

Driver for small type 2 phase stepping motor and applicable motor

**IMS401 series**

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**【User's manual】**

**MYCOM**

MYCOM, INC.

**Attention on safety**

Please read this operation manual thoroughly before starting any operation. This manual will guide the customers for proper use and avoid any mis-operation. This manual if properly read, will protect the users as well as other people from possibilities physical injuries, property damage and other serious accidents.

**DANGER**

This danger shows the possibility that the user may die or get serious injures by fire or electrical shock and the contents which are high emergency of caution when danger is occurred if this warning is neglected and operated.

**WARNING**

This warning shows the possibility that the user may die or get serious injures, fire or electrical shock if this warning is neglected and operated.

**CAUTION**

This caution shows the possibility that the user may be injured by electrical shock or the contents which expect to issue physical damage if this caution is neglected and operated.

**Danger**

- Do not operate this product if it is damaged or disassembled. Otherwise, it may cause fire or electrical shock.
- In any case, do not attempt to repair or modify this product as it may cause fire, electrical shock or serious injuries.
- Do not use this product, in a place where the air includes a corrosive gas, inflammable gas, or any type of explosive gas, or the water or oil splashes, or it is near a flammable material. Otherwise, it may cause fire or electrical shock.
- Leave works such as installation, wiring, operation, checking and maintenance to experts who have enough knowledge on this product. Operation without knowledge may cause electrical shock and other serious physical or property damages.
- Keep the power supply within the rated voltage range. Otherwise, it may cause fire or other damages.
- Make sure all the connections correctly done referring to the wiring diagram shown in this user's manual. Otherwise, it may cause fire or other damages.
- Do not, in any circumstances, touch the terminal block while the power is on as there are some terminals which high voltage appeared. Otherwise, it may cause electrical shock.
- Do not touch or place objects such as metals or foreign substance on the board. Otherwise, it may cause fire or electrical shock.
- Do not bend, pull or place the power or motor lines by the extreme force. Otherwise, it may cause fire or electrical shock.
- Do not make a mistake connecting the motor output terminals to protective earth or power supply. Otherwise, it may cause fire.
- Do not do the driver's installation preventing ventilation. Otherwise, it may cause fire.
- Please stop operation soon in case that more than 60 °C heat generates or HEAT(over heat) function, if the device has HEAT function, acts on during operation. This is cause of fire or accident.



## Warning

- Do not operate to move, wire, maintain and test etc. during power on. After power-off and ten seconds pass, please start to operate. It may cause electric shock.
- Do not touch the unit with wet hand by no means during power on. There is a reason of electric shock.
- Connect the protective earth (PE) with the protective earth terminal by no means. It may cause electric shock.
- Do not use driver outside of control box. It may cause electric shock and injure.
- Fix the driver tightly when installing. It may cause injury.
- Do not touch the driver during operation and for the time being after stop. Because the surface of driver is hot depending of operating condition, it may cause injury.
- Use power isolated from dangerous voltage. It may cause electric shock



## Caution

- Avoid using or storing the unit where air is dusty. It may cause malfunctions.
- Do not give a large shock. It may cause malfunctions.
- Do not use or store this unit in a place of high or low temperature, extreme high or low humidity. It may cause a short circuit or malfunctions.
- Avoid dews to form. It may cause a short circuit or malfunctions.
- We do not have the responsibility about user's repair and modification because it is out of our guarantee.
- When abandoning the driver, treat it as industrial wastes.
- Do not leave the name plate.

**If necessary, we would ask the trading company or distributor to translate this manual into the importer's mother language.**

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# 1 . Model name

## 1 - 1 . Driver model name

<b>IMS 4 0 1</b>	-	<b>2</b>	<b>0</b>
Series name		Additional function F: Function added(Refer specification)	
		Power supply 2: DC24V	
		Phase current 4: 4.0 - 3.9A/phase	
		3: 3.5 - 3.0A/phase	

## 2 . Specification

Driver model	IMS401-420	IMS401-420F	IMS401-320	IMS401-320F
Power supply	DC24V ± 10%			
Power consumption	40W			
Driving type	Bi-polar constant current type			
Driving current(Re-mark)	MAX 4.0 - 3.9 A		MAX 3.5 - 3.0 A	
Basic step	1.8°			
Resolution	1/1,1/2,1/4,1/8			
Standard function	Auto-current down			
Additional function	• Excitation home signal(MONI) output • Power protection circuit • Power indication LED		• Excitation home signal(MONI) output • Power protection circuit • Power indication LED	
Input pulse type	• Standard specification : 2 pulse type(CW, CCW) / Special specification : 1 pulse type(PLUSE, CW/CCW) Please specify the input pulse type at ordering.			
Signal input	• Photo coupler input Input resistance 390 • Input signal voltage L : 0 - 0.5V H : 4 - 5V			
Excitation home signal(MONI output)	• Photocoupler open-collector output, Limited capacity 25V 10mA or less		• Photocoupler open-collector output, Limited capacity 25V 10mA or less	
Insulation Resistance	There is 100M or higher when DC500V is applied at the below sections in normal temperature and humidity. • Power input/Motor output terminal – PE terminal • Power input/Motor output terminal – Signal I/O terminal			
Operating environment temperature	0 to +40		No freezing	
Operating environment humidity	Less than 80%, No condensation			
Storing environment temperature	-10 to +60		No freezing	

Storing humidity	Less than 80% No condensation
Operating height	Less than 1,000m from sea level
Atmosphere	In the room without corrosive gas, inflammable gas and dust. Without splashing water and oil
Weight	130 g
Externals size	80×100×30mm ( The heat sink is contained )
Accessories	User's manual

Remark: There is a case that rated current does not pass depending of motor model.

The value in the table shows the value in case that motor of uni-polar type motor.

## 3 . Setting

### 3 - 1 . Factory default setting

Driver model name	IMS401-320	IMS401-320F	IMS401-420	IMS401-420F
Driving current value	Setting at rated current of motor			
Resolution	1/8			
Input pulse type	2 pulse type			

### 3 - 2 . Drive name plate

Do not remove the nameplate(model name, month of manufacture and serial number) by no means which is put at back of driver

4	2	0	F	2	0	0	8	.	0	9	0	0	0	0	1
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 ( Sample of nameplate )

Above name plate shows driver model number: IMS401-420F, Month of manufacture : September 2008 and Serial number 00001.

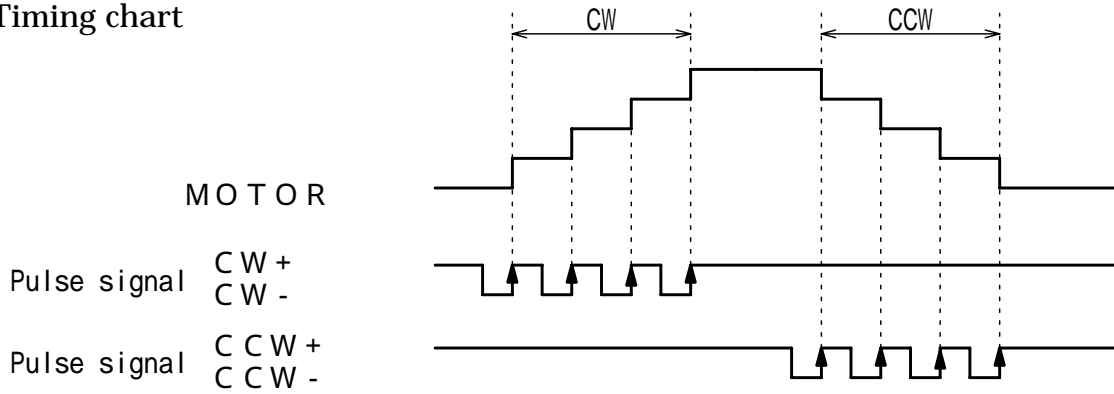
Indication item	Numbers of letter	Description
Driver model number	3 to 4 letters	IMS401-320 (Indication : 320) IMS401-320F (Indication : 320F) IMS401-420 (Indication : 420) IMS401-420F (Indication : 420F)
Month of manufacture	7 letters	A.D.(4 digits), Month(2 digits)
Serial number	5 letters	Serial number by model number (00001 -)

## 4 . Pulse wave

### 4 - 1 . Input pulse type

- 2 pulse type

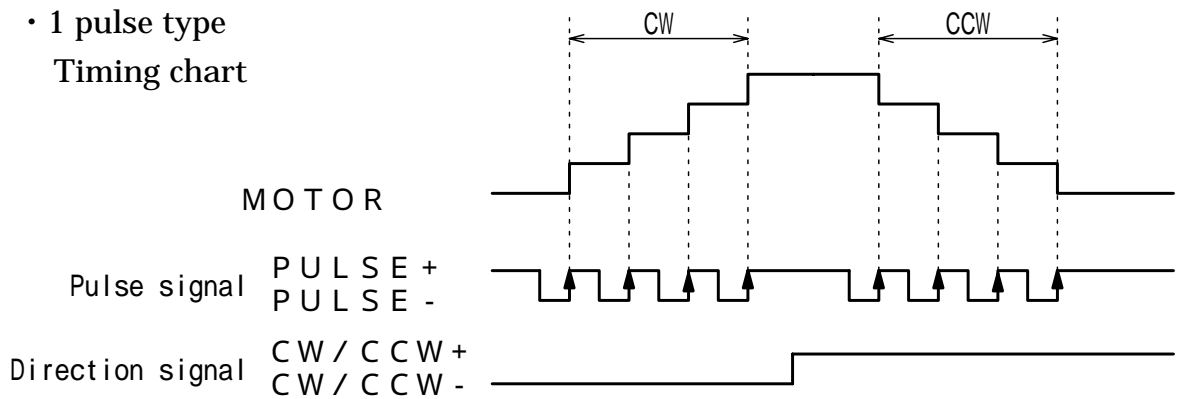
Timing chart



Motor starts to rotate by rising edge( ) of CCW or CW signal.

- 1 pulse type

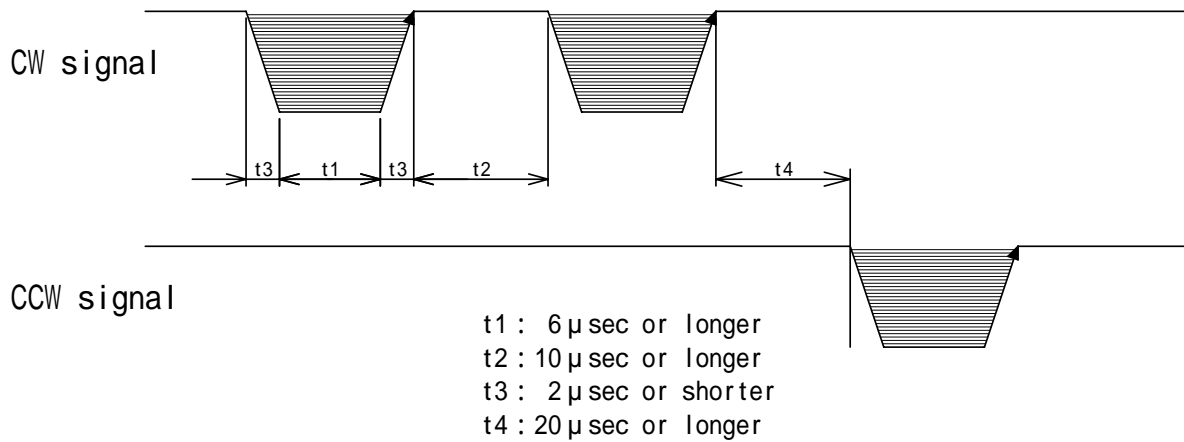
Timing chart




Motor starts to rotate by rising edge( ) of Pulse signal.

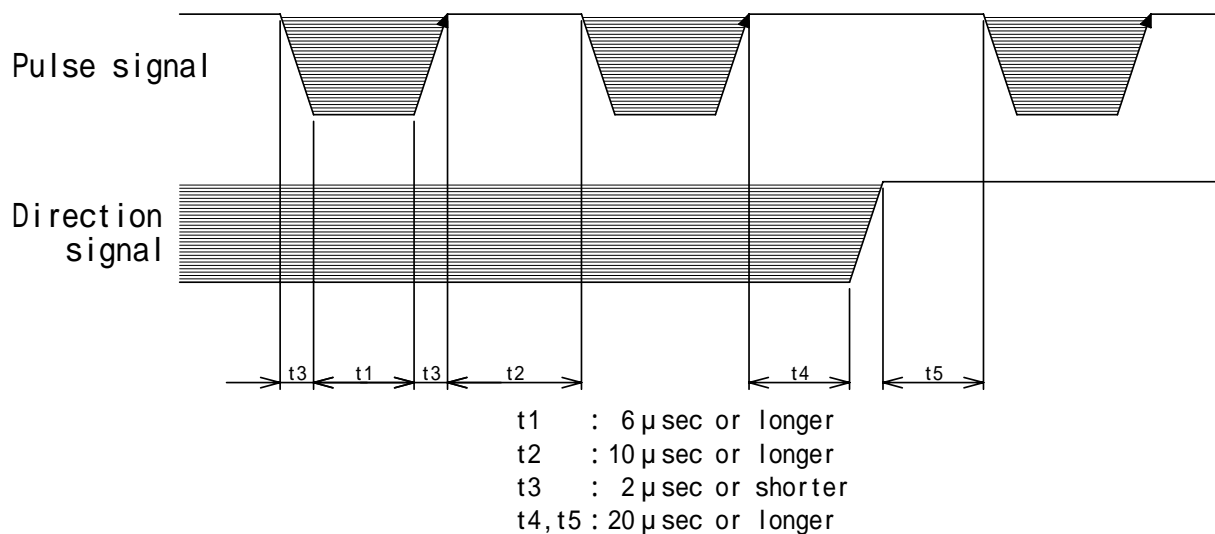
## 4 - 2 . Pulse wave


### • 2 pulses type



-  section shows ON status(turn on of photo coupler) of input circuit photo coupler.
- Motor starts to rotate by rising edge( ) of CCW or CW signal.

### • 1 pulse type



-  section shows ON status(turn on of photo coupler) of input circuit photo coupler.
- Motor starts to rotate by rising edge( ) of pulse signal.
- Direction signal input is to rotate CW direction by inputting pulse signal at ON status. Also if pulse is inputted at OFF status, motor rotates to CCW direction.
- Signal name of product uses pulse signal as CW input and direction signal as CCW input.

## Attention

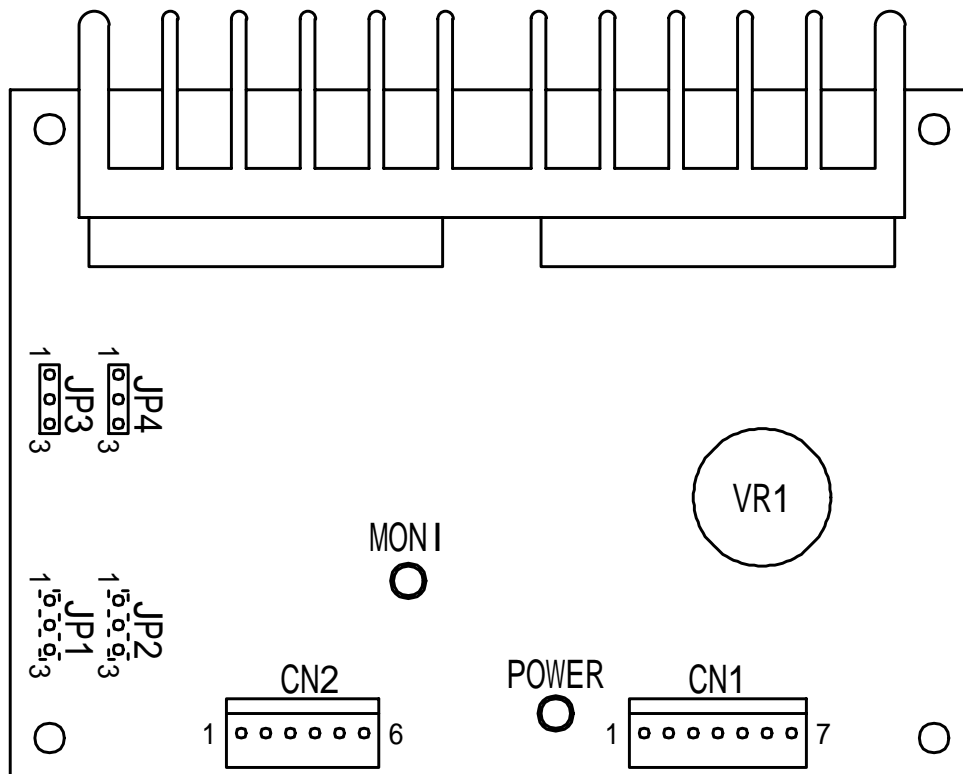
- 1 . If the signal exceeds the voltage of DC5V in use, please insert the series resistor near to output terminal(connector) of using controller so that 10mA current pass.

$$\text{Value of resistor to be inserted( )} = \frac{\text{Input voltage} - 5V}{10\text{mA}} - \text{Register value of wiring( )}$$

- 2 . Current down function is invalid if the photo coupler of pulse input keeps ON status at stopping.

## 5 . Part name and function

### 5 - 1 . Part name



Externals and arrangement chart

### 5 - 2 . Description of function

**Power display LED (POWER) Only IMS401-320F and IMS401-420F**

This lights on during power on.

**Excitation home display LED (MONI) Only IMS401-320F and IMS401-420F**

When output excitation pattern is excitation home, this LED lights on.

Then signal outputs to MONI output of CN2.

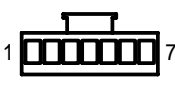
**Resolution select switch(JP3• JP4)**

This selects the angle resolution of motor.

Setting	Type of excitation	Resolution	JP3	JP4	Reference
	2 phase excitation	1/1	1 - 2	1 - 2	
	1-2 phase excitation	1/2	2 - 3	1 - 2	
	W1-2 phase excitation	1/4	1 - 2	2 - 3	
	2W1-2 phase excitation	1/8	2 - 3	2 - 3	Default setting

**Motor, power and protective earth terminal(CN1)**

Connect power, protective earth terminal of the device and motor leads.


CN 1	 (lead wire side)
1	A phase
2	/A phase
3	B phase
4	/B phase
5	DC24V
6	0V(GND)
7	PE

Name	Model number	Reference
Pin header	IL-7P-S3EN2	
Socket housing	IL-7S-S3L-N	Optional
Socket contact	IL-C2-0001	Optional

- Please use DC24V power source and AWG22 (0.5mm<sup>2</sup>) for power line.
- In case of extension of motor wire, use equal to AWG22(0.5mm<sup>2</sup>) or bigger wire.
- Use bigger PE line than or equal to power line for safety.
- Circuit GND and PE are separated therefore connect them with external wiring if necessary.

**Signal input/output connector(CN2)**

This is connected with various input/output pulse signal.

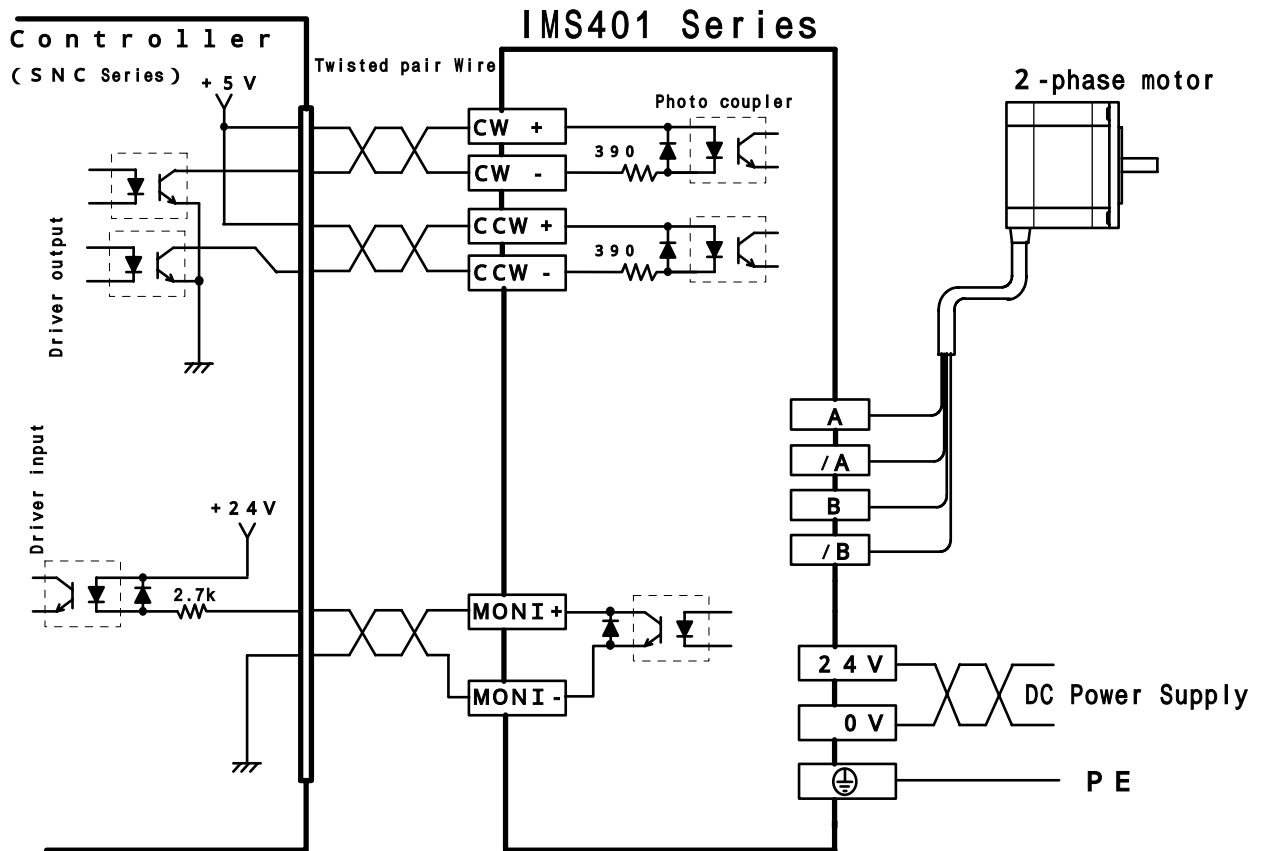
C N2	 (lead wire side)	
	1 pulse type	2 pulse type
1	PULSE +	CW +
2	PULSE -	CW -
3	CW/CCW +	CCW +
4	CW/CCW -	CCW -
5	MONI +	
6	MONI -	

Name	Model number	Reference
Pin header	IL-6P-S3EN2	
Socket housing	IL-6S-S3L-N	Optional
Socket contact	IL-C2-0001	Optional

**Driving current adjustment volume(C.ADJ(VR1))**

This already adjusted motor rated driving current.

## 6 . Example of connection



In case of using of uni-polar motor, separate A·COM and B·COM and use at the un-connecting condition.

## 7 . Wiring and Install condition

### 7 - 1 . Wiring for motor output and power input

- If the motor line becomes longer, radiation noise can be depressed by using equal to AWG22(0.5mm<sup>2</sup>) or bigger shield line.
- Install noise filter at power input where noise sources exist near the driver.
- Wrong connection with power input and motor output cause over current and it is very dangerous.

### 7 - 2 . Wiring of signal line

- Using shield wire can depress the wrong operation by noise in case that input signal wires is long.

### 7 - 3 . Applicable tool

Use CT150-1C-IL of JAE brand to cramp socket contact(IL-C2-0001)

### 7 - 4 . Install condition

- Do not this driver outside of control box. This unit is designed for the following condition.

Over voltage category: Category II, Material group III

Pollution degree: Class 2

Protection structure: IP00

Protection against electric shock: Class III component

It is also limited to use at the place of no mechanical stress.

- Fix to put 3cm or more space between each driver when multiple drivers are arranged.
- It is suggested to use shield twisted pair wires for signal cable of this device.
- There is a possibility that heat sink temperature exceeds 60 depending on load or other environmental condition. In case that it is used in hard condition, please cool the heat sink by cooling fan.
- Put this device taking more than 5mm space from solder side of the board, cover this device by material which does not intercept ventilation and take the safety measures by no means not to insert bar of 4mm diameter.

## 8 . Noise measures

This device is designed to depress unnecessary radiant noise and not to be affected easily by external noise but noise measures may be required depending on the condition of usage (installation and wiring). In such case please take noise measures referring below method.

### 1 . Prevent driver mis-operation

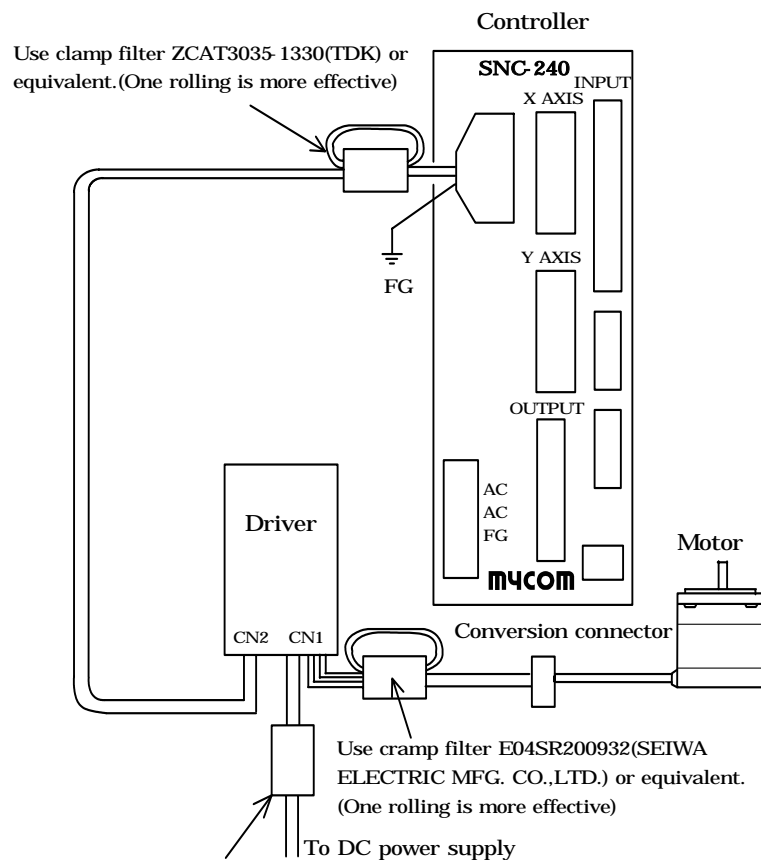
- Please use shielded cable for signal line between controller and driver if the position become off during operation by external noise. These measures are also effective to decrease radiant noise.

### 2 . Decrease radiant noise

- Insert clamp filter (toroidal core) among motor wiring(driver side).
- Insert clamp filter on power line(power side).

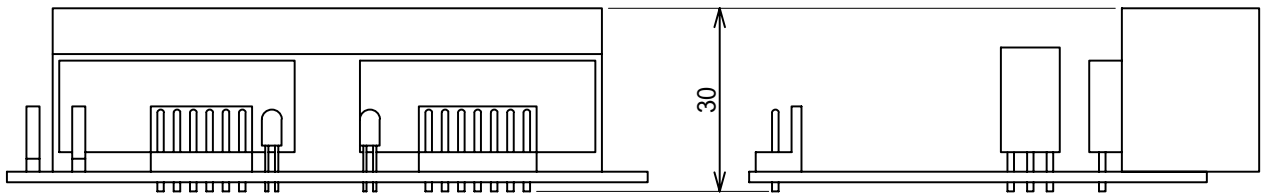
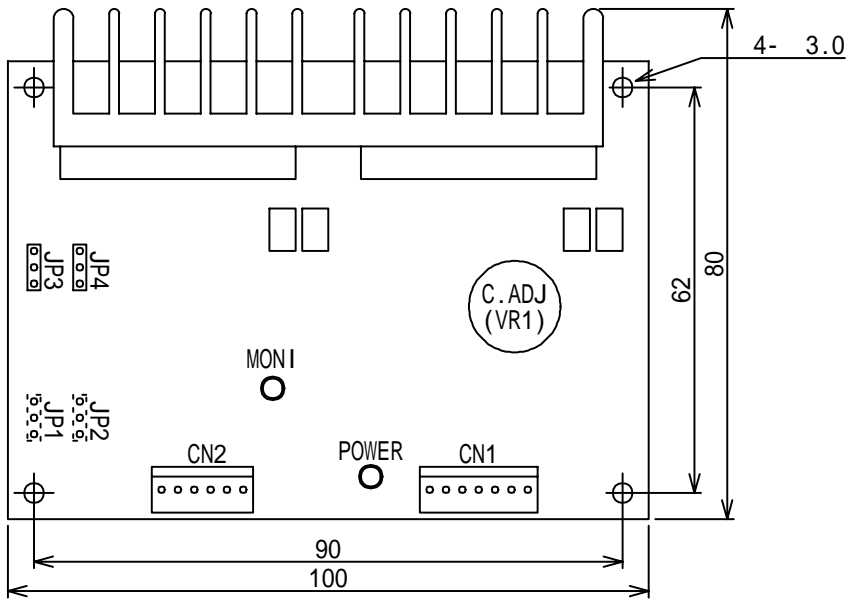
### 3 . Decrease conductive noise

- Insert noise filter on power line(power side).



- Use noise filter to depress noise on DC power supply line.
- Use clamp filter to depress radiant noise ZCAT3035-1330(TDK) or equivalent.(Twice rolling is more effective)

## 9 . Dimension



Unit : mm

## 1 0 . Period of product warranty

### 1 0 - 1 . Guarantee period

#### **One year from delivery.**

In case that the device becomes out of order by our responsibility within the guarantee period, we will repair the parts of trouble or replace by our responsibility. However the damage which malfunction of products of supply cause is out of target of this warranty.

### 1 0 - 2 . Out of warranty

Below case is out of warranty even if guarantee period.

- Malfunction or damage by wrong usage, modification or unreasonable repair.
- Malfunction or damage by transportation, carry or falling after delivery.
- Malfunction or damage by unsuitable maintenance, keeping or storage.
- Malfunction or damage by abnormal voltage, power supply out of appointment (Voltage or Frequency).
- Malfunction or damage by fire, earthquake, flooding, lightning, other disaster, pollution, smoke pollution or gas pollution(sulfuration gas, etc.)
- Other malfunction or damage which is not considered as our responsibility.

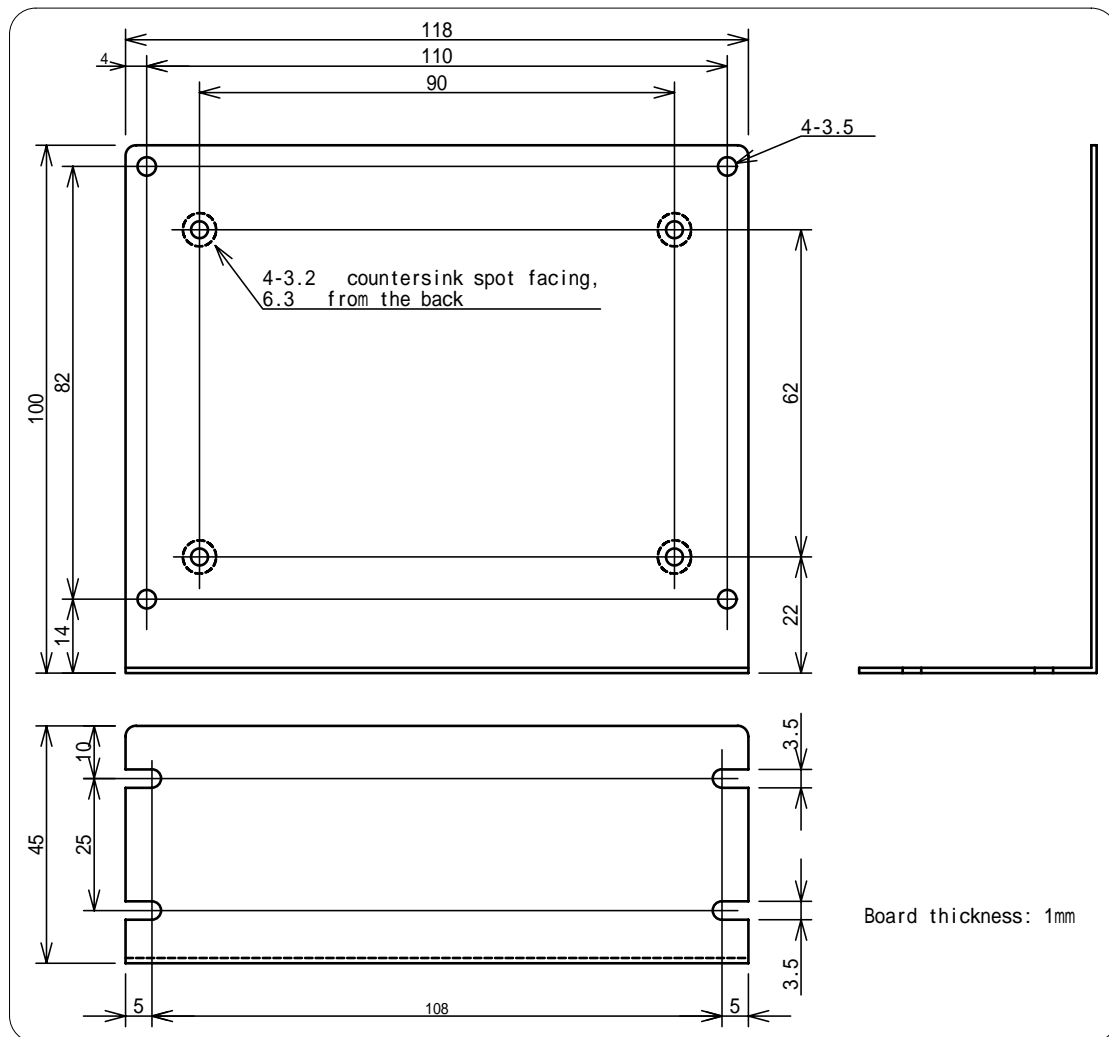
## 1 1 . Optional accessories

Model name	Model number	Specification
Connector set	OCN-IL6/7	Applicable connector and pin for CN1 and CN2
L Bracket	OMP-MP	Available to install with bracket vertically.
Flat Bracket	OMP-MB	Available to install with bracket horizontally.
CN1 cable	OMPC-IL7P15	1.5m Loose wire for CN1 connector (Power & Motor Cable)
CN2 cable	OSC-IL6P15	1.5m Twisted pair wire for CN2(Signal Cable)

Connector set (Model number:ONC-IL6/7 )

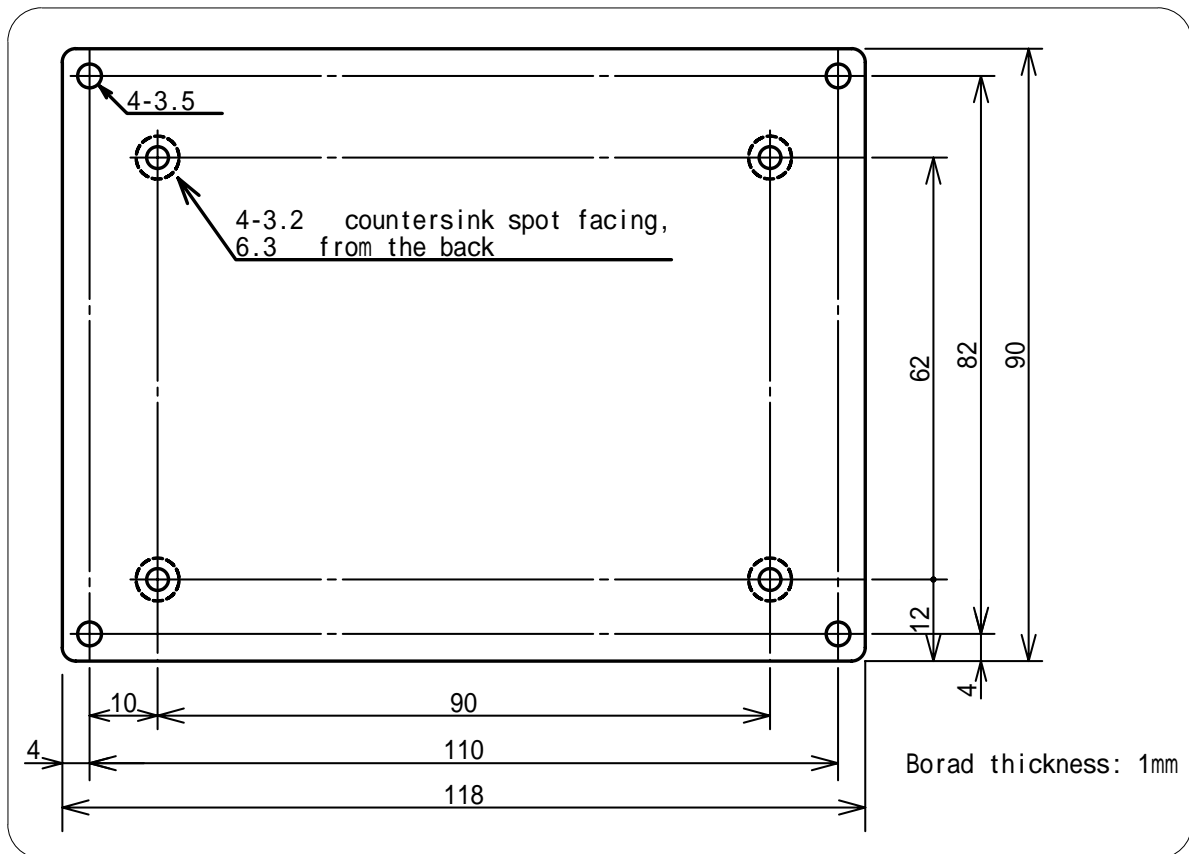
- 6P Connector Housing : IL-6S-S3L-N (1 pc.)
- 7P Connector Housing : IL-7S-S3L-N (1 pc.)
- Contact pin : IL-C2-0001 (13 pcs.)

## L Bracket (Model number: OMP-LB)



- L Bracket (1 pc.)
- Round type midair brass Spacer L=10mm (4 pcs.)
- Round flat washer : M4 (4 pcs.)
- Hex nut : M3 (4 pcs.)
- Plate machine screw : M3 x 15 (4 pcs.)

## Flat bracket (Model number : OMP-MB)

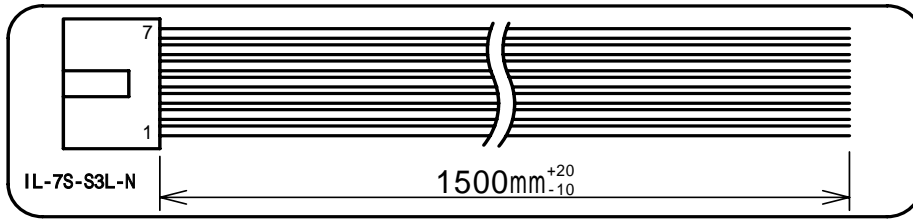


- Flat Bracket (1 pc.)
- Round type midair brass Spacer L=4mm (4 pcs.)
- Round flat washer : M4 (4 pcs.)
- Hex nut : M3 (4 pcs.)
- Plate machine screw : M3 x 15 (4 pcs.)

CN1 cable : Power & Motor Cable (Model number OMPC-IL7P15)

Connector : IL-7S-S3L-N\*1

Cable : Loose cable AWG22 1.5m

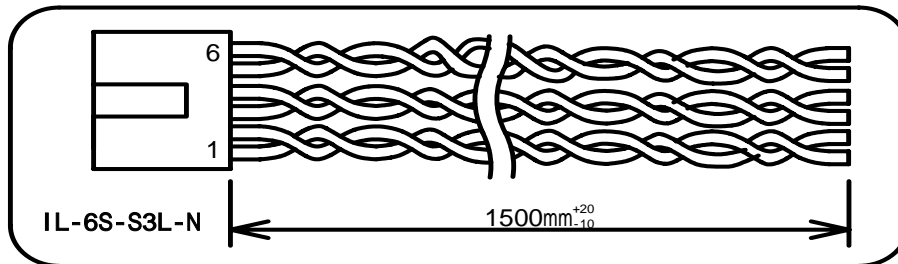


Cable color 1 : Black, 2 : Brown, 3 : Yellow, 4 : Orange,  
5 : Red, 6 : Blue, 7 : Green

CN2 Cable : Signal Cable (Model number : OSC-IL6P15)

Connector : IL-6S-S3L-N\*1

Cable : Twisted pair wire AWG22 1.5m



Cable color 1 : Brown, 2 : Red, 3 : Orange,  
4 : Yellow, 5 : Green, 6 : Blue

\*1 Housing of JAE brand (Contact, IL-C2-0001 is used)

Please understand that we may make modifications to our products without notification in order to improve the capabilities and external appearance of our products.

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