMCNET Channel 1 bus line (+)
2, 10	DMCNET_1B	DMCNET Channel 1 bus line (-)
3, 11	DMCNET_2A	DMCNET Channel 2 bus line (+)
4, 12	--	Reserved
5, 13	--	Reserved
6, 14	DMCNET_2B	DMCNET Channel 2 bus line (-)
7, 15	--	Reserved
8, 16	--	Reserved

※ Connecting method of termination resistor: Two 120Ω termination resistors are required. One is connected between DMCNET_1A and DMCNET_1B and the other is connected between DMCNET_2A and DMCNET_2B.

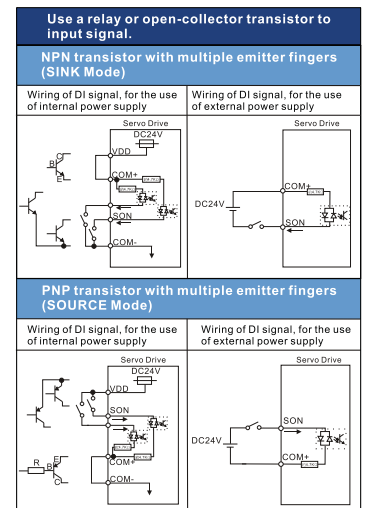


12 Axes Maximum
30m Maximum

Standard Connection Examples for DMCNET™ Communication (ASDA-A2-F Series)



- NOTE**
- 1) Please refer to wiring diagrams of SINK / SOURCE mode.
 - 2) 400W and below drives do not provide a built-in regenerative resistor.
 - 3) The brake oil has no polarity.
 - 4) USB connector is for connecting to personal computers or notebooks.



Caution: Do not use a dual power supply. Failure to observe this caution may result in damage to the servo drive and servo motor.

ASDA-A2-F Servo Drive Specifications

ASDA-A2 Series		100W	200W	400W	750W	1kW	1.5kW	2kW	3kW	4.5kW	5.5kW	7.5kW	
		01	02	04	07	10	15	20	30	45	55	75	
Power supply	Phase / Voltage	Three-phase: 170~255VAC, 50/60Hz ±5%						Three-phase: 170~255VAC, 50/60Hz ±5%					
		Single-phase 2000~255VAC, 50/60Hz ±5%											
	Continuous Output Current	0.9 Arms	1.55 Arms	2.6 Arms	5.1 Arms	7.3 Arms	8.3 Arms	13.4 Arms	19.4 Arms	32.5 Arms	40 Arms	47.5 Arms	
	Cooling System	Natural Air Circulation				Fan Cooling							
	Encoder Resolution/ Feedback Resolution	20-bit (1280000 p/rev)											
	Control of Main Circuit	SVPWM (Space Vector Pulse Width Modulation) Control											
	Tuning Modes	High-speed serial communication control											
	Dynamic Brake	None				Built-in				External			
Position Control Mode	Command Source	Communication											
	Smoothing Strategy	Low-pass and P-curve filter											
	Electronic Gear	Electronic gear N/M multiple N: 1~32767, M: 1:32767 (1/50<N/M<25600)											
	Torque Limit Operation	Set by parameters											
	Feed Forward Compensation	Set by parameters											
Speed Control Mode	Speed Control Range*1	1:5000											
	Command Source	Communication											
	Smoothing Strategy	Low-pass and S-curve filter											
	Torque Limit Operation	Set by parameters or via analog input											
	Frequency Response Characteristic	Maximum 1kHz											
Speed Control Mode	Speed Accuracy*2 (at rated rotation speed)	0.01% or less at 0 to 100% load fluctuation											
		0.01% or less at ±10% power fluctuation											
		0.01% or less at 0°C to 50°C ambient temperature fluctuation											
Torque Control Mode	Command Source	Communication											
	Smoothing Strategy	Low-pass filter											
	Speed Limit Operation	Set by parameters											
Digital Inputs/Outputs	Inputs	Servo on, Reset, Gain switching, Pulse clear, Zero speed CLAMP, Command input reverse control, Command triggered, Speed/Torque limit enabled, Position command selection, Motor stop, Speed position selection, Position / Speed mode switching, Speed / Torque mode switching, Torque / Position mode switching, PT / PR command switching, Emergency stop, Forward / Reverse inhibit limit, Reference "Home" sensor, Forward / Reverse operation torque limit, Move to "Home" Electronic Cam (E-Cam), Forward / Reverse JOG input, Event trigger PR command, Electronic gear ratio (Numerator) selection and Pulse inhibit input. The above digital inputs are not designed for DMCNET communication mode. If using the above digital inputs in DMCNET communication mode, it is recommended to write into digital inputs via DMCNET communication. Only emergency stop, forward / reverse inhibit limit, reference "Home" sensor can be used in DMCNET communication mode.											
	Outputs	Encoder signal output (A, B, Z Line Driver and Z Open Collector) Servo ready, Servo on, At Zero speed, At Speed reached, At Positioning completed, At Torques limit, Servo alarm (Servo fault) activated, Electromagnetic brake control, Homing completed, Output overload warning, Servo warning activated, Position command overflow, Forward / Reverse software limit, Internal position command completed, Capture operation completed output., Motion control completed output., Master position of E-Cam (Electronic Cam)											

ASDA-A2 Series		100W	200W	400W	750W	1kW	1.5kW	2kW	3kW	4.5kW	5.5kW	7.5kW
		01	02	04	07	10	15	20	30	45	55	75
	Analog Monitor Output	Monitor signal can be set by parameters (Output voltage range: ±8V)										
	Protective Functions	Overcurrent, Overvoltage, Undervoltage, Motor overheated, Regeneration error, Overload, Overspeed, Abnormal pulse control command, Excessive deviation, Encoder error, Adjustment error, Emergency stop activated, Reverse/ Forward limit switch error, Position excessive deviation of full-closed control loop, Serial communication error, Input power phase loss, Serial communication time out, short circuit protection of U, V, W, and CN1, CN2, CN3 terminals										
	Communication Interface	RS-232/RS-485/ DMCNET /USB										
Environment	Installation Site	Indoor location (free from direct sunlight), no corrosive liquid and gas (far away from oil mist, flammable gas, dust)										
	Altitude	Altitude 1000m or lower above sea level										
	Atmospheric Pressure	86kPa ~ 106kPa										
	Operating Temperature	0°C ~ 55°C (If operating temperature is above 45°C, forced cooling will be required)										
	Storage Temperature	-20°C ~ 65°C (-4°F to 149°F)										
	Humidity	0 to 90% (non-condensing)										
	Vibration	9.80665m/s ² (1G) less than 20Hz, 5.88m/s ² (0.6G) 20 to 50Hz										
	IP Rating	IP20										
	Power System	TN System ³										
	Approvals	IEC/EN 61800-5-1, UL 508C, C-tick 										

Footnote:

*1 Rated rotation speed: When full load, speed ratio is defined as the minimum speed (the motor will not pause).

*2 When command is rated rotation speed, the speed fluctuation rate is defined as:

(Empty load rotation speed / Full load rotation speed) / Rated rotation speed

*3 TN system: A power distribution system having one point directly earthed, the exposed conductive parts of the installation being connected to that point by a protective earth conductor.

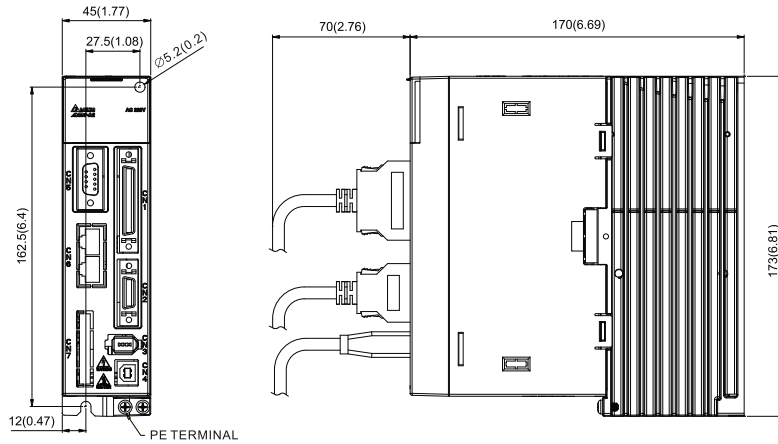




ASDA-A2-F Servo Drive Dimensions

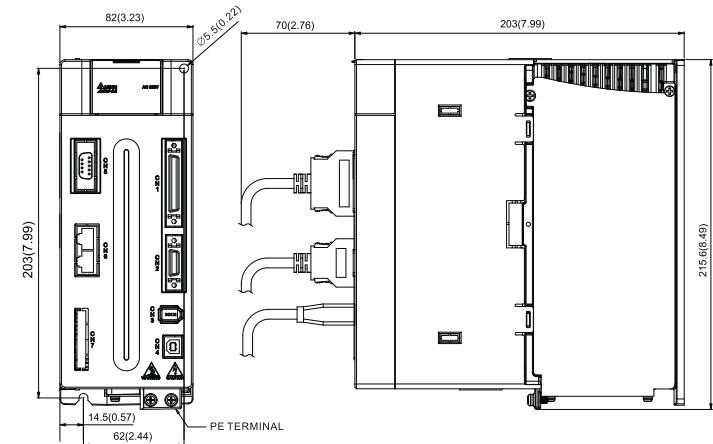
ASD-A2-0121-F : ASD-A2-0221-F : ASD-A2-0421-F (100W ~ 400W)

Weight
1.5 (3.3)



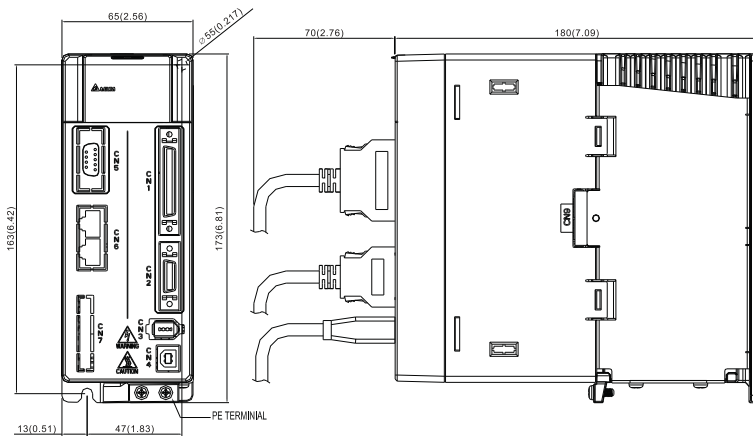
ASD-A2-2023-F : ASD-A2-3023-F (2kW ~ 3kW)

Weight
2.89 (6.36)



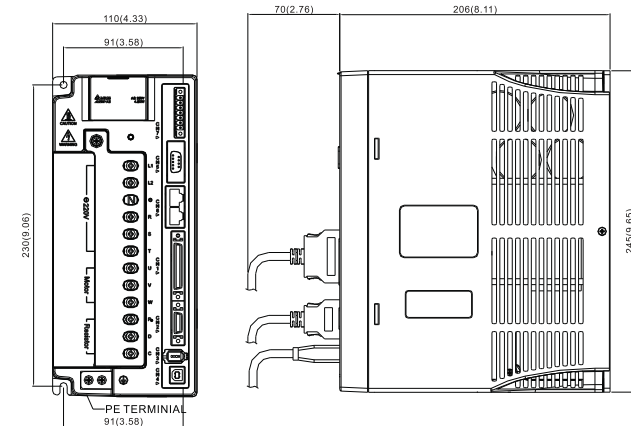
ASD-A2-0721-F : ASD-A2-1021-F : ASD-A2-1521-F (750W ~ 1.5kW)

Weight
2.0 (4.4)



ASD-A2-4523-F (4.5kW)

Weight
4.4 (9.7)

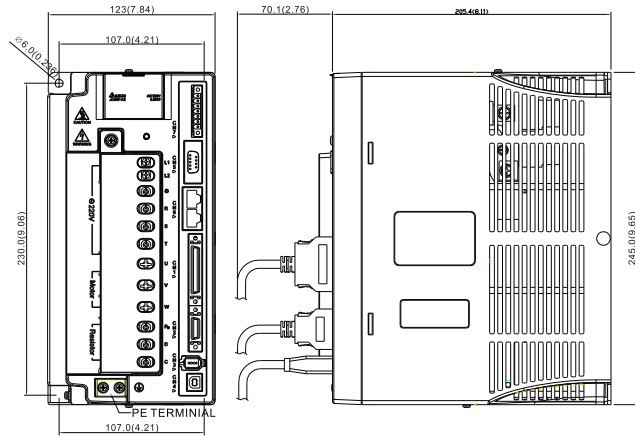




ASDA-A2-F Servo Drive Dimensions

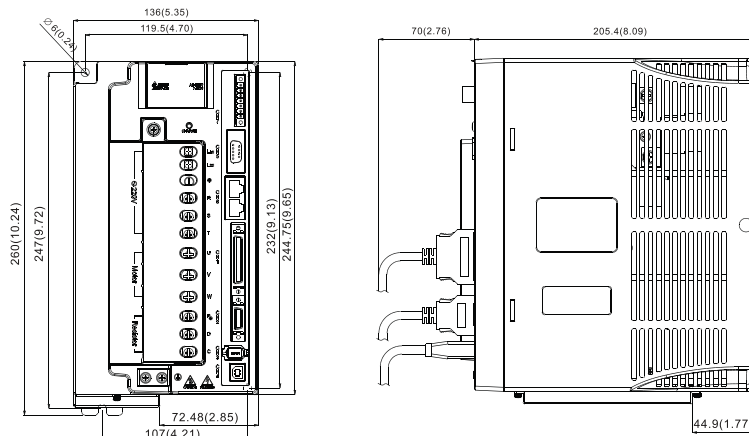
ASD-A2-5523-F (5.5kW)

Weight
5.5 (12.1)



ASD-A2-7523-F (7.5kW)

Weight
5.9 (13.0)



Optional Accessories of ASDA-A2-F Servo Drives

▶ Quick Connectors

- Used for 100W to 300W servo drives
- One operating lever is provided for wire to terminal block insertion



▶ Power Cables

- 3m and 5m standard cables are available
- Customized service is offered to meet the needs of customers
- Two types are selectable: with brake and without brake



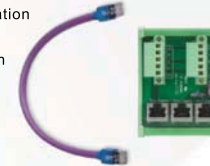
▶ Encoder Cables

- 3m and 5m standard cables are available
- Customized service is offered to meet the needs of customers



▶ DMCNET Accessories

- DMCNET communication cable is provided. Standard cable length is 0.5m and 1m.



▶ Regenerative Resistors

- 400W, 40Ω and 1kW, 20Ω two kinds of specifications are available.



Extension Modules on DMCNET™

Remote Extension Modules

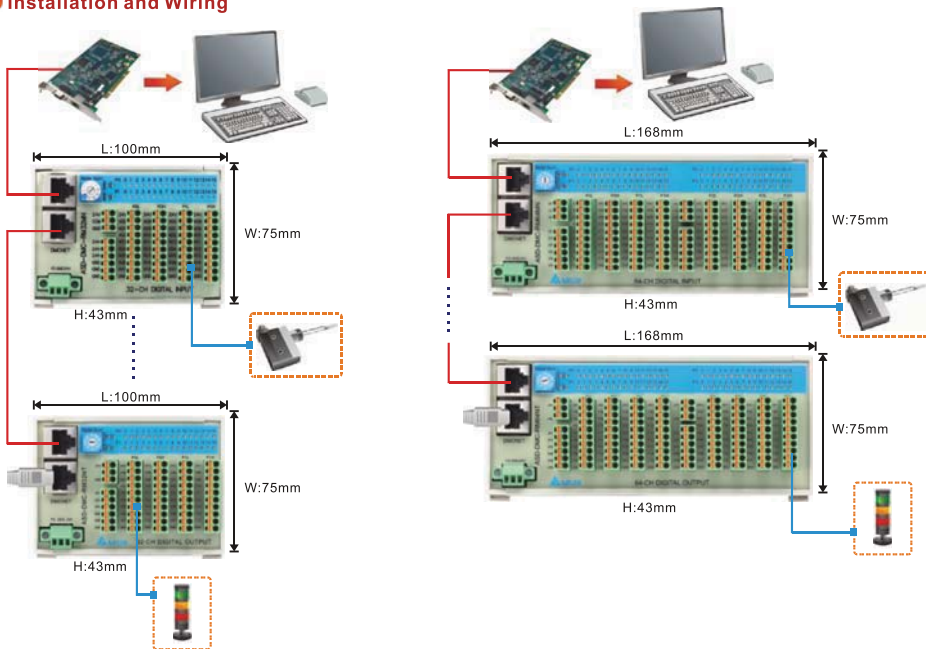
▶ ASD-DMC-RM32MN/ASD-DMC-RM32NT

▶ ASD-DMC-RM64MN/ASD-DMC-RM64NT

Electrical Specifications

Item	RM32MN / RM64MN	RM32NT / RM64NT
Circuit Type	Single	Transistor
Signal Type	SINK / SOURCE	SINK
Power Supply Voltage	24VDC (5mA)	24VDC (0.1A / 1point)
Response Time / Work Frequency	0 ~ 3ms (adjustable)	1KHz
Active Level (OFF > ON)	> 16.5VDC	20us
Active Level (ON > OFF)	< 8VDC	30us
Noise Immunity	ESD (IEC 61131-2, IEC 61000-4-2): 8KV Air Discharge EFT (IEC 61131-2, IEC 61000-4-4): Power Line: 2KV, Communication I/O: 1KV RS (IEC 61131-2, IEC 61000-4-3): 80MHz ~ 1GHz, 10V/m	
Operating/Storage Environment	Operation: 0°C ~ 55°C; Storage: -20°C ~ 70°C	

Installation and Wiring

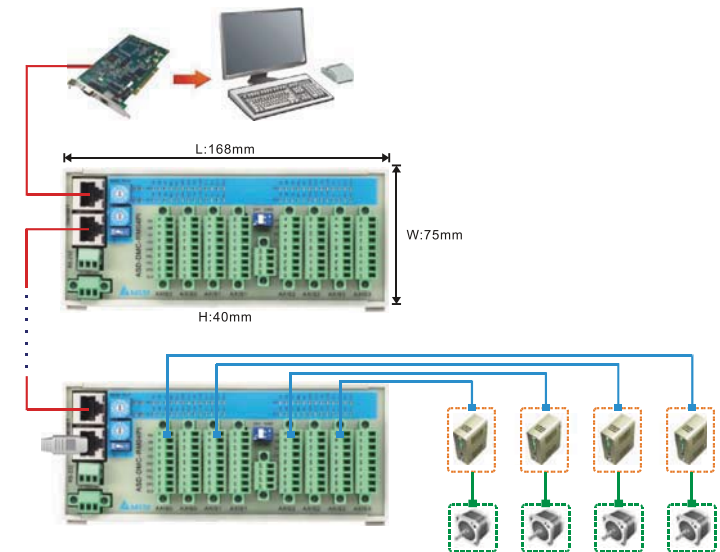


▶ ASD-DMC-RM04PI

Electrical Specifications

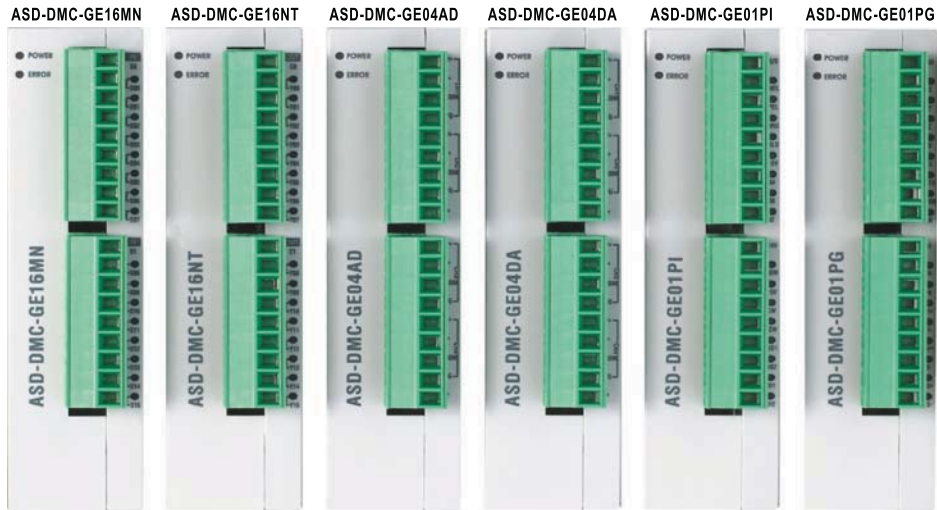
ASD-DMC-RM04PI		ASD-DMC-RM04PI	
Item	Input (QA,QB,QZ,DI1,DI2)	Item	Output (MEL,PEL,ORG,SLD)
Circuit Type	Single	Circuit Type	Single
Signal Type	SINK	Signal Type	SINK / SOURCE
Power Supply Voltage	5VDC	Power Supply Voltage	24VDC (5mA)
Work Frequency	QA, QB, QZ : 200KHz (5mA / 1point) DI1, DI2 : 1KHz (5mA / 1point)	Response Time / Work Frequency	1ms
Noise Immunity	ESD (IEC 61131-2, IEC 61000-4-2): 8KV Air Discharge EFT (IEC 61131-2, IEC 61000-4-4): Power Line: 2KV, Communication I/O: 1KV RS (IEC 61131-2, IEC 61000-4-3): 80MHz ~ 1GHz, 10V/m	Active Level (OFF > ON)	> 16.5VDC
Operating/Storage Environment	Operation: 0°C ~ 50°C; Storage: -20°C ~ 70°C	Active Level (ON > OFF)	< 8VDC
		Noise Immunity	ESD (IEC 61131-2, IEC 61000-4-2): 8KV Air Discharge EFT (IEC 61131-2, IEC 61000-4-4): Power Line: 2KV, Communication I/O: 1KV RS (IEC 61131-2, IEC 61000-4-3): 80MHz ~ 1GHz, 10V/m
		Operating/Storage Environment	Operation: 0°C ~ 50°C; Storage: -20°C ~ 70°C

Installation and Wiring



Station Extension Modules (Available soon)

► GE Series



Gateway Main Station (Available soon)

► GA Series

► ASD-DMC-GA01 Switch Settings



Front View

ADDR1		
Pin	Description	Note
1~12	Start Node Address	Start Station

ADDR2		
Pin	Description	Note
1~12	End Node Address	End Station

There is no communication when the value is tuned to 0 and 13~15.
If ADDR1 is set to 1 and ADDR2 is set to 2, it indicates that the extension modules have occupied two stations.

Ordering Information

Motion Control Card	
PCI-DMC-A01	PCI-DMC-A01 High-speed Motion Control Card
Gateway Main Station	
ASD-DMC-GA01	ASD-DMC-GA01 Gateway Main Station (Available soon)
Station Extension Modules	
ASD-DMC-GE16MN	16 Digital Inputs (NPN/PNP) (Available soon)
ASD-DMC-GE16NT	16 Digital Outputs (Transistor Output) (Available soon)
ASD-DMC-GE04AD	4 Analog Inputs (Available soon)
ASD-DMC-GE04DA	4 Analog Outputs (Available soon)
ASD-DMC-GE01PI	1 Pulse Output (Available soon)
ASD-DMC-GE01PG	1 Manual Pulse Generator (MPG) (Available soon)
Remote Extension Modules	
ASD-DMC-RM32MN	32 Digital Inputs (NPN/PNP)
ASD-DMC-RM64MN	64 Digital Inputs (NPN/PNP) + Manual Pulse Generator (MPG)
ASD-DMC-RM32NT	32 Digital Outputs (Transistor Output)
ASD-DMC-RM64NT	64 Digital Outputs (Transistor Output)
ASD-DMC-RM04PI	4 Pulse Outputs
AC Servo Drives	
ASD-A2-0121-F	A2 100W Servo Drive for DMCNET™
ASD-A2-0221-F	A2 200W Servo Drive for DMCNET™
ASD-A2-0421-F	A2 400W Servo Drive for DMCNET™
ASD-A2-0721-F	A2 750W Servo Drive for DMCNET™
ASD-A2-1021-F	A2 1.0kW Servo Drive for DMCNET™
ASD-A2-1521-F	A2 1.5kW Servo Drive for DMCNET™
ASD-A2-2023-F	A2 2.0kW Servo Drive for DMCNET™
ASD-A2-3023-F	A2 3.0kW Servo Drive for DMCNET™
ASD-A2-4523-F	A2 4.5kW Servo Drive for DMCNET™
ASD-A2-5523-F	A2 5.5kW Servo Drive for DMCNET™
ASD-A2-7523-F	A2 7.5kW Servo Drive for DMCNET™

For ordering information of AC servo motors and accessories, please refer to the ASDA-A2 series catalogue.