Controller Integrated 2-Phase Closed-Loop Stepper Motor Driver

▣ Features

NEW

- Motor driver and controller integral type
- Competitive price compared to the servo motor and closed-loop function and fast response for short-distance continuous drive
- Controllable maximum 31 axis with RS485 communication
- Realizing a wide variety of operation up to 256 steps using 14 control commands combination
- 4 type of operation mode: jog mode, continuous mode, index mode, program mode
- Improved user convenience with providing 50 I/O pins
- C language library provided (32-bit, 64-bit)
- Dedicated Windows program (atMotion) provided
- Responding rapidly and maintaining torque in stop without hunting
- Easy to use without tuning (various gain settings via programming)
- Applicable to the precision equipment such as optical inspection equipment with
- the features of maintaining torque in stop and having no micro vibration (hunting)
- Containing various resolutions (electric gear)
  : 500, 1000, 1600, 2000, 3200, 3600, 5000, 6400, 7200, 10000 (10-level)
- Various alarm functions
  : 17 alarms; over current, over speed, over heat, motor connection error, encoder connection error
- Frame size 42mm, 56mm, 60mm supported

Please read "Safety Considerations" in operation manual before using.

CE

▣ Applications

- Filed requiring preciseness such as semiconductor equipment, 3D printer, Optical inspection equipment, chip mounter, cartesian robot, conveying equipment, and alignment stage.

▣ Manual

For the detail information and instructions, please refer to user manual, user manual for communication and library manual and be sure to follow cautions written in the technical descriptions (catalog, homepage).
Visit our homepage (www.autonics.com) to download manuals.

▣ Software (atMotion)

- atMotion is a comprehensive motion device management program that can be used with Autonics motion controller (AiC-D, PMC-2HSP/2HSN, PMC-1HS/2HS, PMC-4B-PCI).
- atMotion provides GUI control for easy and convenient parameter setting and monitoring data management of multiple devices.
- Visit our website (www.autonics.com) to download the user manual and software.

< Computer specification for using software>

Item	Minimum requirements
System	IBM PC compatible computer with Intel Pentium III or above
Operations	Microsoft Windows 98/NT/XP/Vista/7/8/10
Memory	256MB+
Hard disk	1GB+ of available hard disk space
VGA	Resolution: 1024×768 or higher
Others	RS-232 serial port (9-pin), USB port

< atMotion screen >

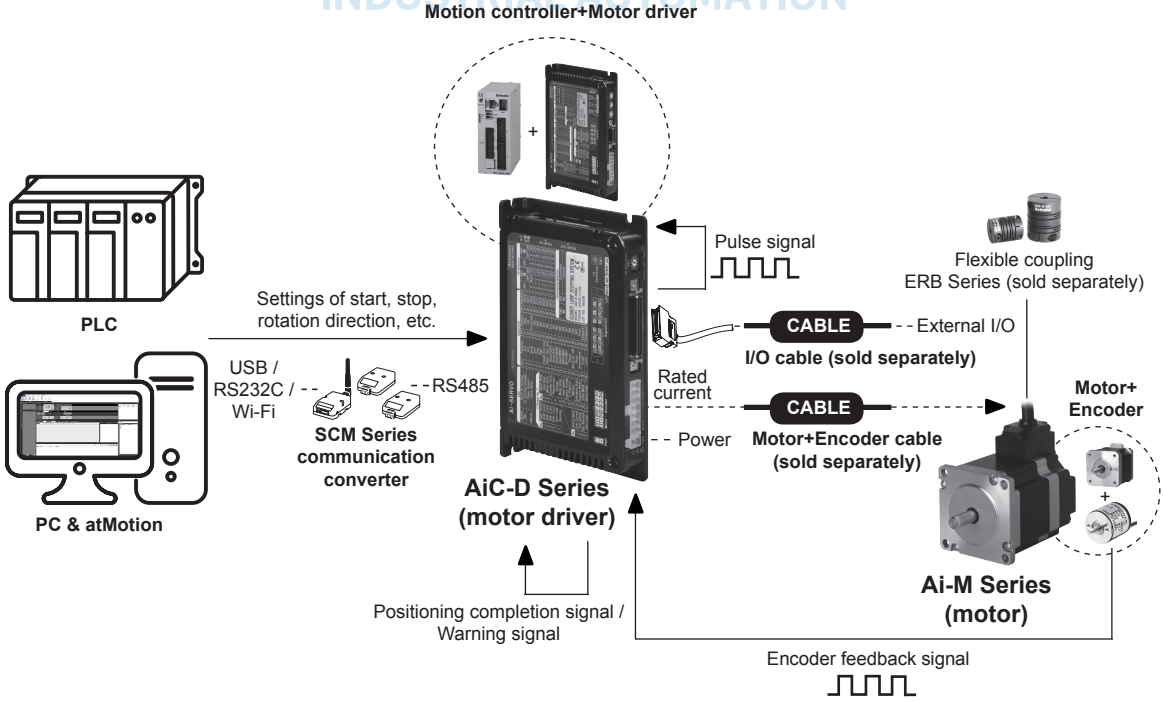
■ Ordering Information

Ai C - D - 42 L A

- Encoder resolution
  - **A** 10,000PPR (2,500PPR×4-multiply)
- Motor length
- Motor frame size
  - **42** 42×42mm
    - **S** 67.5mm
    - **M** 73.5mm
    - **L** 81.5mm
  - **56** 57.2×57.2mm
    - **S** 77.3mm
    - **M** 90.3mm
    - **L** 111.3mm
  - **60** 60×60mm
    - **S** 81.9mm
    - **M** 102.8mm
    - **L** 119.8mm
- Item
  - **D** Driver
- Category
  - **C** Controller
- Series
  - **Ai** Artificial intelligence

Set	Driver	Motor
AiC-42SA	AiC-D-42SA	Ai-M-42SA
AiC-42MA	AiC-D-42MA	Ai-M-42MA
AiC-42LA	AiC-D-42LA	Ai-M-42LA
AiC-56SA	AiC-D-56SA	Ai-M-56SA
AiC-56MA	AiC-D-56MA	Ai-M-56MA
AiC-56LA	AiC-D-56LA	Ai-M-56LA
AiC-60SA	AiC-D-60SA	Ai-M-60SA
AiC-60MA	AiC-D-60MA	Ai-M-60MA
AiC-60LA	AiC-D-60LA	Ai-M-60LA

■ Configuration Diagram



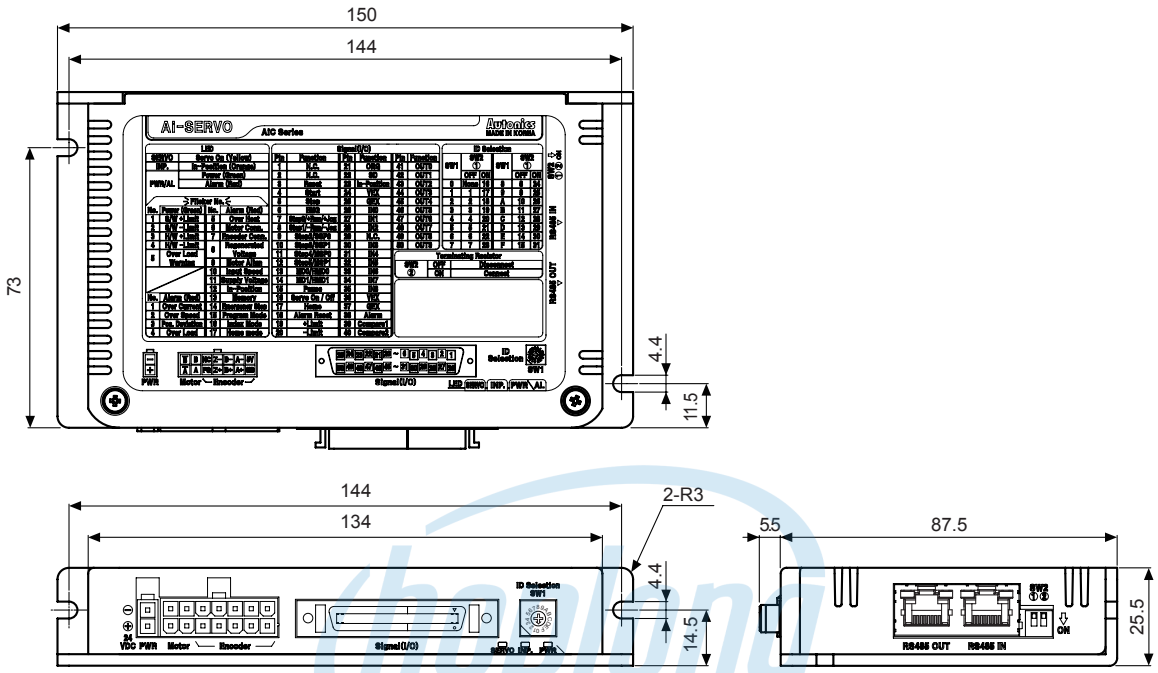
▣ Specifications

Model		AiC-D-42SA	AiC-D-42MA	AiC-D-42LA	AiC-D-56SA	AiC-D-56MA	AiC-D-56LA	AiC-D-60SA	AiC-D-60MA	AiC-D-60LA
Power supply		24VDC⎓								
Allowable voltage range		90 to 110% of the rated voltage								
Power consumption	STOP※1	Max. 10W			Max. 12W			Max. 15W		
	Max. during operation※2	Max. 60W			Max. 120W			Max. 240W		
Max. RUN current※3		1.7A/Phase			3.5A/Phase					
STOP current※4		20 to 100% of max. RUN current (factory default: 50%)								
Rotation speed		0 to 3000rpm								
Resolution※4		500 (factory default), 1000, 1600, 2000, 3200, 3600, 5000, 6400, 7200, 10000 PPR								
Speed filter※4		0 (disable), 2, 4, 6, 8 (factory default), 10, 20, 40, 60, 80, 100, 120, 140, 160, 180, 200 ms								
Positioning gain※4		(P Gain, I Gain) =(1, 1), (2, 1), (3, 1), (4, 1), (5, 1), (1, 2), (2, 2), (3, 2), (4, 2), (5, 2), (1, 3), (2, 3), (3, 3), (4, 3), (5, 3), user setting								
Positioning range		-2,147,483,648 to +2,147,483,647								
In-Position		Fast Response: 0 to 7 or Accurate Response: setting range among 0 to 7								
Motor rotation direction※4		CW, CCW								
Status indicator		● Power/Warning indicator: green LED ● Alarm indicator: red LED ● In-Position indicator: yellow LED ● Servo On/Off indicator: orange LED ● RS485 DATA IN/OUT indicator: green/yellow LED								
I/O voltage level		[H]: 5-30VDC⎓, [L]: 0-2VDC								
I/O	Input	Exclusive input: 20, general input: 9								
	Output	Exclusive output: 4, general output: 10								
External power supply		VEX (recommended: 24VDC⎓): 2, GEX (GND): 2								
Operation mode		Jog / Continuous / Index / Program mode								
Index step numbers		64 steps								
Program function	Step	256 steps								
	Control command	ABS (move absolute position), INC (move incremental position), HOM (home search), ICJ (jump input condition), IRD (waiting input), OPC (on/off of output port), OPT (on pulse from outuput port), JMP (jump), REP (start repetition), RPE (end repetition), END (end program), POS (position set), TIM (timer), CMP (compare output)								
	Start	Power ON program auto-start function								
	Home search	Power ON home search auto-start function								
Home search mode		Home, limit home, zero home, torque home								
Communication		RS485 Speed※4: 9600, 19200, 38400, 57900, 115200 (factory default) [bps]								
Multiaxial control		31-axis								
ID setting switch		16-bit rotary switch (0 to F), 1-bit piano switch								
Alarm output		Over current, over speed, position tracking, over load, over heat, motor connection, encoder connection, regenerative voltage, motor misalignment, command speed, input voltage, in-position, memory, emergency stop, program mode, index mode, home search mode								
Warning output		+software limit, +hardware limit, -software limit, -hardware limit, over load								
Insulation resistance		Over 100MΩ (at 500VDC megger)								
Dielectric strength		1,000VAC 60Hz for 1 min								
Vibration		1.5mm amplitude at frequency of 10 to 55Hz (for 1 min) in each X, Y, Z direction for 2 hours								
Shock		300m/s^2 (approx. 30G) in each X, Y, Z direction for 3 times								
Environment	Ambient temp.	0 to 50℃, storage: -10 to 60℃								
	Ambient humi.	35 to 85%RH, storage: 10 to 90%RH								
Protection structure		IP20 (IEC standard)								
Approval		CE								
Weight※5		Approx. 460g (approx. 300g)								

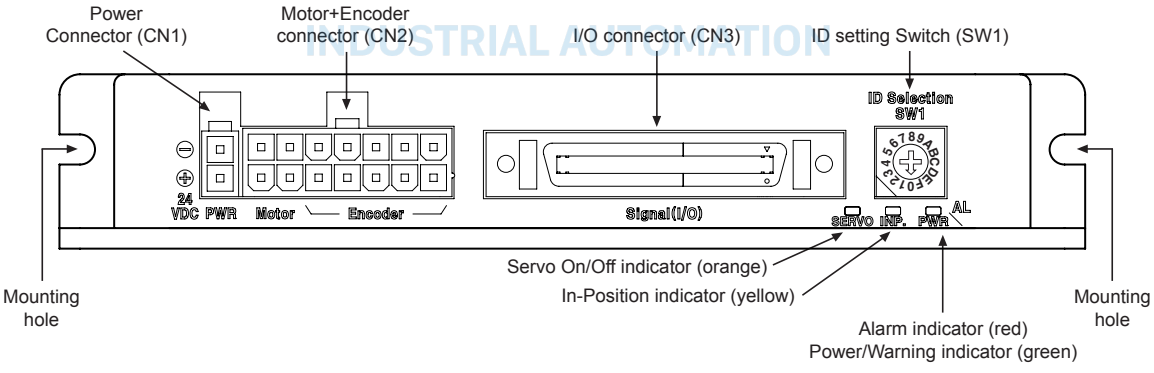
※1: Based on the ambient temperature 25℃, ambient humidity 55%RH, and STOP current 50%.
※2: Max. power consumption during operation. When changing the load rapidly, instantaneous peak current may increase.
The capacity of power supply should be over 1.5 to 2 times of max. power consumption.
※3: RUN current varies depending on the input RUN frequency and max. RUN current at the moment varies also.
※4: Settable with the dedicated program.
※5: The weight includes packaging. The weight in parenthesis is for unit only.
※Environment resistance is rated at no freezing or condensation.

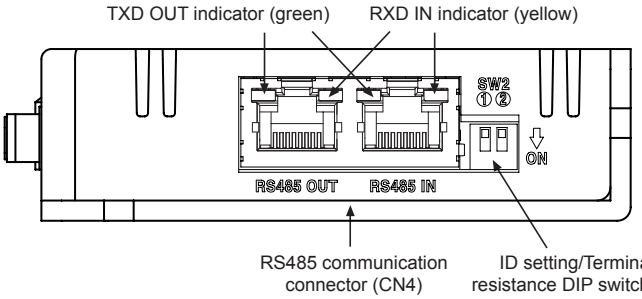
▣ Dimensions

(unit: mm)



▣ Unit Descriptions





■ Status Indicators

Status indicator	Location	LED color	Function	Descriptions
PWR	Front	Green	Power indicator	Turns ON when the unit operates normally after supplying power.
			Warning indicator	Flashes when limit signal is input or over load status is maintained
AL		Red	Alarm indicator	When alarm occurs, it flashes in various ways depending on the situation. Refer to '■ Control Input/Output → ◎ Output → **3. Alarm/Warning**'.
INP.		Yellow	In-Position indicator	Turns ON when motor is placed at command position after positioning input.
SERVO		Orange	Servo On/Off indicator	Turns ON when Servo is operating, turns OFF when servo is not operating.
RXD IN※1	Right side	Yellow	RS485 Data I/O display	Flashes when receives data.
TXD OUT※1		Green		Flashes when sending data.

※1: Although RS485 OUT is disconnected, RXD IN/TXD OUT operates normally, if RS485 IN is communicating.

■ Driver Setting

◎ SW1: ID setting switch

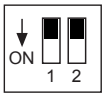
※Set Node ID of the driver.
※Depending on the 1 switch setting of the SW2, it is possible to connect max. 31-axis.

ID Selection SW1

Setting switch	Setting	ID		Setting	ID	
		SW2 1 OFF	SW2 1 ON		SW2 1 OFF	SW2 1 ON
	0	Disable	16	8	8	24
	1	1 (factory default)	17	9	9	25
	2	2	18	A	10	26
	3	3	19	B	11	27
	4	4	20	C	12	28
	5	5	21	D	13	29
	6	6	22	E	14	30
	7	7	23	F	15	31

◎ SW2: ID setting/Terminating resistance DIP switch

※Set Node ID of the driver.
※Set to use terminating resistance.



No.	Function	Switch position	
		ON	OFF (factory default)
1	ID setting	ID: 16 to 31	ID: 1 to 15
2	Terminating resistance	Use terminating resistance (120Ω)	Do not use terminating resistance

■ Control Input/Output

Inner signal of all input/output consists of photocoupler.
ON: photocoupler power ON
OFF: photocoupler power OFF

◎ Input

1. Exclusive input (20)

Signal name	Descriptions	Pin no.	Signal name	Descriptions	Pin no.
Reset	Reset command	3	MD0/HMD0	Operation mode designate 0 / Home search mode designate 0	13
Start	Drive start command	4	MD1/HMD1	Operation mode designate 1 / Home search mode designate 1	14
Stop	Drive stop command	5	Pause	Pause	15
EMG	Drive emergency stop command	6	Servo On/Off	Servo On/Off	16
Step0/+Run/+Jog	Step designate 0 / +Run / +Jog	7	Home	Home search	17
Step1/-Run/-Jog	Step designate 1 / -Run / -Jog	8	Alarm Reset	Alarm reset command	18
Step2/SSP0	Step designate 2 / Start speed designate 0	9	+Limit	+direction limit sensor	19
Step3/SSP1	Step designate 3 / Start speed designate 1	10	-Limit	-direction limit sensor	20
Step4/MSP0	Step designate 4 / Max. speed designate 0	11	ORG	Home sensor	21
Step5/MSP1	Step designate 5 / Max. speed designate 1	12	SD	Deceleration (deceleration stop) signal	22

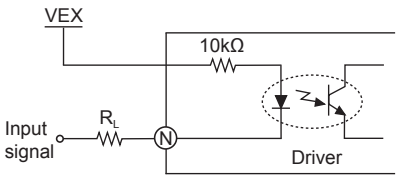
2. General input (9)

Signal name	Descriptions	Pin no.
IN0 to IN2	General input 0 to 2	26 to 28
IN3 to IN8	General input 3 to 8	30 to 35

3. Example of input circuit connection

-All input circuits are insulated with photocoupler, and separate external power (recommended: 24VDC) is necessary.
-Case of using external power 24VDC does not require R_L.
-In case using external power over 24VDC, select R_L value that I_F (forward current of primary LED) of photocoupler to be around 2.5mA (max. 10mA).

※$R_L = \frac{VEX-1.25V}{0.0025A} - 10\times10^3\,\Omega$



※N: Input pin number of CN3

◎ Output

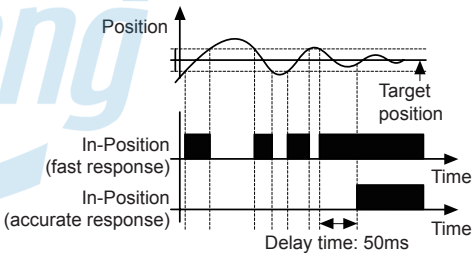
1. Exclusive output (4)

Signal name	Descriptions	Pin no.	Signal name	Descriptions	Pin no.
In-Position	Drive ending pulse	23	Compare1 (trigger)	Comparison output1	39
Alarm	Alarm output	38	Compare2 (trigger)	Comparison output2	40

2. In-Position

-In-Position output represents output is output of positioning completion signal.
-If the gap between target position and real position is under In-Position setting value after position command pulse has finished, In-Position output turns ON and In-Position indicator turns ON.
-In reverse, when the gap is over In-Position setting value, In-Position output turns OFF and the In-Position indicator turns OFF.
※For accurate drive, check the In-Position output again and execute the next drive.
※Refer to example of output circuit connection.

Fast Response		Accurate Response	
Setting	Value	Setting	Value
0 (factory default)	0	8	0
1	±1	9	±1
2	±2	10	±2
3	±3	11	±3
4	±4	12	±4
5	±5	13	±5
6	±6	14	±6
7	±7	15	±7



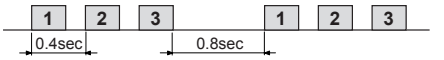
3. Alarm/Warning

● Alarm
-This function stops motor to protect driver, depending on the error status such as over current or over speed.
-In case of normal status, output turns ON, and in case of alarming status, output turns OFF.
-When supplying alarm reset, driver returns to the normal status.
※Refer to example of output circuit connection.
● Warning
-This function notices dangers with the alarm indicator prior to motor stop with limit signal or over load alarm.
-When turning out from the alarming condition, driver returns to the normal status automatically.

Alarm indicator	No. of flashing	Alarm type	Descriptions	Motor stop	Maintain torque
AL (red)	1	Over current error	When over current flows at motor RUN element	O	×
	2	Over speed error	When motor speed is over 4,000rpm		
	3	Position tracking error	When the gap between position command value and current position value is over 90˚		
	4	Over load error	When applying load over the rated load for over 1 sec.		
	5	Over heat error	When driver inner temperature is over 80℃		
	6	Motor connection error	When motor cable connection error occurs at driver		
	7	Encoder connection error	When encoder cable connection error occurs at driver		
	8	Regenerative voltage error	When regenerative voltage is over 78V		
	9	Motor misalignment	When motor is in misalignment		
	10	Command speed error	When command speed is over 3,500rpm		
	11	Input voltage error	When input voltage is out of 24VDC ±10%		
	12	In-Position error	When position error (over 1) is kept over 3 sec, after motor stopped		
	13	Memory error	When memory error is detected as power supplied		
	14	Emergency stop	When emergently stopped with emergency stop command	O	O
	15	Program mode error	When 'END' command is not exist at the last step		
	16	Index mode error	When other instruction is used but 'INC', 'ABS' When index command is not completed due to the stop command		
	17	Home search mode error	When failed to find home		

Warning indicator	No. of flashing	Warning type	Descriptions	Motor stop	Maintain torque
PWR (green)	1	+ software limit	When normal direction (CW) software limit is ON	O	O
	2	- software limit	When reverse direction (CCW) software limit is ON		
	3	+ hardware limit	When normal direction (CW) hardware limit is ON		
	4	- hardware limit	When reverse direction (CCW) hardware limit is ON		
	5	Over load warning	When maximum load is kept connected over 10 sec (motor or driver can be overheated)	×	O

※Even though warning occurs, it drives as normal status and it may cause damage by fire.
It is recommend not to use the unit during warning status.
※Depending on alarm/warning type, it flashes 0.4 sec interval and it turns OFF for 0.8 sec repeatedly.
<In case of no. 3 alarm>



4. Comparison output (compare1, compare2)

Outputs trigger pulse on the certain interval that user has set.

Mode	Descriptions
0	Not use comparison output.
1	Comparison output turns ON when the present absolute position value is same or bigger than the set position value.
2	Comparison output turns ON when the present absolute position value is same or smaller than the set position value.
3	Trigger pulses output with the set interval and width.

※Please refer to the user manual to learn how to set.

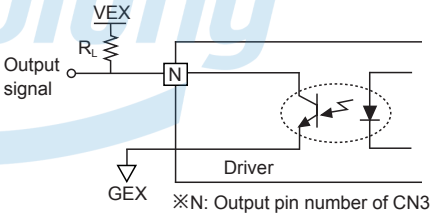
5. General output (10)

Signal name	Descriptions	Pin no.
OUT0 to OUT9	General output 0 to 9	41 to 50

6. Example of output circuit connection

-All output circuits are insulated with photocoupler.
-External power input is available from 5VDC to 80VDC with the open collector method.
select R_L value that I_C (collector current of secondary LED) of photocoupler to be around 10mA.

※$R_L = \frac{VEX-0.7V}{0.01A}$



※N: Output pin number of CN3

▣ Communication Output

It is for parameter setting and monitoring via external devices (PC, PLC, etc.).

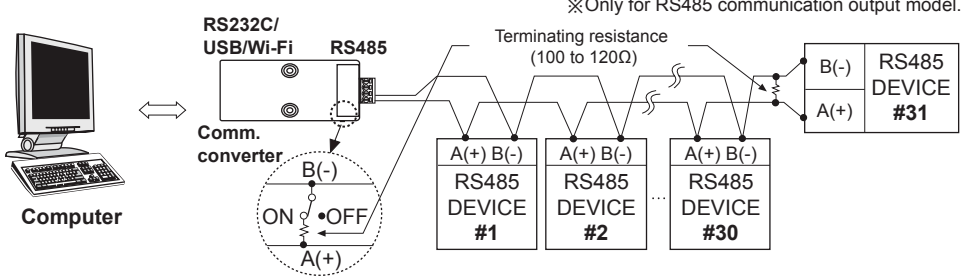
◎ Interface

Comm. protocol	Modbus RTU	Comm. speed	9600, 19200, 38400, 57600, 115200 bps
Connection type	RS485	Comm. response wait time	5 to 99 ms
Application standard	Compliance with EIA RS485	Start bit	1-bit (fixed)
Max. connection	31 units (address: 01 to 31)	Data bit	8-bit (fixed)
Synchronous method	Asynchronous	Parity bit	None, Odd, Even
Comm. method	Two-wire half duplex	Stop bit	1-bit, 2-bit
Comm. distance	Max. 800m		

※It is not allowed to set overlapping communication address at the same communication line.
Use twisted pair wire for RS485 communication.

◎ Application of system organization

※Only for RS485 communication output model.



※It is recommended to use Autonics communication converter;
SCM-WF48 (Wi-Fi to RS485·USB wireless communication converter, sold separately),
SCM-US48I (USB to RS485 converter, sold separately), SCM-38I (RS232C to RS485 converter, sold separately).
Please use twisted pair wire, which is suitable for RS485 communication, for SCM-WF48, SCM-US48I and SCM-38I.

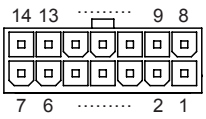
▣ Connection Connectors of Driver

◎ Connector function

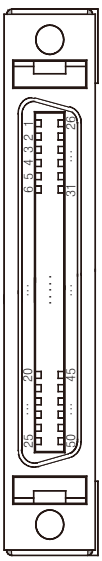
• CN1: Power connector

Pin arrangement	Pin no.	Function
	2	GND
	1	24VDC

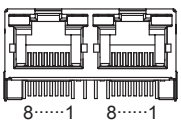
• CN2: Motor+Encoder connector

Pin arrangement	Pin no.	Function	Pin no.	Function
	1	GND	8	+5VDC
	2	Encoder A	9	Encoder $\overline{A}$
	3	Encoder B	10	Encoder $\overline{B}$
	4	Encoder Z	11	Encoder $\overline{Z}$
	5	F.G.	12	N·C
	6	Motor A	13	Motor $\overline{B}$
	7	Motor $\overline{A}$	14	Motor $\overline{B}$

• CN3: I/O connector

Pin arrangement	Pin no.	I/O	Function	Pin no.	I/O	Function
	1	—	N·C	26	Input	IN0
	2	—	N·C	27	Input	IN1
	3	Input	Reset	28	Input	IN2
	4	Input	Start	29	—	N·C
	5	Input	Stop	30	Input	IN3
	6	Input	EMG	31	Input	IN4
	7	Input	Step0/+Run/+Jog	32	Input	IN5
	8	Input	Step1/-Run/-Jog	33	Input	IN6
	9	Input	Step2/SSP0	34	Input	IN7
	10	Input	Step3/SSP1	35	Input	IN8
	11	Input	Step4/MSP0	36	Input	VEX
	12	Input	Step5/MSP1	37	Input	GEX
	13	Input	MD0/HMD0	38	Output	Alarm
	14	Input	MD1/HMD1	39	Output	Compare1 (Trigger)
	15	Input	Pause	40	Output	Compare2 (Trigger)
	16	Input	Servo On/Off	41	Output	OUT0
	17	Input	Home	42	Output	OUT1
	18	Input	Alarm Reset	43	Output	OUT2
	19	Input	+Limit	44	Output	OUT3
	20	Input	-Limit	45	Output	OUT4
	21	Input	ORG	46	Output	OUT5
	22	Input	SD	47	Output	OUT6
	23	Output	In-Position	48	Output	OUT7
	24	Input	VEX	49	Output	OUT8
	25	Input	GEX	50	Output	OUT9

• CN4: RS485 communication cable connector

Pin arrangement	Pin no.	I/O	Function	Pin no.	I/O	Function
	1	—	N·C	5	—	N·C
	2	—	N·C	6	Input/Output	RS485 DATA-
	3	Input/Output	RS485 DATA+	7	—	N·C
	4	—	N·C	8	—	N·C

◎ Connector specifications

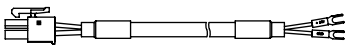
Type		Specifications			Manufacture
		Connector	Connector terminal	Housing	
CN1	Driver	3930-1020 (5569-02A2)	—	—	Molex
	Power	CHD1140-02	CTD1140	—	HANLIM
CN2	Driver	35318-1420	—	—	Molex
	Motor+Encoder	5557-14R	5556T		
CN3	Driver	10250-52A2 PL	—	—	3M
	I/O connector	10150-3000PE		10350-52F0-008	
CN4	Driver	KRM-U-02-8-8-4-7M5	—	—	KINNEXA

※Above connectors are suitable for AiC-D Series. You can use equivalent or substitute connectors.

▣ Sold Separately

◎ Power cable

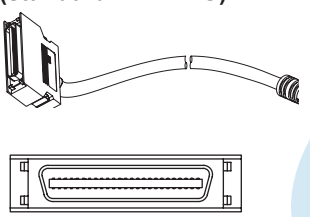
● **CJ-PW-□**



※□ of model name indicates cable length (010, 020)
E.g.) CJ-PW-010: 1m power cable.

◎ I/O cable

● **CJ-MP50-HP□**
(standard: AiC TAG)

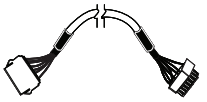


Pin no.	Function (name tag)	Cable color	Dot line color-numbers	Pin no.	Function (name tag)	Cable color	Dot line color-numbers
1	N·C	Orange	Black-1	26	IN0	White	Red-3
2	N·C		Red-1	27	IN1		Black-4
3	RESET		Black-2	28	IN2		Red-4
4	START		Red-2	29	N·C		Black-5
5	STOP		Black-3	30	IN3		Red-5
6	EMG		Red-3	31	IN4	Gray	Black-1
7	STEP0/+RUN/+JOG		Black-4	32	IN5		Red-1
8	STEP1/-RUN/-JOG		Red-4	33	IN6		Black-2
9	STEP2/SSP0		Black-5	34	IN7		Red-2
10	STEP3/SSP1		Red-5	35	IN8		Black-3
11	STEP4/MSP0	Yellow	Black-1	36	VEX		Red-3
12	STEP5/MSP1		Red-1	37	GEX		Black-4
13	MD0/HMD0		Black-2	38	ALARM		Red-4
14	MD1/HMD1		Red-2	39	COMPARE1		Black-5
15	PAUSE		Black-3	40	COMPARE2		Red-5
16	SERVO ON/OFF		Red-3	41	OUT0	Pink	Black-1
17	HOME		Black-4	42	OUT1		Red-1
18	ALARM RESET		Red-4	43	OUT2		Black-2
19	+LIMIT		Black-5	44	OUT3		Red-2
20	-LIMIT		Red-5	45	OUT4		Black-3
21	ORG	White	Black-1	46	OUT5		Red-3
22	SD		Red-1	47	OUT6		Black-4
23	IN POSITION		Black-2	48	OUT7		Red-4
24	VEX		Red-2	49	OUT8		Black-5
25	GEX		Black-3	50	OUT9		Red-5

※□ of model name indicates cable length (010, 020, 030, 050, 070, 100, 150, 200)
E.g.) CJ-MP50-HP070: 7m I/O cable.

◎ Motor+Encoder cable

● **Normal: CID14M-□, Moving: CIDF14M-□**



※□ of model name indicates cable length (1, 2, 3, 5, 7, 10)
E.g.) C1DF14M-10: 10m moving type motor+encoder cable.

◎ Communication converter

● **SCM-WF48**
(Wi-Fi to RS485·USB wireless communication converter)

CE K

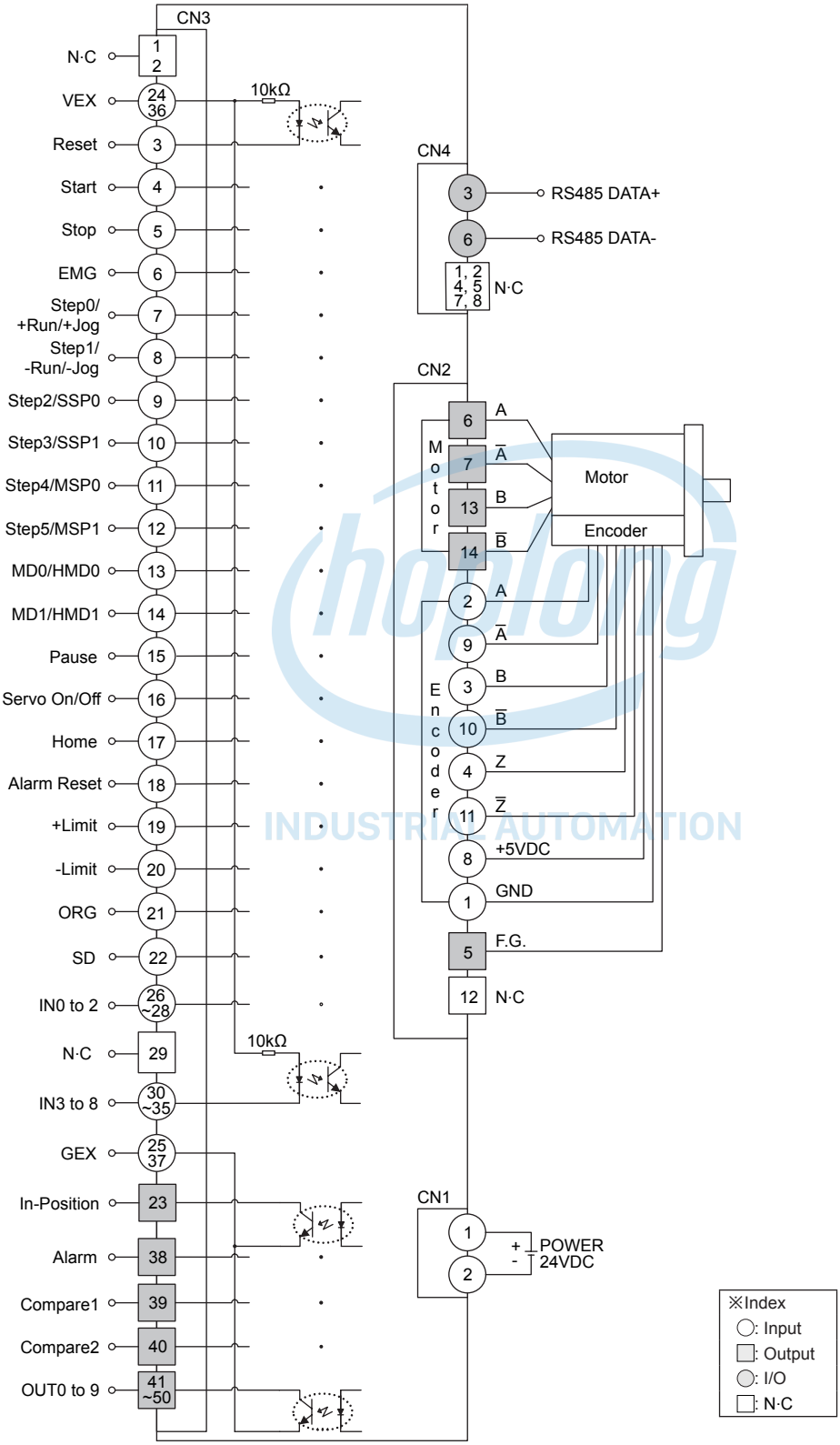
● **SCM-US48I**
(USB to RS485 converter)

CE K

● **SCM-38I**
(RS232C to RS485 converter)

CE K

▣ Connection for Motor and Driver



▣ Troubleshooting

1. When driver communication is failed

①Check whether the connection between driver and communication cable is correct.
②Check whether the port and communication speed is set correctly in the dedicated communication program.

2. When operation of motor is unstable

①Check whether driver and motor are connected correctly.
②Check whether operation command is set correctly (e.g. speed, accel/deceleration speed).

▣ Proper Usage

- Follow instructions in 'Proper Usage'.
  Otherwise, It may cause unexpected accidents.
- 24VDC power supply should be insulated and limited voltage/current or Class 2, SELV power supply device.
- Re-supply power after min. 1 sec from disconnected power.
- In case communication is unstable due to the noise generated by supplied power or peripheral device,
  use ferrite core at communication line.
- It is recommended to use 485 converter with the separate power.
  (Autonics product, SCM Series recommended)
- The thickness of cable should be same or thicker than the below specifications when connecting the cable for the connector.
  ①CN1 (Power connector): AWG18
  ②CN2 (Motor+Encoder connector): AWG22, AWG24
  ③CN3 (I/O connector): AWG28
- Keep the distance between power cable and signal cable more than 10cm.
- Motor vibration and noise can occur in specific frequency period
  ①Change motor installation method or attach the damper.
  ②Use the unit out of the dedicated frequency range when vibration and noise occurs due to changing motor RUN speed.
- For using motor, it is recommended to maintenance and inspection regularly.
  ①Unwinding bolts and connection parts for the unit installation and load connection
  ②Strange sound from ball bearing of the unit
  ③Damage and stress of lead cable of the unit
  ④Connection error with motor
  ⑤Inconsistency between the axis of motor output and the center, concentric (eccentric, declination) of the load, etc.
- This product does not prepare protection function for a motor.
- This unit may be used in the following environments.
  ①Indoors (in the environment condition rated in 'Specifications')
  ②Altitude max. 2,000m
  ③Pollution degree 2
  ④Installation category II