Autonics

Controller Integrated 2-Phase Closed-Loop Stepper Motor Driver [DC type, Frame size 20/28/35/42/56/60, RS485 Comm.] **AiC-D Series**

INSTRUCTION MANUAL

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

Safety Considerations

 $\begin{tabular}{ll} \$P lease observe all safety considerations for safe and proper product operation to avoid hazards. \\ \begin{tabular}{ll} \& \Delta \end{tabular} symbol represents caution due to special circumstances in which hazards may occur. \\ \end{tabular}$

↑ 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
- 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.
 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. Check 'Connections' before wiring.
 Failure to follow this instruction may result in fire.
- 6. Do not disassemble or modify the unit.
- Failure to follow this instruction may result in fire or electric shock.

- 7. Install the driver in the housing or ground it.
 Failure to follow this instruction may result in personal injury, fire or electric shock.
 8. Do not touch the unit during or after operation for a while.
 Failure to follow this instruction may result in burn or electric shock due to high temperature of the surface.
- 9. Emergency stop directly when error occurs.

⚠ Caution

- When connecting the power input, use AWG 18(0.75mm²) cable or over.
 Brake is non-polar. When conneting the brake, use AWG 24(0.2mm²) cabel or over.
 Failure to follow this instruction may result in fire or malfunction due to contact failure
 To use the motor safely, do not apply external force to the motor.
 It is recommended to use STOPPER for the vertical load.

- 5. 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.

 6. 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
- Install a safety device to maintain the vertical position after turn off the power of Failure to follow this instruction may result in personal injury or product damage by
- releasing holding torque of the motor.

 8. Use the unit within the rated specifications.
- Failure to follow this instruction may result in fire or product damage.
- 9. 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.

 10. 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.

 11. Keep the product away from metal chip, dust and wire residue which flow into the
- Failure to follow this instruction may result in fire or product damage.
- 12. Use the designated motor only.
 Failure to follow this instruction may result in fire or product damage.

Product Components

Before use the product, check all components are contained

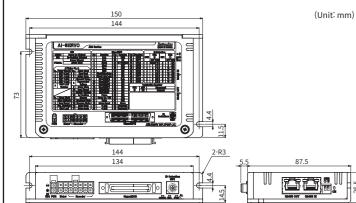
The components are contained each one.

• Motor driver

• Power connector

• I/O connector

Dimensions



Manual

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

- *The above specifications, dimensions, etc. are subject to change and some models may
- Be sure to follow cautions written in the instruction manual, user manual and the

■ Specifications

Model ^{**1}		AiC-D-20MA	AiC-D-28SB AiC-D-28MB	AiC-D-35SB AiC-D-35MB	AiC-D-42SA(-B) AiC-D-42MA(-B)	AiC-D-56SA(-B) AiC-D-56MA(-B)	AiC-D-60SA(-B) AiC-D-60MA(-B)	
		AiC-D-20LA	AiC-D-28LB	AiC-D-35LB	AiC-D-42LA(-B)	AiC-D-56LA(-B)	AiC-D-60LA(-B)	
Power supply		24VDC==	I.					
Allowable vol		90 to 110% of the rated vo	oltage		1011	1011	1511	
	STOP**2	Max. 10W			Max. 10W	Max. 12W	Max. 15W	
Concumption	Max. during operation**3	Max. 60W			Max. 60W	Max. 120W	Max. 240W	
Max. RUN curi		0.6A/Phase	1.0A/Phase	1.2A/Phase	1.7A/Phase	3.5A/Phase		
STOP current		20 to 100% of max. RUN c	urrent (factory defaul	t: 50%)				
Rotation spee	ed	0 to 3000rpm						
Resolution**5		500 (factory default), 1000 1600, 2000, 3600, 4000, 5000, 6400, 7200, 10000PF	7200, 10000, 16000	t), 1000, 1600, 2000, 3600, 500 PPR			5000, 6400, 7200, 10000PPR	
		_	Ai-M-28SB	Ai-M-35SB	Ai-M-42SA(-B)	Ai-M-56SA(-B)	Ai-M-60SA(-B)	
Applied moto	r**1	Ai-M-20MA	Ai-M-28MB	Ai-M-35MB	Ai-M-42MA(-B)	Ai-M-56MA(-B)	Ai-M-60MA(-B)	
		Ai-M-20LA	Ai-M-28LB	Ai-M-35LB	Ai-M-42LA(-B)	Ai-M-56LA(-B)	Ai-M-60LA(-B)	
Speed filter**5	. WE	0 (disable), 2, 4, 6, 8, 10, 20	0, 40, 60 (factory defai	ult), 80, 100, 120, 140, 160, 180), 200ms			
Positioning G				1, 2), (2, 2), (3, 2), (4, 2), (5, 2),	(1, 3), (2, 3), (3, 3), (4, 3), (5, 3), (iser setting		
Positioning ra	inge	-2,147,483,648 to +2,147,						
In-Position Motor rotation	n direction ^{**5}	Fast Response: 0(factory of CW, CCW						
Status indicat		Power/Warning indicatoServo On/Off indicator:	or: green LED orange LED	 Alarm indicator: red LE RS485 DATA IN/OUT ind 	D dicator: green, yellow LED	In-Position indic	ator: yellow LED	
I/O voltage lev		[H]: 5-30VDC=, [L]: 0-2VD						
1/0	Input	Exclusive input: 20, general						
, -	Output	 Standard type - exclusive 		output: 10 • Built-in br	ake type - exclusive output: 6,	general output: 9		
External powe		VEX(recommended: 24VD						
Operation mo		Jog, Continuous, Index, P	rogram mode					
Index step nu	mbers	64 stpes						
	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 Home search	Power On Program auto-s Power On Home Search a						
Home search		Home, limit home, zero ho						
		9600, 19200, 38400, 57600		ult) bps				
Multiaxial con		31-axis	,					
ID setting swit		16-bit rotary switch (0 to F	F), 1-bit DIP switch (Of	N/OFF)				
Alarm output		Overcurrent, overspeed, r	position tracking, over	rload, overheat, motor connec	tion, encoder connection, rege	enerative voltage, motor mis	alignment, command speed	
Warning outp	ut	input voltage, in-position, memory, emergency stop, program mode, index mode, home search mode ±software limit, ±hardware limit, overload						
Insulation res		±sortwate timin, ±nardwate timin, overtoau Over 100MΩ (500VDC neger)						
Dielectric stre		1,000VAC 60Hz for 1 min	26.2 - /					
Vibration	O		uency of 10 to 55Hz (fo	or 1 min) in each X, Y, Z direction	on for 2 hours			
Shock		300m/s ² (approx. 30G) in 6						
	Ambient temp.	0 to 50°C, storage: -10 to 6						
Envoronment	Ambient humi.	35 to 85%RH, storage: 10 to	to 90%RH					
Protection str		IP20(IEC standard)						
Sold separate		Power cable: CJ-PW- Communication cable:		• I/O cable: • Motor+en	CO50-MP□-R ^{*7} (standard: AiC coder cable - normal: C1D14M-	TAG) □ / moving: C1DF14M-□**		
Approval		CE						
Weight ^{**9}		Approx 460g (approx 300g	g)					
	he ambient temer consumption	perature 25°C, ambient hum during operation. When char ling on the input RUN freque	nidity 55%RH, and STOF nging the load rapidly, i ency and max. RUN curr	P current 50%. Instantaneous peak current may ent at the moment varies also.	brake type stepping motor drive increase. The capacity of power		times of max. power consump	
※3: Max. powe※4: Run curren※5: Settable w※6: ☐ of mode※7: ☐ of mode※8: ☐ of mode※9: The weight	ith the edicated el name indicate el name indicate el name indicate t includes packa	s cabel length (010, 020). E.g s cable length (010, 020, 030	0, 15, 20). E.g.)C1DF14M esis is for unit only.	r cable.)). E.g.)CO50-MP070-R: 7m I/O ca I-10: 10m moving type motor+er	ble. ncoder cable.			

Unit Descriptions

Power connector (CN1: PWR)	2. Motor+Encoder o	connector (CN2: Mo	otor / Encoder)
Pin No. Function		Pin No. Function	Pin No. Funciton
Pin No. Function 2 2 GND 1 124VDC		1 GND	8 +5VDC
□ 1 1 24VDC	1413 9 8	2 Encoder A	9 Encoder A
		3 Encoder B	10 Encoder B
		4 Encoder Z	11 Encoder Z
	7 6 2 1	5 F.G.	12 N·C
		6 Motor A	13 Motor B
I/O connector (CN3: Signal I/O)		7 Motor A	14 Motor B

1/0/					
		2520		6 1	
	0				Co
		50 ·· 45		31 26	
	Pin	Function	1/	0	Pin

Funciton I/O

	, -	No.		, -	No.		,, -
	Exclusive output	18	Alarm Reset	Exclusive input	35	IN8	General input
Brake-**1	Exclusive output	19	+Limit	Exclusive input	36	VEX	-
Reset	Exclusive input	20	-Limit	Exclusive input	37	GEX	-
Start	Exclusive input	21	ORG	Exclusive input	38	Alarm	Exclusive output
Stop	Exclusive input	22					
			In-Position	Exclusive input	40	Compare2(Trigger)	Exclusive output
			VEX	_	41	OUT0	General output
				_			General output
	Exclusive input			General input	43		General output
	Exclusive input			General input	44	OUT3	General output
	Exclusive input	28	IN2	General input	45	OUT4	General output
	Exclusive input	29		_	46	OUT5	General output
				General input	47	OUT6	General output
MD1/HMD1	Exclusive input	31			48	OUT7	General output
Pause	Exclusive input	32	IN5	General input			General output
Servo On/Off	Exclusive input	33			50	N.C ^{*2}	_
Home	Exclusive input	34	IN7	General input			
	Brake-#1 Reset Start Stop EMG StepD/+Run/+Jog Step1/-Run/-Jog Step2/SSP0 Step3/SSP1 Step4/MSP0 Step5/MSP1 MD0/HMD0 MD1/HMD1 Pause Servo On/Off	Brake+**1 Exclusive output Brake-**1 Exclusive output Brake-**1 Exclusive output Reset Exclusive input Start Exclusive input Stop Exclusive input EMG Exclusive input Step0/+Run/+Jog Exclusive input Step1/-Run/-Jog Exclusive input Step2/SSP0 Exclusive input Step3/SSP1 Exclusive input Step4/MSP0 Exclusive input Step5/MSP1 Exclusive input Step5/MSP1 Exclusive input MD1/HMD1 Exclusive input MD1/HMD0 Exclusive input MD1/HMD1 Exclusive input Servo On/Off Exclusive input Servo On/Off	Brake- Reset Exclusive output 19 Reset Exclusive input 20 Start Exclusive input 21 Stop Exclusive input 22 EMG Exclusive input 23 Step0/+Run/+Jog Exclusive input 25 Step1/-Run/-Jog Exclusive input 25 Step1/-Run/-Jog Exclusive input 25 Step2/SSP0 Exclusive input 25 Step3/SSP1 Exclusive input 27 Step4/MSP0 Exclusive input 28 Step5/MSP1 Exclusive input 29 MD0/HMD0 Exclusive input 30 MD1/HMD1 Exclusive input 31 Pause Exclusive input 31 Pause Exclusive input 32 Servo On/Off Exclusive input 33	Brake+®1 Exclusive output 18 Alarm Reset Brake-®1 Exclusive output 19 +Limit 19 +Limit 20 -Limit 20 -Limit 21 ORG 20 Exclusive input 21 ORG 21 ORG 21 ORG 22 SD Exclusive input 23 In-Position 23 In-Position 24 VEX 25 DE 21 ORG 25 DE 21 ORG 25 DE 21 ORG 25 DE 21 ORG 26 DE 21 ORG 26 DE 21 ORG 27 In Position 24 VEX 25 DE 21 ORG 27 DE 21 ORG 27 In Position 26 DE 21 ORG 27 In Position 28 DE 21 ORG 27 In Position 29 DE 21 ORG 27 In The Position 29 DE 21 OR	Brake+®1 Exclusive output 18 Alarm Reset Exclusive input Brake-®1 Exclusive output 19 +Limit Exclusive input 20 -Limit Exclusive input Start Exclusive input 21 ORG Exclusive input Stop Exclusive input 22 IORG Exclusive input Stop Exclusive input 23 In-Position Exclusive input EMG Exclusive input 23 In-Position Exclusive input Step0/+Run/+Jog Exclusive input 24 VEX — Step1/-Run/-Jog Exclusive input 25 GEX — Step2/SSP0 Exclusive input 26 INO General input Step3/SSP1 Exclusive input 27 IN1 General input Step4/MSP0 Exclusive input 28 IN2 General input Step5/MSP1 Exclusive input 29 IN.C — MD0/HMD0 Exclusive input 30 IN3 General input MD1/HMD1 Exclusive input 31 IN4 General input Servo On/Off Exclusive input 32 IN5 General input Servo On/Off Exclusive input 33 IN6 General input	Brake+ ^{⊕1} Exclusive output 18 Alarm Reset Exclusive input 35 Brake- ^{⊕1} Exclusive output 19+Limit Exclusive input 36 Reset Exclusive input 20+Limit Exclusive input 37 Start Exclusive input 20+Limit Exclusive input 38 Stop Exclusive input 21 ORG Exclusive input 39 EMG Exclusive input 22 SD Exclusive input 39 EMG Exclusive input 23 In-Position Exclusive input 40 Step0/+Run/-Jog Exclusive input 24 VEX — 41 Step1/-Run/-Jog Exclusive input 25 GEX — 42 Step2/SSP0 Exclusive input 26 IM0 General input 43 Step3/SSP1 Exclusive input 27 IN1 General input 43 Step3/MSP0 Exclusive input 28 IN2 General input 44 Step5/MSP1 Exclusive input 29 N.C — 45 MD0/HMD0 Exclusive input 30 IN3 General input 47 MD1/HMD1 Exclusive input 31 IN4 General input 48 Pause Exclusive input 31 IN4 General input 48 Servo On/Off Exclusive input 33 IN6 General input 50	Brake+®1 Exclusive output 18 Alarm Reset Exclusive input 35 IN8 Brake-®1 Exclusive output 19+Limit Exclusive input 36 VEX Reset Exclusive input 20 - Limit Exclusive input 37 GEX Start Exclusive input 21 ORG Exclusive input 38 Alarm Stop Exclusive input 22 SD Exclusive input 39 Compare1(Trigger) EMG Exclusive input 23 In-Position Exclusive input 40 Compare2(Trigger) Step0/+Run/+Jog Exclusive input 24 VEX − 41 OUTO Step1/-Run/-Jog Exclusive input 25 GEX − 42 OUT1 Step2/SSP0 Exclusive input 26 IN0 General input 43 OUT2 Step3/SSP1 Exclusive input 27 IN1 General input 44 OUT3 Step4/MSP0 Exclusive input 28 IN2 General input 45 OUT4 Step5/MSP1 Exclusive input 29 N.C − 46 OUT5 MD0/HMD0 Exclusive input 30 IN3 General input 45 OUT4 MD1/HMD1 Exclusive input 31 IN4 General input 48 OUT7 Pause Exclusive input 31 IN4 General input 48 OUT7 Servo On/Off Exclusive input 31 IN5 General input 49 OUT8

- *1: Corresponding pins are N.C in standard type.
 *2: It corresponds to OUT9 (general output) in standard type.
 *The Connector table is base on built-in brake type.
- **4. Servo On/Off indicator (Servo, Orange)** : Turns ON when Servo is operating, turns OFF when Servo is not operating

Pin Function I/O

- 5. In-Position indicator (INP., Yellow)

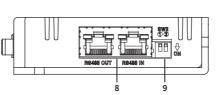
 : Turns ON when motor is placed at command position after positioning input

6. Power/Alarm indicator (PWR/AL, Green/Red)
: Green - Turns ON when the unit operates normally after supplying power
Flashes when limit signal is input or overload stauts is maintained
Red - When alarm occurs, it flashes in various ways depending on the situation. Refer to '■ Alarm/Warning'.

7. Communication ID setting rotary switch (ID Selection SW1)

	Cotting	ina ID		Cotting	ID		
	Setting	SW2 ① OFF	SW2 ① ON	Setting	SW2 ① OFF	SW2 ① ON	
	0	Disable	16	8	8	24	
61897	1	1(factory default)	17	9	9	25	
ο (II) ο I	2	2	18	A	10	26	
	3	3	19	В	11	27	
(1033)	4	4	20	С	12	28	
	5	5	21	D	13	29	
	6	6	22	E	14	30	
	7	7	23	F	15	31	

**Set Node ID of the driver.
**Depending on the Communication ID setting/Terminating resistance setting DIP switch (SW2), it is able to connect max. 31-axis.



3. RS485 Communication connector (CN4: RS485 OUT / RS485 IN)

o. R5405 Communication Connection (CR4-R5405 CO1 / R5405 III						
	Pin No.	Function	Pin No.	Function		
 	1	N⋅C	5	N·C		
	2	N⋅C	6	RS485 DATA-		
	3	RS485 DATA+	7	N·C		
8 1 8 1	4	N·C	8	N⋅C		

- TxD OUT indicator (Green): Flash when data transmit
 RxD IN indicator (Yellow): Flash when data recieve
 Even the connector is not connected to the RS485 OUT but communicating via RS485 IN, RxD IN / TxD OUT operates the same.

9. Communication ID setting/Terminating resistance setting DIP switch (SW2)

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

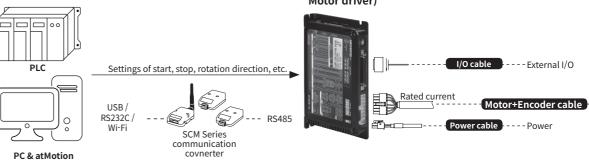
Set Node ID of the driver.
 Set to use terminating resistance.

[Connector specifications]

			Specifications				
Туре			Connector	Connector terminal	Housing	Manufacture	
CN1	Driver		3930-1020 (5569-02A2)	-	-	Molex	
	Power		CHD1140-02	CTD1140	_	HANLIM	
	Driver		35318-1420	-			
CN2		Frame size 20, 28, 35mm	-5557-14R	5556T2	_	Molex	
		Frame size 42, 56, 60mm	1555 <i>1</i> -14K	5556T			
CNO	Driver		10250-52A2 PL		_	214	
CN3	I/O connector		10150-3000PE	_	10350-52F0-008	3M	
CN4	N4 Driver		KRM-U-02-8-8-4-7M5	_	_	KINNEXA	

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

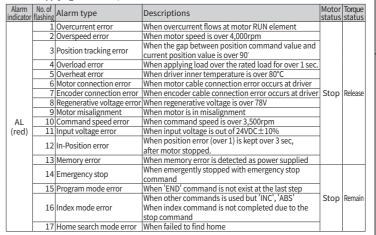
Configuration Diagram **AiC-D Series** (Controller Integrated Motor driver)



Alarm/Warning

-This function stops motor to protect driver, depending on the error status such as overcurrent

or overspeed.
-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.



When 14 to 17 alarm occurs, the motor stops, but the current flowing into the motor is not blocked

on notices dangers with the alarm indicator prior to motor stop with limit signal or overload alarm.

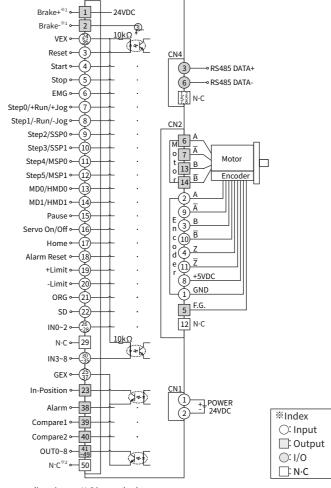
-When	turni	ng out from the alarmin	g condition, driver returns to the normal status au	ıtomat	ically.
Warning indicator	No. of flashing	0.71	Descriptions		Torque status
	1	+ software limit	When normal direction(CW) software limit is ON		
	2	- software limit	When reverse direction(CCW) software limit is ON	Cton	Domain
PWR	3	+ hardware limit	When normal direction(CW) hardware limit is ON	Stop	Remain
(green)	4	- hardware limit	When reverse direction(CCW) hardware limit is ON		
	5		When maximum load is kept connected over 10 sec (motor or driver can be overheated)	Remain	Remain

*It is possible to operate even if the warning occurs and the motor current is not blocked. «Although the driver normally operates in alarming status, the driver can be damaged. Please operate the driver, avoiding alarming situation.

ing on alarm/warning type, indicators flash with interval of 0.4 sec and turn OFF with

<E.g. case of alarm 3> 1 2 3 1 2 3 0.8 sec 0.8

Connection for Motor and Driver



1: Corresponding pins are N.C in standard type.2: It corresponds to OUT9(output) in standard type.**The Connection diagram is base on built-in brake type.

Comparison Output (Compare1, Compare2)

Ai-M Series

(Motor)

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

- Not use comparison output.
 Comparison output turns ON
- 1 Comparison output turns ON when the present absolute position value is same or bigger than the set position value.

 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

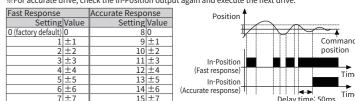
*Please refer to the user manual to learn how to set.

In-Position

- In-Position output represents output condition 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
- For accurate drive, check the In-Position output again and execute the next drive



Motion Device Management Program [atMotion]

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.

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	The communication cable is not connected.	Check communication cable wiring. Check communication cable connection correctly.
is not connected	The communication port or speed settings are not correct.	Check communication port and speed settings are correct.
When motor does not	Servo is not On.	Check that servo On/Off input signal is O In case of On, servo is Off and excitation motor is released.
excite	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.
When motor drive is unstable	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

- Follow instructions in 'Cautions during Use'.
 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
- 4. In case communication is unstable due to the noise generated by supplied power or peripheral device, use ferrite core at communication line.

 5. It is recommended to use 485 converter with the separate power. (Autonics product, SCM-38I, recommended)
- 6. The thickness of cable should be same or thicker than the below specifications when

- 6. The thickness of cable should be same or thicker than the below specifications when connecting the cable for the connector.

 ① CN1 (power connector): AWG18
 ② CN2 (motor+encoder connector): AWG22, AWG24
 ③ CN3 (I/O connector): AWG28
 3. Keep the distance between power cable and signal cable more than 10cm.

 8. Motor vibration and noise can occur in specific frequency period
 ① Change motor installation method or attach the damper.
 ② Use the unit out of the dedicated frequency range when vibration and noise occurs due to changing motor RUN speed. to changing motor RUN speed.

 9. 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.

- declination) of the load, etc.

 10. This product does not prepare protection function for a motor.

 11. 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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