



5 phase stepping motor Driver

NanoDrive

INS50 series

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【User's manual】

**MYCOM**

MYCOM, INC.

## Safety precautions

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**

Indicates a possibility of causing serious injury or worst, death to the user, caused by fire or electric shock if this warning is ignored. Also indicates that the equipment has the highest degree of causing damage.



**WARNING**

This shows the possibility that the user may get serious injury by fire or electrical shock if this warning is neglected.



**CAUTION**

This shows the possibility that may cause slight injury or damage to this product or other equipment.



**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 cables 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.
- When the "HEAT" is activate, stop the pulse signal. Otherwise, it may cause fire. (Only the product have a Overheat function.)

 **WARNING**

- Do not attempt any type of works such as moving the machine, wiring, maintenance, checking while the power is on. It is recommended that such works should be done only when more than ten seconds have elapsed after the power is off. Otherwise, it may cause electrical shock.
- Do not touch this product with wet hands while the power is on. Otherwise, it may cause electrical shock.
- Connect the protective earth terminal (PE) properly to it on your equipment, as illustrated in this user's manual. Otherwise, it may cause electrical shock.
- Use this product which installed properly in the enclosure. Otherwise, it may cause electrical shock or injury.
- Do not leave the cover off from the terminal block while the power is on. Otherwise, it may cause electrical shock or injury.
- Fix this product securely onto your equipment. Otherwise, it may cause injury.
- Do not touch this product while it is running or right after it is stopped. Otherwise, it may cause injury, as its surface remains hot.
- Depending on the setting of this product, it may show an unexpected operation when recovering from overheating. Please read this user's manual carefully and pay a special attention.
- Use a DC power supply with reinforced insulation for dangerous voltage. Otherwise, it may cause electrical shock.(Only DC input type)

 **CAUTION**

- Do not use or store this product under a dusty environment. Otherwise, it may cause malfunction.
- Do not give a big shock to this product. Otherwise, it may cause malfunction.
- Do not use or store this product in a place of high or low temperature, or under an environment of extremely high or low humidity. Otherwise, it may cause short circuit to your device or further damage.
- Do not install this product in a place where a dew is generated. Otherwise, it may cause short circuit to your device or further damage.
- MYCOM is, in no way, responsible for any damages or malfunctions that are caused by user's repair or modifications on this driver. If the user performed these initiations and the driver does not work satisfactorily, a warranty will not be provided.
- When giving up the use of the driver, dispose it according to an appropriate regulation on the industrial waste.
- Please do not remove 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. Specification of driver

## 1-1. INS50-110/INS50-120

Model number	INS50-110	INS50-120
Power source	Single phase 100-120V $\pm$ 10% 50/60Hz	Single phase 200-220V $\pm$ 10% 50/60Hz
Power consumption	400VA or less	500VA or less
Driving type	Star bi-polar type	
Output current	1.4A/phase	
Resolution	Basic step : 1,2,2.5,5,8,10,20,25,40,50,100,125,200,250,500,1000 division	
Function	Auto-current down (Only INS50-110), Auto-current off, Input of output current off, Exciting timing output, Overheat output, Input of resolution selection	
Signal input	Photocoupler input; Input resistance 390 Input signal voltage: L :0 - 0.5V, H : 4 - 5V 1 pulse type (PLUSE, CW/CCW), 2 pulse type ( CW, CCW), CO, SEL	
Signal output	Photocoupler open-collector output, Limited capacity 25V 10mA or less, MONI, HEAT	
Dielectric Strength	No abnormality detected after the application of the below voltage among each terminal for one second in normal temperature and humidity.	
	<ul style="list-style-type: none"> <li>• Power input: Motor leads collection terminal - PE terminal</li> <li>• Power input: Motor leads collection terminal - Signal I/O terminal</li> </ul>	
	2.0kV(60Hz)	3.0kV(60Hz)
Insulation Resistance	100M or higher with DC500V Meger applied in normal temperature and humidity.	
	<ul style="list-style-type: none"> <li>• Power input: Motor leads collection terminal - PE terminal</li> <li>• Power input: Motor leads collection terminal - Signal I/O terminal</li> </ul>	
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.	
Applicable Standard	EN60950	
Weight	1000 g	
Accessories	User's manual (This book), Connector brand: J.S.T. Housing ; XHP-2 $\times$ 1 pc. , Contact ; SXH-001T-P0.6 $\times$ 2 pcs.	
Applicable Motor	CE marking approved	PCE5641-AC(BC), PCE 5661-AC(BC), PCE 5691-AC(BC) PCE 5961-AC(BC), PCE 5991-AC(BC) , PCE 59131-AC(BC)

## 1-2. INS50-210/INS50-220

Driver model	INS50-210	INS50-220
Power source	Single phase 100-120V $\pm$ 10% 50/60Hz	Single phase 200-220V $\pm$ 10% 50/60Hz
Power consumption	620VA or less	850VA or less
Driving type	Star bi-polar type	
Output current	2.8A/phase	
Resolution	Basic step : 1, 2, 2.5, 5, 8, 10, 20, 25, 40, 50, 100, 125, 200, 250, 500, 1000 division	
Function	Auto-current down, Auto-current off, Input of output current off, Exciting timing output, Overheat output, Input of resolution selection	
Signal input	Photocoupler input; Input resistance 390 Input signal voltage: L : 0 - 0.5V, H : 4 - 5V 1 pulse type (PLUSE, CW/CCW), 2 pulse type (CW, CCW), CO, SEL	
Signal output	Photocoupler open-collector output, Limited capacity 25V 10mA or less, MONI, HEAT	
Dielectric Strength	No abnormality detected after the application of the below voltage among each terminal for one second in normal temperature and humidity. <ul style="list-style-type: none"> <li>• Power input: Motor leads collection terminal - PE terminal</li> <li>• Power input: Motor leads collection terminal - Signal I/O terminal</li> </ul>	
	2.0kV(60Hz)	3.0kV(60Hz)
Insulation Resistance	100M or higher with DC500V Meger applied in normal temperature and humidity. <ul style="list-style-type: none"> <li>• Power input: Motor leads collection terminal - PE terminal</li> <li>• Power input: Motor leads collection terminal - Signal I/O</li> </ul>	
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.	
Applicable Standard	EN60950	
Weight	1000 g	
Accessories	User's manual (This book), Connector brand: J.S.T. Housing ; XHP-2 $\times$ 1 pc. , Contact ; SXH-001T-P0.6 $\times$ 2 pcs.)	
Applicable Motor 	CE marking approved	PCE 5692-AC(BC), PCE 5962-AC(BC), PCE 5992-AC(BC) , PCE 59132-AC(BC)

## 2. Model number & Factory default

### 2-1. Model number of set

**INS50 - 110 - 5661BC**

Series name

Extension of set



#### List of motor and driver combination

Series name, INS50			
Extension of set	Motor model	CE marking	Driver model
5641AC(BC)	PCE 5641-AC(BC)	approved	INS50-110 INS50-120
5661AC(BC)	PCE 5661-AC(BC)		
5691AC(BC)	PCE 5691-AC(BC)		
5961AC(BC)	PCE 5961-AC(BC)		
5991AC(BC)	PCE 5991-AC(BC)		
59131AC(BC)	PCE 59131-AC(BC)		
5692AC(BC)	PCE 5692-AC(BC)	approved	INS50-210 INS50-220
5962AC(BC)	PCE 5962-AC(BC)		
5992AC(BC)	PCE 5992-AC(BC)		
59132AC(BC)	PCE 59132-AC(BC)		



Attention

- Please use our CE marked PCE series motor.
- Please use the motor in safety condition after careful confirmation of using condition, heating and ground setting if another motor than CE marked motor is used.

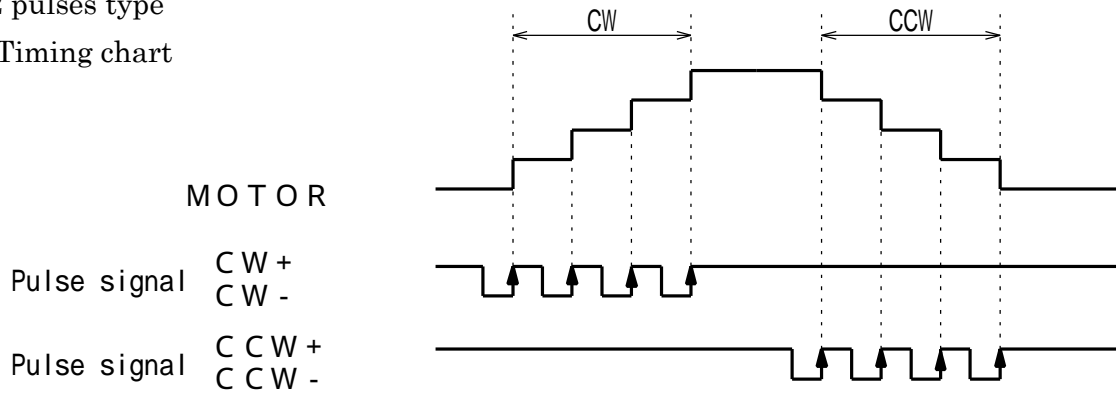


### 3. Pulse waveform



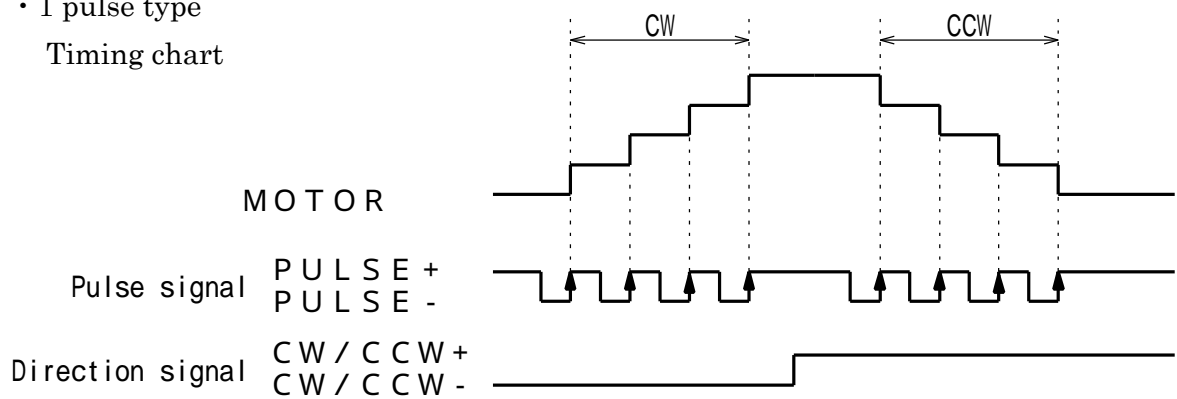
#### 3-1. Input pulse type

- 2 pulses type  
Timing chart



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

- 1 pulse type  
Timing chart

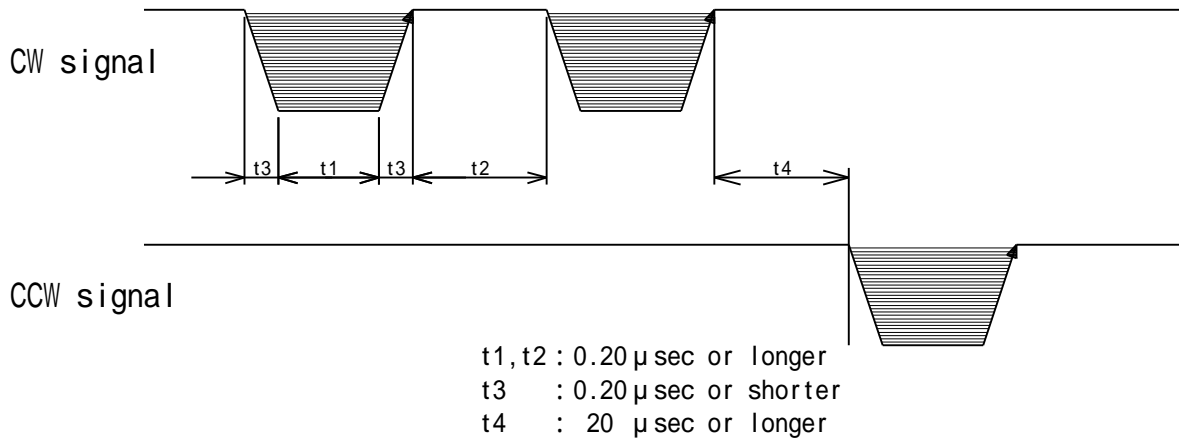


Motor starts to rotate by rising edge( ) of Pulse signal.

### 3-2. Pulse waveform

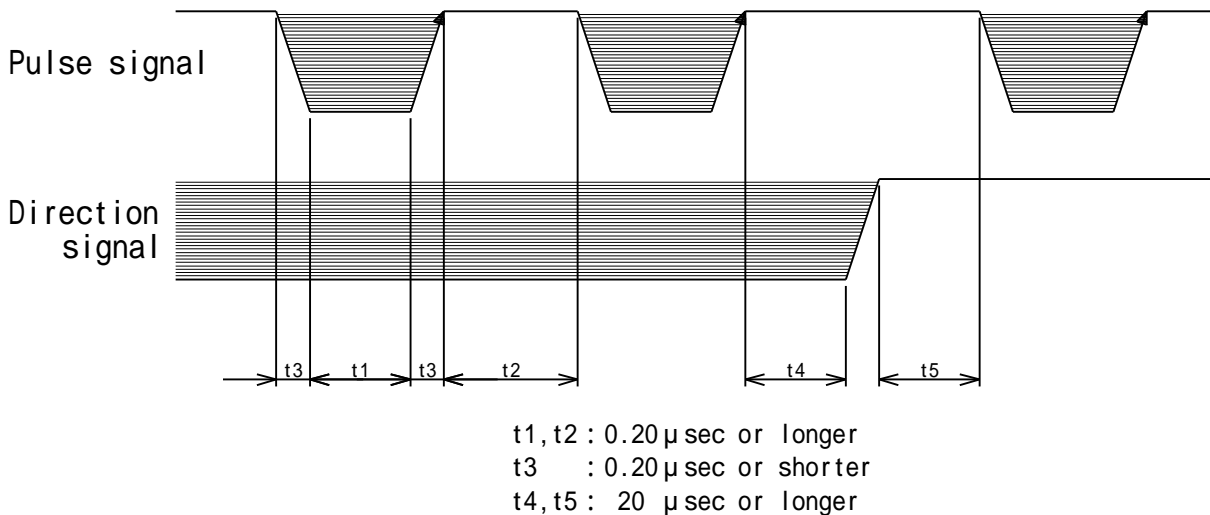


• 2 pulses type



- 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

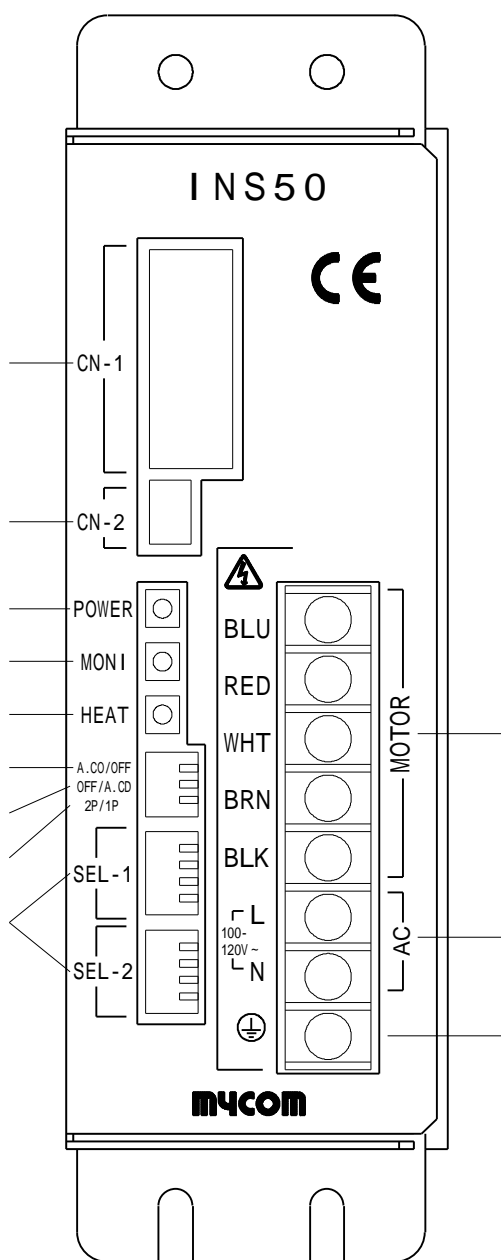
- 1 . If the signal exceeds the voltage of DC5V in use, please insert the series resistor near to output terminal(connector) of using controller so that 6.3mA ~ 15mA current pass.

Value of resistor to be inserted( ) =  $\frac{\text{Input voltage} - 5V}{6.3mA \sim 15mA}$  - Register value of wiring( )

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

## 4. Each part name and functions

### 4-1. Each part name



LED Power display LED

This lights on during power on.

Excitation home display LED

This lights on when excitation home.

Overheat display LED

This lights on when overheat.

A.CO/OFF (Switching of Auto current off function)

This turns valid/invalid the auto current off function.  
( except INS50-120 )

OFF/A.CD (Switching of Auto current down function)

This turns valid/invalid the auto current down  
function.

2P/1P, (Switching of input pulse type)

This switches the input pulse type

Resolution Config.

This selects the resolution of micro step.

Signal I/O connector

Various I/O signals are connected.

Resolution select input.

Resolution select signal is inputted.

Motor connector terminal

Connect in accordance with the color of  
Motor leads.

Power connector terminal

Connect power.

Protective earth terminal(PE)

Connect with the protective earth terminal of  
External diagram of front panel the machine.

( INS50-110 )

\*Note A figure is INS50-110/INS 50-210, and LN portion of AC becomes "200-220V - "  
in INS50-120/INS 50-220.

### 4-2. Description of function

#### 4-2-1. Power display LED (POWER)

This lights on during power on. Though POWER LED and MONI LED blink for a few seconds after power off, it is not abnormal. Only INS50-110/INS50-210

### 4-2-2. Excitation home display LED (MONI)

This lights on when the output excitation pattern is excitation home.

Then the signal is outputted to MONI terminal of CN-1.

### 4-2-3. Overheat display LED (HEAT)

This lights on when the temperature of internal heat-sink exceeds about 70 .

Then a signal is outputted to the HEAT output of CN-1.

### 4-2-4. Current off function (CO)

The signal between CO ± of CN-1 can control the excitation or non-excitation of motor.

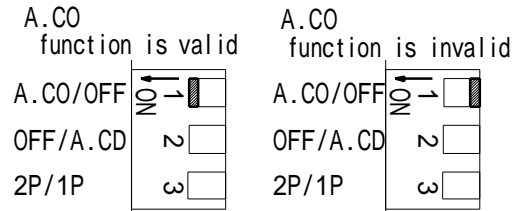
H level : excitation off (A photo-coupler is at the 'ON' time.)

L level (or no connection) : excitation on

### 4-2-5. Auto current off function (A.CO)

When the temperature of driver inside rises and becomes overheat condition, this function automatically excites off.

A.CO/OFF switch (4-1 External diagram ) can release the function.

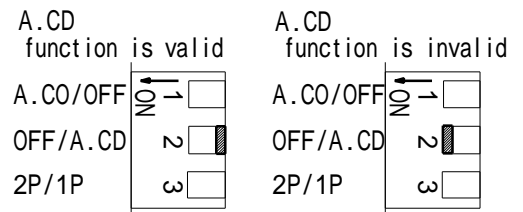


### 4-2-6. Auto current down function (A.CD)

This reduces the motor driving current to 50% of normal current and temperature rising of motor after the motor stops and 200ms later.

OFF/A.CD switch (4-1 External diagram ) can release the function.

(The auto-current-down function of INS50-120 is impossible to release. )

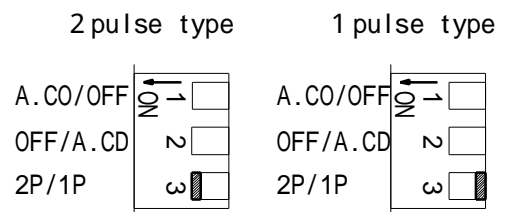


### 4-2-7. Pulse input type select switch (2P/1P)

2P/1P switch sets the driving pulse to 2 pulse type or 1

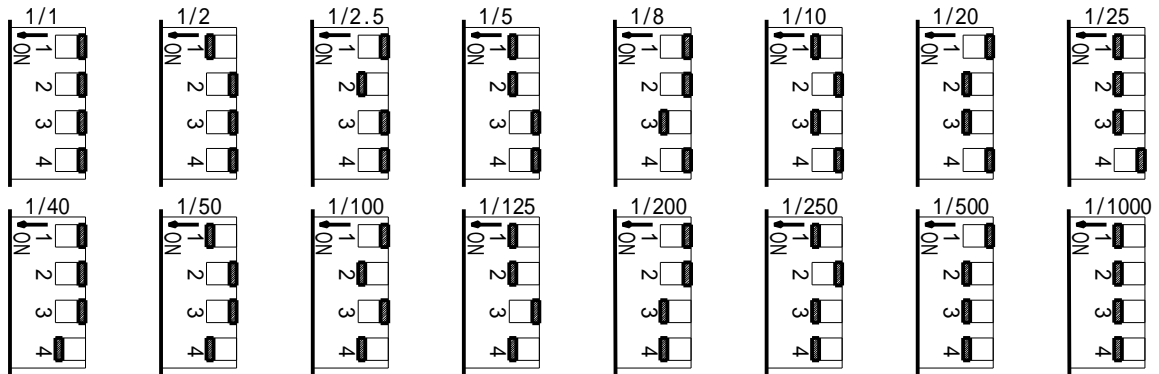
pulse type by 2P/1P switch (4-1 External diagram ).

Please refer 3. Pulse waveform about input type.



### 4-2-8. Resolution select switch (SEL-1, SEL-2)

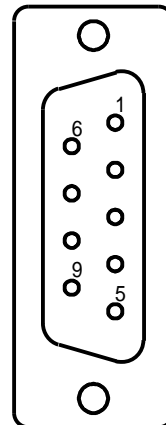
Resolution select switch(4-1.External diagram ) sets the resolution. Two sets of SEL-1 and SEL-2 can set 16 various resolutions individually. “Resolution select input”, CN-2 (External diagram ) selects which resolution setting is valid.



### 4-2-9. Signal I/O connector (CN-1)

This is to be connected with driving pulse, current off signal and various monitor signals.

Connector pin assignment			
1	CW+	6	CO-
2	CW -	7	MONI+
3	CCW+	8	HEAT+
4	CCW -	9	COM -
5	CO+		



(Front panel side)

Connector combination 9 pin D-sub connector Socket type

Connector : OMRON, XM2D-0901 equivalent

Hood : OMRON, XM2S-0911 equivalent ( M2.6 × 0.45 )

#### 4-2-10. Resolution Select signal input connector (CN-2)

This selects one of Resolution select switches (SEL-1 and SEL-2) to drive.

H level : The resolution set by SEL-2 is activated. (A photo-coupler is at the 'ON' time.)

L level (or no connection) : The resolution set by SEL-1 is activated.

Connector for assemble (accessory)

Housing : XHP-2,

Contact : SXH-001T-P0.6 (JST Mfg.Co.,Ltd.)

Pin assignment, 1 : SEL+, 2 : SEL -

\*Note: This resolution select function is invalid if any of SEL-1 or SEL-2 is set full step(1/1).  
There will be incorrect positioning.

\*Note: Do not change the resolution setting when the signal is being output. If it is changed, when the pulse is being outputted, the motor may cause incorrect positioning. The incorrect positioning is not occurred when the motor stops and the resolution is changed.

#### 4-2-11. Motor connector (MOTOR)

This is connected according to the motor lead color.



**Attention** • Please connect with motor which is suitable to output current specified at name plate.

#### 4-2-12. Power supply connector terminal (AC)

In case of 100V type driver, connect single-phase 100V-120V 50/60Hz power supply.

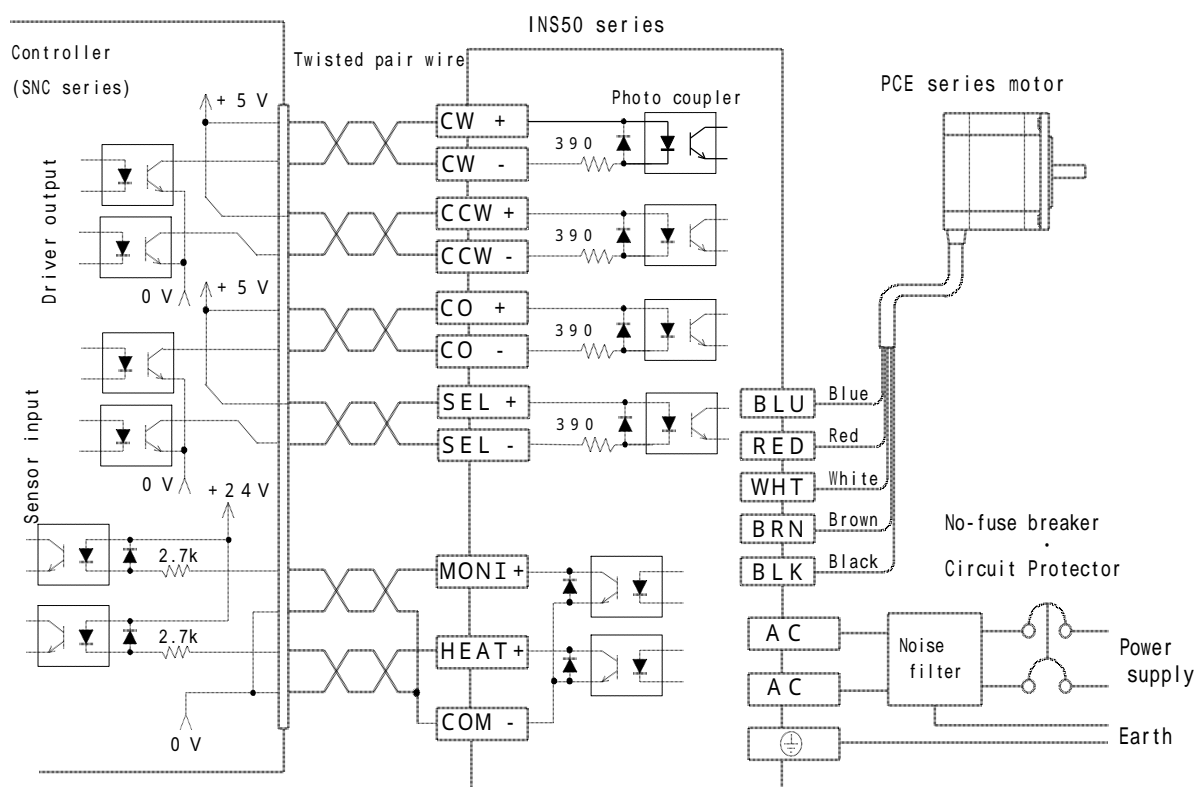
In case of 200V type driver, connect single-phase 200V-220V 50/60Hz power supply.

Use AWG18(0.75mm<sup>2</sup>) or bigger wire.

#### 4-2-13. Protective earth terminal (PE)

Connect with the protective earth terminal of the machine by thickness more than a power supply line for safety.

## 5. Example of connection



## 6. Wiring and Install condition

### 6-1. Wiring for motor lines and power lines

- When wiring, surely wire the protect earth line at first.
- If the motor line becomes longer, radiation noise can be depressed with shield wire using.
- Install noise filter at power input where noise sources exist near the driver.
- This driver has fuse inside, but use no-fuse-breaker or circuit protector of the capacity of below table for safety.
- It is very dangerous to connect AC power with motor output.

Driver model	Current capacity
INS50-110	5 A
INS50-120	3 A
INS50-210	8 A
INS50-220	5 A

### 6-2. Wiring of motor line

- The radiant noise can be depressed by shield cable equal to or bigger than AWG22(0.5mm<sup>2</sup>) in case that redundant radiant noise is trouble. F
- In case that the motor wiring is longer, please use the shield cable equal to or bigger than AWG22(0.5mm<sup>2</sup>) F

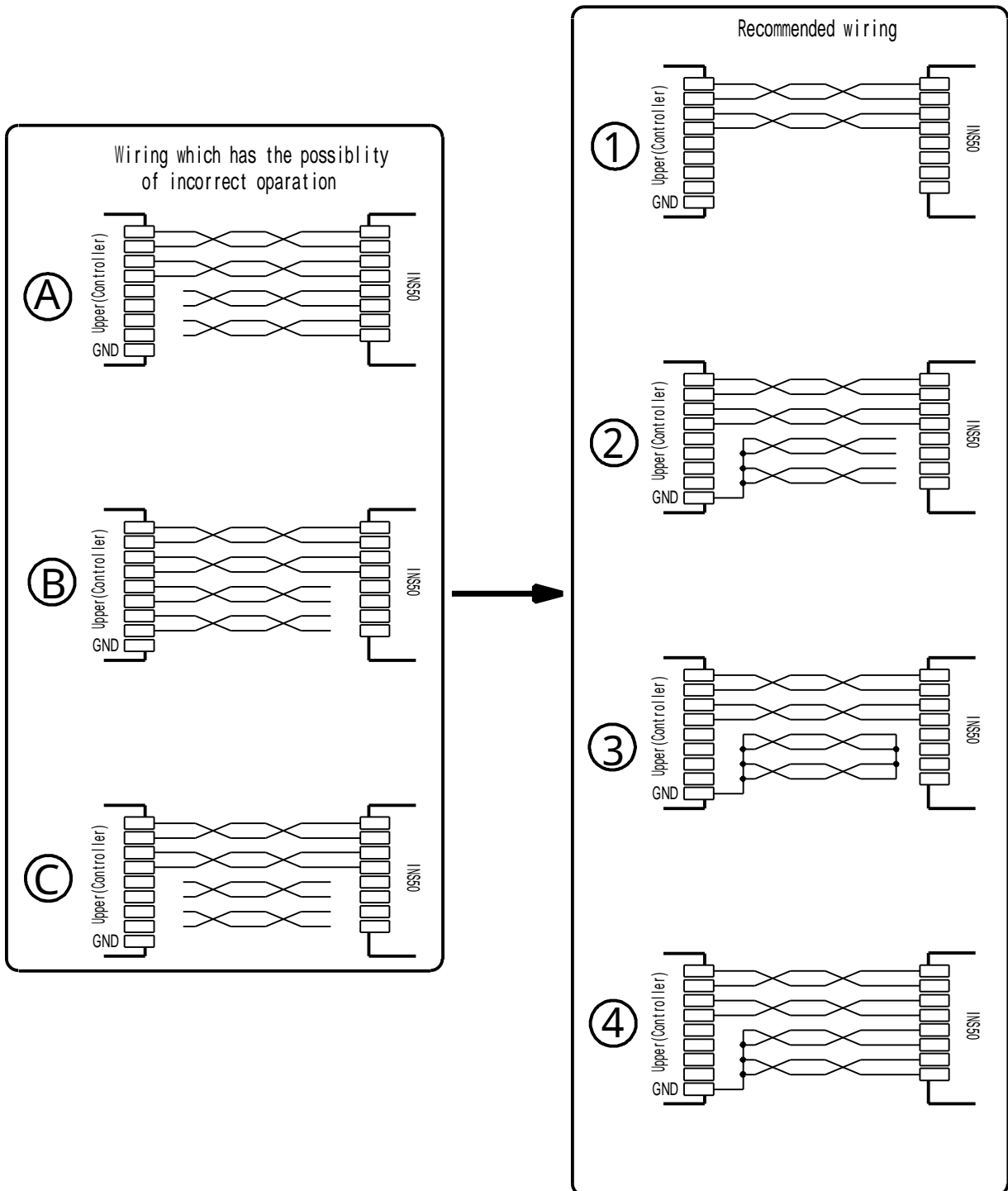
### 6-3. Wiring of signal line

If the following procedure is not made, there may be a cause of incorrect operation.

- Use bigger cable than AWG28 which suits with the connector.
- Use twisted pair line or shield line.

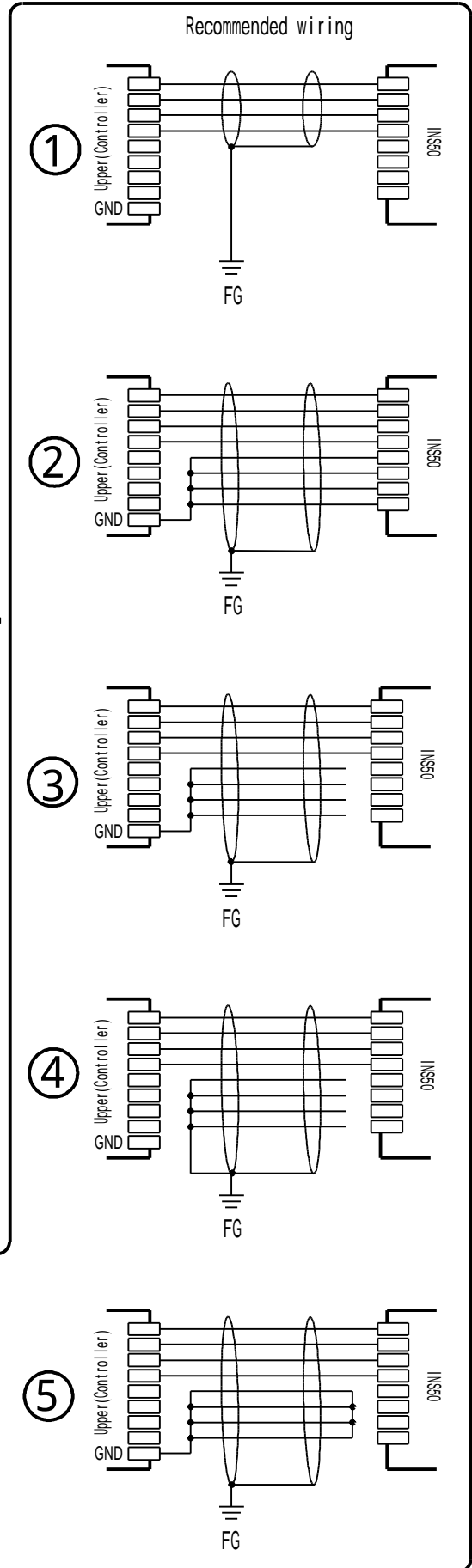
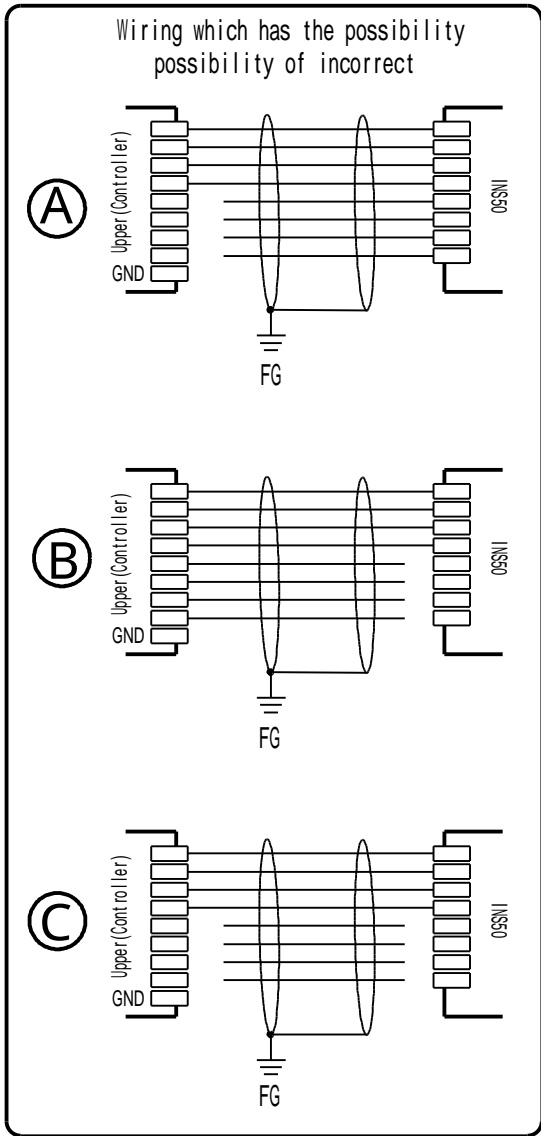
- of twisted pair wiring diagram is recommended in case of twisted pair line but select and use a suitable diagram of to depending on cable and environment. However do not wire as A to C.

Twisted pair wiring diagram



- of shield line wiring diagram is recommended in case of shield line but select and use a suitable diagram of to depending on cable and environment. However do not wire as to C.

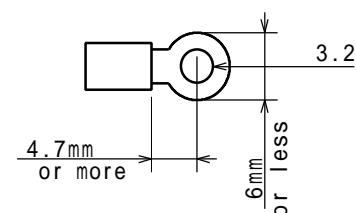
Shield line wiring diagram



## 6-4. Applicable solder-less terminal

Use insulated ring tongue terminal to connect with terminals.

V1.25-MS3(J.S.T), TGV1.25-3(NICHIFU) or equivalent




## 6-5. Tightening torque for terminal block.



Do not add vertical force against screw when connecting with terminal.

Please tighten the screw within torque of  $0.392 \sim 0.686\text{N} \cdot \text{m}$  ( $4 \sim 7\text{Kgf} \cdot \text{cm}$ ) at stopping.

## 6-6. Install condition

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

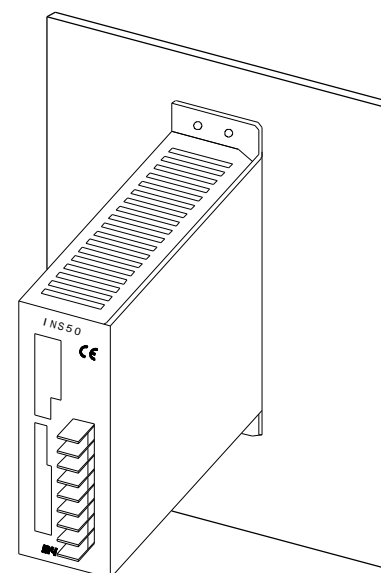
Over voltage category: Category II, Material group III

Pollution degree: Class 2

Protection structure: IP20

Protection against electric shock: Class I component

- Fix driver on heat conductive metal plate tightly.
- Put 3cm or more space between each driver and fix the drivers when multiple drivers are arranged.
- Pay attention not to close the side slits of driver.
- Put this unit vertically because this unit radiates by natural convection. (INS50-110 and INS50-120) see right fig.
- Confirm that the driver environmental temperature is less than 40 °C when overheat LED lights.
- Use M4 screws of “thickness of installing place plus 3”
- Because this unit uses high speed photocoupler for the part of input pulse, use the shield line for signal cable.
- Please do not connect the signal line which is not used. It becomes the cause of incorrect operation.

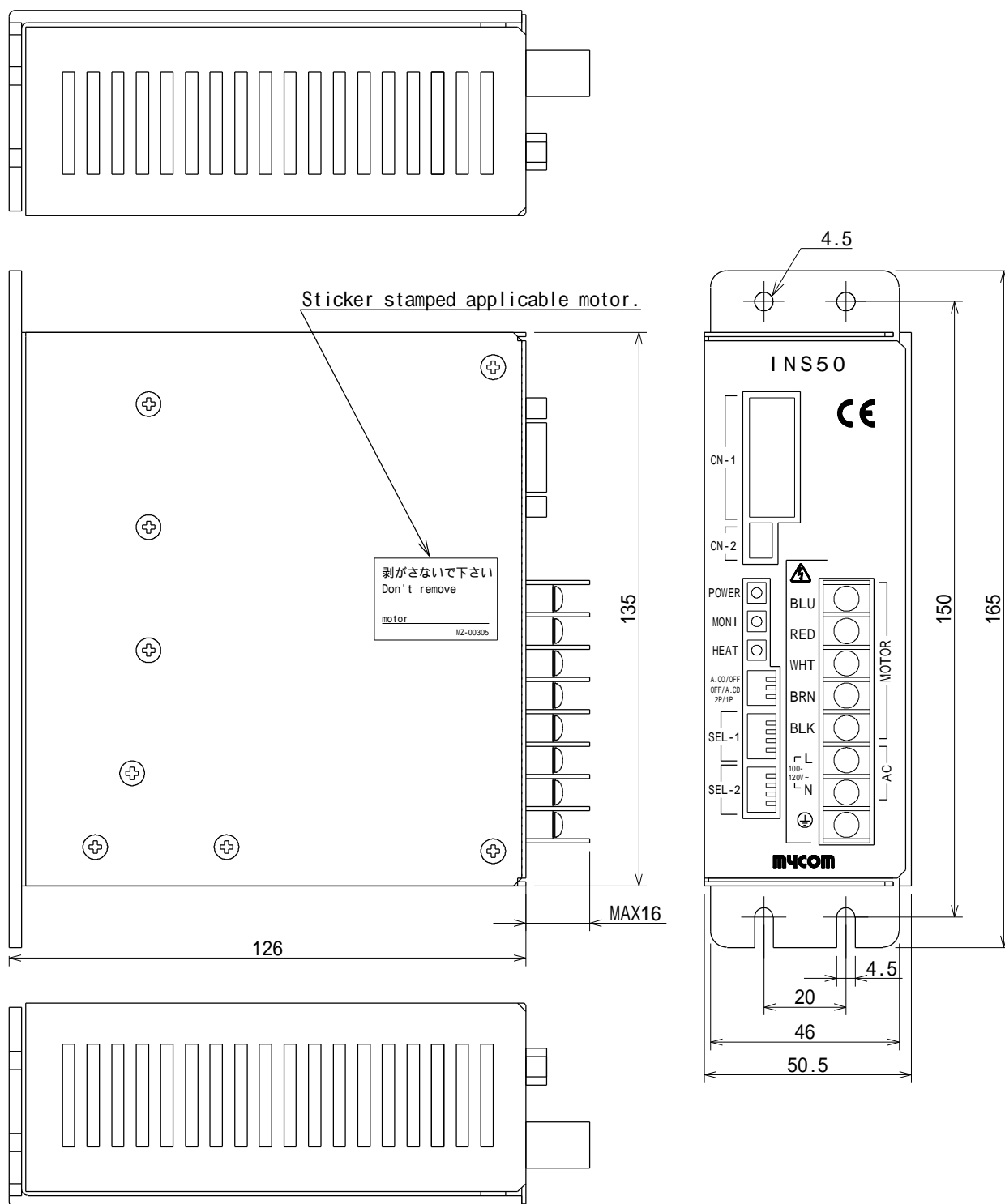


## Caution

There is a possibility that driver chassis temperature exceeds 60 °C depending on environmental condition.

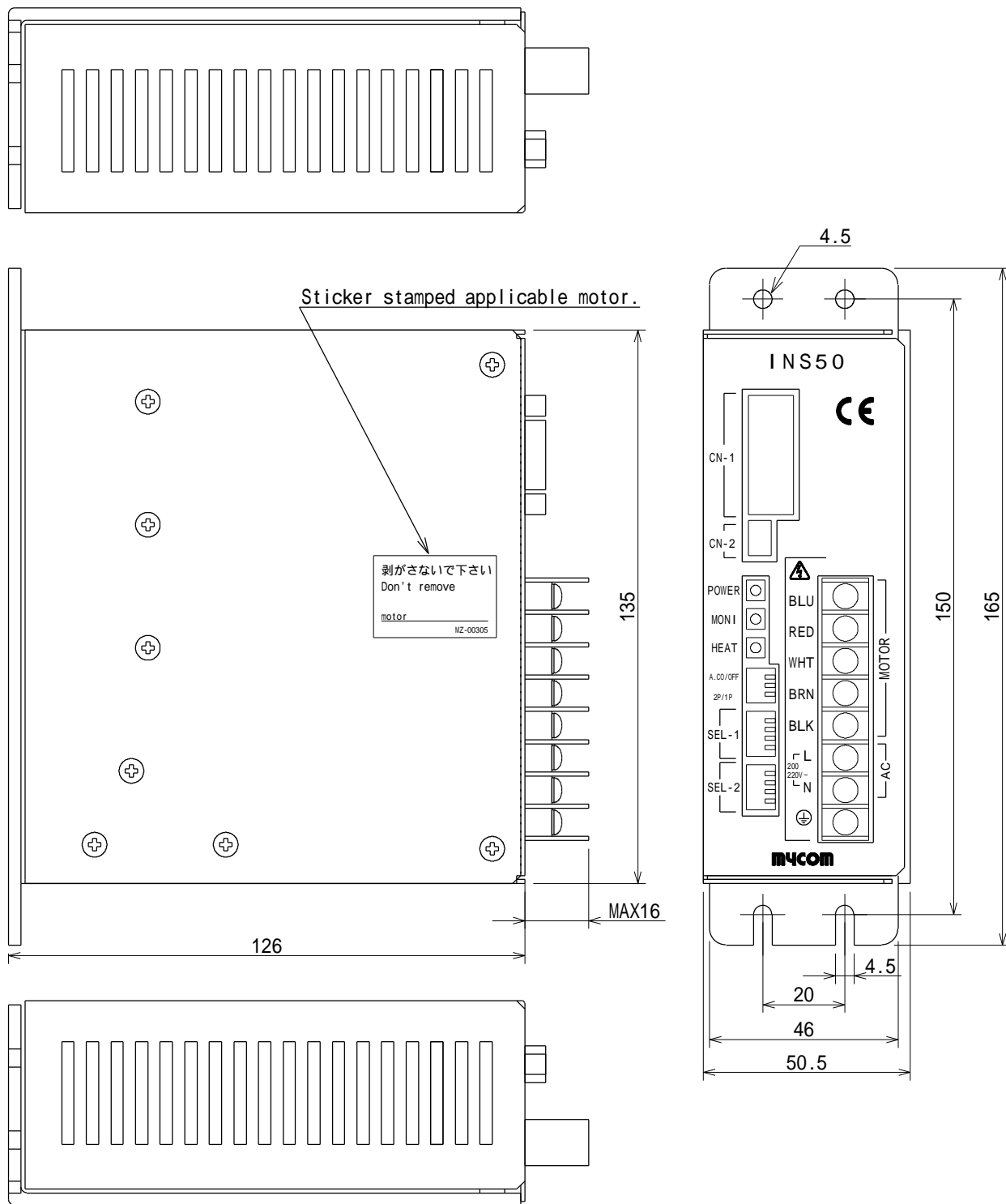
## 7. Dimension

### 7-1. Dimension of INS50-110



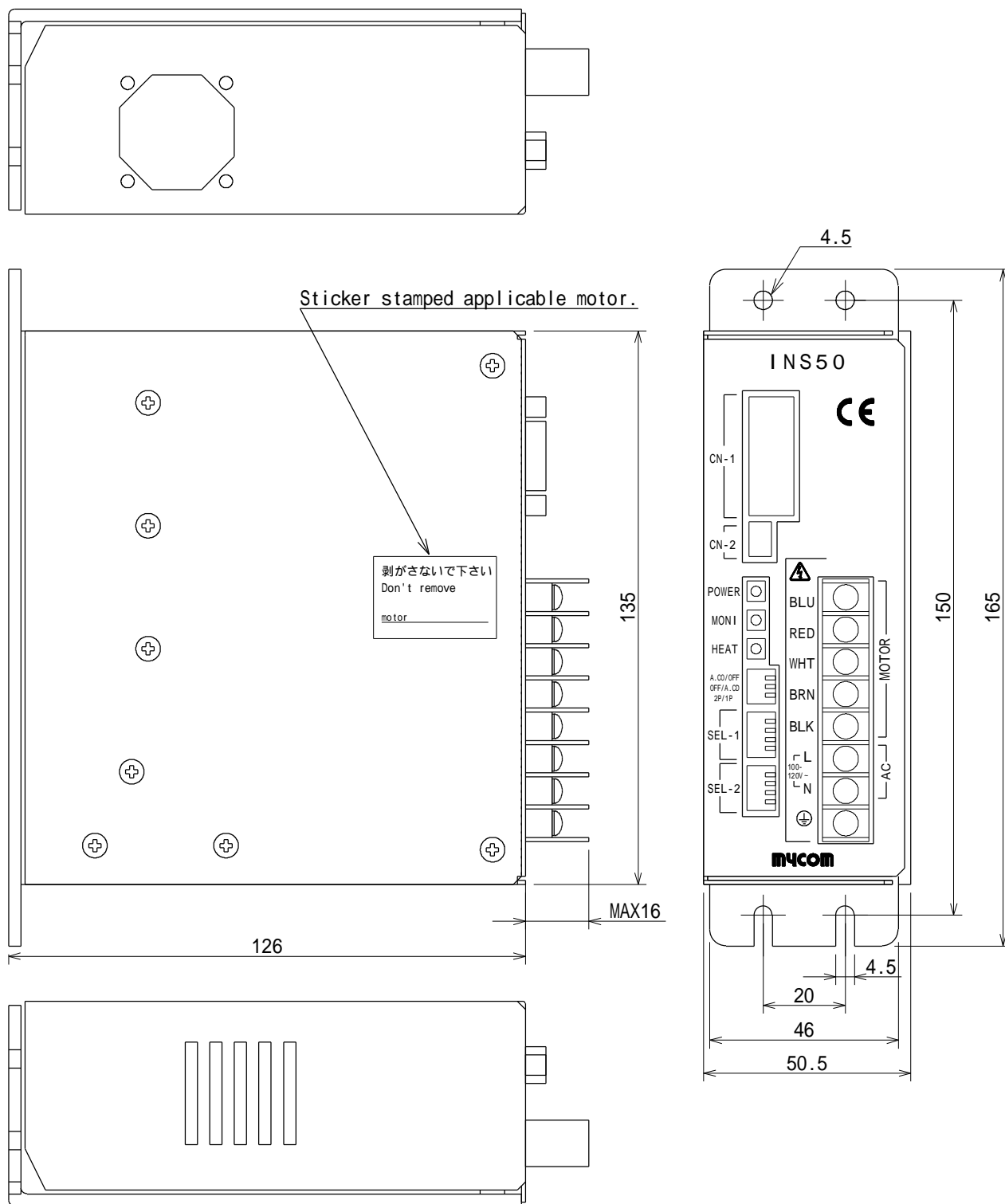
Unit : mm, The screw head is not included.

7-2. Dimension of INS50-120



Unit : mm, The screw head is not included.

7-3. Dimension of INS50-210/INS50-220



Unit : mm, The screw head is not included.

The dimension is INS50-210. In case of INS50-220, LN portion of AC is "200-220V ~".

## 8. List of equivalent motor

	Standard motor	Equivalent motor
Output current 1.4A/phase	PCE5641-AC(BC)	PF564-A(B)
	PCE5661-AC(BC)	PF566-A(B)
	PCE5691-AC(BC)	PF569-A(B)
	PCE5961-AC(BC)	PF596-A(B)
	PCE5991-AC(BC)	PF599-A(B)
	PCE59131-AC(BC)	PF5913-A(B)
Output current 2.8A/phase	PCE5692-AC(BC)	PF569H-A(B)
	PCE5962-AC(BC)	PF596H-A(B)
	PCE5992-AC(BC)	PF599H-A(B)
	PCE59132-AC(BC)	PF5913H-A(B)

Only numeral part of standard motor is printed at the applicable motor sticker. Therefore, for example, in case of PCE5641-AC(BC) and PF564-A(B), “5641” is printed at the applicable motor sticker.

## 9.Option

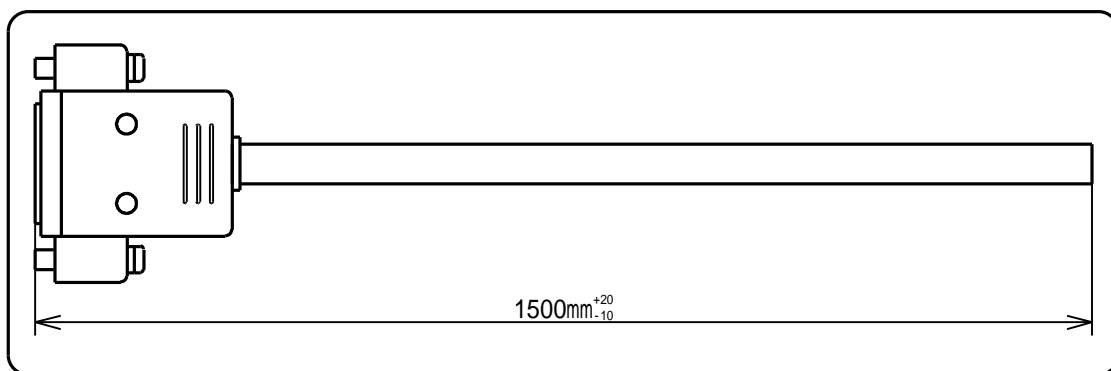
It is available to supply the following optional cables which have covering connector at the one side.

- C N 1 : Pulse cable

Model number : OPC-DS9P15

Connector : 9 pin D-sub

Cable : AWG 28 Multi-heart cable with a shield 1.5m



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Connect the unused cables with the ground of the upper. Otherwise it may become the cause of incorrect operation. Please refer 6-3 “Wiring of signal line” for the detail.

- Motor Cable

Model number : OMC-NC5P15

Cable : AWG 20 Both-ends end Shield-less multi-heart cable 1.5m

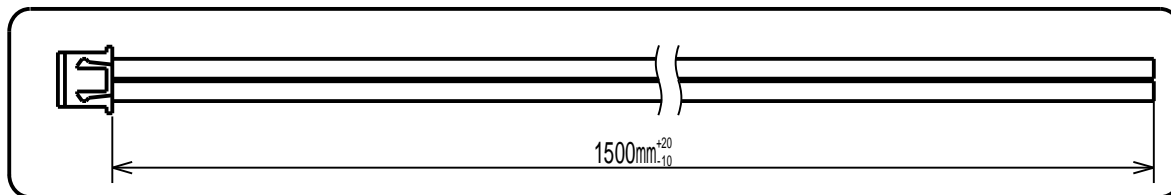
F

- C N 2 : resolution -- a change cable

Model number : OSC-XH2P15

Connector : XHP - 2

Cable : AWG 22 Loose cable 1.5m



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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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