

Controller Integrated 2-Phase Closed-Loop Stepper Motor Driver

■ Features

- Brake operation for safe control of vertical load at power OFF and alarm occur. (built-in brake type)
- 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 10-level resolutions (electric gear)
- Various alarms out
 - : overcurrent, overspeed, overheat, motor connection error, encoder connection error, and etc., overall 17 types
- Frame size 20mm, 28mm, 35mm, 42mm, 56mm, 60mm motors supported



⚠ Please read "Safety Considerations" in the instruction manual before using.



■ 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 manual and library manual and be sure to follow cautions written in the technical descriptions (catalog, website). Visit our website (www.autonics.com) to download manuals.

■ Software (atMotion)

- atMotion is a comprehensive motion device management program that can be used with Autonics motion controllers.
- 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 >



SENSORS

FIELD INSTRUMENTS

CONTROLLERS

MOTION DEVICES

SOFTWARE

(A) Closed Loop Stepper System

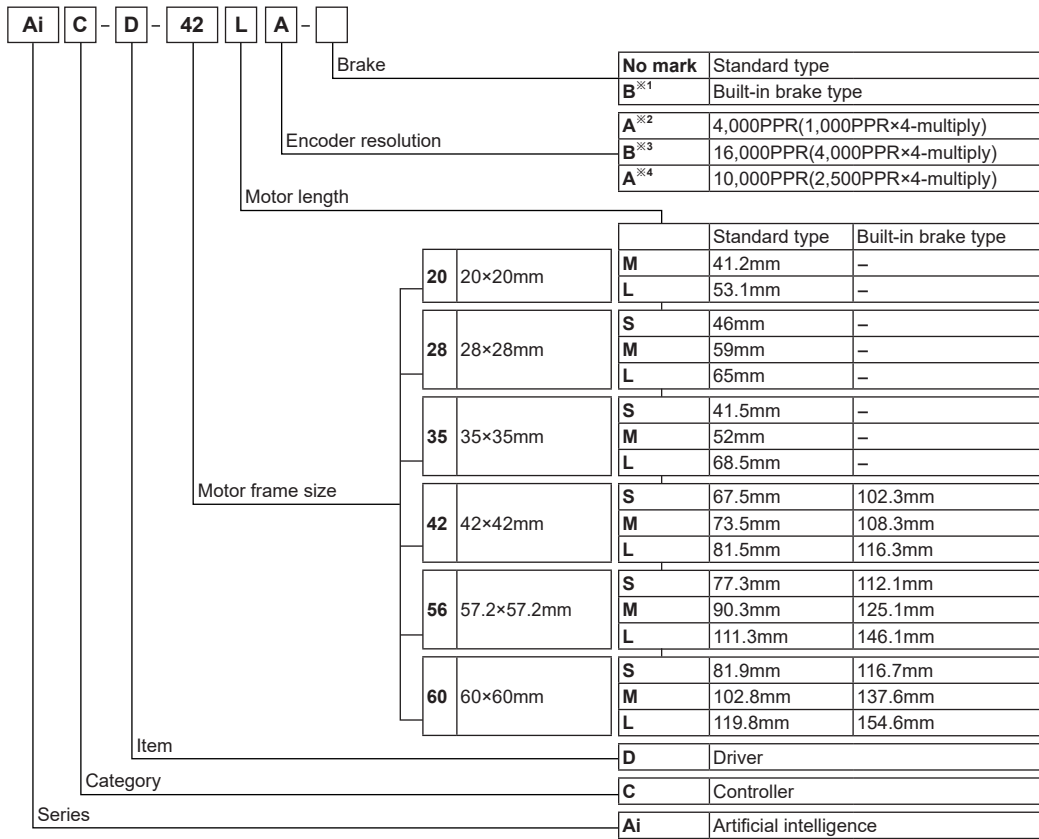
(B) Stepper Motors

(C) Stepper Motor Drivers

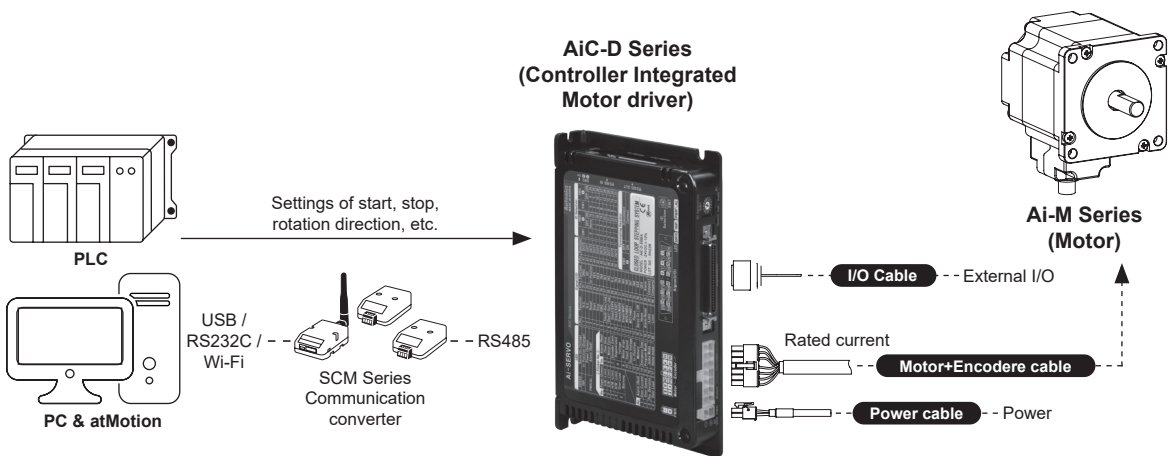
(D) Motion Controllers

AiC-D Series

Ordering Information



Configuration Diagram



2-Phase Closed-Loop Stepper Motor Driver

■ Specifications

| Model ^{※1} | — | | AiC-D-28SB | AiC-D-35SB | AiC-D-42SA(-B) | AiC-D-56SA(-B) | AiC-D-60SA(-B) |
|--|---|---|--|----------------|---|----------------|----------------|
| | AiC-D-20MA | AiC-D-28MB | AiC-D-35MB | AiC-D-42MA(-B) | AiC-D-56MA(-B) | AiC-D-60MA(-B) | AiC-D-60LA(-B) |
| Power supply | 24VDC ⁻⁻⁻ | | | | | | |
| Allowable voltage range | 90 to 110% of the rated voltage | | | | | | |
| Power consumption | STOP ^{※2} | Max. 10W | | | Max. 10W | Max. 12W | Max. 15W |
| | Max. during operation ^{※3} | Max. 60W | | | Max. 60W | Max. 120W | Max. 240W |
| Max. RUN current ^{※4} | 0.6A/Phase | 1.0A/Phase | 1.2A/Phase | 1.7A/Phase | 3.5A/Phase | | |
| STOP current ^{※5} | 20 to 100% of max. RUN current (factory default: 50%) | | | | | | |
| Rotation speed | 0 to 3000rpm | | | | | | |
| Resolution ^{※5} | 500 (factory default), 1000, 1600, 2000, 3600, 4000, 5000, 6400, 7200, 10000PPR | | 500 (factory default), 1000, 1600, 2000, 3600, 5000, 6400, 7200, 10000, 16000PPR | | 500 (factory default), 1000, 1600, 2000, 3200, 3600, 5000, 6400, 7200, 10000PPR | | |
| | Speed filter ^{※5} 0 (disable), 2, 4, 6, 8, 10, 20, 40, 60 (factory default), 80, 100, 120, 140, 160, 180, 200ms | | | | | | |
| Positioning Gain ^{※5} | (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(factory default) to 7, Accurate Response: 0 to 7 | | | | | | |
| Motor rotation direction ^{※5} | CW, CCW | | | | | | |
| Status indicator | <ul style="list-style-type: none"> ● 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 ^{※6} | Exclusive input: 20, general input: 9 | | | | | |
| | Output | <ul style="list-style-type: none"> ● Standard type - exclusive output: 4, general output: 10 ● Built-in brake type - exclusive output: 6, general output: 9 | | | | | |
| External power supply | VEX(recommended: 24VDC ⁻⁻⁻): 2, GEX(GND): 2 | | | | | | |
| Operation mode | Jog, Continuous, Index, Program mode | | | | | | |
| Index step numbers | 64 stpes | | | | | | |
| 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 output 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 | | | | | | |
| RS485 comm. | Comm. speed ^{※5} | 9600, 19200, 38400, 57600, 115200(factory default) bps | | | | | |
| Multiaxial control | 31-axis | | | | | | |
| ID setting switch | 16-bit rotary switch (0 to F), 1-bit DIP switch (ON/OFF) | | | | | | |
| Alarm output | Overcurrent, overspeed, position tracking, overload, overheat, motor connection, encoder connection, regenerative voltage, motor misalignment, command speed, input voltage, in-position, memory, emergency stop, program drive, index drive, home search drive | | | | | | |
| Warning output | ±software limit, ±hardware limit, overload, position override | | | | | | |
| Insulation resistance | Over 100MΩ (500VDC negger) | | | | | | |
| 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 | | | | | | |
| Envoronment | Ambient temp. | 0 to 50°C, storage: -10 to 60°C | | | | | |
| | Ambient humi. | 35 to 85%RH, storage: 10 to 90%RH | | | | | |
| Protection structure | IP20(IEC standard) | | | | | | |
| Approval | CE | | | | | | |
| Weight ^{※6} | Approx 460g (approx 300g) | | | | | | |

※1: The model name indicates driver type. (none: standard type, B: built-in brake type)
E.g.) AiC-D-42LA-B: built-in brake type stepping motor driver.

※2: Based on the ambient temperature 25°C, ambient humidity 55%RH, and STOP current 50%.

※3: 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.

※4: Run current varies depending on the input RUN frequency and max. RUN current at the moment varies also.

※5: Settable with the edicated program (atMotion).

※6: Brake ON/OFF function can be changed in general input IN8 in built-in brake type.

※7: The weight includes packaging. The weight in parenthesis is for unit only.

※Environment resistance is rated at no freezing or condensation.

SENSORS

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SOFTWARE

(A) Closed Loop Stepper System

(B) Stepper Motors

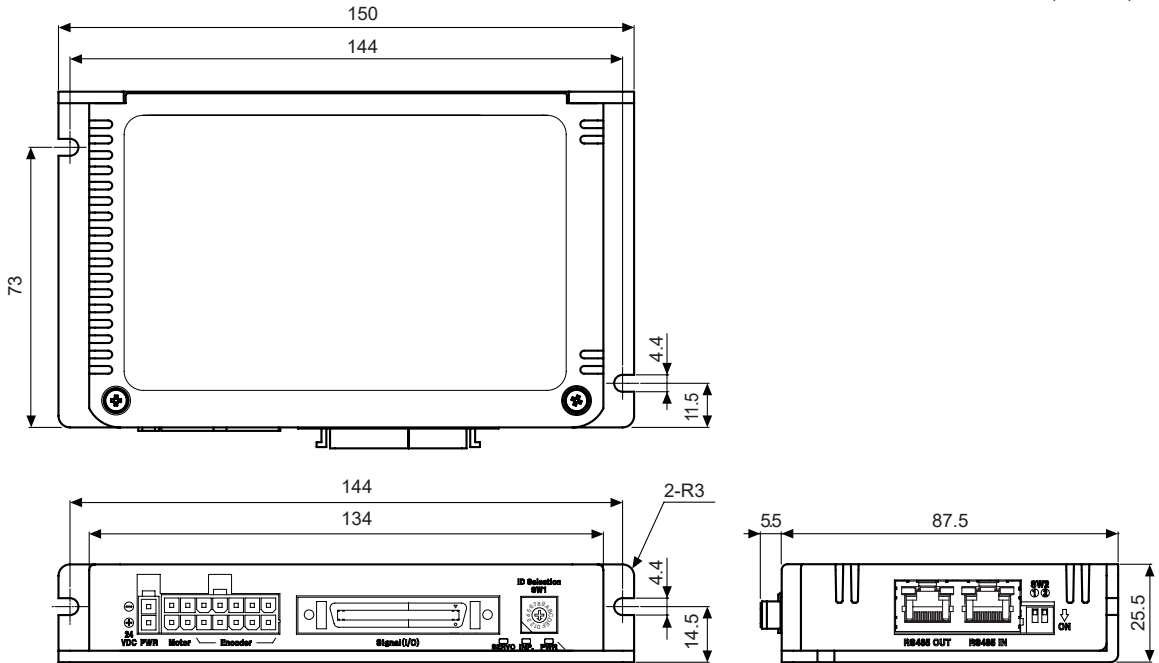
(C) Stepper Motor Drivers

(D) Motion Controllers

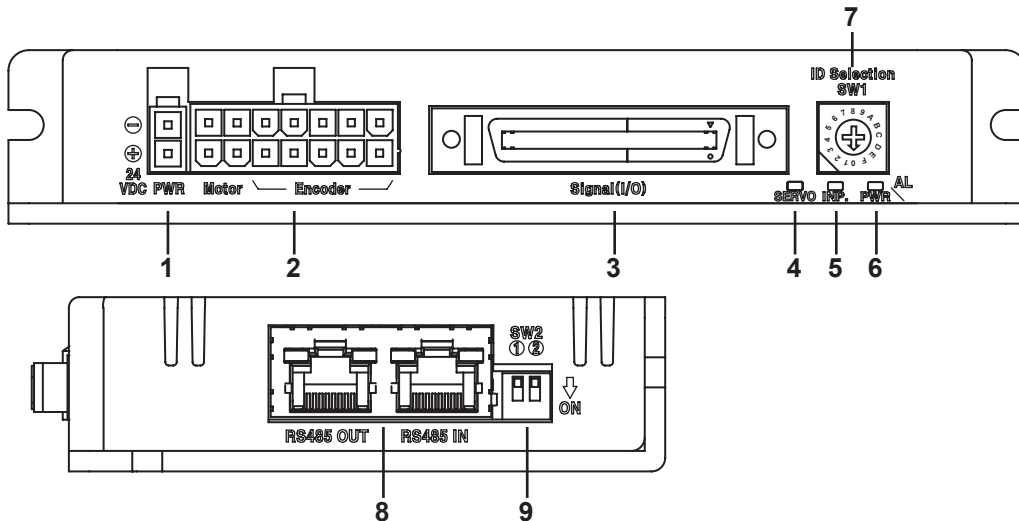
AiC-D Series

■ Dimensions

(unit: mm)



■ Unit Descriptions



1. Power connector (CN1: PWR)
2. Motor+Encoder connector (CN2: Motor / Encoder)
3. I/O connector (CN3: Signal I/O)
4. Servo On/Off indicator (Servo, Orange)
5. In-Position indicator (INP., Yellow)
6. Power/Alarm indicator (PWR/AL, Green/Red)
7. Communication ID setting rotary switch (ID Selection SW1)
8. RS485 Communication connector (CN4: RS485 OUT / RS485 IN)
9. Communication ID setting/Terminating resistance setting DIP switch (SW2)

2-Phase Closed-Loop Stepper Motor Driver

■ 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 overload 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 |
| SERVO | | Orange | Servo On/Off indicator | Turns ON when Servo is operating, turns OFF when servo is not operating. |
| RXD IN* ¹ | | | Yellow | RS485 Data I/O display |
| TXD OUT* ¹ | Right side | Green | RS485 Data I/O display | 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.

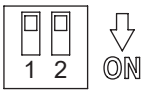
※Depending on the 1 switch setting of the SW2, it is possible to connect max. 31-axis.

| Setting switch | Setting | ID | | Setting | ID | |
|---|---------|---------------------|----------|---------|-----------|----------|
| | | SW2 1 OFF | SW2 1 ON | | SW2 1 OFF | SW2 1 ON |
|  ID Selection SW1 | 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 |

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AiC-D Series

Control Input/Output

Inner signal of all input/output consists of photocoupler.

ON, [H]: photocoupler power ON

OFF, [L]: photocoupler power OFF

※ Brake operation is only for built-in brake type.

Input

1. Exclusive input (20)

| Signal name | Descriptions | Pin no. | Signal name | Descriptions | Pin no. |
|-----------------|---|---------|--------------|---|---------|
| Reset | Reset command | 3 | Pause | Pause | 15 |
| Start | Drive start command | 4 | Servo On/Off | Servo On/Off | 16 |
| Stop | Drive stop command | 5 | Home | Home search | 17 |
| EMG | Drive emergency stop command | 6 | Alarm Reset | Alarm reset command | 18 |
| Step0/+Run/+Jog | Step designate 0 / +Run / +Jog | 7 | +Limit | +direction limit sensor | 19 |
| Step1/-Run/-Jog | Step designate 1 / -Run / -Jog | 8 | -Limit | -direction limit sensor | 20 |
| Step2/SSP0 | Step designate 2 / Start speed designate 0 | 9 | ORG | Home sensor | 21 |
| Step3/SSP1 | Step designate 3 / Start speed designate 1 | 10 | SD | Deceleration (deceleration stop) signal | 22 |
| Step4/MSP0 | Step designate 4 / Max. speed designate 0 | 11 | Brake ON/OFF | Brake ON/OFF | 35 |
| Step5/MSP1 | Step designate 5 / Max. speed designate 1 | 12 | | | |
| MD0/HMD0 | Operation mode designate 0 / Home search mode designate 0 | 13 | — | | |
| MD1/HMD1 | Operation mode designate 1 / Home search mode designate 1 | 14 | | | |

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 |

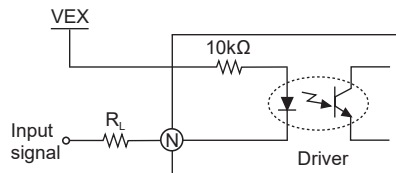
3. Example of input circuit connection

-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).

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



※N: Input pin number of CN3

Output

1. Exclusive output (AiC-D: 4, AiC-D-B: 6)

| Signal name | Descriptions | Pin no. | Signal name | Descriptions | Pin no. |
|-------------|----------------------|---------|--------------------|--------------------|---------|
| Brake+ | Brake output (24VDC) | 1 | Alarm | Alarm output | 38 |
| Brake- | Brake output (GND) | 2 | Compare1 (trigger) | Comparison output1 | 39 |
| In-Position | Drive ending pulse | 23 | 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,

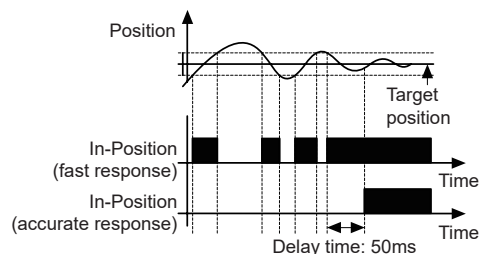
In-Position output turns ON and In-Position indicator turns ON.

-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 '6. 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 |



2-Phase Closed-Loop Stepper Motor Driver

Control Input/Output

3. Alarm/Warning

• Alarm

- 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 alarm occurs, brake operates.
- When supplying alarm reset, driver returns to the normal status.
- ※Refer to '6. Example of output circuit connection'.

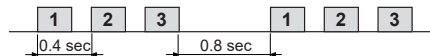
• Warning

- This function notices dangers with the alarm indicator prior to motor stop with limit signal or overload alarm.
- When turning out from the alarming condition, driver returns to the normal status automatically.

| Alarm indicator | No. of flashing | Alarm type | Descriptions | Motor status | Torque status | Brake status | | | |
|-------------------|-----------------|----------------------------|---|--------------|---------------|--------------|------|--------|---------|
| AL (red) | 1 | Overcurrent error | When overcurrent flows at motor RUN element | Stop | Release | Lock | | | |
| | 2 | Overspeed 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 | Overload error | When applying load over the rated load for over 1 sec. | | | | | | |
| | 5 | Overheat error | When driver inner temperature is over 80°C | | | | | | |
| | 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 | | | | | | |
| | 15 | Program mode error | When 'END' command is not exist at the last step | | | | Stop | Remain | Release |
| | 16 | Index mode error | When other instruction is used but 'INC', 'ABS' | | | | | | |
| | 17 | Home search mode error | When failed to find home | | | | | | |
| Warning indicator | No. of flashing | Warning type | Descriptions | Motor status | Torque status | Brake status | | | |
| PWR (green) | 1 | + software limit | When normal direction (CW) software limit is ON | Stop | Remain | Release | | | |
| | 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 | Overload warning | When maximum load is kept connected over 10 sec (motor or driver can be overheated) | Remain | Remain | Release | | | |
| | 6 | Position override warning | When position override is failed to operate | Stop | Remain | Release | | | |

※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 (AiC-D: 10, AiC-D-B: 9)

• Standard type

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

• Built-in brake type

| Signal name | Descriptions | Pin no. |
|--------------|-----------------------|----------|
| OUT0 to OUT8 | General output 0 to 8 | 41 to 49 |

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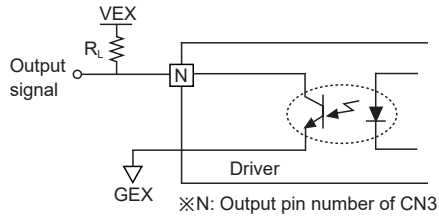
AiC-D Series

Control Input/Output

6. Example of output circuit connection

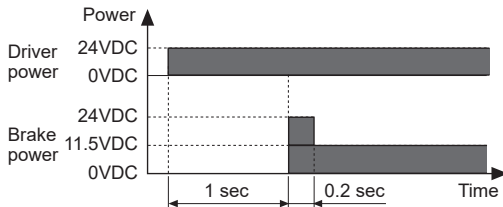
-All output circuits are insulated with photocoupler.
 -External power input is available from 5VDC to 80VDC with the open collector method.
 Select R_L value that I_C (collector current of secondary LED) of photocoupler to be around 10mA.

$$\ast R_L = \frac{VEX - 0.7V}{0.01A}$$



7. Brake output

-In order to reduce heat in the brake, connected to the motor, the driver outputs DC power to turn off the brake.



-When supplying power to the driver after connecting the driver and brake, the rated excitation voltage is supplied and the brake power is released after approx. 1 sec.
 Then after approx. 0.2 sec, the excitation voltage is decreased to 11.5VDC and the released brake power is maintained.
 \ast While power is supplied to the driver, the brake is kept turning on, except in the Servo On status.

Communication Output

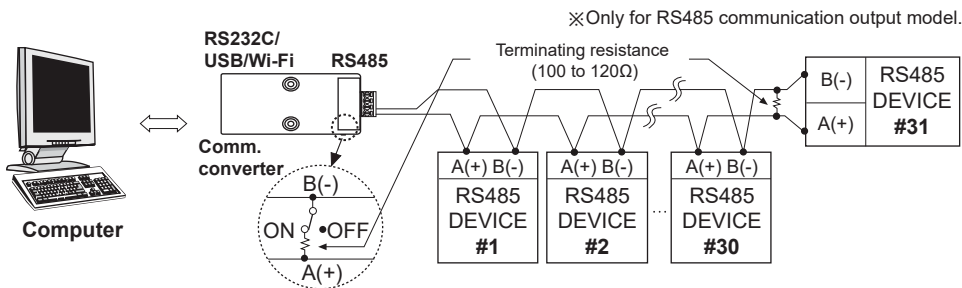
It is for parameter setting and monitoring via external devices (PC, PLC, etc.).

Interface

| | | | |
|----------------------|------------------------------|--------------------------|---------------------------------------|
| Comm. protocol | Modbus RTU | Comm. speed | 9600, 19200, 38400, 57600, 115200 bps |
| Connection type | RS485 | Comm. response wait time | 5 to 99ms |
| 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 | | |

\ast 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




\ast It is recommended to use Autonic communication converter;
 SCM-WF48 (Wi-Fi to RS485-USB wireless communication converter, sold separately).
 SCM-US481 (USB to RS485 converter, sold separately), SCM-381 (RS232C to RS485 converter, sold separately).
 Please use twisted pair wire, which is suitable for RS485 communication, for SCM-WF48, SCM-US481 and SCM-381.

2-Phase Closed-Loop Stepper Motor Driver

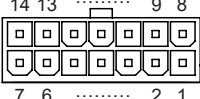
■ Driver Connectors

◎ 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 A |
| | 3 | Encoder B | 10 | Encoder B |
| | 4 | Encoder Z | 11 | Encoder Z |
| | 5 | F.G. | 12 | N·C |
| | 6 | Motor A | 13 | Motor B |
| | 7 | Motor A | 14 | Motor B |

● CN3: I/O connector

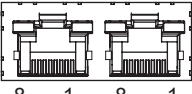
| Pin arrangement | Pin no. | I/O | Function | Pin no. | I/O | Function |
|--|-----------------|--------|-----------------|------------------|--------|---------------------------------|
|  | 1 ^{※1} | Output | Brake+ | 26 | Input | IN0 |
| | 2 ^{※1} | Output | Brake- | 27 | Input | IN1 |
| | 3 | Input | 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, Brake ON/OFF ^{※3} |
| | 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 ^{※2} | Output | OUT9 |

※1: N·C for standard type motor.

※2: N·C for built-in brake type motor.

※3: Brake ON/OFF function can be changed in built-in brake type.

● 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 | Frame size 20, 28, 35mm Frame size 42, 56, 60mm | 5557-14R 5556T2 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.

SENSORS

FIELD INSTRUMENTS

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(A) Closed Loop Stepper System

(B) Stepper Motors

(C) Stepper Motor Drivers

(D) Motion Controllers

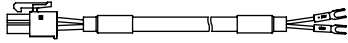
AiC-D Series

■ Sold Separately

※It is recommended to use ferrite core at power cable, I/O cable and Motor+Encoder cable.

○ Power cable

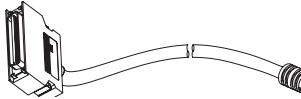
● CJ-PW-□



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

○ I/O cable

● CO50-MP□-R (standard: AiC TAG)

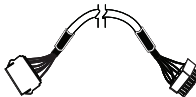


| Pin no. | Function (name tag) | Cable color | Dot line color-numbers | Pin no. | Function (name tag) | Cable color | Dot line color-numbers | |
|---------|---------------------|-------------|------------------------|---------|---------------------|-------------|------------------------|---------|
| 1 | Brake+ | Orange | Black-1 | 26 | IN0 | White | Red-3 | |
| 2 | Brake- | | 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 | Black-1 | | |
| 7 | Step0/+RUN/+JOG | Yellow | Black-4 | 32 | IN5 | Gray | 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, Brake ON/OFF | | Black-3 | |
| 11 | Step4/MSP0 | | Black-1 | 36 | VEX | | Red-3 | |
| 12 | Step5/MSP1 | | Red-1 | 37 | GEX | Black-4 | | |
| 13 | MD0/HMD0 | | White | Black-2 | 38 | Alarm | Pink | 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 | | 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 | Black-1 | | 46 | OUT5 | Red-3 | | |
| 22 | SD | Red-1 | | 47 | OUT6 | Black-4 | | |
| 23 | In-Position | White | 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.) CO50-MP070-R: 7m I/O cable.

○ Motor+Encoder cable

● Normal: C1D14M-□, Moving: C1DF14M-□



※□ of model name indicates cable length (1, 2, 3, 5, 7, 10, 15, 20)
E.g.) C1DF14M-10: 10m moving type motor+encoder cable.

○ Communication converter

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



● SCM-US481 (USB to RS485 converter)

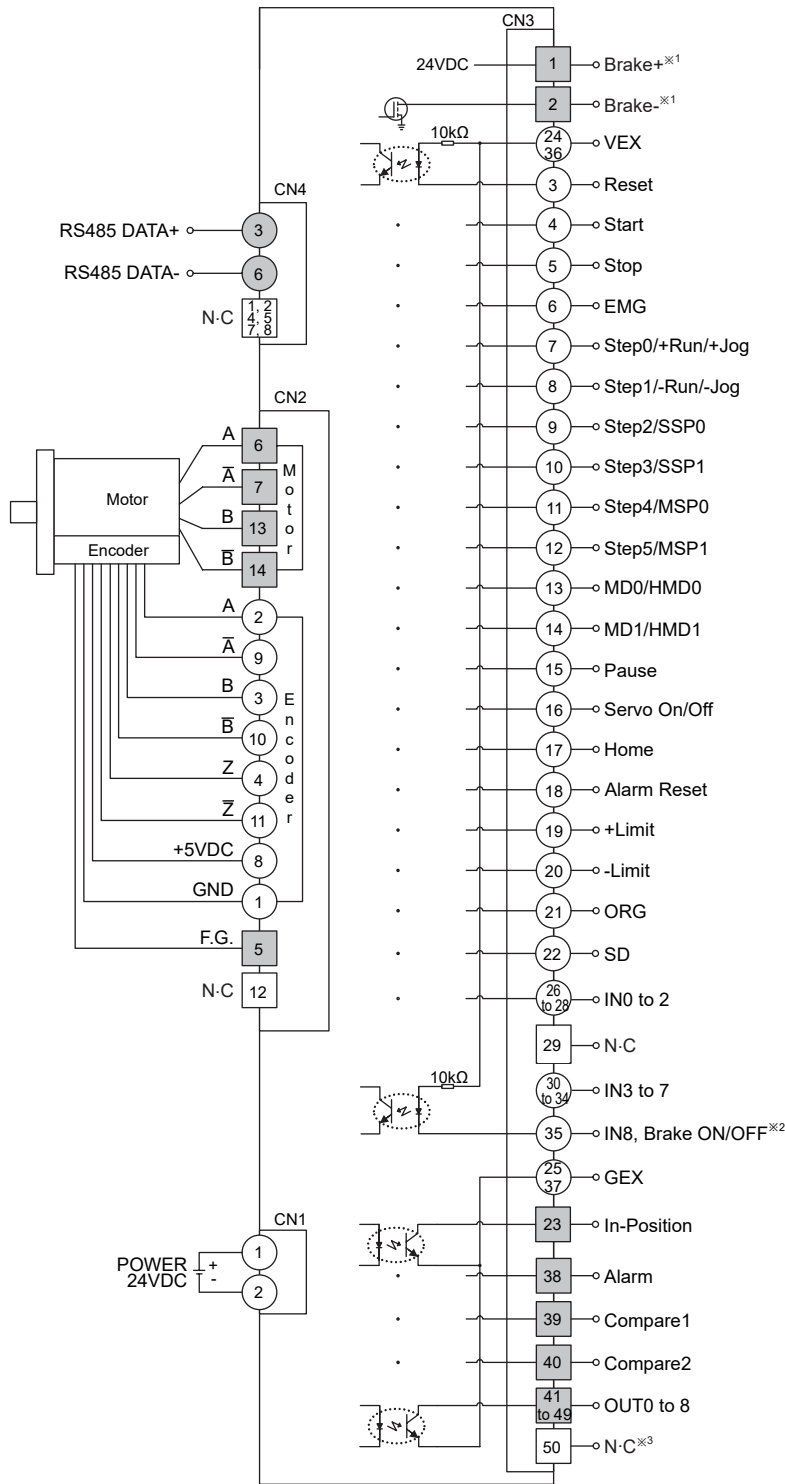


● SCM-381 (RS232C to RS485 converter)



2-Phase Closed-Loop Stepper Motor Driver

■ Connection for Motor and Driver



※1: Corresponding pins are N-C in standard type.

※2: In built-in brake type, the corresponding pin can be switched as Brake ON/OFF.

※3: It corresponds to OUT9(output) in standard type.

※The Connection diagram is base on built-in brake type.

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■ Troubleshooting

1. When driver communication is failed

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

2. When operation of motor is unstable

- ① Check that driver, motor, and brake are connected correctly.
 - ② Check 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 motor cable's when extending the motor cable.
- Keep the distance between power cable and signal cable more than 10cm.
- 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.
- 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.
- This product does not prepare protection function for a motor.
- 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