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No.QT33-04003A

CE

2 phase stepping motor Driver

NanoDrive

INS20 series

【User's manual】

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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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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.)

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⚠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.

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1. Specification of driver

INS20-010□/INS20-210□

Driver model #	INS20-010□	INS20-210□
Power source	Single phase 100-120V±10%　50/60Hz	
Power consumption	150VA or less	300VA or less
Driving type	Uni-Polar constant current type	
Output 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 390Ω 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.	
	・Power input: Motor leads collection terminal - PE terminal ・Power input: Motor leads collection terminal - Signal I/O terminal	
	2.0kV(60Hz)	
Insulation Resistance	100MΩ　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	700g (600g Wichout cover)	
Accessories	User's manual (This book),	
※Applicable motor		PF243-A(B),PF244-A(B),PF245-A(B) PF264-A(B),PF266-A(B),PF268-A(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 #	Current A/phase	Driver model #
243A(B)	PF243-A(B)	0.9	INS20-210□
244A(B)	PF244-A(B)	1.2	
245A(B)	PF245-A(B)	1.2	
264A(B)	PF264-A(B)	2.0	
266A(B)	PF266-A(B)	2.0	
268A(B)	PF268-A(B)	2.0	

2-2. Driver model number

ＩＮＳ２０－０１０□

Series name　　L：Wichout cover　Non：With cover

Power source,　1：AC100V

Phase current,　0：0.8A/phase　2：2.0A/phase

2-3. Factory default

Driver model number	INS20-010□	INS20-210□
Phase 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)	

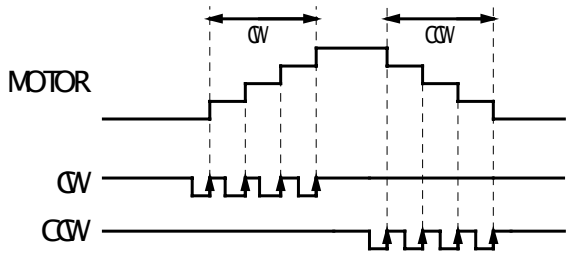
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3. Pulse waveform

3-1. Input pulse type

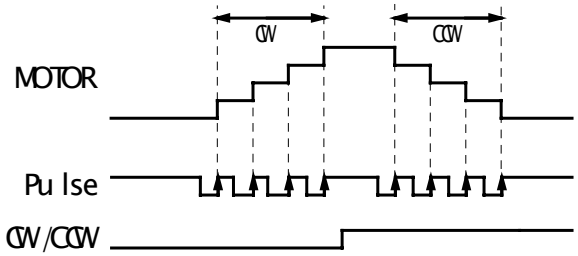
2pulse type

Timing chart



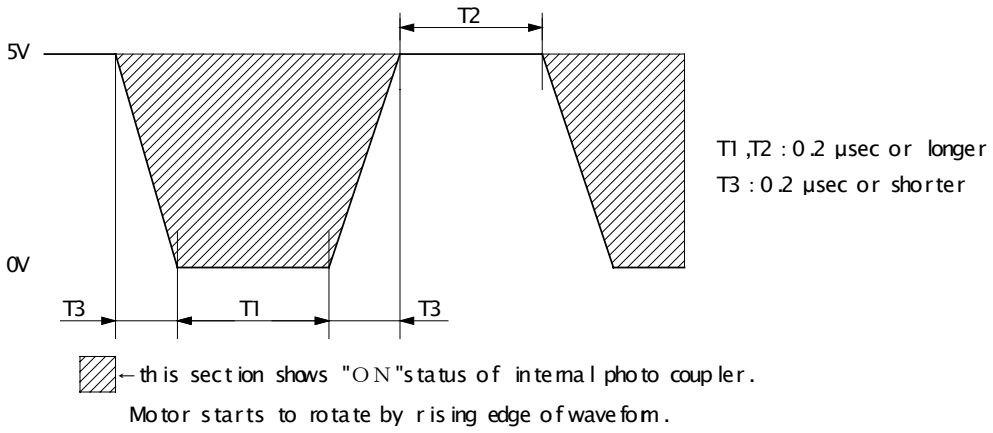
1pulse type

Timing chart



3-2. Pulse waveform

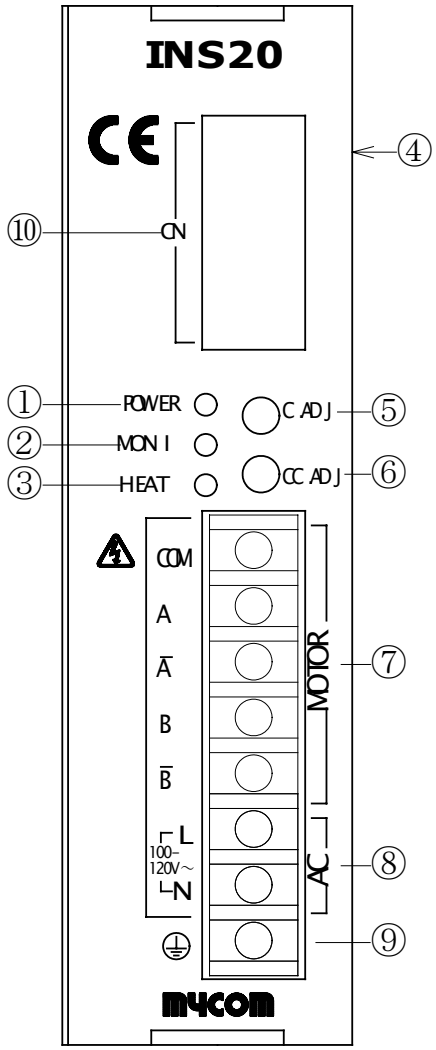
Please input the pulse signal of the below shown waveform.



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4. Each part name and functions

4-1. Each part name



①Power display LED (POWER)

This lights on during power on.

②Excitation home display LED(MONI)

This lights on when excitation home.

③Overheat display LED (HEAT)

The light is switched on at the time of overheat.

④Switching

- 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 on/off the auto current down function.

⑤Current adjust volume for current(C.ADJ)

This adjusts the current when motor run.

⑥Current adjust volume for current down(CC.ADJ)

This adjusts the current when current down.

⑦Motor connector

Connect in accordance with the color of motor Leads.

⑧Power connector

Connect power.

⑨Protective earth terminal(PE)

Connect with the protective earth terminal of the machine.

⑩Signal I/O connector(CN)

Various I/O signals are connected.

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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℃.

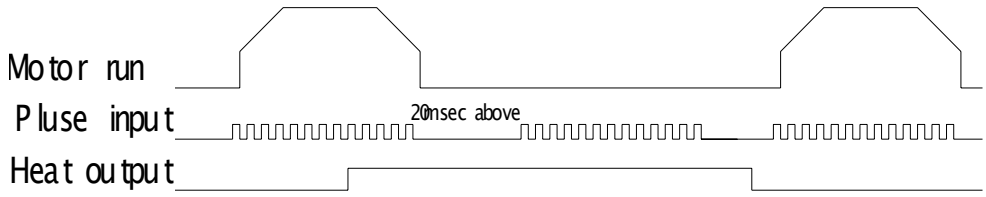
Then a signal is outputted to the HEAT output of CN. Please refer **5. Example of wiring.**

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 receves 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.

Sudden operation is expected for the return from HEAT.

Attention Be careful.

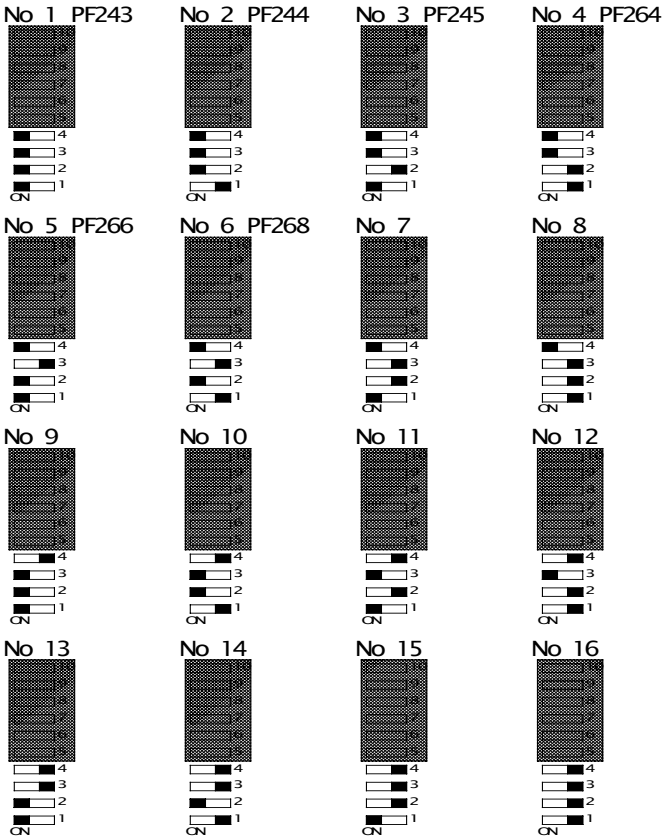


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4-2-6. Motor change

An adaptation motor is set up by a dip switch. (4-1.Each part name④　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	PF266-A(-B)
No　6	PF268-A(-B)
No　7	-
No　8	-
No　9	-
No　10	-
No　11	-
No　12	-
No　13	-
No　14	-
No　15	-
No　16	-

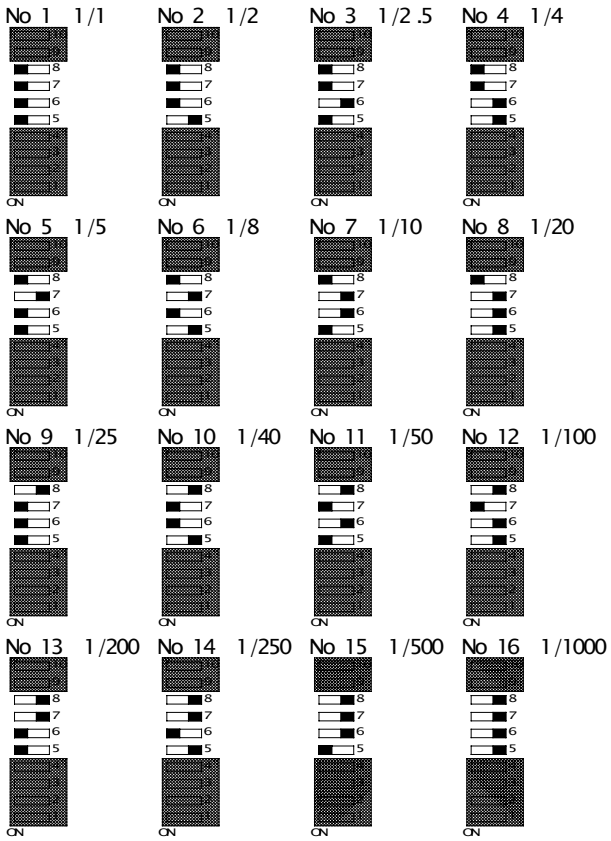


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4-2-7. Resolution select switch

Resolution select switch.(4-1.Part name④ 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 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 equianglar resolution and 1/250 to 1/1000 resolution are follow-up control resolution

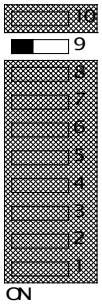
- Equianglar resolution; The resolution which equally carries out an angle change per one pulse
- follow-up control resolution; The resolution which carries out an angle change per one pulse

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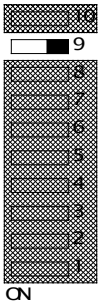
4-2-8. Pulse input type select switch (1P/2P, SW 9th pole)

2P/1P switch sets the driving pulse to 2 pulse type or 1 pulse type. (4-1 Each part name④) Please refer "**3. Pulse wave"** about input type.

2 pulse type



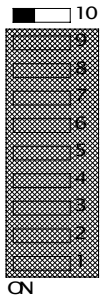
1 pulse type



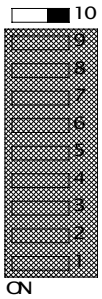
4-2-9. Auto current down function (A.CD, SW10th pole)

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 name④ 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 name⑤).

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 ⑥).

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.

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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.

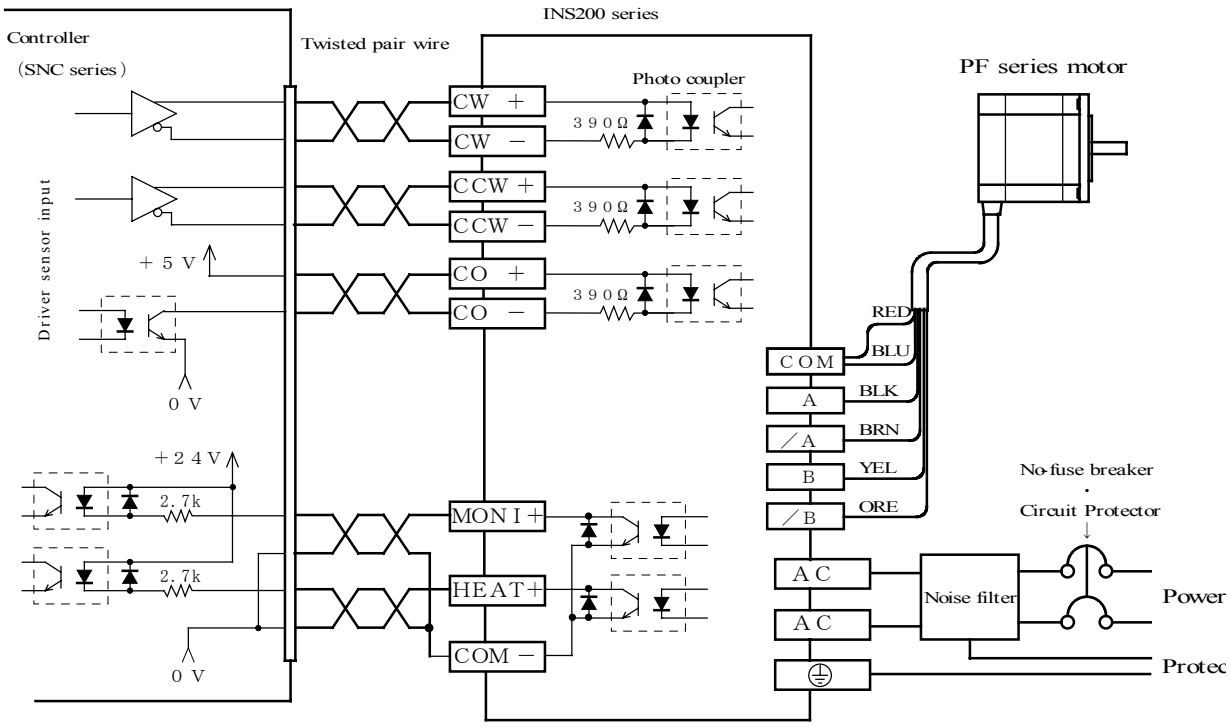
Use AWG18(0.75mm^2) or bigger wire.

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+		

5. Example Of connection



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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

・ Using shield wire can depress the radiant noise in case that the unnecessary radiation causes troubles.

6-3. Wiring of signal line

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

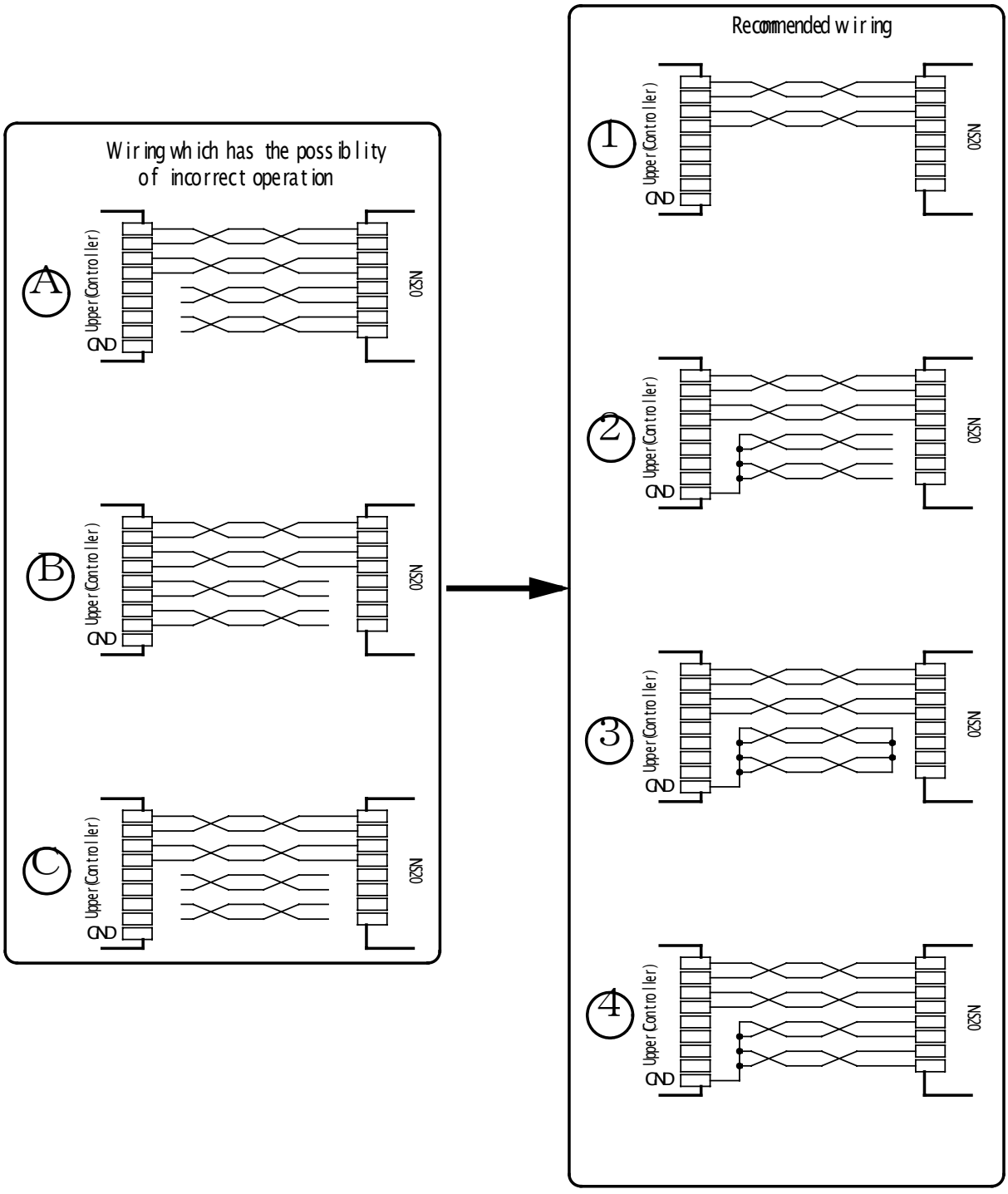
・ Use bigger cable than AWG28 which suits with the connector.

・ Use twisted pair line or shield line.

・ ① of twisted pair wiring diagram is recommended in case of twisted pair line but select and use a suitable diagram of ② to ④ depending on cable and environment. However do not wire as Ⓐ to Ⓒ

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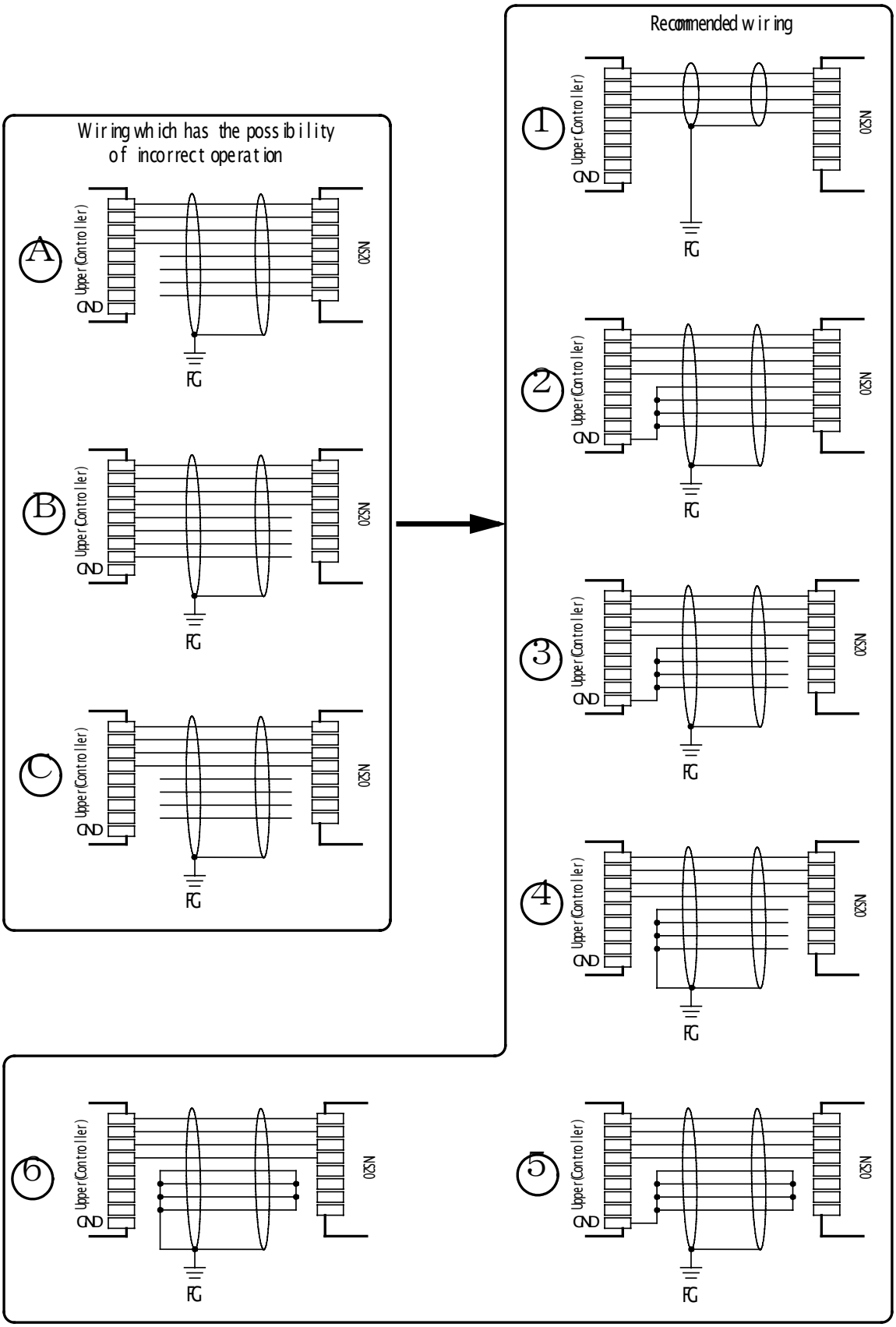
Twisted pair wiring diagram



- ① of shield line wiring diagram is recommended in case of shield line but select and use a suitable diagram of ② to ⑥ depending on cable and environment. However do not wire as Ⓐ to Ⓒ

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Shield line wiring diagram



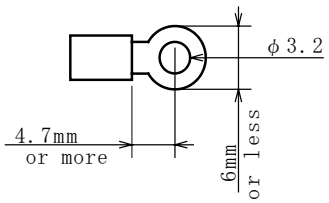
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6-4. Applicable solder-less terminal

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.

Tighten the terminal block with the torque of 4 to 7 kgfcm when connecting

6-6. Install condition

・Install the driver in control box. This unit is designed by 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

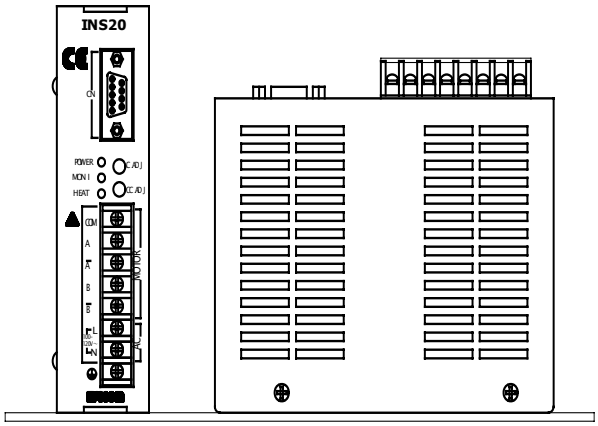
・Fix driver on heat conductive metal plate tightly.

・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.

※ see right fig.



・Confirm that the driver environmental temperature is less than 40℃ 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.

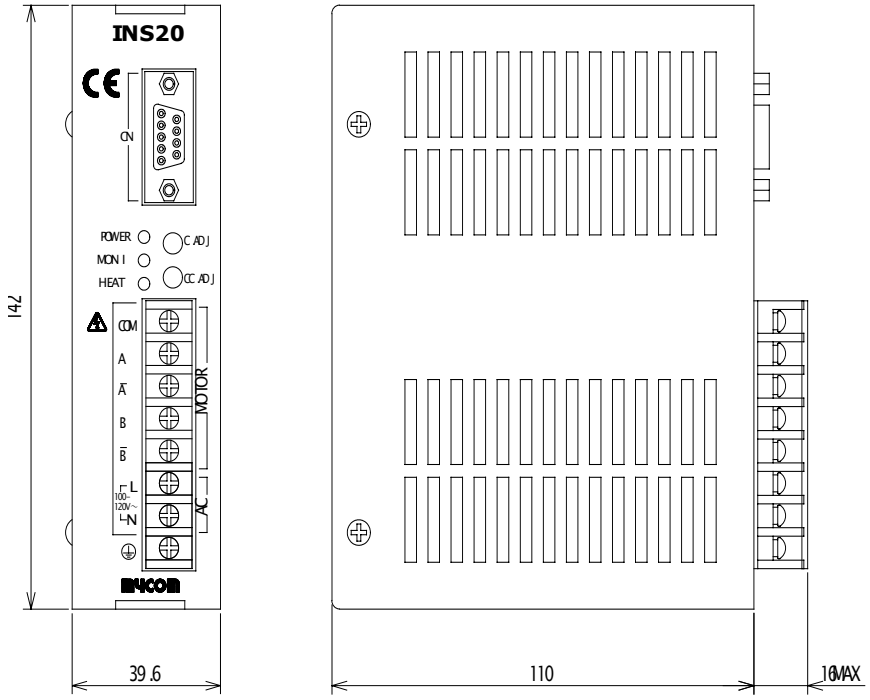
⚠CAUTION

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

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7. Dimension

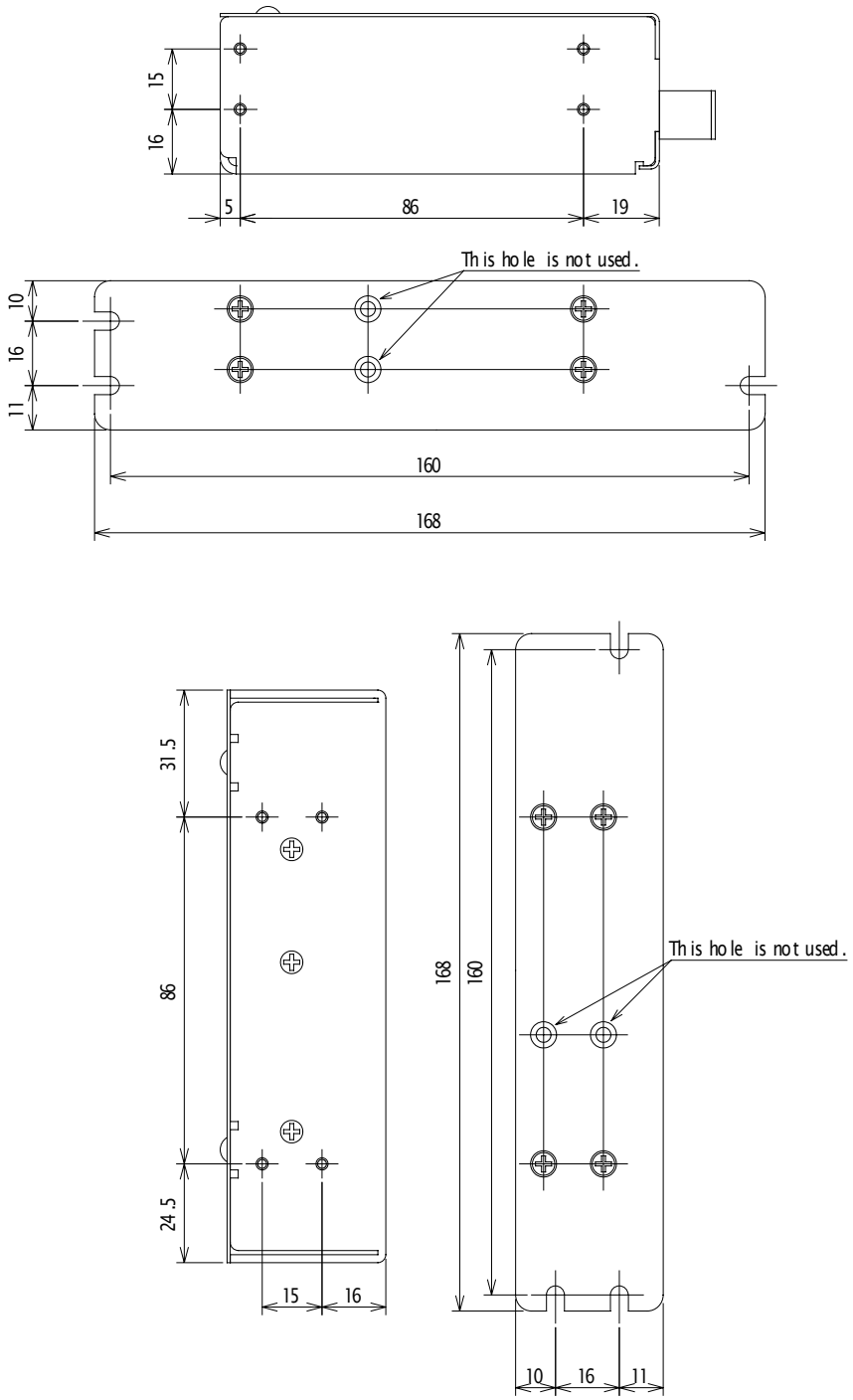
7-1. Dimension of INS20-010□/INS20-210□



Unit: mm. The screw head is not included.

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



Unit: mm. The screw head is not included.

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8. Option

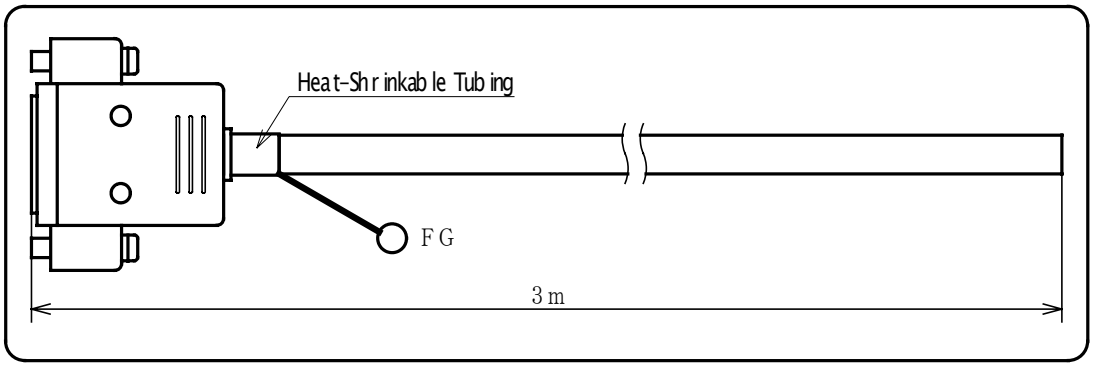
It is available to supply the following optional cables which have covering connector at the one side.

・ＣＮ： Pulse cable

Model number ：ＯＰＣ-ＤＳ９Ｐ３ Connector ： ９pin Ｄ-sub

Cable ： ＡＷＧ２８

Multi-heart cable with a shield ３ｍ



Pin #	1	2	3	4	5	6	7	8	9	
Insulator color	White		Red		Yellow		Violet		Blue	
Line color	None	Black	None	Black	None	Black	None	Black	None	Black

Because the cable of which insulator color is blue and line color is black 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.

・Motor Cable

Model number ：ＯＭＣ-ＣＴ２０３ Cable ： ＡＷＧ２０ Both-ends end ３ｍ

Shield-less multi-heart cable

Pin Number	1	2	3	4	5
Color	Blue	Red	White	Brown	Black

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このページは取扱説明書に添付せず。

変更履歴

変更日	ﾊﾞｰｼﾞｮﾝ	変更箇所	内容	変更者

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