Autonics Controller Intergrated 2-Phase Colsed-Loop Stepper Motor Driver [AC type, Frame size 60/86, RS485 Comm.] **AiCA-D SERIES**

INSTRUCTION MANUAL

Thank you for choosing our Autonics product. Please read the following safety considerations before use.

Safety Considerations

**Please observe all safety considerations for safe and proper product operation to avoid hazards. ※★ symbol represents caution due to special circumstances in which hazards may occur.

⚠ Warning Failure to follow these instructions may result in serious injury or death.

▲ Caution Failure to follow these instructions may result in personal injury or product damage

⚠ Warning

- 1. Fail-safe device must be installed when using the unit with machinery that may cause serious injury or substantial economic loss. (e.g. nuclear power control, medical equipment, ships, vehicles, railways, aircraft, combustion apparatus, safety equipment, crime/disaster prevention devices, etc.)

 Failure to follow this instruction may result in personal injury, economic loss or fire.

 2. Do not use the unit in the place where flammable/explosive/corrosive gas, high humidity, direct
- sunlight, radiant heat, vibration, impact or salinity may be present.
 Failure to follow this instruction may result in explosion or fire.

 3. Do not connect, repair or inspect the unit while connected to a power source.
- Failure to follow this instruction may result in fire or electric shock
- Failure to follow this instruction may result in fire or electric snock.

 Install the unit after considering counter plan against power failure.

 Failure to follow this instruction may result in personal injury, economic loss or fire.

 5. Re-supply power after min. 20 sec from disconnected power.

 Failure to follow this instruction may result in product damage or malfunction.

 6. Check 'Connections' before wiring.

- Failure to follow this instruction may result in fire
- Failure to follow this instruction may result in fire.

 7. For installing the unit, ground it exclusively and use over AWG 18(0.75mm²) ground cable.
 Failure to follow this instruction may result in electric shock.

 8. Do not disassemble or modify the unit.
- Failure to follow this instruction may result in fire or electric shock.
- 9. Insulate the connector not to be exposed.
 Failure to follow this instruction may result in electric shock.

 10. Install the driver in the housing or ground it.
- Failure to follow this instruction may result in personal injury, fire or electric shock.

- Failure to follow this instruction may result in peranting for a while.

 Failure to follow this instruction may result in burn or electric shock due to high temperature of the surface.

 12. Do not remove the connector during or after operation for a while.

 Failure to follow this instruction may result in electric shock or product damage.
- 13. Emergency stop directly when error occurs.
 Failure to follow this instruction may result in personal injury or fire.

▲ Caution

- When connecting the power input, use AWG 18(0.75mm²) cable or over.
 Install overcurrent prevention device (e.g. the current breaker, etc) to connect the driver with power.
- Failure to follow this instruction may result in fire.

 3. Check the control input signal before supplying power to the driver
- Failure to follow this instruction may result in personal injury or product damage by unexpected driver
- 4. Install a safety device to maintain the vertical position after turn off the power of this driver. Failure to follow this instruction may result in personal injury or product damage by releasing holding torque
- 5. Use the unit within the rated specifications.
- 5. Use the unit within the rated specifications.
 Failure to follow this instruction may result in fire or product damage.
 6. Use a dry cloth to clean the unit and do not use water or organic solvent.
 Failure to follow this instruction may result in fire or electric shock.

- Failure to follow this instruction may result in the or electric since.

 7. The driver may overheat depending on the environment.

 Install the unit in the well ventilated place and forced cooling with a cooling fan.

 Failure to follow this instruction may result in product damage or degradation by heat.

 8. Keep metal chip, dust and wire residue from flowing into the unit.

 Failure to follow this instruction may result in fire or product damage.

- Use the designated motor only.
 Failure to follow this instruction may result in fire or product damage.

Product Components

(#)

Unit Descriptions

Before use the product, check all components are contained. The components are contained each one
• Motor driver
• Instruction manual

positioning input.

[ON] Node ID 16 to 31

DIP switch (ID, TERM)

- Power connector
- 8. Power connector (CN2)

Specifications

operation

Motor rotation direction **2 CW, CCW

Input

Step

Speed* Multiaxial control

Model

Power supply

Max. Run current

STOP current

Resolution[®]

Motor GAIN

In-Position

Status indicator

I/O voltage level

Operation mode

Index step

Program function

RS485

Alarm

Warning

Vibration

Shock

ID setting switch

Input resistance

Sold separately

Approval

Weight*

Rotation speed

Applied motor

Positioning range

AiCA-D-60MA

Max. 60W

2.0A/Phase

0 to 3000rpm

Max. during Max. 160W

200-240VAC~50/60Hz

20% of max, RUN current

AiA-M-60MA AiA-M-60LA

-2,147,483,648 to +2,147,483,647

0 (factory default) to 30, Fine Gain

• In-Position indicator: orange LED

Exclusive input: 20, general input: 9

Exclusive output: 4, general output: 10

Power ON program auto-start function

Power ON home search auto-start function

±Software limit, ±hardware limit, overload

4.7kΩ (Anode Pull-up)

Approx. 1,080g (approx. 800g) %1: Based on the ambient temperature 25°C, ambient humidity 55%RH and STOP current 20%.

#3: Settable with the dedicated program (atMotion).

#4: ☐ of model name indicates cable length (010, 020, 030, 050, 070, 100, 150, 200)

E.g.) CO50-MP070-R: 7m I/O cable.

E.g., CO30-MP07-R. 7111/0 Cable.
For corresponding EMC standard, cable length should be below 2m.
:
of model name indicates cable length (1, 2, 3, 5, 7, 10, 15, 20)

E.g.) C1DF14M-10: 10m moving type motor+encoder cable.

#6: The weight includes packaging. The weight in parenthesis is for unit only.

Environment resistance is rated at no freezing or condensation.

nsulation resistance Over 200MΩ (at 500VDC megger)

Dielectric strength 1,500VAC 60Hz for 1 min

Protection structure IP20 (IEC standard)

Environ- Ambient temp. 0 to 50°C, storage: -10 to 60°C ment Ambient humi. 35 to 85%RH, storage: 10 to 90%R

9600, 19200, 38400, 57600, 115200 (factory default) bps

16-bit rotary switch (0 to F), 1-bit DIP switch (ON/OFF)

300m/s² (approx. 30G) in each X, Y, Z direction for 3 times

*2: RUN current varies depending on the input RUN frequency and max. RUN current at the moment varies also.

[H]: 15-30VDC==, [L]: 0-2VDC

External power supply VEX (recommended: 24VDC==): 2, GEX (GND): 2

64 steps

256 steps

31-axis

AiCA-D-60LA

AiCA-D-86MA

Max. 65W

Max. 250W

AiA-M-86MA

Servo On/Off indicator: blue LED

500 (factory default), 1000, 1600, 2000, 3200, 3600, 5000, 6400, 7200, 10000 PPR

Alarm/Status display part: orange LED 7seg.
 Power/Alarm indicator: green/red LED

HOM (home search), ICJ (jump input condition), IRD (waiting input),
OPC (ON/OFF of output port), OPT (on pulse from output port), JMP (jump),
REP (start repetition), RPE (end repetition), END (end program), POS (position set),
TIM (timer), CMP (compare output), TOQ (torque control)

Overcurrent, overspeed, position tracking, overload, overheat, motor connection, encoder connection, overvoltage, undervoltage, motor misalignment, command speed, in-position, memory, emergency stop, program mode, index mode, home search mode

1.5mm amplitude at frequency of 10 to 55Hz (for 1 min) in each X, Y, Z direction for 2 hours

| I/O cable: CO50-MP□-R^{®5} (standard: AiC TAG)
| Motor+encoder cable - normal: C1D14M-□^{®5} / moving: C1DF14M-□^{®6}
| Communication cable: SCM-WF48, SCM-US48I, SCM-38I

Fast Response: 0 (factory default) to 7, Accurate Response: 0 to 7

Jog / Continuous / Index / Program / Position / Torque mode

ABS (move absolute position), INC (move incremental position)

AiCA-D-86LA

Max. 300W

	Pin arrangement		Pin no.	Function
i	0	1	1	Regenerative
		1 2	2	resistance
		3	3	N-C
i	∰⊚}	4	4	AC power
		6	5	input

9. Communication cable connector (CN3) nent | Pin no. | Function | Pin no. | Function N-C

RS485 DATA-

N-C

ii di idiigeiiieiie	1 111 110.	i direction	i iii aii aii geinen	. 1 111 110.	i unction
0	1	Regenerative		1	N-C
[¶ ®] 1	2	resistance		-	
(a) 2 3	3	N-C		2	N-C
(a) 4	4	AC power	盾:	3	RS485
□	5	input			DATA+
	6	PE		4	N-C

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

[Connector specifications]

Туре		Recommended specifications	Manufacture
CN1	Motor+Encoder	5557-14R (connector terminal: 5556T)	Molex
CN2	Power	5ESDVM-06P-OR	Dinkle
CN3	Communication	RJ45: 2	
CN4	I/O connector	10150-3000PE (Housing: 10350-52F0-008)	3M

Configuration Diagram & Cautions for Wiring

- In case of unwanted noise generating from peripherals and power, use ferrite core in the wiring.
 The thickness of cable should be same or thicker than the below specifications when connecting the cable for connector.
 CN1 (motor+encoder connector): AWG22
 CN2 (power connector): AWG18
- ③ CN3 (communication connector): AWG28 4 CN4 (I/O connector): AWG28

When connecting wires, please purchase separately. Noise filter for signal line

ending on frequency, filtered noise may different.				
e	Model	Manufacture		
or line	28A5776-0A2			
ver line	28A5131-0A2	Lairdtech		
nm. line	28A2025-0A2			

When connecting power, please purchase separately. • Regenerative resistance

Connect Pin no. 1, 2 on power connector (CN2).
Use in condition of the high inertia load or the short deceleration time Forced cooling is required in condition of high surface temperature of

egenerative res	sistance.	
Model	Specification	Manufacture
RC100	Resistance: 100 Ω ±5%, Rated power: 60W(standby), 100W(heatsink attached)	Rara Electronics Corp.

Noise filter for power

Type Mote

Connect the power to suppress external noise. The wires should be connected as short as possible and grounded.

Model	Specification	Manufacture
RNS-2006	Rated voltage: 250V Rated current: 6A Max. leakage current: 1mA	Orient Electronics

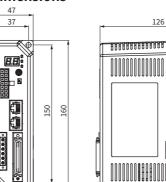
Surge protector

Protect the product from external noise and surge by connecting power. *Be sure to disconnect the surge protector when testing internal pressure.

t may result in porduct damage.				
odel	Specification	Manufacture		
T-C12G801W	_	OTOWA Electric Co. Ltd		

Circuit breaker

Dimensions



Installation

- Install on the metal plate with high thermal conductivity for heat dissipation • Install in the well-ventilated area and install the cooling fan in the
- unventilated environment.
 Failure to heat dissipation may result in damage or malfunction due to the
- stress on the product. Check the environment of use within the rated specifications and install on
- the well-heat dissipated area. In case of installing the drivers more than two, keep distance at least 20mm
- in the horizontal direction and at least 25mm in the vertical dire

Horizontal direction

Min. 20mm

Alarm/Warning Display

the alarm/warning type, it displays as a segment on the Alarm/Status display part. the alarm type, it flashes for 0.4 sec interval and it turns OFF for 0.8 sec repeatedly.

bepending on the atarm type, it hashes for 0.4 sec interval and it turns or r for 0.6 sec repeateury.					
Alarm/ Status	ALM (flashing)	Alarm type	Alarm/ Status	ALM (flashing)	Alarm type
0 1	1	Overcurrent error	10	10	Motor misalignment
0.2	2	Overspeed error	11	11	Command pulse error
03	3	Position tracking error	15	12	In-Position error
04	4	Overload error	13	13	Memory error
0.5	5	Overheat error	14	14	Emergency stop
0.6	6	Motor connection error	15	15	Program mode error
0 7	7	Encoder connection error	16	16	Index mode error
0.8	8	Overvoltage error	17	17	Home search mode error
119	9	Undervoltage error	_		

When warning occurs, it may result in damage of the product. (maintain operation)

кс арргоріта	c appropriate troubleshoot for each warning.		
arning/Status	Warning type		
7.1	+Software limit		
ñ5	-Software limit		
7.3	+Hardware limit		
24	-Hardware limit		
<u> </u>	Overload warning		

Manual

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

Motion Device Management Program [atMotion]

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CN3

(Comm. conver

RS232C / Wi-Fi

F.

CN1

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Noise filter

AiA-M Series

200-240VAC

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Surge protector

O Panel cut-out

2-M5

Circuit breaker

atMotion provides GUI control for easy and convenient parameter setting and monitoring data Visit our website (www.autonics.com) to download the user manual and software

AiCA-D Series

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: 1024x768 or higher
Others	RS232C serial port(9-pin), USB port

Troubleshooting

Malfunction	Causes	Troubleshooting		
When communication is	The communication cable is not connected.	Check communication cable wiring. Check communication cable connection correct		
not connected	The communication port or speed settings are not correct.	Check communication port and speed settings are correct.		
When motor does not excite	Servo is not On.	Check that servo On/Off input signal is Off. In case of On, servo is Off and excitation of moto is released.		
	Alarm occurs.	Check the alarm type and remove the cause of alarm.		
When motor rotates to the opposite direction of the designated direction	MotorDir parameter setting is not correct.	Check the MotorDir parameter settings.		
	Connection between motor and encoder is unstable.	Check the Motor+Encoder connection cable.		
unstable	Motor gain value is not correct.	Change the Motor Gain parameter as the certain value.		
	·	·		

Cautions during Use

- 1. Follow instructions in 'Cautions during Use'. Otherwise, it may cause unexpected accidents. It is recommended to use 485 converter with the separate power.
- (Autonics product, SCM-38I, recommended)
- 3. Use designated cable to extend motor+encoder wire
- 4. Install vertically so that the Alarm/Status display part located on top
- 5. Keep the distance between power cable and signal cable more than 10cm. 6. Motor vibration and noise can occur in specific frequency period.
- 1) Change motor installation method or attach the damper.
- 2 Use and set the gain value.
- 7. For using motor, it is recommended to maintenance and inspection regularly. ① Unwinding bolts and connection parts for the unit installation and load connection
- ② Strange sound from ball bearing of the unit
- 3 Damage and stress of lead cable of the unit
- (4) Connection error with motor
- (5) Inconsistency between the axis of motor output and the center, concentric (eccentric, declination) of the load, etc.
- 8. This product does not prepare protection function for a motor. 9. This unit may be used in the following environments.
- ① Indoors (in the environment condition rated in 'Specifications')
- ② Altitude max 2 000m
- 3 Pollution degree 2
- 4 Installation Category II

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Autonics

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TERM - Set to use terminating resistance (factory default: OFF) 7. Motor+Encoder connector (CN1)

Pin arrangement	Pin no	Function	Pin no	Function
7	1	GND	8	+5VDC
	2	Encoder A	9	Encoder A
	3	Encoder B	10	Encoder B
	4	Encoder Z	11	Encoder Z
	5	PE	12	N·C
	6	Motor A	13	Motor B

ication ID setting (factory default: OFF)

Alarm/Status display part (orange)
 Displays the corresponding number, when alarm occurs.

:Turns ON when motor is placed at command position after

5. Communication ID setting rotary switch (ID Sel: 0 to F)

6. Communication ID setting/Terminating resistance setting

:[OFF] Node ID 0 (disable), 1 (factory default) to 15

2. Power/Alarm indicator (PWR/ALM) (green/red)

3. In-Position indicator (INP) (orange)

4. Servo On/Off indicator (SERVO) (blue)

: Turns ON when servo is operating, turns OFF when servo is not operating

The above specifications, dimensions, etc. are subject to change and some models may be disconti

Be sure to follow cautions written in the instruction manual, user manual and the technical descriptions