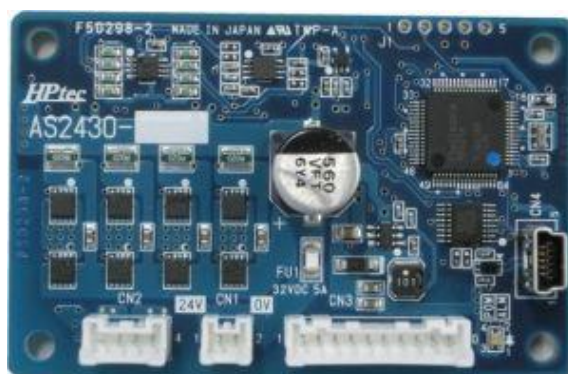


*Compact, Ultra-low vibration type  
2-phase micro step driver*

# AS2430

*Instruction manual*



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● Thank you for purchasing AS2430. This manual describes on the specification and the usage.  
Please review the material in this manual thoroughly before using AS2430.

## — Feature of the product —

- Since using Full Current loop control (Full Current control) by a high-speed microcomputer, a stepping motor can be rotated with very low vibration.
- Iron loss can be reduced and heat generation of the motor can be suppressed because of small current ripple.
- Ultra-compact (45 × 70)
- Maximum current 3Arms
- All parameters can be set by a PC through a USB cable.  
(Dedicated application software is attached. A mini-B type cable should be prepared by the customer please.)
- You can save parameter settings to a file, read it and write it to the other drivers. This feature helps programmers to prevent configuration setting mistakes to each driver when you want to configure multi-driver system.
- Since JOG operation can be done with the PC application, trial operation can be done on site without the dedicated controller.
- A DIN rail mounting case is available.
- The database of Minebea Mitsumi's each motor are available.

## — Warranty —

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- The product is guaranteed one (1) year from the date of the first delivery, if such a functional failure occurs in spite of your correct usage. However, we will provide repair free of charge only in case that the customer carries the failure product to us by oneself or send to us by parcel. Please be forewarned that repair will take a few days
- Any repair except above case will be charged to the customer. (For instance, any failure due to incorrect usage by the customer, or any failure occurs after the guaranteed period.) We will agree to repair the failure product if customer carries the failure product to us by oneself or sends to us by parcel. Repair takes a few days. Please consider purchasing the same unit(s) as a backup if customer uses this product in a mission critical system.
- We will NOT liable for any damage to the product that caused by transit. To reduce an influence of outer-impact (that should be less than 0.5G), please pack carefully by enough cushioning materials.
- Followings are NOT included in the price of the product.
  - A) Evaluation of suitability to a system (Design phase)
  - B) Trial run and alignment
  - C) Failure investigation and repair in a field.

## — Cautions for Proper Use —

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- Please use the product under the absolute maximum ratings and the environment recommendation.
- This product is intended to be used with general industries products. But it is neither designed nor manufactured to be used in a machine or a system that may cause personal death when it fails. Consult us in advance if you are planning to use this product for the applications under such special conditions and environments.
- We are making the best effort on to ensure the highest quality of the products. However, it is highly recommended that you should make enough safety design such as a redundant design, an anti-fire design, or a fail-safe design in order to avoid an accident causing personal injury or death, fire accident, or damage of social.
- The contents of this manual are subject to change without prior notice for functional improvement, change of specifications, or user's better understanding.

## — Product lifetime —

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- Please recognize that some parts has product lifetime due to aging degradation. Be sure to change the following parts in overhaul and repair when the product lifetime of the parts is expired.


No.	Parts name	Product lifetime	conditions of use
1	Electrolytic capacitors in main circuits	5 years	Load factor: Less than 50% of rating. Ambient temp.: Less than 40 C in average.


## — Safety Precautions —

---

For safety usage of AS2430, various icons and important messages are used in this manual to indicate to avoid problems that could result in hazards to personnel and damage to properties. The notes given here indicate serious safety content. Please observe safety precautions fully.

	Danger	In case of incorrect handling, it indicates the possibility that dangerous situation could arise and that the possibility of death or serious illness of a person is assumed.
	Caution	In case of incorrect handling, it indicates the possibility that dangerous situation could arise and that the possibility of personal injury or property damage is assumed.
	Inhibition	This symbol is used to indicate the act that shall not be attempted.
	Imposition	This symbol is used to indicate the act that should be done.

	Danger
<ul style="list-style-type: none"> <li>● Never touch the terminals and the inside of the driver while energizing. <b>Could cause electric shocks.</b></li> <li>● Do not pull or bend the cable, do not place heavy objects on it. <b>Could cause electric shocks or fire.</b></li> <li>● Never touch the moving part with your hand. <b>Could cause personal injury</b> by getting caught in the rotor.</li> <li>● Never touch the inside of the driver. <b>Could cause electric shocks.</b></li> <li>● Confirm lights-out of the LED on front panel after shutting down power supply, before execute transportation, connection, maintenance, or inspection. <b>Could cause electric shocks.</b></li> <li>● Never touch the rotating part of the motor while driving. <b>Could cause injury.</b></li> <li>● Never touch surface of the motor while driving. <b>Could cause burns.</b></li> </ul>	

	Caution
<ul style="list-style-type: none"> <li>● Do not use in places where splashes of water, oil, chemicals, or others are applied, or in places with corrosive gas, flammable gas.</li> <li>● Use the rated power supply voltage. <b>Could cause fire.</b></li> <li>● Do not touch the driver, motor, and peripheral devices because it becomes high temperature. <b>Could cause burns.</b></li> <li>● Wiring should be done correctly and securely.</li> <li>● Use the motor and driver in the specified combination. Could cause <b>motor damage</b> or <b>fire.</b></li> <li>● Do not touch the inside of the board or the motor, as it may be hot while turning on the power or while after just shutting off the power. <b>Could cause burns.</b></li> </ul>	



## Inhibition

- Do not use or store in places exposed to direct sunlight.
- Do not use or store in places where the ambient temperature or relative humidity exceeds the specification range of value.
- Do not use or store in places with many dust, dirt, and others.
- Do not use or store in places subject to direct vibration or shock.
- Do not repair or modification by yourself.



## Imposition

- Install an emergency stop circuit outside to be able to stop the system operation immediately.

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## 1. Unpacking inspection

1-1 Please check if parts model are as same as your purchase order.

1-2 Please check whether the following accessories are attached

(In case of custom specification, it may not be attached)

No.	Product Name	Model	qty	Maker
1	Power supply connector housing	PAP-02V-S	1	JST
2	I/F connector housing	PAP-10V-S	1	JST
3	Motor connector housing	PAP-04V-S	1	JST
4	Contact Pin	BPHD-001T-P0.5	17	JST

1-3 Parameter setting application software

- Install the application software from the attached CD.
- Please prepare a USB cable (mini - B type) for parameter setting by customer.

1-4 Be sure to install the application program before connecting a motor to a PC.

Connect AS2430 and the PC with a USB cable, launch the application software and check the model number of the motor is match the model number shown on the screen.

If the motor is driven with a driver which has different model number, the motor may **be damaged**.

## 2. Installation

### 2-1 Usage environment

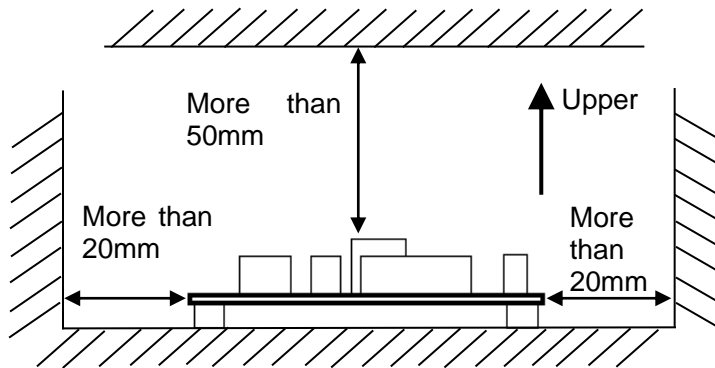
Please use in the following environment.

- Ambient environmental condition: Temperature 0 to 50C, Humidity less than 85% RH.
- Physical environments: With low vibration (0.5G or less).
- Chemical environments where is not exposed to; corrosive gas, flammable gas, grinding fluid, oil mist, iron powder, or chips.
- Electrical environment with low pulse noise. (Add a noise filter to a power input if needed)

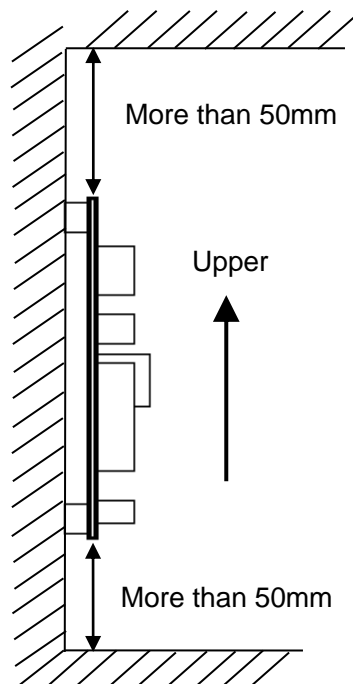
### 2-2 Fastening the driver

The driver can be set in both faces. For ventilation, keep space around the driver as following figures. If enough space cannot be ensured then install an air fan for forced air cooling.

#### Lateral installation



#### Vertical installation





### 2-3 Heat dissipation conditions of each motor

When operating current 100%, a heat sink equivalent to the following conditions is required.  
If the heat sink condition is not satisfied, lower a current during operation than the conditions.

Motor size	Heat sink conditions (fixed to an aluminum heat sink with the following dimensions)
Sq. 20	TBD
Sq. 25	115 × 115 × 5 (t)
Sq. 42	175 × 175 × 5 (t)
Sq. 56	250 × 250 × 10 (t)
Circle 71	TBD

### 3. Specifications

Item	Definition	Note
Model	AS2430	
Power supply voltage	DC24V $\pm$ 10%	
Rated Input current	3Amax	Peak load type power supply is recommended. (Note 1)
Applicable motor	2-Phase Stepping motor (Bipolar connection)	Unipolar motor can also be driven.
Maximum continuous rated output current	3Arms ( $\pm$ 5%) / phase	The rms value means a Root Mean Square value of the sine current.
Driving method	Bipolar constant current chopper method	
Current down function	Auto current down	
Maximum input pulse frequency	800KHz	
Parameter setting method	USB 2.0 (Virtual COM port)	Mini-B type
<b>The following adjustment and selection function are all done from the PC with the dedicated application software through a USB interface.</b>		
Settings Function	Type of Command pulse	<ul style="list-style-type: none"> <li>• 2 pulses</li> <li>• 1 pulse</li> <li>• 2-phase pulses</li> </ul>
	Number divider of Micro step (19 types)	1/1, 1/2, 1 / 2.5, 1/4, 1/5, 1/8, 1/10, 1/16, 1/20, 1/25, 1/32, 1/50, 1/64, 1/100, 1/125, 1/128, 1/200, 1/250, 1/256 (Note 3)
	Auto current down	<ul style="list-style-type: none"> <li>• Auto current down ON</li> <li>• Auto current down OFF</li> </ul> In order to suppress the heat generation of the motor, please use it normally ON.
	Selection of Regenerative brake	<ul style="list-style-type: none"> <li>• Regenerative brake OFF</li> <li>• Regenerative brake ON</li> </ul>
Adjustment Function	Current during operation	0 to 100% The output current at 100% varies depending on the motor used.
	Current value at Auto current down	0 to 70%
	Time from Command pulse stop to Current down	1 to 10,000msec
	Current increase ratio during acceleration / deceleration	100 to 150% (Note 2)
	The maximum speed of JOG	1 to 200,000pps
	Starting speed of JOG	0 to (The maximum speed of JOG)
	Acceleration / deceleration time of JOG	20 to 10,000msec

(Note 1) The input current of the power supply varies from rated current of a motor, armature resistance, and a number of rotations used. Usually, it is close to the rated current of the motor used. If there is no margin in the power of power supply, please rotate it at the number of revolutions expected to use in advance, and measure the actual power supply current and decide a suitable power supply unit to use.

Since there is inrush current at power-on, we recommend power supply that corresponds to peak load.

(Note 2) "Current increase (ratio) during acceleration / deceleration" is a method to increase the power current at acceleration / deceleration and accelerate / decelerate faster. When using this function, please consider to motor heat generation carefully. Please take measures to reduce heat generation such as lowering the current during stop at Auto current down.

Input command pulse which waveform is with no jitter (no cycle variation) when constant speed is operated.

(Note 3) Supports the number of divider 1/125, 1/250, 1/256 from firmware version 1.05.

Display Function	PWR	Lit when power is input	Lit in green
	ALM	Flashing at abnormal (Over voltage, under voltage, over current, CPU fault)	You can determine the cause of alarm by the number of flashing.
Input Signal	Pulse 1, Pulse 2, Exciting OFF	All inputs are electrically isolated by photo couplers	
Output Signal	ALARM	<ul style="list-style-type: none"> <li>· Over current</li> <li>· Over voltage</li> <li>· Under voltage</li> <li>· CPU flash memory error</li> </ul>	Output is shut off in case of abnormality. Alarm is cleared by turning on the power supply again.
	OUT	Auxiliary output	N/A
Dimension		W70 x D45 x H51	
Wight		18g	
Operating temperature, humidity		0 to 50C, 35 to 80%	No condensation
Storage temperature, humidity		-20 to + 85 C, 35 to 80%	No condensation
Options		DIN rail mounting case	(Note 2)

(Note 2) Please consult our salesperson.

#### 4. Connector pin assignment

##### 4-1 CN1 : Power supply

No.	Signal name	Definition
1	DC24V	DC24V $\pm$ 10%
2	0V	

##### 4-2 CN2 : motor

No.		Signal name	Description
1		Phase A	Motor phase A
2		Phase /A	Motor phase /A
3		Phase B	Motor phase B
4		Phase /B	Motor phase /B

##### 4-3 CN3 : Interface

No.	Signal name	Definition
1	P +	Command CW pulse, or Rotation command pulse, or Phase A
2	P -	
3	D +	Command CCW pulse, or Rotation direction command, or Phase B
4	D -	
5	OFF +	Exciting OFF
6	OFF-	
7	ALARM+	Alarm output
8	ALARM-	Negative common of above output
9	OUT+	Auxiliary output
10	OUT-	Negative common of auxiliary output

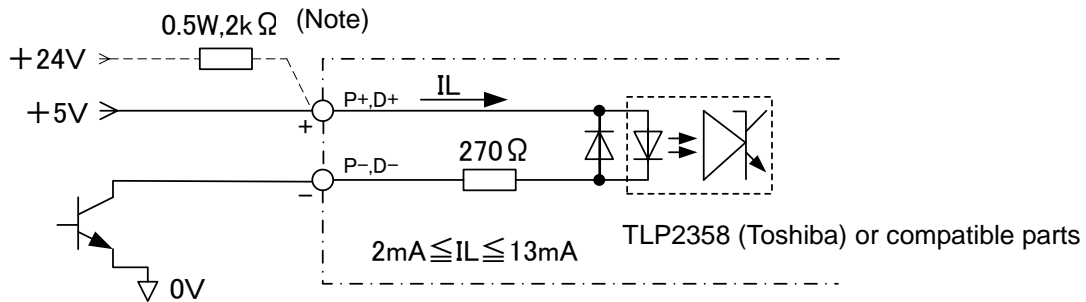
##### 4-4 Type of applicable connector housing and contactor

Symbol	Application	Model	Applicable wire rod	Maker
CN1	Power supply	Housing: PAP-02V-S	AWG # 26 to 22	JST Mfg. Co., Ltd
		Contactor: BPHD-001T-P0.5		
CN2	Motor	Housing: PAP-04V-S	AWG # 26 to 22	JST Mfg. Co., Ltd
		Contactor: BPHD-001T-P0.5		
CN3	Interface	Housing: PAP-10V-S	AWG # 26 to 22	JST Mfg. Co., Ltd
		Contactor: BPHD-001T-P0.5		

## 5. Input circuit diagram

### 5-1 Command pulse Input.

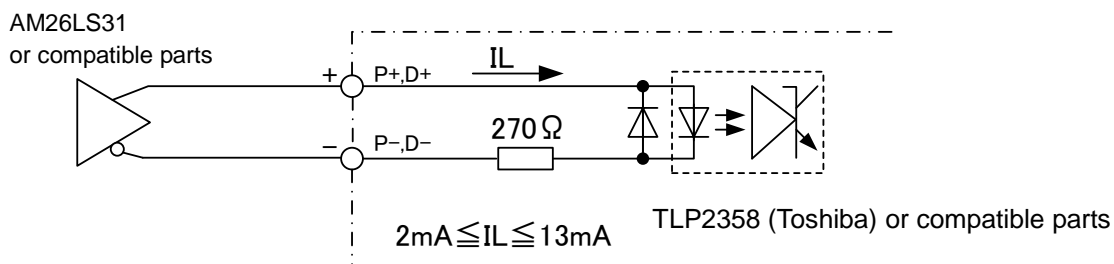
- In case of Open collector driven



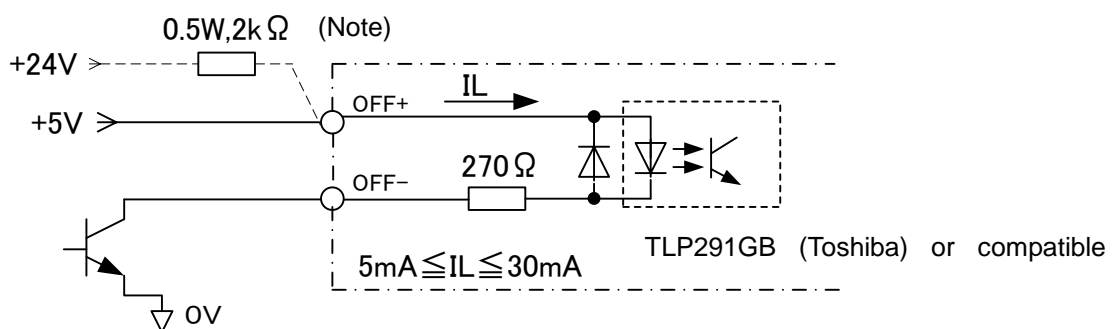
(Note) When circuit is driven at + 24V, connect a resistor of 0.5 W, 2 kΩ (recommend) in series.

When using a resistor other than 2 kΩ, use the resistance value that satisfies the current value in the figure.

- In case of Line driver driven



### 5-2 Excitation OFF input



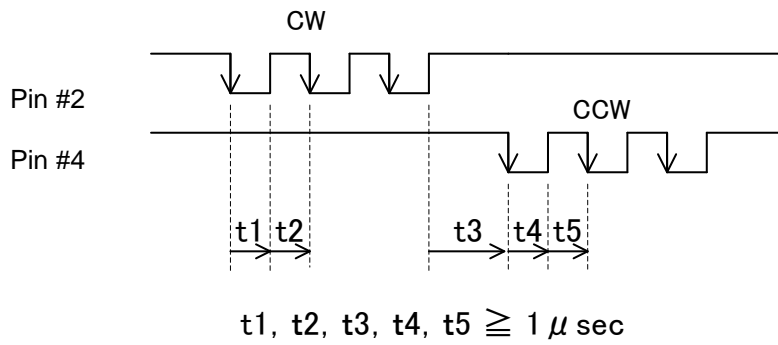
(Note) When circuit is driven at + 24V, connect a resistor of 0.5 W, 2 kΩ (recommend) in series.

When using a resistor other than 2 kΩ, use the resistance value that satisfies the current value in the figure.

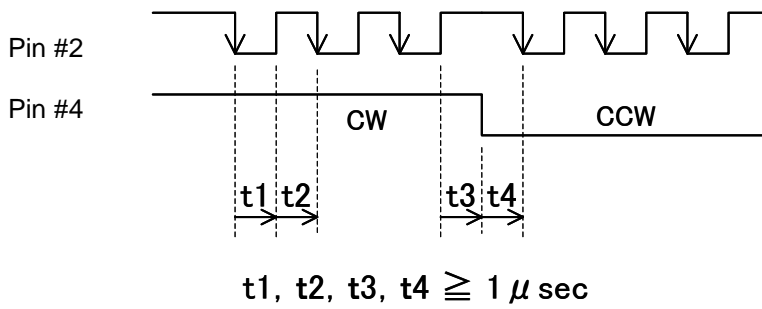
**6. Count Edge and period of input command pulse**

Following figure shows the waveform of pin CN3-2, and 4.

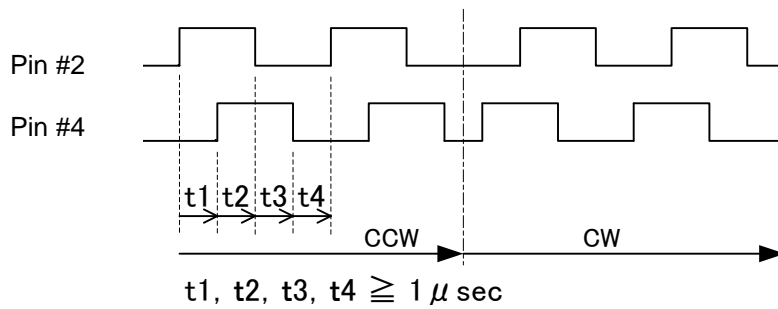
6-1 In case of 2 pulses mode



6-2 In case of 1 pulse mode



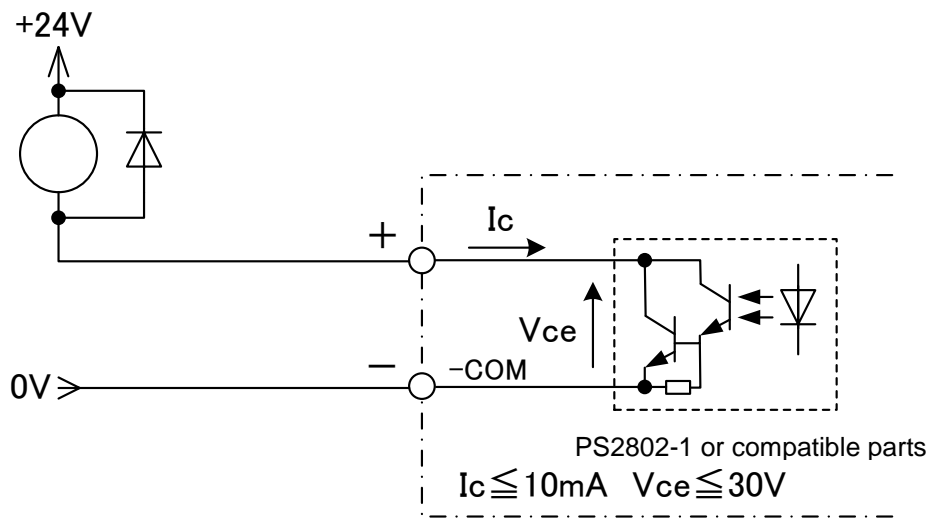
6-3 In case of 2-phase pulses mode



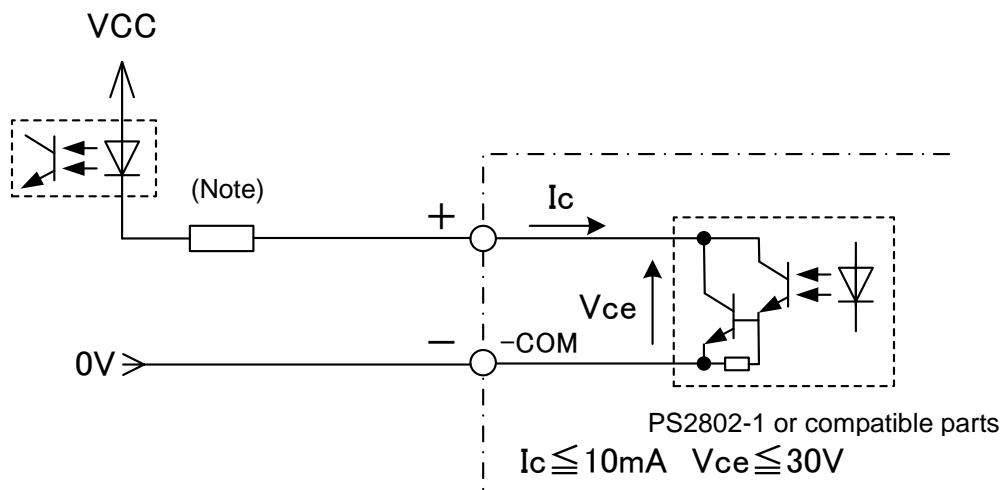
## 7. Output circuit diagram

Alarm and auxiliary output

7-1 In case of relay connection



7-2 In case of photo coupler connection



(Note) Select a resistance value in consideration of output photo coupler saturation voltage 1Vtyp (at output current=10mA) at ON status.

**8. Option cable (not included)**

**8-1 Power supply (model: C002049-1)**



Pin #	Applicable wire rod	length
1	UL1007 AWG22 Red	1m
2	UL1007 AWG22 Black	1m

**8-2 Interface (model: C010056-0.5)**

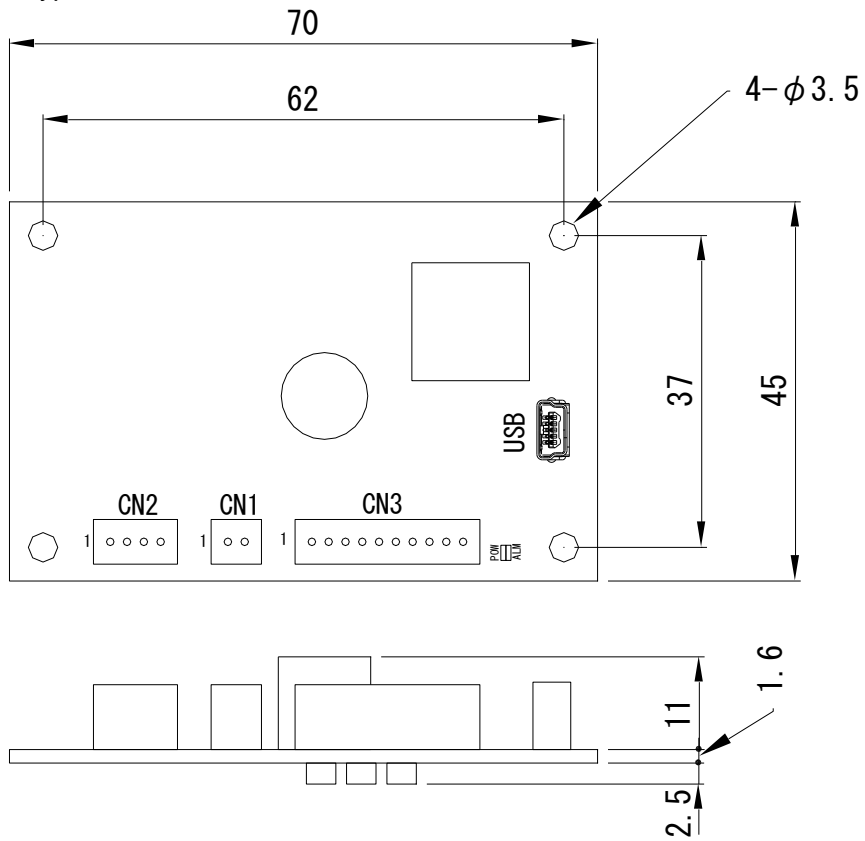


Pin #	Applicable wire rod	length
1 to 10	UL1007 AWG26 blue	0.5m

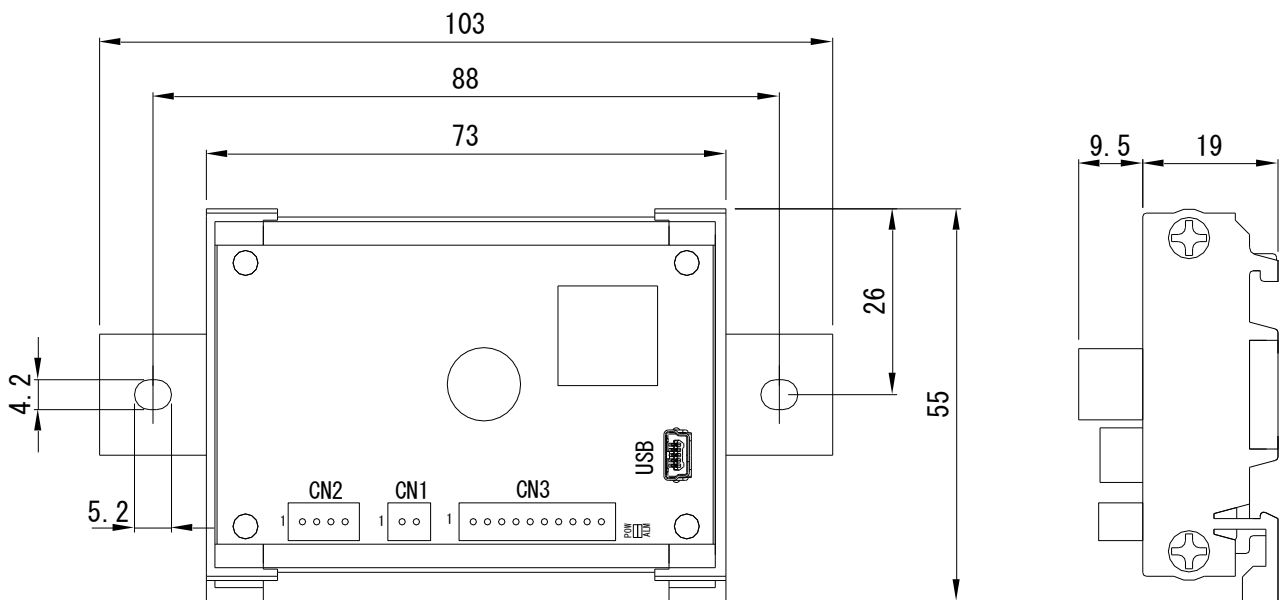


## 9. Dimension

### 9-1 Standard type



### 9-2 With DIN rail mounting case



## 10. Parameter setting

Following Settings are all done from the PC through a USB cable. Please prepare a USB cable (mini - B type) for parameter setting by customer.

No	Function	Definition	Default
P01	Number divider of micro step	19 division numbers are set against Full step angle. 1/1, 1/2, 1 / 2.5, 1/4, 1/5, 1/8, 1/10, 1/16, 1/20, 1/25, 1/32, 1/50, 1/64, 1/100, 1/125, 1/128, 1/200, 1/250, 1/256 (Note 5)	1 / 64
P02	Current during operation	0 to 100% (Note 1)	70%
P03	Auto current down	It is a function to prevent heat generation of a motor at the time of stop that is to lower current of the motor to a constant current value, after the following Auto current down time after the command pulse disappears (Note 2).	ON
P04	Current value at auto current down	0 to 70% × Current during operation	50%
P05	Time from command pulse stop to auto current down	1 to 10,000 msec	1,000 msec
P06	Current increase ratio during acceleration / deceleration (Note 3)	100 to 150% By increasing acceleration / deceleration current, it is possible to start and stop the motor in a short time. However, be care that <b>the motor will generate larger amount of heat</b> in the case that start and stop are repeated at short pitch. In order to reduce an effective value of current, it is necessary to reduce an operation current value at constant speed. It is also effective to reduce a current of Auto current down when stopped.	100%
P07	Type of control pulse (Note 4)	2 pulses method 1 pulse method 2-phases pulse method	2 pulses method
P08	ON/OFF selection of regenerative brake at excitation OFF	It can prevent the phenomenon that a work falls suddenly on Z or other axis, even when Excitation is OFF under condition of Regenerative brake being turned ON.	OFF
P09	Maximum speed during JOG operation	1 to 200,000 pps	10,000 pps
P10	Starting speed during JOG operation	0 to 200,000 pps	1,000 pps
P11	Acceleration / deceleration time during JOG operation	20 to 10,000 msec	500msec
P12	Selection of rotation direction command	Rotate motor CW by CW command Rotate motor CCW by CW command	CW
P13	Selection of rotation command	Select a source of direction command External command: Operated by External command pulse Communication command: Operated by the command from USB	External command

(Note 1) Please be sure to satisfy the condition in "Section 2-3. Heat dissipation conditions of each motor" when setting a current during operation to a value exceeding 70% of the maximum. If the heat dissipation condition is not satisfied, a temperature of the motor might be high and possibly damaging the motor.

If a setting value is exceeding 70% of the maximum, Auto current down is forcibly performed when stopped.

(Note 2) In order to suppress heat generation of a motor, please use it normally ON.

(Note 3) Input command pulse which waveform is with no jitter (no cycle variation) when constant speed is operated.

(Note 4) It is necessary to turn on the power again after setting for switching.

(Note 5) Supports number of divider 1/125, 1/250, 1/256 from firmware version 1.05.  
Application software supports version 1.16.

## 11. Alarm

When an alarm occurs alarm output is turned on. Type of alarm can be confirmed by number of blinks of the red LED on the board.

To cancel the alarm, cycle power after fixing cause of the alarm.

<b>Flashing counts</b>	<b>Type of alarm</b>	<b>Detailed cause</b>
2	Power under voltage	Supply voltage dropped below 15V
3	Over voltage	Power supply voltage exceeded 30V
4	Over current	Motor wire short circuit, motor rare short
5	CPU flash memory error	

## 12. Instruction revision history

<b>№</b>	<b>Description</b>	<b>Firmware version</b>
02	· Added parameter P12 "Selection of command rotation direction"	V1.01
03	Add 1/125, 1/250, 1/256 number divider of micro step	V1.05

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