



5 phase stepping motor Driver

NanoDrive

INS500 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 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.
- 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

INS500-020 /INS500-120

Driver model #	INS500-020	INS500-120
Power source	DC24V ± 10%	
Power consumption	36W or less	60W or less
Driving type	Star bi-polar constant current type	
Output current	0.75A/phase	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, Input of output current off, Exciting timing output, Input of resolution selection	
Signal input	Photocoupler input; Input resistance 390 Input signal voltage: L :0 - 0.5V, H : 4 - 5V 1 pulse (PLUSE, CW/CCW), 2 pulse (CW, CCW), CO, SEL	
Signal output	Photocoupler open-collector output, Limited capacity 25V 10mA or less, MONI	
Insulation Resistance	100M or more with applied DC500V megger in normal temperature and humidity. • Power input : Motor leads collection terminal - chassis • Power input : Motor leads collection 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.	
Applicable Standard	EN60950	
Weight	240g. (with cover 270g)	
Accessories	User's manual (This book), Connector(J.A.E.), Housing : each of IL-2S-S3L, IL-5S-S3L and IL-9S-S3L Contact : 16 pcs. of IL-C2-10000	
Applicable motor 	PEE533-A(B), PEE535-A(B), PCE5431-AC(BC), PCE5441-AC(BC), PCE5451-AC(BC)	PCE5641-AC(BC), PCE5661-AC(BC), PCE5691-AC(BC)

The PEE series motors of INS500-020 do not support CE.

## 2. Model number & Factory default

### 2-1. Model number of set

**INS500 - 120 - 5661BC**

Series name

Extension of set



List of motor and driver combination

Series name, INS500			
Extension of set	Motor model #	CE marking	Driver model #
533A(B)	PEE533-A(B)	Not approved	INS500-020
535A(B)	PEE535-A(B)		
5431AC(BC)	PCE5431-AC(BC)	approved	
5441AC(BC)	PCE5441-AC(BC)		
5451AC(BC)	PCE5451-AC(BC)		
5641AC(BC)	PCE5641-AC(BC)	approved	INS500-120
5661AC(BC)	PCE5661-AC(BC)		
5691AC(BC)	PCE5691-AC(BC)		

### 2-2. Driver model number

**INS500 - 1 2 0**

Series name

Cover,

L : Without cover

None : With cover

Power source,

2 : DC24V

Phase current,

0 : 0.75A/phase,

1 : 1.4A/phase

### 2-3. Factory default

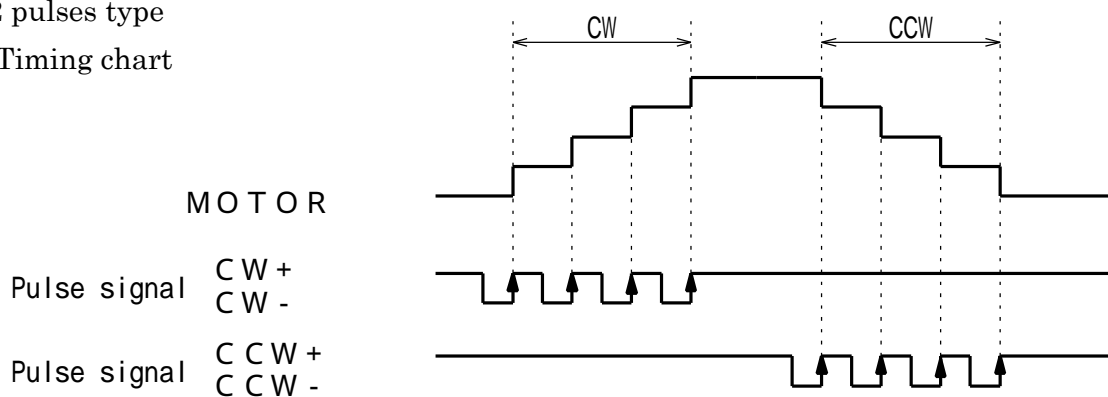
Driver model number	INS500-020	INS500-120
Phase current	0.75 A/phase	1.4 A/phase
Current down value	0.4 A/phase	0.7 A/phase
Auto current down function	Auto current down function, valid	
Input type	2 pulse type	
Resolution	1/1(FULL)	

### 3. Pulse waveform

#### 3-1. Input pulse type

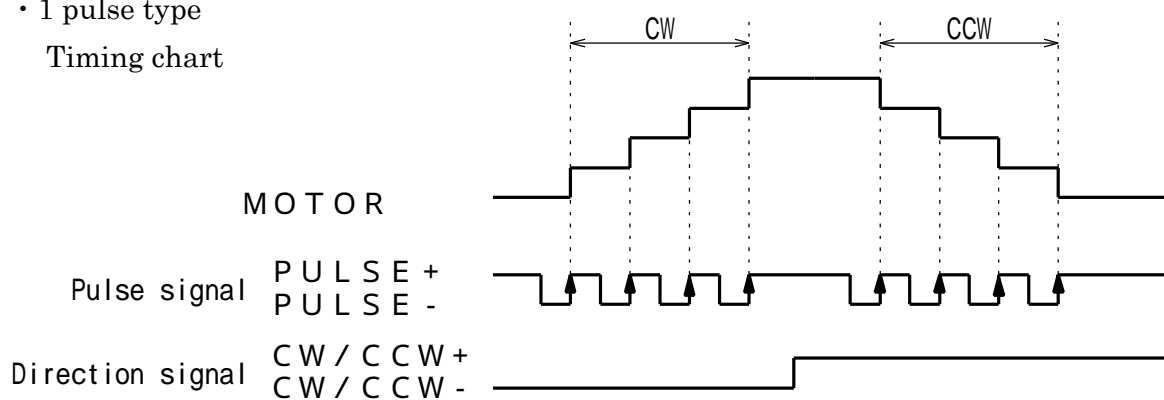


- 2 pulses type  
Timing chart



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

- 1 pulse type  
Timing chart

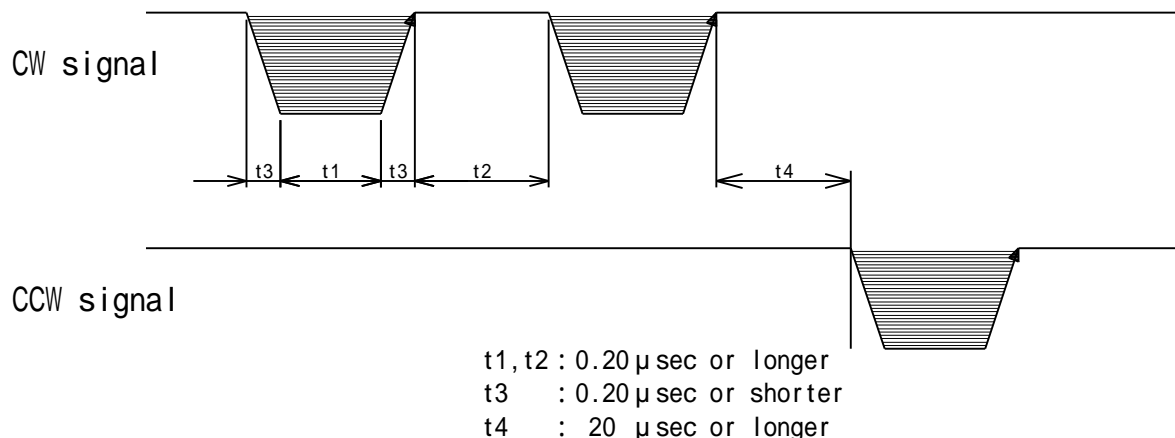


Motor starts to rotate by rising edge( ) of Pulse signal.

### 3-2. Pulse waveform

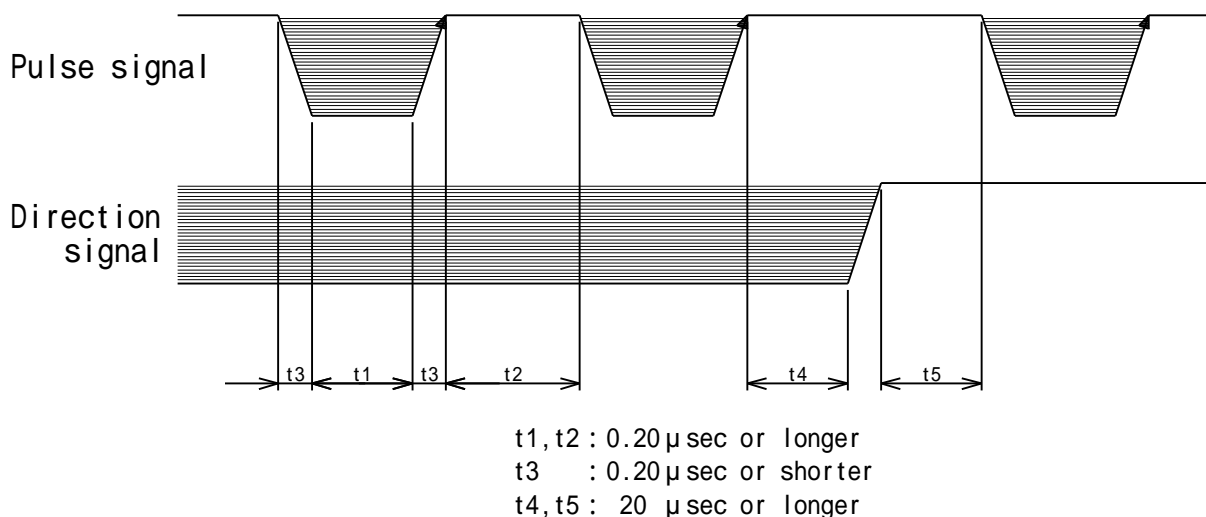


• 2 pulses type



- 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

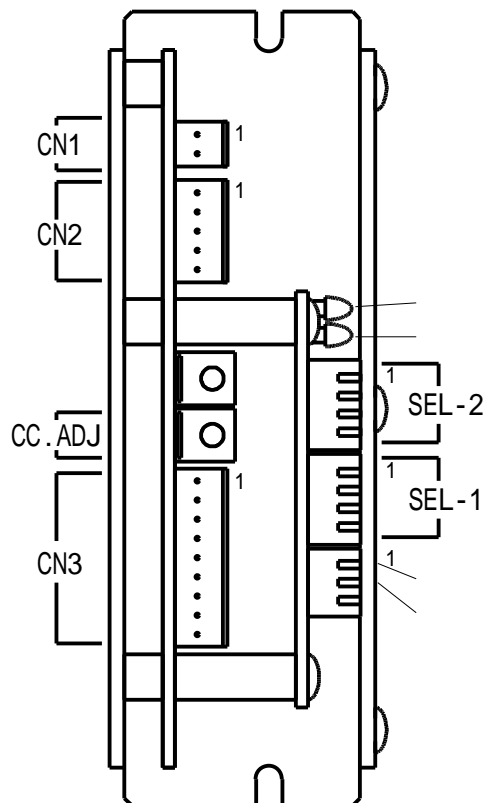
- 1 . If the signal exceeds the voltage of DC5V in use, please insert the series resistor near to output terminal(connector) of using controller so that 6.3mA ~ 15mA current pass.

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



Power display LED (POWER)

This lights on during power on.

Excitation home display LED(MONI)

This lights on when excitation home.

Resolution select switch (SEL-1, SEL-2)

This selects the resolution of micro step.

Switching of Auto current down function(A.CD)

This turns valid/invalid the auto current down function.

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

This switches the input pulse type

Power connector(CN-1)

Connect power.

Motor connector(CN-2)

Connect in accordance with the color of motor Leads.

Current adjust volume for current down (CC.ADJ)

This adjusts the current when current down.

Signal I/O connector(CN-3)

Various I/O signals are connected.

Dimension of INS500-020L/INS500-120L

\*Note; Please refer "7-2. dimension of INS500-020/INS500-120" for INS500-020/INS500-120.

### 4-2. Description of function

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

This lights on during power on.

#### 4-2-2. Excitation home display LED (MONI, Pin # CN-3 8-9)

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

Then the signal is outputted to MONI terminal of CN-3. Please refer 5. Example of wiring.

### 4-2-3. Current off function (CO, Pin # CN-3 7-5)

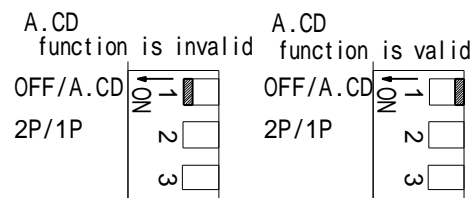
The signal between +COM and -CO of CN-3 can control the excitation or non-excitation of motor. Please refer “5. Example of wiring”.

L level : excitation off (A photo-coupler is at the 'ON' time.) F  
 H level (or no connection): excitation on

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

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

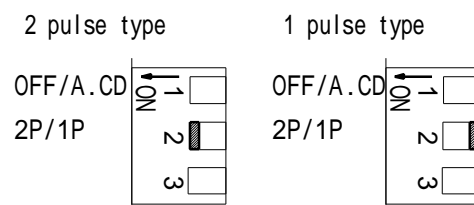
OFF/A.CD switch (4-1, Part name ) can release the function.



### 4-2-5. Pulse input type select switch (2P/1P)

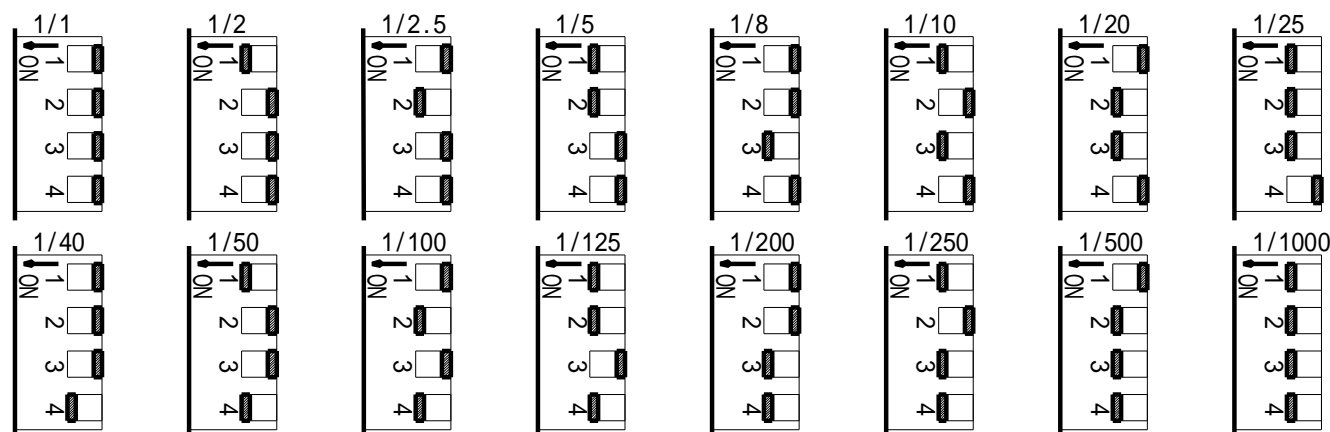
2P/1P switch sets the driving pulse to 2 pulse type or 1 pulse type by 2P/1P switch (4-1 External diagram ).

Please refer “3. Pulse wave” about input type.



### 4-2-6. Resolution select switch (SEL-1, SEL-2)

Resolution select switch(4-1.Part name ) sets the resolution. Two sets of SEL-1 and SEL-2 can set 16 various resolutions individually. Please refer “4-2-7. Resolution select signal(CN-3)” to select which resolution setting is valid.



#### 4-2-7. Resolution switching signal (CN-3, 7-6 pin)

This selects one of Resolution select switches (SEL-1 and SEL-2) to drive. Refer “5. Example of wiring”.

- L level: The resolution set by SEL-2 is activated.(A photo-coupler is at the 'ON' time.) F  
 H level (or no connection): The resolution set by SEL-1 is activated.

\*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 when switching.

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

#### 4-2-8. Current adjusting volume of current down (CC.ADJ)

During current down status the motor driving current is adjustable by the volume of C.C.ADJ (4-1. Part name ).

INS500-020 : Within about 40 to 80 percent of normal driving current

INS500-120 : Within about 30 to 80 percent of normal driving current



Attention

Please turn the volume within the range of torque of 0.98 ~ 19.6mN · m(10 ~ 200gf · cm). G

#### 4-2-9. Power supply connector (CN-1)

DC+24V and 0V are connected.

Connector pin assignment	
1	+24V
2	0V

#### 4-2-10. Motor connector (CN-2)

This is connected according to the motor lead color.

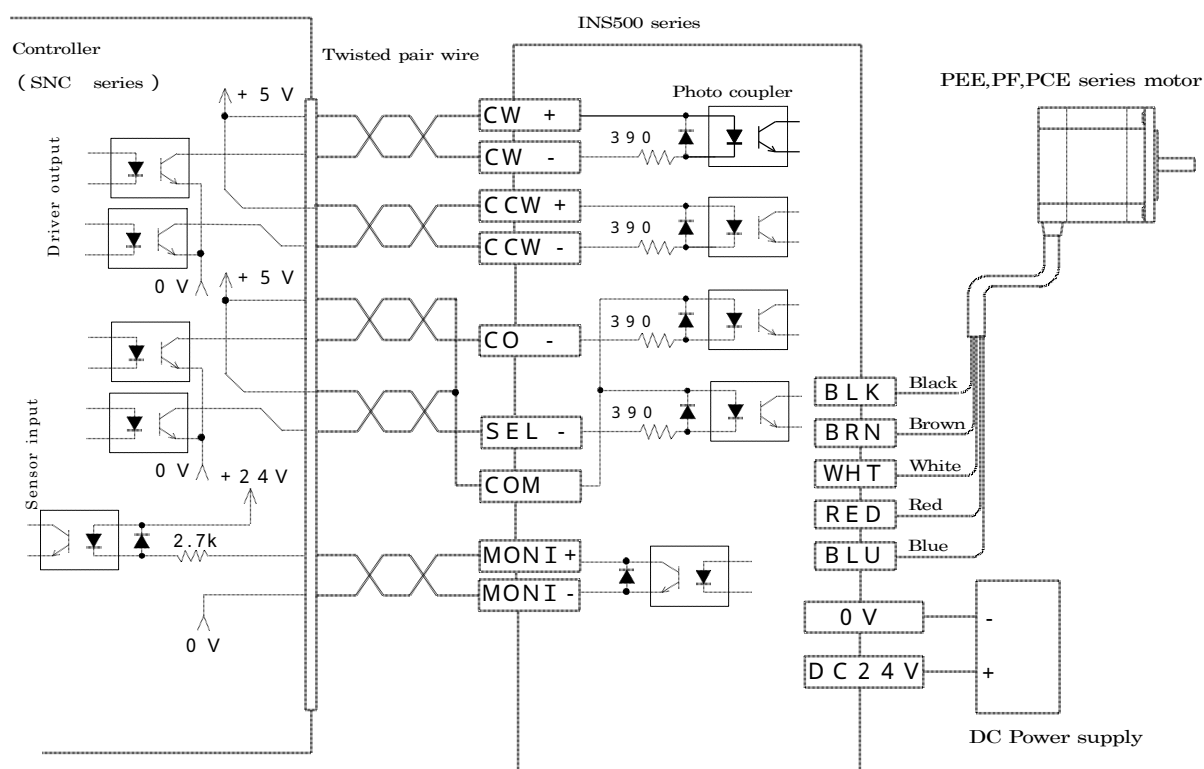
Connector pin assignment			
1	BLU	4	BRN
2	RED	5	BLK
3	WHT		

#### 4-2-11. Signal I/O connector (CN-3)

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

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

## 5. Example Of connection



## 6. Wiring and Install condition

### 6-1. Wiring of power line

- Use DC power supply built in soft start function. Do not connect switch between the driver and power supply.
- Install noise filter at power input if noise sources exist near the driver.
- Install noise filter at power input if there are effects of power noise.

### 6-2. Wiring of motor line

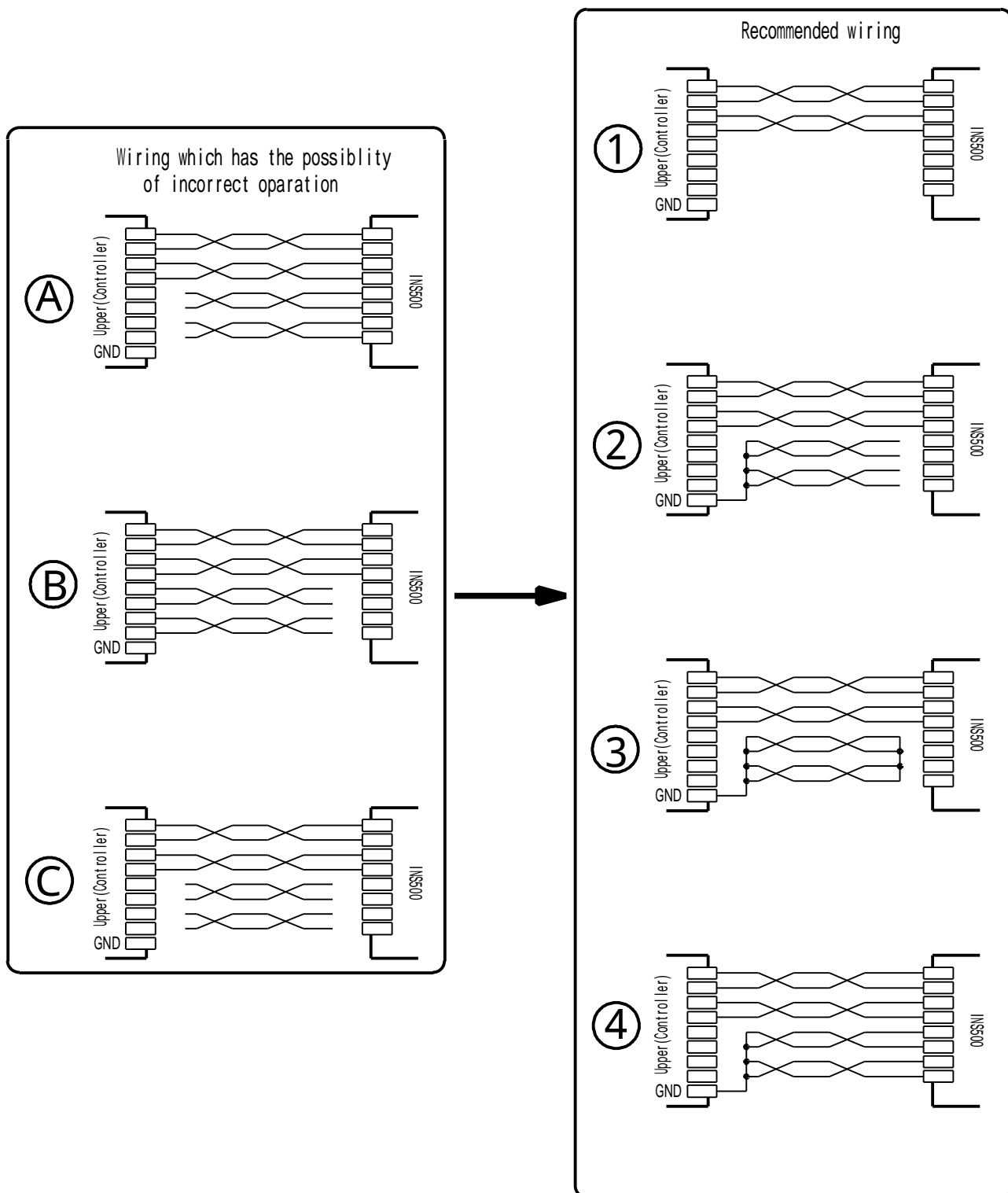
- The radiant noise can be depressed by shield cable equal to or bigger than AWG22(0.5mm<sup>2</sup>) in case that redundant radiant noise is trouble. E
- In case that the motor wiring is longer, please use the shield cable equal to or bigger than AWG22(0.5mm<sup>2</sup>) E

### 6-3. Wiring of signal line

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

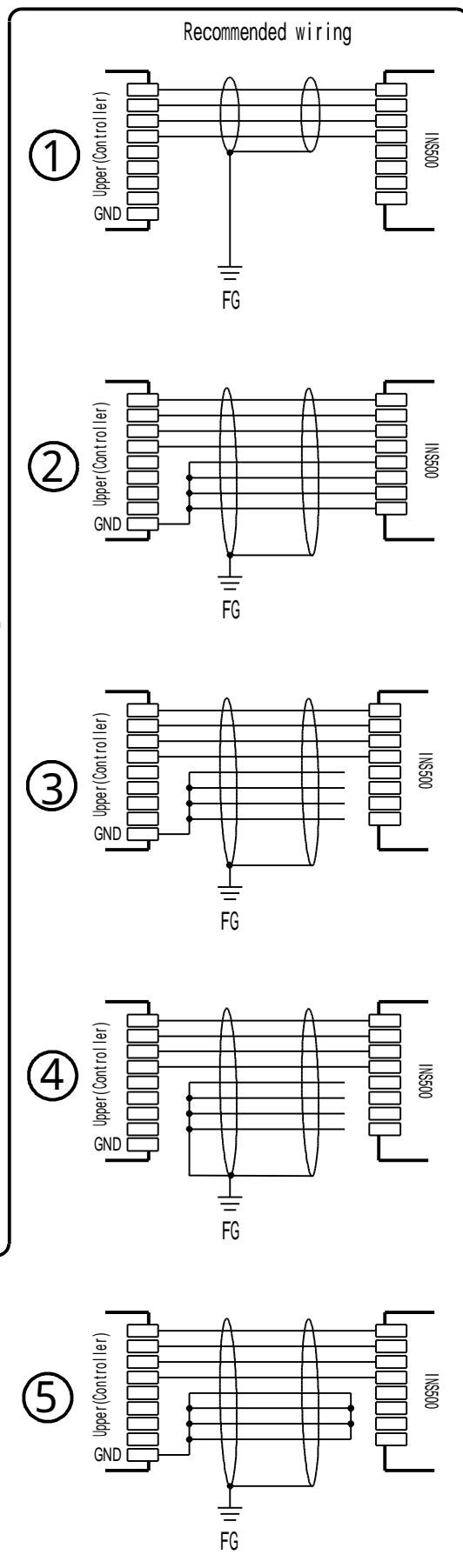
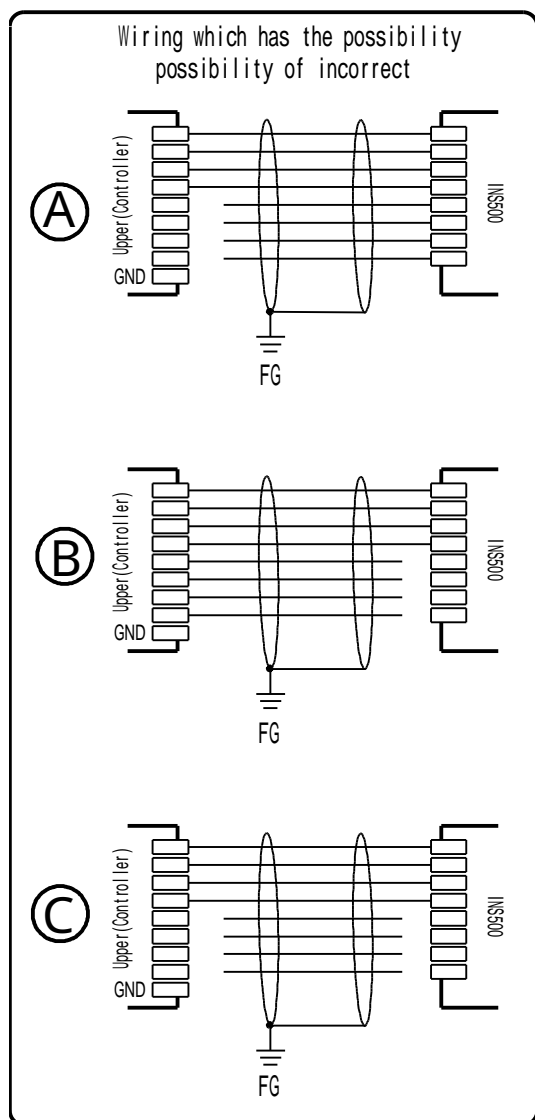
- Use bigger cable than AWG28 which suits with the connector.
- Use twisted pair line or shield line.
- of twisted pair wiring diagram is recommended in case of twisted pair line but select and use a suitable diagram of to depending on cable and environment. However do not wire as A to C.

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 A to C.

Shield line wiring diagram



## 6-4. Install condition

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

Over voltage category: Category I, Material group

Pollution degree: Class 2

Protection structure : IP20 (INS500-020/120)

: IP00 (INS500-020L/120L)

Protection against electric shock: Class component

### 6-4-1. In case of Without cover type

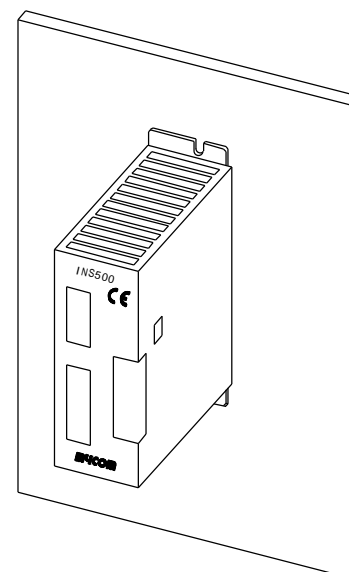
- Fix the driver on heat conductive metal plate tightly.
- Put 3cm or more space between each driver and fix the drivers when multiple drivers are arranged.
- Because this unit uses high speed photo coupler for the part of input pulse, use the shield line for signal line
- Use M3 screws of length of “thickness of installing place plus 3mm”.

### 6-4-2. With cover type

- Fix the driver on heat conductive metal plate tightly.
- Put 3cm or more space between each driver and fix the drivers when multiple drivers are arranged.
- Because this unit uses high speed photo coupler for the part of input pulse, use the shield line for signal line
- Use M3 screws of length of “thickness of installing place plus 3mm”.
- Pay attention not to close the side slits of the driver.
- Put this unit vertically because this unit radiates by natural convection.

see right fig.

- Please do not connect the signal line which is not used.  
It becomes the cause of incorrect operation.

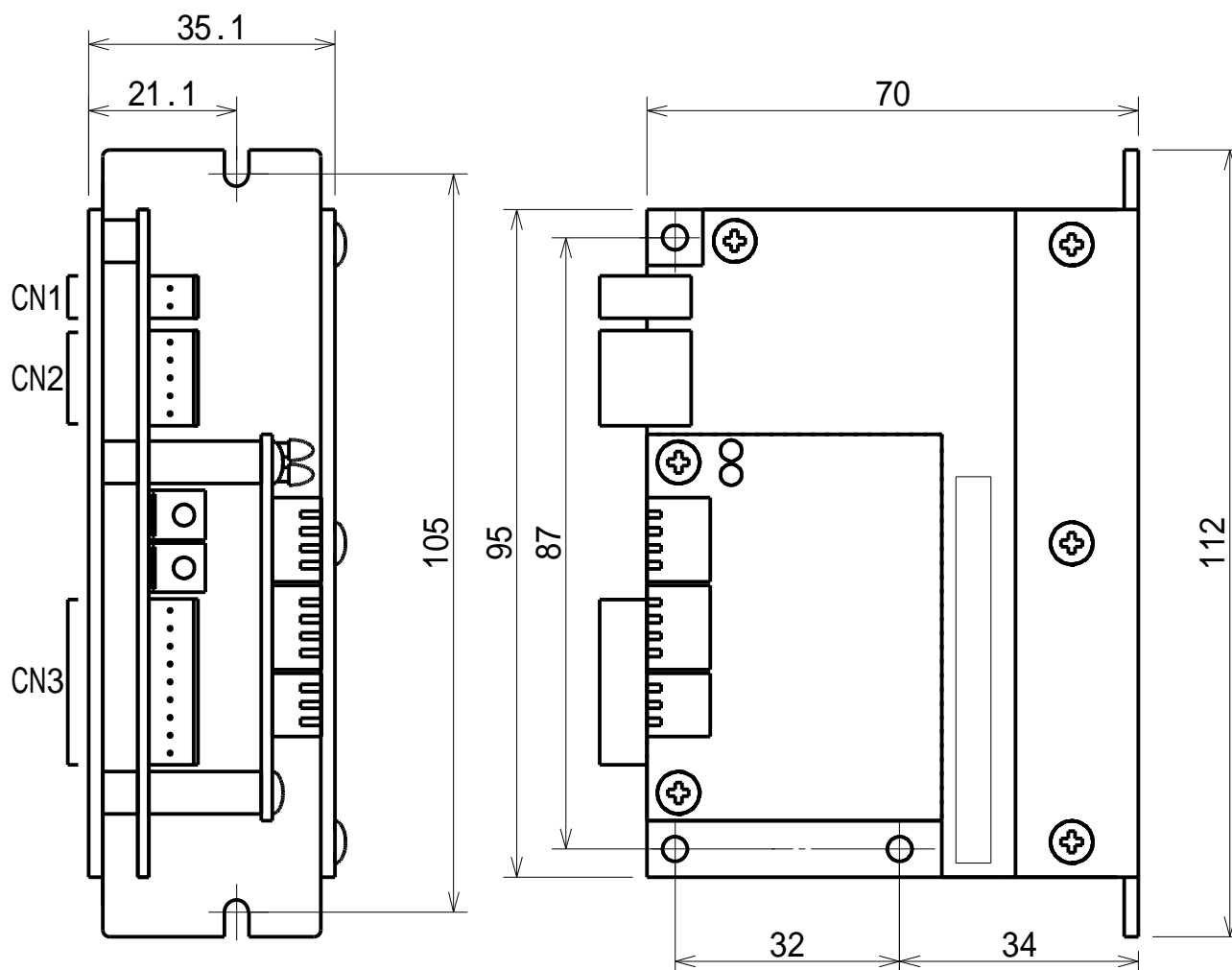


## Caution

Use the driver in the condition that the heat sink temperature is under 60 °C.

## 7. Dimension

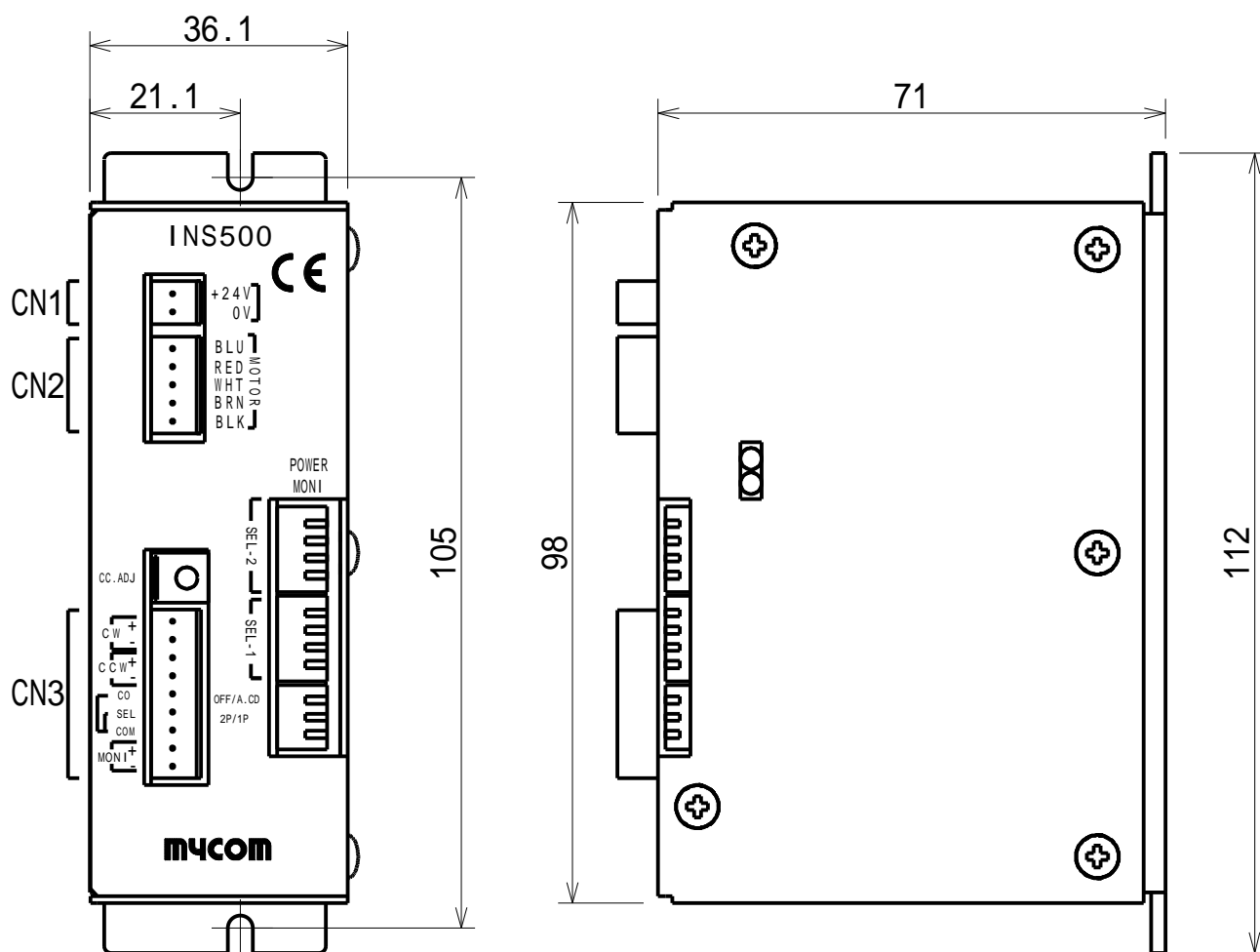
### 7-1. Dimension of INS500-020L/INS500-120L



Unit: mm. The screw head is not included.

## 7-2. Dimension of INS500-020/INS500-120

Unit : mm. The screw head is not included.



## 8. Option

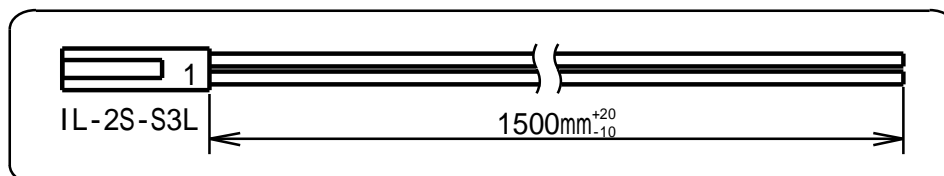
It is available to supply the following optional cables which have covering connector at the one side.

- CN1 : Power cable

Model number : OPC-IL2P15

Connector : IL-2S-S3L

Cable : AWG22 Loose cable 1.5m

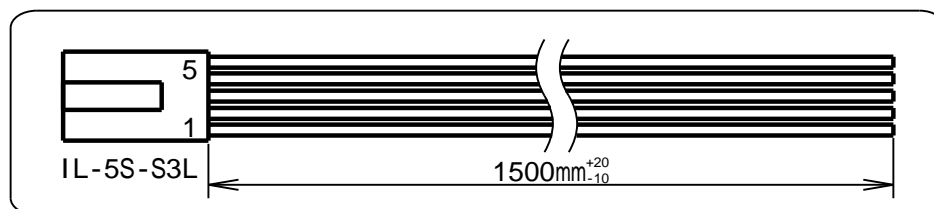


- CN2 : Motor cable

Model number : OMC-IL5P15

Connector : IL-5S-S3L

Cable : AWG22 Loose cable 1.5m

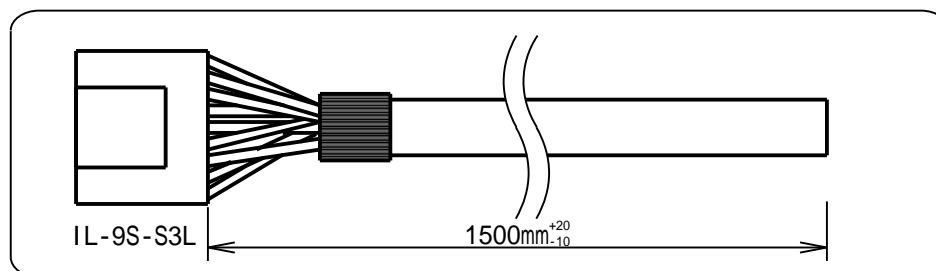


- C N 3 : Pulse cable

Model number : OSC-IL9P15

Connector : IL-9S-S3L

Cable : AWG24 Shield cable 1.5m



Because the cable of which insulator color is violet is not used, please connect with the ground of the upper.

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.

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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