



2 phase stepping motor Driver

NanoDrive

INS20 series

【 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

INS20-010 /INS20-210

Driver model #	INS20-010	INS20-210					
Power source	Single phase 100-120V \pm 10% 50/60Hz						
Power consumption	150VA or less	300VA or less					
Driving type	Uni-Polar constant current type						
Driving current	0.8A/phase Max	2.0A/phase Max					
Resolution	Basic step : 1, 2, 2.5, 4,5, 8, 10, 20, 25, 40, 50, 100, 200, 250, 500, 1000 division						
Function	Auto-current down, Input of output current off, Exciting timing output,						
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						
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"> • Power input: Motor leads collection terminal - PE terminal • Power input: Motor leads collection terminal - Signal I/O terminal 						
Insulation Resistance	2.0kV(60Hz)						
	100M or more with applied DC500V megger in normal temperature and humidity.						
Operating environment temperature	<ul style="list-style-type: none"> • Power input : Motor leads collection terminal - chassis • Power input : Motor leads collection terminal - Signal I/O terminal 						
	0 to +40 No freezing						
Operating environment humidity	Less than 80%, No condensation						
Storing environment temperature	-10 to +60 No freezing						
	Less than 80%, No condensation						
Storing humidity	Less than 1,000m from sea level						
Operating height	In the room without corrosive gas, inflammable gas and dust. Without splashing water and oil.						
Atmosphere	EN60950						
Applicable Standard	700g (600g Wichout cover)						
Weight	User's manual (This book)						
Accessories	<table border="1"> <tr> <td rowspan="2">Applicable Motor E</td> <td rowspan="2">CE marking Not approved</td> <td rowspan="2">PS444-02A(B)</td> <td>PF243-A(B),PF244-A(B),PF245-A(B)</td> </tr> <tr> <td>PF264-A(B),PF265-A(B),PF268-A(B) PS443-01A(B),PS445-01A(B),PF464-02A(B) PF466-02A(B),PF468-02A(B)</td> </tr> </table>		Applicable Motor E	CE marking Not approved	PS444-02A(B)	PF243-A(B),PF244-A(B),PF245-A(B)	PF264-A(B),PF265-A(B),PF268-A(B) PS443-01A(B),PS445-01A(B),PF464-02A(B) PF466-02A(B),PF468-02A(B)
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2. Model number & Factory default

2-1. Model number of set

INS20 - 210 - 268A

Series name

Extension of set



List of motor and driver combination

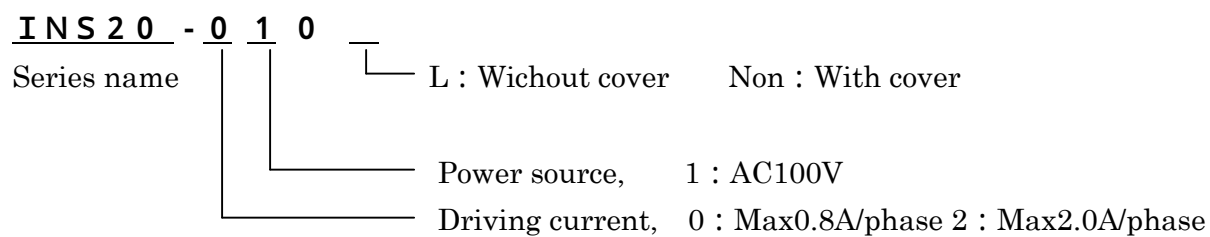
Series name, INS20				
Extension of set	Motor model (Uni-polar type)	Output current	CE marking	Driver model
444A(B)	PS444-02A(B)	0.8A/ phase	Not approved	INS20-010
243A(B)	PF243-A(B)	0.9A/ phase	Not approved	INS20-210
244A(B)	PF244-A(B)	1.2A/ phase		
245A(B)	PF245-A(B)			
264A(B)	PF264-A(B)	2.0A/ phase		
265A(B)	PF265-A(B)			
268A(B)	PF268-A(B)			
443A(B)	PS443-01A(B)	0.95A/ phase		
445A(B)	PS445-01A(B)	1.2A/ phase		
464A(B)	PF464-02A(B)	2.0A/ phase		
466A(B)	PF466-02A(B)			
468A(B)	PF468-02A(B)			



Attention

- Please use our CE marked 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.

2-2. Driver model number



2-3. Factory default

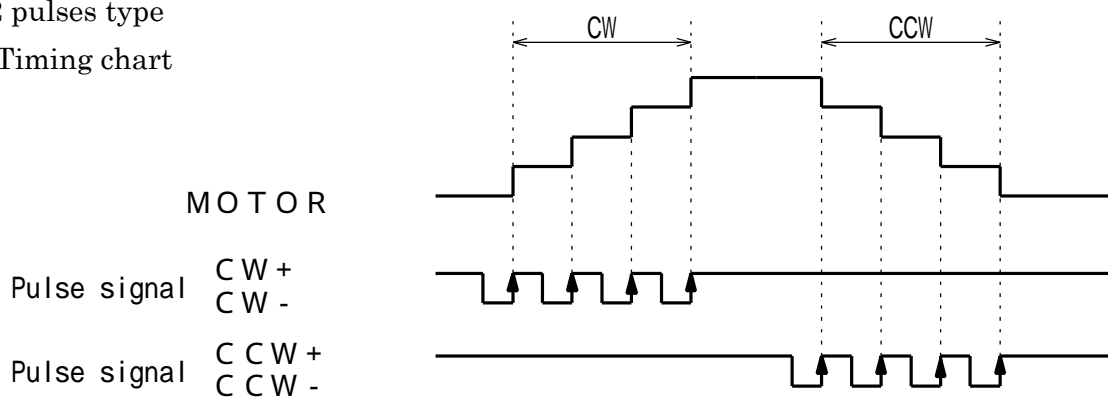
Driver model number	INS20-010	INS20-210
Driving current	0.8 A/phase Max	2.0 A/phase Max
Current down value	0.4 A/phase	1.0 A/phase
Auto current down function	Auto current down function, valid	
Input type	2 pulse type	
Resolution	1/1(FULL)	

3. Pulse waveform

3-1. Input pulse type

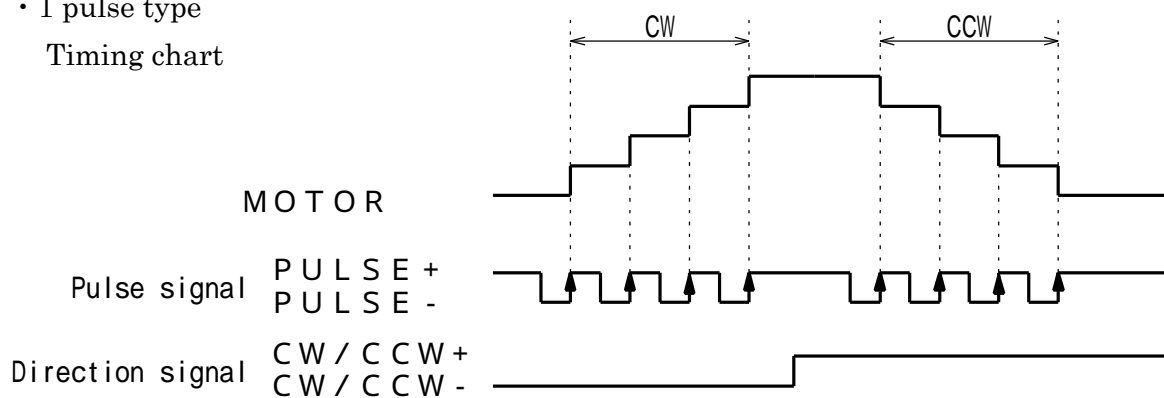
E

- 2 pulses type
Timing chart



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

- 1 pulse type
Timing chart

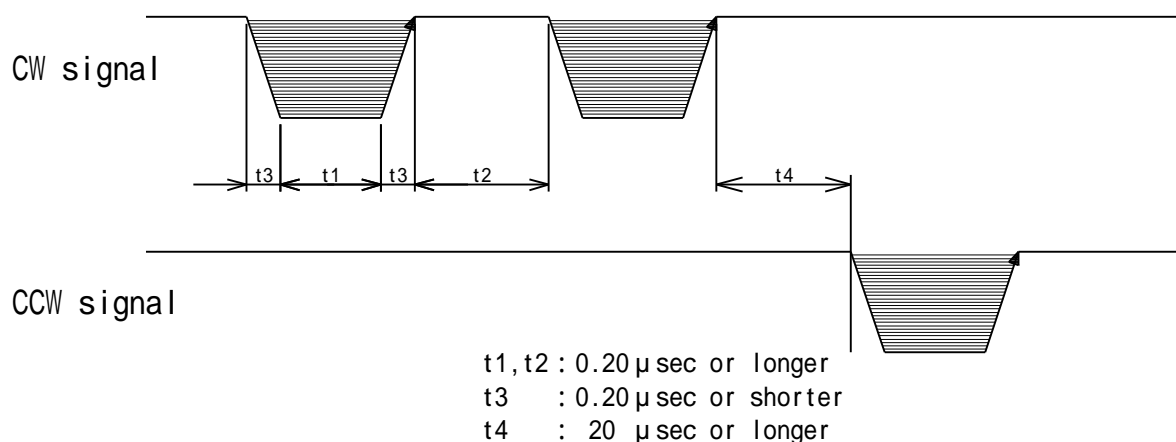


Motor starts to rotate by rising edge() of Pulse signal.

3-2. Pulse waveform

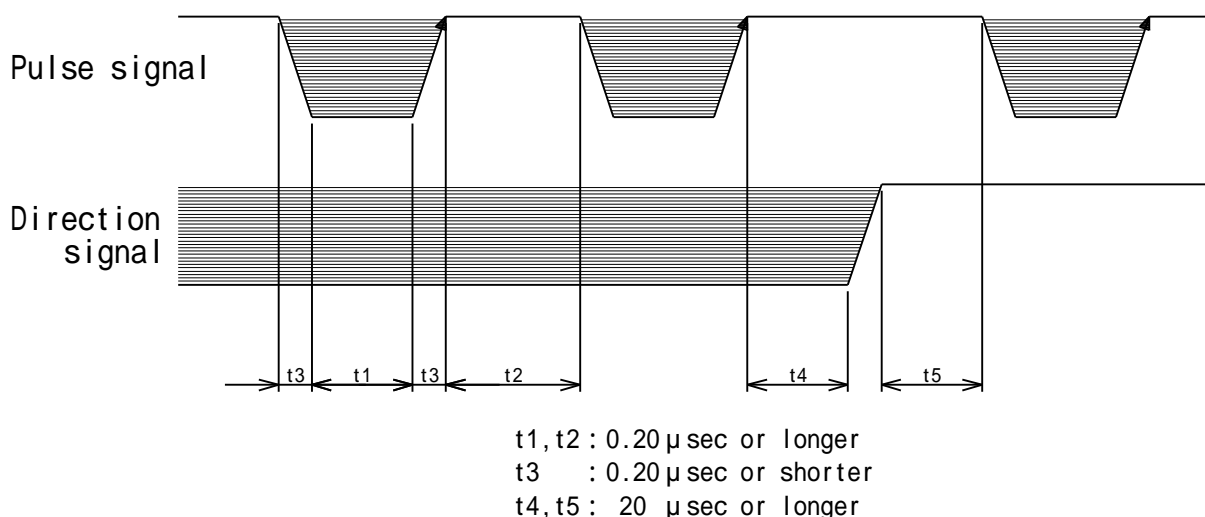


• 2 pulses type



- 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

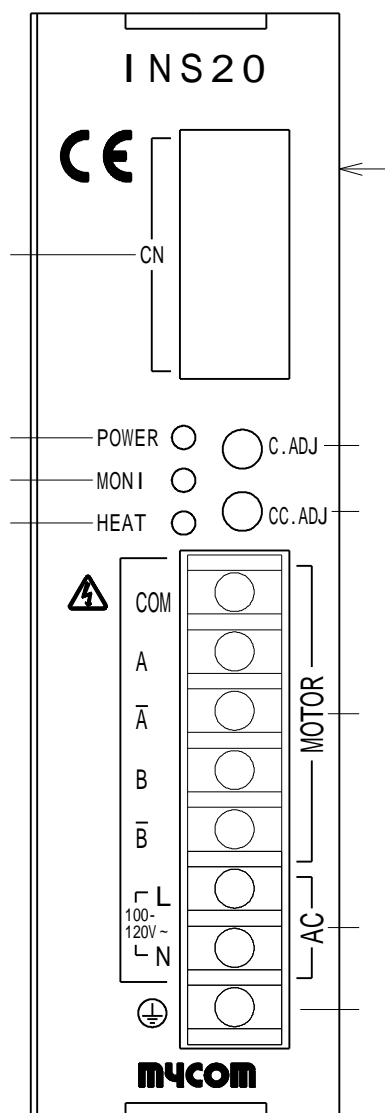
- 1 . If the signal exceeds the voltage of DC5V in use, please insert the series resistor near to output terminal(connector) of using controller so that 6.3mA~15mA current pass.

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

- 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.

Overheat display LED (HEAT)

The light is switched on at the time of overheat.

Switching

- Motor change: 1st-4th pole
Adaptation motor data is changed.
- Resolution select switch: 5th-8th pole
Resolution is changed.
- Switching of input pulse type (2P/1P) : 9th pole
This switches the input pulse type
- Switching of Auto current down
function(A.CD) : 10th pole
This turns Effective/Release the auto current
down function.

Current adjust volume for current(C.ADJ)

This adjusts the current when motor run.

Current adjust volume for current down(CC.ADJ)

This adjusts the current when current down.

Motor connector

Connect in accordance with the color of motor Leads.

Power connector Connect power.

Protective earth terminal(PE)

Connect with the protective earth terminal of the machine.

Signal I/O connector(CN)

Various I/O signals are connected.

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)

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

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

4-2-3. Current off function (CO)

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

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

4-2-4. 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. Please refer 5. Example of wiring.

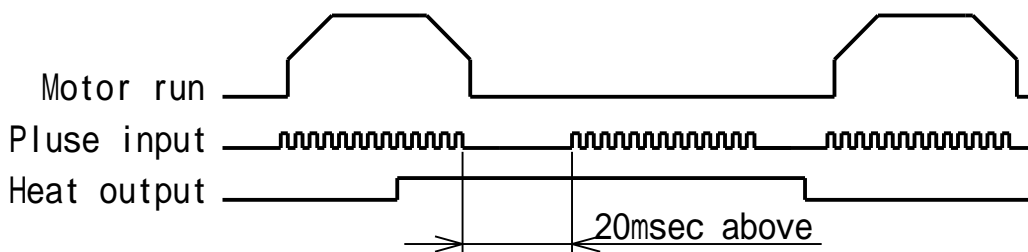
4-2-5. Overheat function

When a HEAT output is outputted, driver receives and operates the pulse which is being currently inputted. However, if a pulse input once goes out and there is no pulse input for 20msec(s), even if driver receives any pulses after that, it will not be operated. Excitation is maintained while driver is detecting HEAT signal (Motor does not become free.). Moreover, if temperature falls and HEAT is canceled after HEAT output, a pulse will be received and driver will operate.



Attention

Sudden operation is expected for the return from HEAT.
 Be careful.

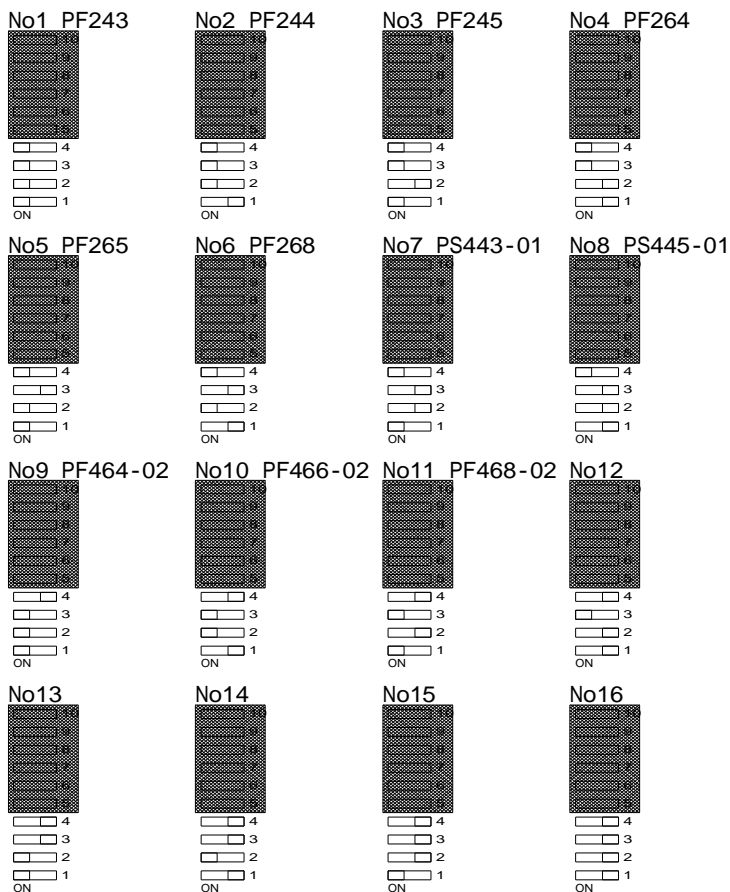


4-2-6. Motor change (SW 1st - 4th pole)

4-2-6-1.INS20-210 adaptation motor is set up

An adaptation motor is set up by a dip switch. (4-1.Each part name SW 1st-4th pole)

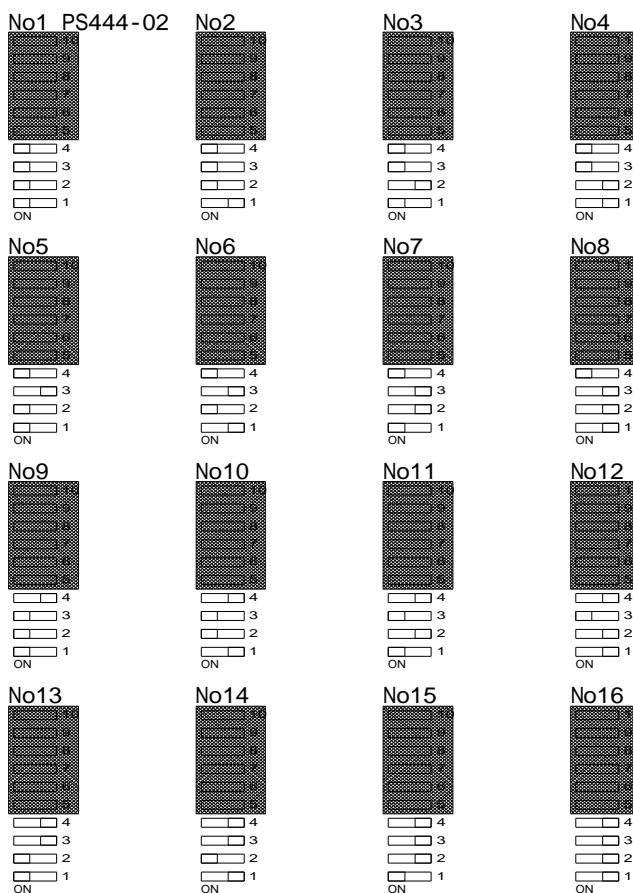
	adaptation motor
No 1	PF243-A(-B)
No 2	PF244-A(-B)
No 3	PF245-A(-B)
No 4	PF264-A(-B)
No 5	PF265-A(-B)
No 6	PF268-A(-B)
No 7	PS443-01A(B)
No 8	PS445-01A(B)
No 9	PF464-02A(B)
No 10	PF466-02A(B)
No 11	PF468-02A(B)
No 12	
No 13	
No 14	
No 15	
No 16	



4-2-6-2.INS20-010 adaptation motor is set up

An adaptation motor is set up by a dip switch. (4-1.Each part name SW 1st-4th pole)

	adaptation motor
No 1	PS444-02A(-B)
No 2	-
No 3	-
No 4	-
No 5	-
No 6	-
No 7	-
No 8	-
No 9	-
No 10	-
No 11	-
No 12	-
No 13	-
No 14	-
No 15	-
No 16	-



4-2-7. Resolution select switch (SW 5th - 8th pole)

Resolution select switch.(4-1.Part name SW 5th-8th pole) can set 16 various resolutions individually.

	Resolution	No 1 1/1	No 2 1/2	No 3 1/2.5	No 4 1/4
No 1	1 / 1				
No 2	1 / 2				
No 3	1 / 2.5				
No 4	1 / 4				
No 5	1 / 5				
No 6	1 / 8				
No 7	1 / 10				
No 8	1 / 20				
No 9	1 / 25				
No 10	1 / 40				
No 11	1 / 50				
No 12	1 / 100				
No 13	1 / 200				
No 14	1 / 250				
No 15	1 / 500				
No 16	1 / 1000				

1/1 to 1/200 resolution of INS20 series are equiangular resolution and 1/250 to 1/1000 resolution are follow-up control resolution

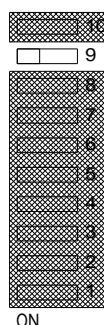
- Equiangular resolution: The resolution which equally carries out an angle change per one pulse
- Follow-up control resolution: The resolution which carries out an angle change per one pulse

4-2-8. Pulse input type select switch (1P/2P, SW 9th pole)

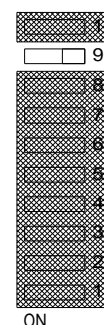
2P/1P switch sets the driving pulse to 2 pulse type or 1 pulse type.

(4-1 Each part name) Please refer “3. Pulse wave” about input type.

2 pulse type



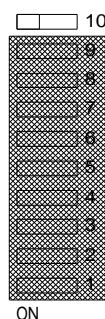
1 pulse type



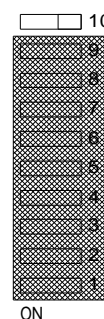
4-2-9. Auto current down function (A.CD, SW10th pole)

This reduces the motor driving current to 50%(default) of normal current to reduce temperature rising of motor after the motor stops and 200ms. later. OFF/A.CD switch (4-1, Each part name SW10th pole) can release the function.

A.CD Release



A.CD Effective



CAUTION

- When automatic current down release is carried out, compulsive air cooling is required for a driver.
- When automatic current down release is carried out, be careful of heat generation of a motor and a driver.

4-2-10. Current adjusting volume of current (C.ADJ)

Motor run current adjust (4-1. Each part name).



CAUTION

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

4-2-11. Current adjusting volume of current down (CC.ADJ)

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

INS20-010 : Within about 40 to 80 percent of normal driving current

INS20-210 : Within about 30 to 80 percent of normal driving current



CAUTION

- When making a current down current value 50% or more by INS200-210 , compulsive air cooling is required for a driver.
- Be careful of heat generation of a motor and a driver.
- Please turn the volume within the range of torque of 0.98 ~ 19.6mN · m(10 ~ 200gf · cm). E

4-2-12. Motor connector (MOTOR).

This is connected according to the motor lead color.

4-2-13. Power supply connector terminal (AC)

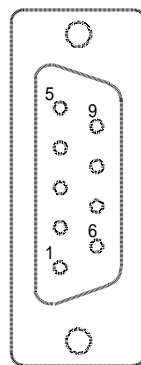
This connects with single-phase 100V-120V 50/60Hz power supply.

Use AWG18(0.75mm²) or bigger wire.

4-2-14. Signal I/O connector (CN)

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)

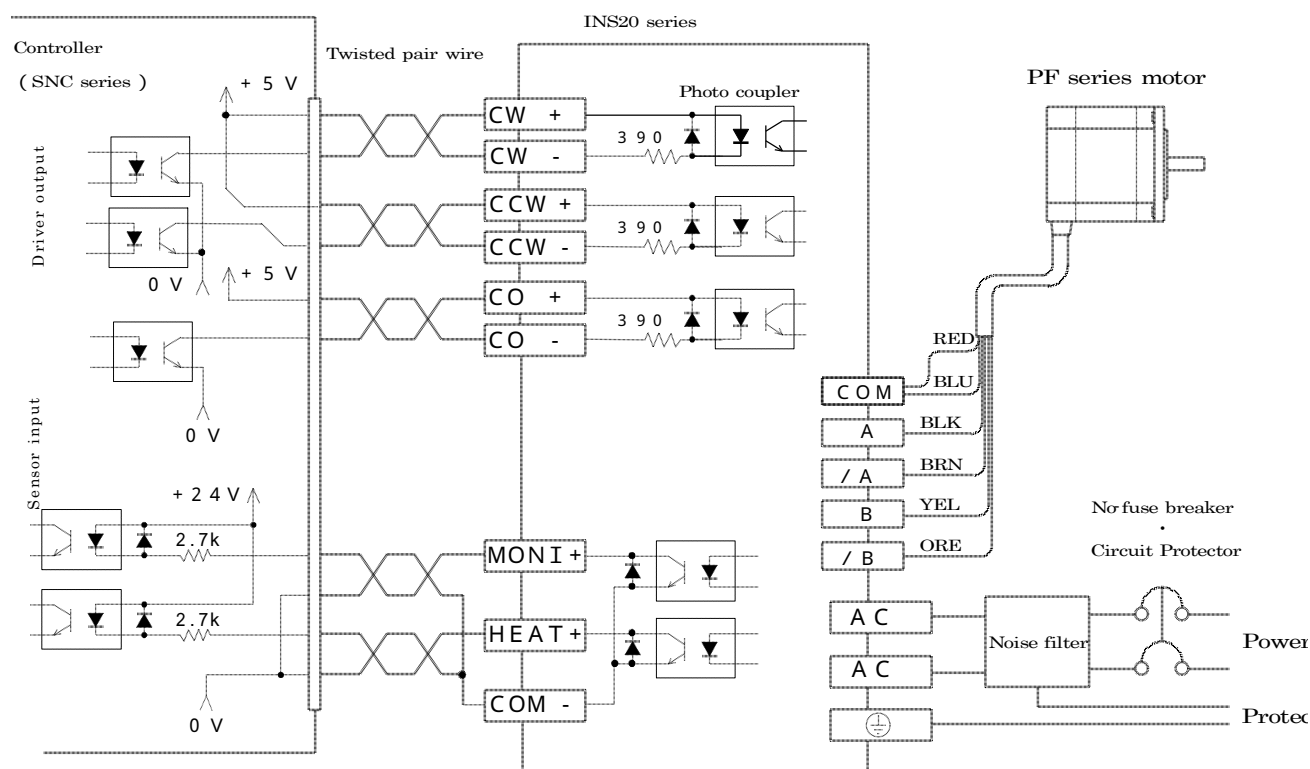


Connector combination 9 pin D-sub connector Socket type

Connector : OMRON, XM2D-0901 equivalent

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

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.
- 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.

Driver model	Current capacity
INS20-010	2 A
INS20-210	3 A

6-2. Wiring of motor line

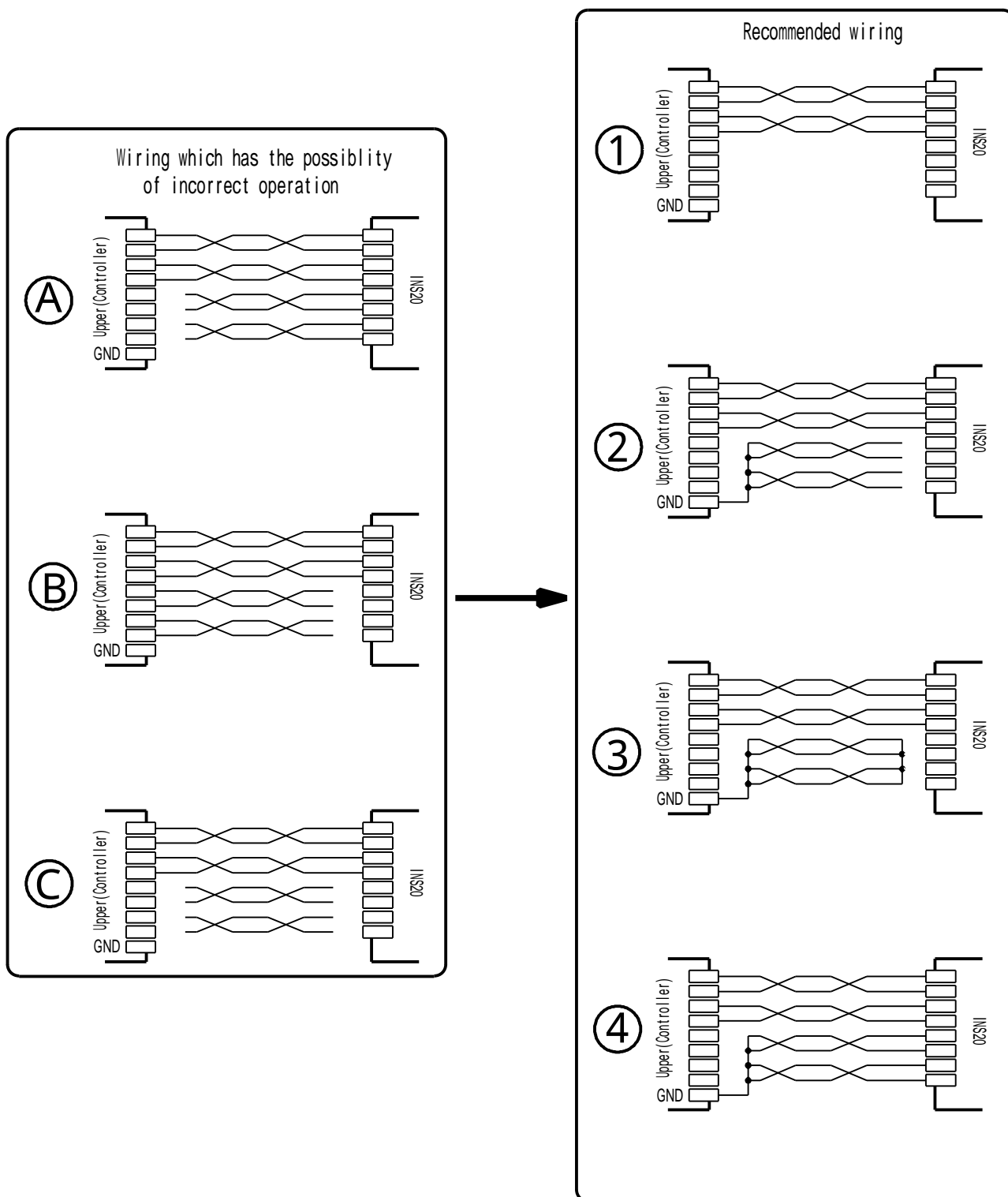
- The radiant noise can be depressed by shield cable equal to or bigger than AWG22(0.5mm²) in case that redundant radiant noise is trouble. C
- In case that the motor wiring is longer, please use the shield cable equal to or bigger than AWG22(0.5mm²) C

6-3. Wiring of signal line

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

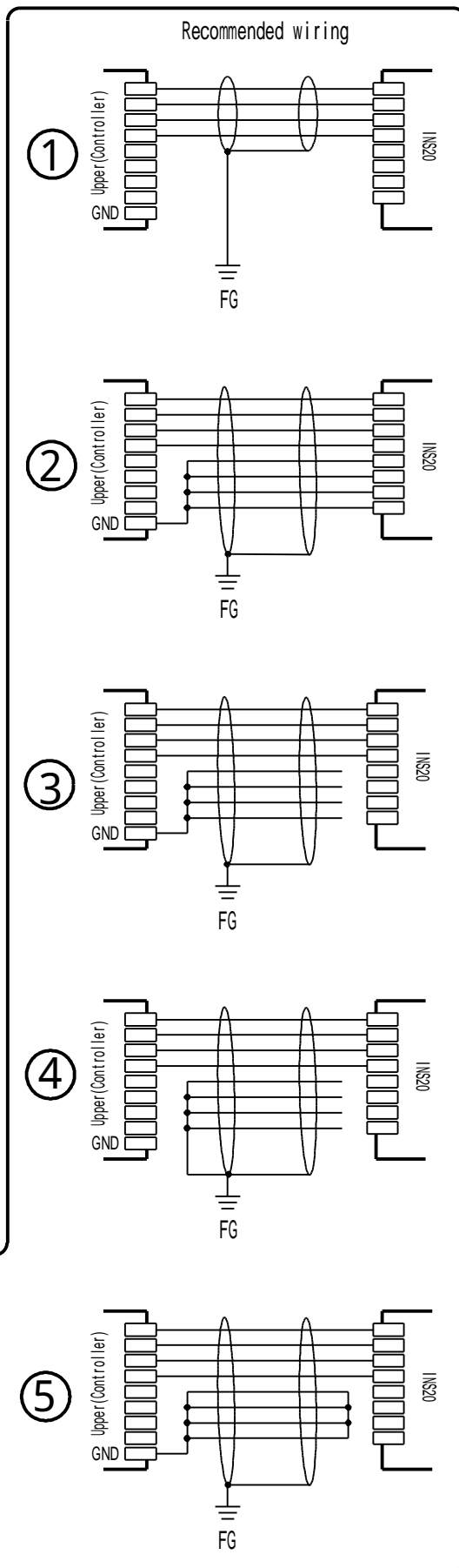
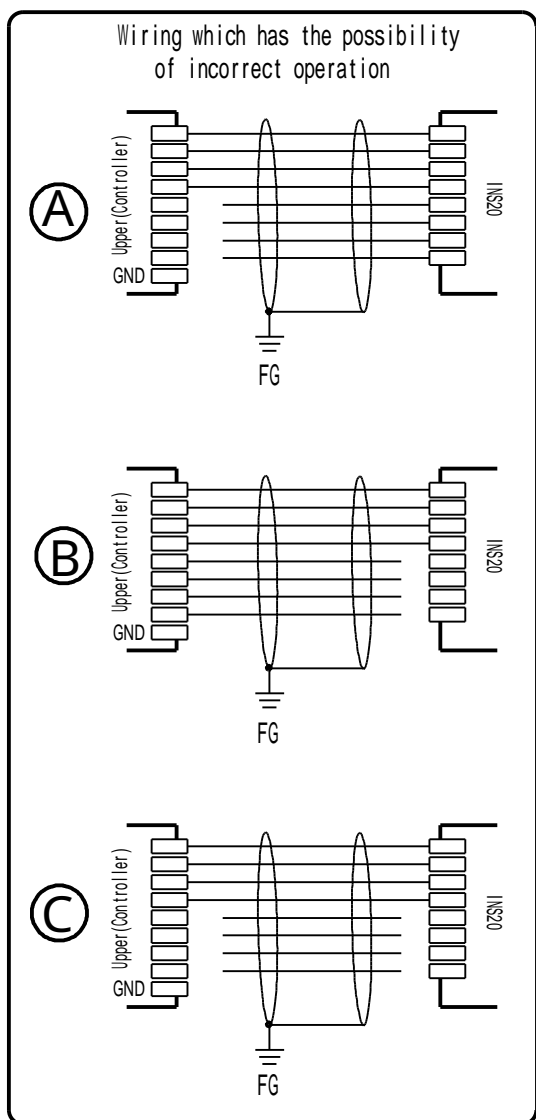
- Use bigger cable than AWG28 which suits with the connector.
- Use twisted pair line or shield line.
- of twisted pair wiring diagram is recommended in case of twisted pair line but select and use a suitable diagram of to depending on cable and environment. However do not wire as A to C.

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

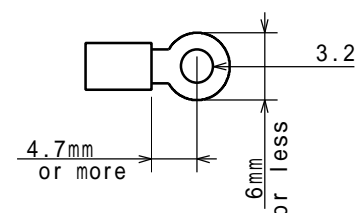


6-4. Applicable solder-less terminal

Use insulated ring tongue terminal to connect with terminals.

J.S.T	V1.25-MS3
NICHIFU	TGV1.25-3

Or a considerable article



6-5. Tightening torque for terminal block. E

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. C

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.

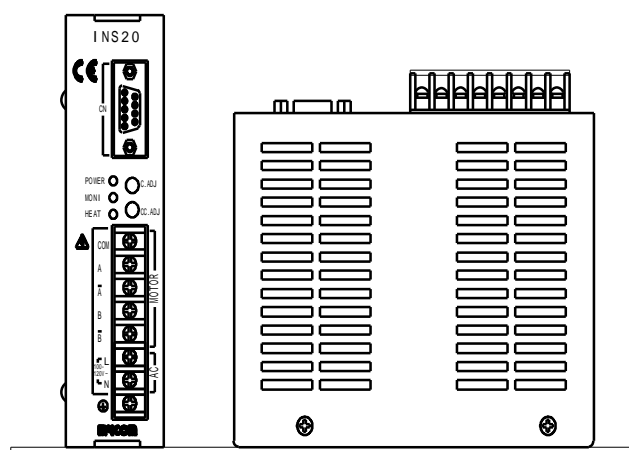
see right fig.

- Confirm that the driver environmental temperature is less than 40°C when overheat LED lights.

• When attached metal brackets are not used but installing by screws directly, use screws of “the thickness of installing part plus 3 to 5 mm”.

- 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.

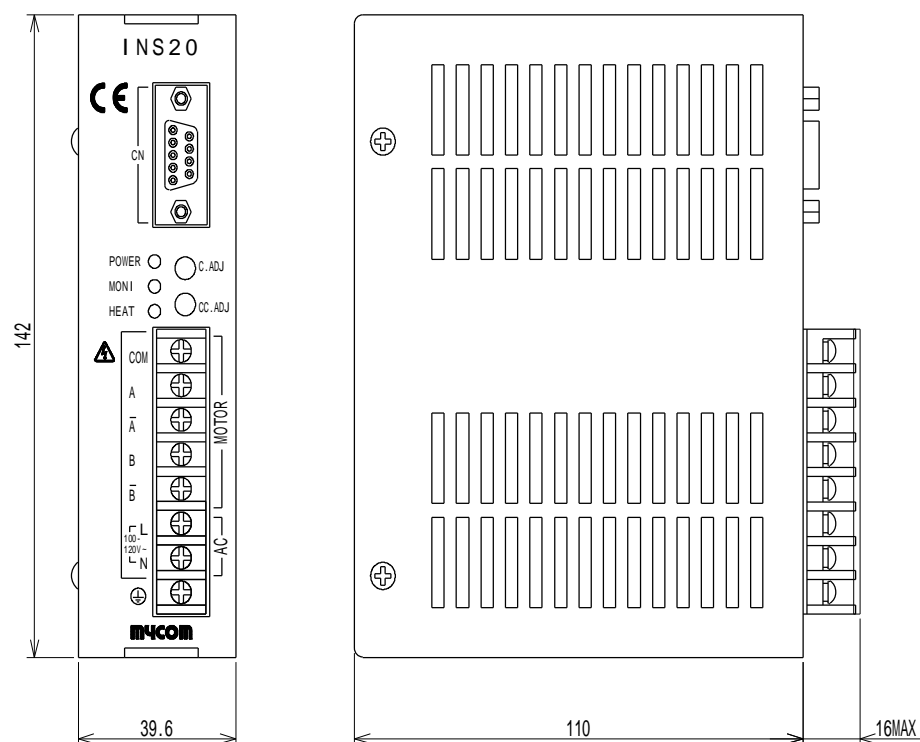


CAUTION

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

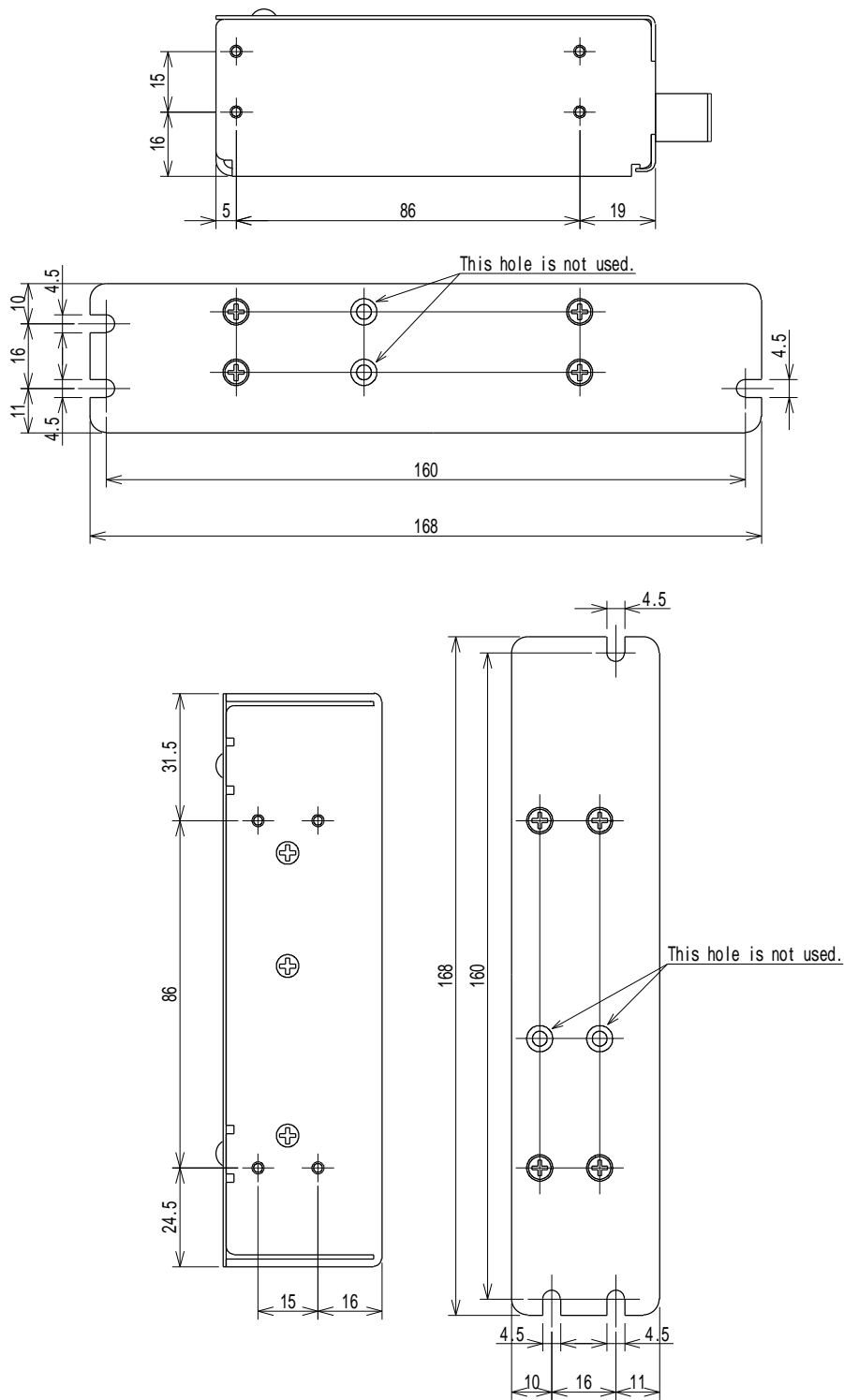
7. Dimension

7-1. Dimension of INS20-010 /INS20-210



Unit: mm. The screw head is not included.

7-2 . Dimention for instllation and metal plate (option)



Unit: mm. The screw head is not included.

8. Option

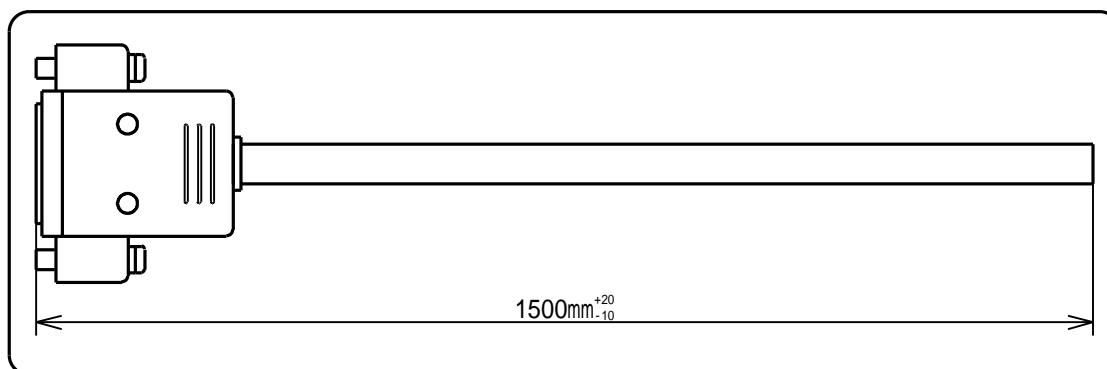
It is available to supply the following optional cables which have covering connector at the one side.

- C N : Pulse cable

Model number : OPC-DS9P15

Connector : 9 pin D-sub

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



Ⓢ

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

Ⓢ

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

MYCOM

MYCOM, INC. (Head office)

12, S. Shimobano, Saga hirosawa, Ukyo, Kyoto, Japan 616-8303

TEL: 81-75-882-3601

FAX : 81-75-882-6531

Home Page : <http://www.mycom-japan.co.jp/>

NYDEN CORP.

2610, North First St. #B San Jose, Ca, 95134, USA

TEL: 1-408-232-7700

Home Page: <http://www.nyden.com>

MYCOM TECHNOLOGY, INC.

2Fl., No.333, Fuhsing N, Road Taipei, Taiwan, R.O.C.

TEL : 886-2-2719-0525

MYCOM KOREA, INC.

RM. C-605, Woolim Lions Valley, Geum Cheon-Gu, Gasan-dong, Seoul, Korea

TEL : 02- 2635- 6703 ~ 4

MYCOM THCHNOLOGY (SINGAPORE) PTE. LTD.

No.1, Sims Lane #05-05, One Sims Lane, Singapore 387355

TEL : 65-6743-4476

Home Page : <http://www.mycommts.com.sg>

Malaysian Contact;

No.1E-12-07, Jalan Batu Uban, Sunny Ville, Penang, Malaysia

TEL : 60-04-656-0328