TR Series

2 Phase Stepping Motor Driver User's Manual

Made by TROY Enterprise Co., Ltd

TÜV Rheinland/Berlin-Brandenburg TÜV Anlagentechnik GmbH ISO14001 Certificate No.: 09 104 9351

TÜV CERT DIN EN ISO 9001:2000 Certificate: 09 100 99275

Environment Responsibility

- TROY is always committed to environment protection. All packaging material is recyclable and reusable.
- If disposing of used product, please recycle by type as per waste disposal procedures.

----------Protect the green earth with your care and commitment----------

※The product is subject to design modification for performance improvement without prior notice. For more details please contact your local seller.

Precautions

Precautions for using

1.Thank you for purchasing TROY products. Please read this user's manual thoroughly before installing and operating the driver, and always keep the manual where it is readily available.

2. The products described in this manual has been designed and manufactured for use in industrial machinery, and must not be used for any other purpose. We are not responsible for any damage caused through failure to observe this warning.

3.Check that the motor, driver and any accessories are all present. If an accessory is missing or damaged, contact the nearest our branches.

4.Never disassemble the motor and driver. Damage or performance impairment may result. Disassembly voids all warranties.

Precautions for maintenance

Check the ambient environments, clean the system equipment to remove dust and tighten the screws periodically. Also pay attention to the followings.

1. Contact us when repairs become necessary.
2. Since the temperature of the frame of the driver can rise high, be careful when conducting maintenance work or inspection work.

Precautions for warranty period

Within the period of one year after delivery of the system equipment, when failures occurring from design error or fabrication error attributable to the manufacture side occur, we will be repairing the failure free of charge within the reparable range or will replace with substitute. (We cannot hold ourselves responsible for breakage and accidents occurring from your use beyond the specified range described in this document.)

Precautions for disposal

When disposing of the driver and the motor, treat them as ordinary industrial waste.

Contents

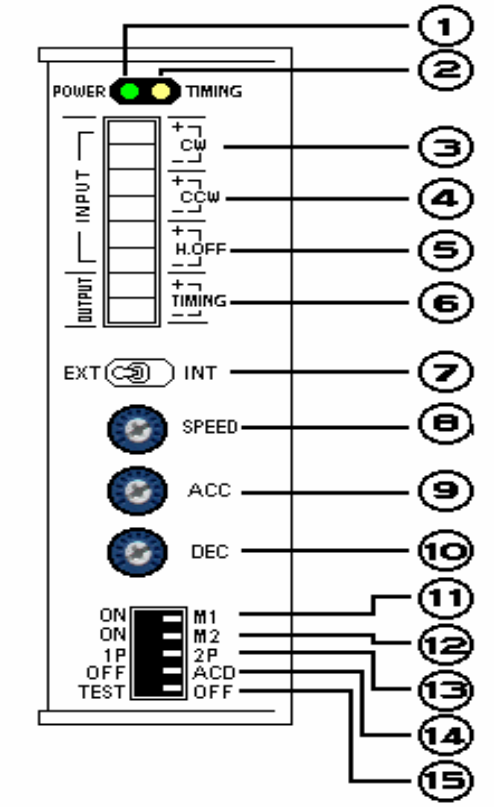
※For any operational or technical question with the product, please contact us for professional service「**0800-450-168**」during our business hours.

1.Specs

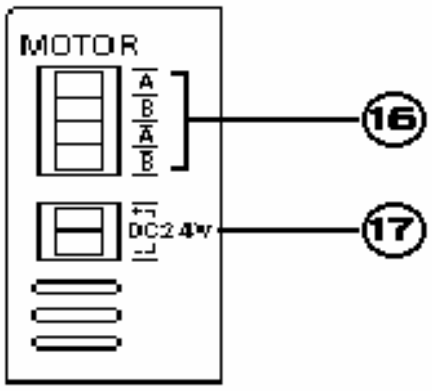
●Specs

Driver model		TR21PM	
Drive current		0.85A/phase	1.20A/phase
Input power		DC 24V MIN:＞1A	DC 24V MIN:＞1.5A
Excitation mode		Bipolar drive Full step(1.8°)，Half step(0.9°)；1/4 step(0.45°),1/8 step(0.225°)	
Signal output/input mode		●Photo coupler input ●Open collector output	
Input signal	CW pulse input	1pulse: Pulse input；2 pulse:Clockwise pulse input	
	CCW pulse input	1 pulse:Rotating direction signal input；2 pulse:Counterclockwise pulse input	
	H.OFF input	HOLDING OFF input	
Output signal	TIMING output	Excitation phase origin output Full step:1 signal outputs every 4 pulses Half step:1 signal output every 8 pulses 1/4 step:1 signal output every 16 pulses 1/8 step:1 signal output every 32 pulses	
Functions		●Self test(TEST)	
		●Pulse input mode switch(1P/2P)	
		●Step angle switch【Full,Half(1/2),1/4,1/8】	
		●Inner pulse generate(INT)/External pulse input(EXT)function selection Inner pulse : Max pulse speed:5Kpps Acceleration time ACC:60ms~1.96s Deceleration time DEC:12ms~1s	
Protection modes		●Inverse power protection:Auto disconnection in the case of reversed voltage polarities ●Over current protection：Auto disconnection in the case of current input exceeding rated value	
LED display		POWER、TIMING	
Dimension(mm)		100(L)X65(W)X32(H)	
Weight		275g	
Ambient	Temperature	0℃~40℃	
	Humidity	＜85％	
	Condition	Avoid dust and corrosive、inflammable gas	

2.Name of driver part



Front panel



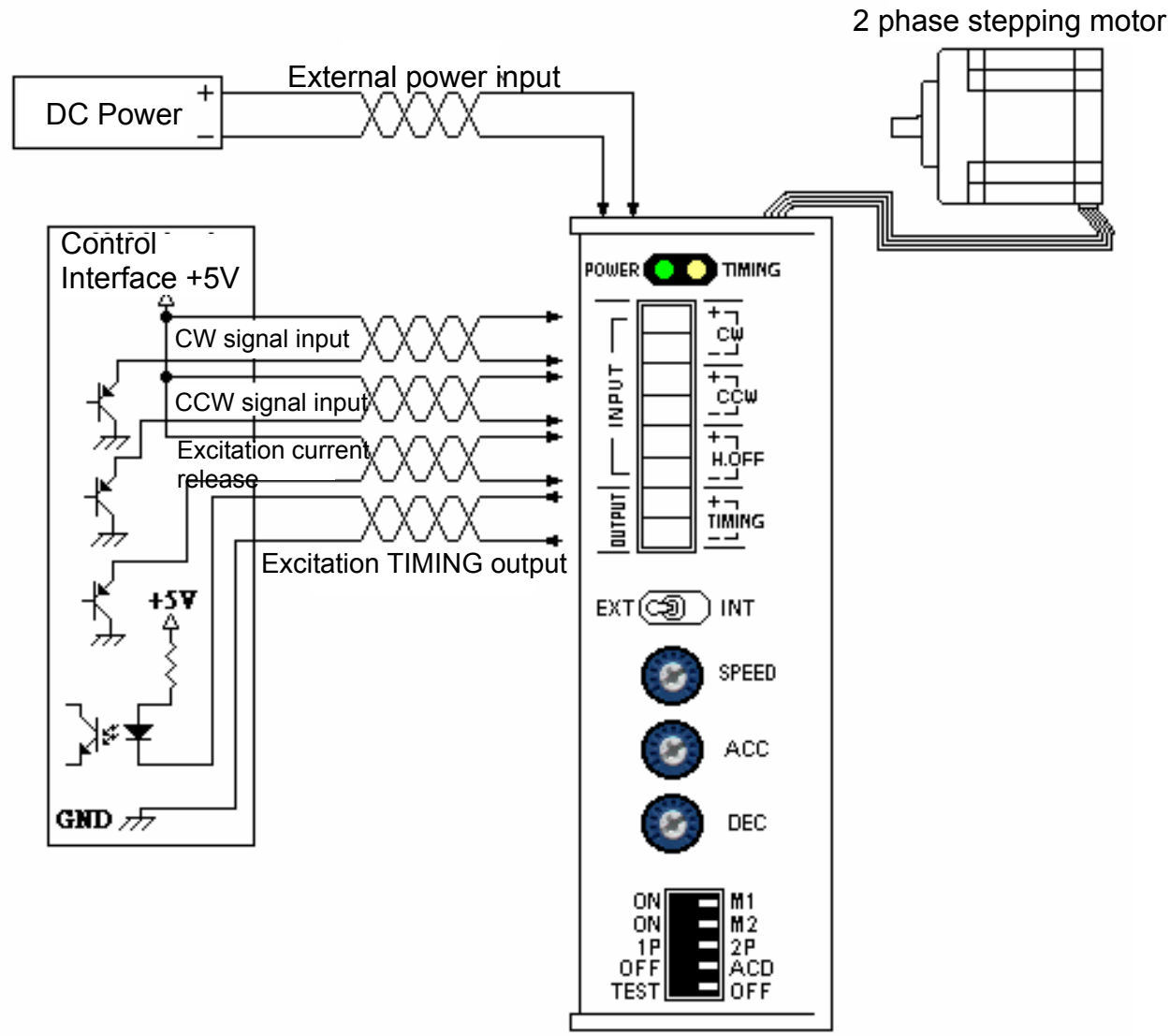
Left side panel

No.	Name of the panel	Type	Name of function	Function	Remark
1.	POWER	LED	Power indicator	LED lamp lit up when power input	
2.	TIMING	LED	Phase origin indicator	Full step:LED lit up once every 4 pulses Half step:LED lit up once every 8 pulses 1/4 step:LED lit up once every 16 pulses 1/8 step:LED lit up once every 32 pulses	LED will lit up during high speed
3.	CW	I	2P:CW pulse input	Clockwise timing pulse input via this terminal	
			1P:Pulse input	Counterclockwise timing pulse input via this terminal	
4.	CCW	I	2P:CCW pulse input	Counterclockwise timing pulse input via this terminal	
			1P:Run direction control	Timing pulse input via this terminal	
5.	H.OFF	I	HOLDING OFF	(L)level input to unexcited the motor.Axle rotated by hand easily	
6.	TIMING	O	Excitation phase origin	Full step:1 signal outputs every 4 pulses Half step:1signal outputs every 8 pulses 1/4 step:1 signal outputs every 16 pulses 1/8 step:1signal outputs every 32 pulses	Less DC 24V Less 10mA
7.	EXT/INT	SW	Pulse input mode	EXT: Pulse input via CW/CCW INT: Pulse generated by internal(Tip switch:1P)	Default:INT
8.	SPEED	VR	Adjustment	Regulating the motor run speed	Default:50%
9.	ACC	VR	Adjustment	Regulating the pulse acceleration time	Default:50%
10.	DEC	VR	Adjustment	Regulating the pulse deceleration time	Default:0%
11.	M1	SW	Step angle switch	M1 ON, M2 ON: Full step run M1 OFF, M2 ON: Half step run M1 ON, M2 OFF: 1/4 step run M1 OFF, M2 OFF: 1/8 step run	Default: M1 OFF, M2 OFF 1/8 step (1600 dpi)
12.	M2	SW			
13.	1P/2P	SW	Pulse input mode	1P side: 1 pulse input 2P side: 2 pulse input	Default:1P
14.	OFF/ACD	SW	Auto current down	OFF side: Motor current to be maintained at run current upon stopping pulse input ACD side: Motor current drops approx0.1sec upon stopping pulse input,so as to mitigate motor temperature rise	Default: ★ACD recommended to mitigate temperature rise of motor/driver
15.	TEST/OFF	SW	Self test switch	OFF side: Stop the self test function and set at OFF side during operation TEST side: Driver rotated CW by 2PPS	Default: OFF
16.	MOTOR	O	Motor wiring	Connecting the motor to the driver	
17.	DC 24V	I	Power input (+) Power ground(-)	External power V+ connect to this terminal External power V- connect to this terminal	DC24V

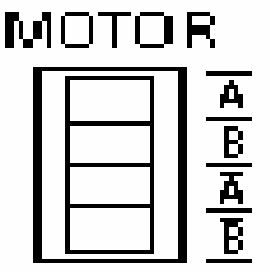
※Indication:LED→LED lamp，SW→Switch，VR→Variable resistor，Ⅰ→Input contact，O→Output contact

3.Wiring

3.1Driver



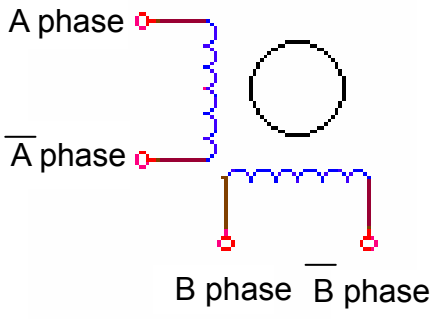
3.2Motor



Motor connect with driver via this terminal

2 phase stepping motor wiring contrast chart(Variety brands)

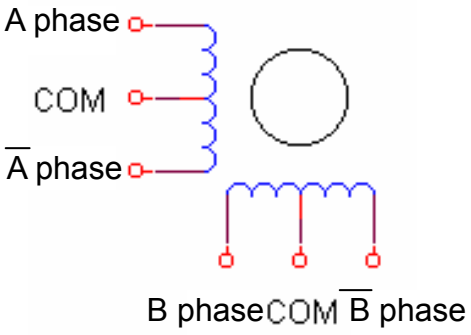
●4 leads of internal motor wiring



Phase / Brand	Ā	A	B̄	B
Tamagawa	Blue	Red	White	Yellow
Oriental motor	Black	Green	Red	Blue
Sanyo denki	Orange	Blue	Red	Yellow

Wiring chart

●6 leads of internal motor wiring

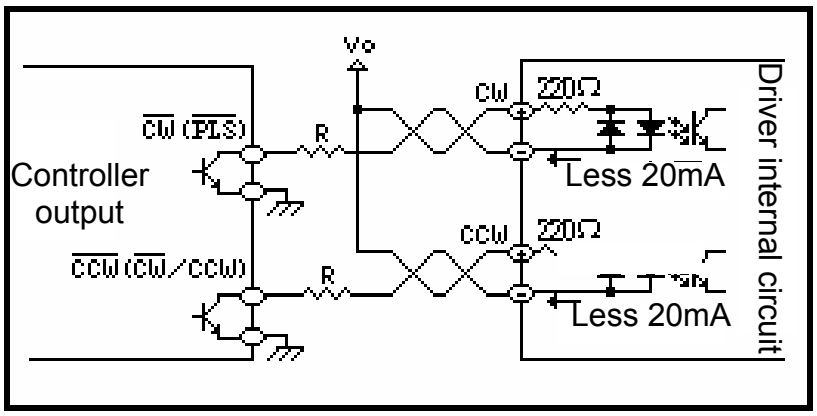


Phase / Brand	A	COM	Ā	B	COM	B̄
Tamagawa	Black	Yellow	Green	Red	White	Blue
Oriental Motor	Black	Yellow	Green	Red	White	Blue
Sanyo denki	Orange	White	Blue	Red	Black	Yellow
Note		Do not connect			Do not connect	

Wiring chart

4.Wiring examples

4.1External pulse:CW、CCW pulse input



★Note:

External power voltage VO	External resister R
5V	X
12V	390Ω 1/4W
24V	1KΩ 1/2W

(1)2 pulse input mode

Input pulse has clockwise pulse and counterclockwise pulse； -CW terminal:Clockwise pulse input -CCW terminal:Counterclockwise pulse input

The negative edge-triggered input is employed. The motor stays at ''H'' level in the case of no pulse signal output. The motor turns 1 step clockwise in the case of 1 pulse input at CW terminal. The motor turns 1step counterclockwise in the case of 1 pulse input at CCW terminal.

(2)1 pulse input mode

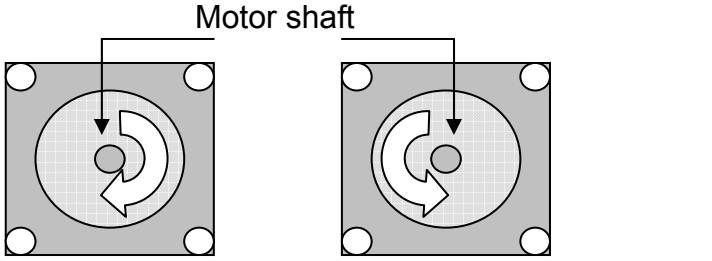
Input pulse connect to –CW and clockwise/counterclockwise control connect to the –CCW

The negative edge-triggered input is employed. The motor stays at ''H'' level in the case of no pulse signal output. The pulse signal input to the –CW terminal and –CCW terminal rotation direction indicates:"H" level clockwise ,"L" level counterclockwise

(3)Pulse voltage range:"H" level is 4~5V,"L" level is 0~0.5V

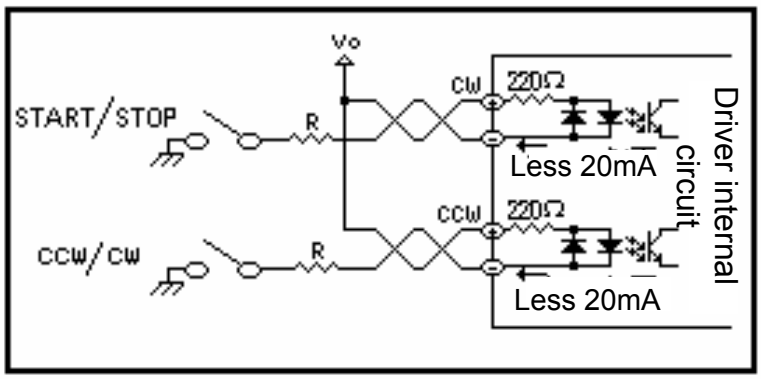
(4)Pulse width＞5 μ sec and up/down time＜2 μ sec

(5)CW/CCW definition



CW(Clockwise) CCW(Counterclockwise)

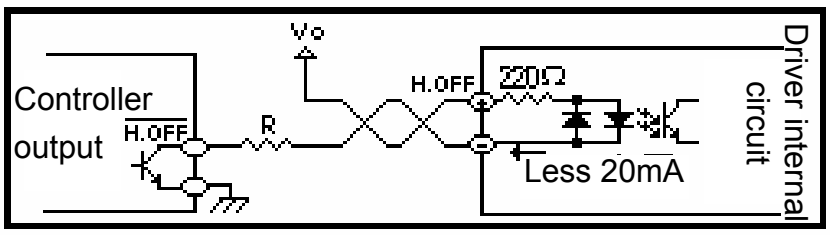
4.2Internal pulse:Start/Stop



(1)－CW:STRT/STOP switch at "H" level is STOP(Stop operation condition)；at "L" level is START(Start operation condition)
(2)－CCW:CCW/CW switch at "H" level is clockwise rotation；at "L" level is counterclockwise rotation

Note:
Because of the auto current down(ACD) function,please set the －CCW terminal at "H" level when motor didn't run.If motor only need counterclockwise rotation during motor start running.Switching the motor leads A→B and $\overline{A}$→$\overline{B}$

4.3H.OFF input

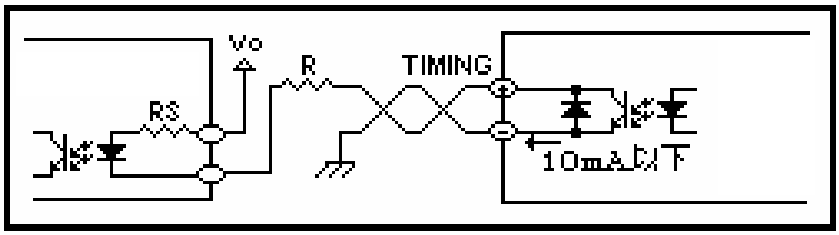


★Note:

External power voltage VO	External resistor R
5V	X
12V	390Ω 1/4W
24V	1KΩ 1/2W
36V	1.8KΩ 1W

Control signal H.OFF at "L"level and motor excitation release and motor running current declined to the 0 then motor shaft could be rotated by hand easily

4.4TIMING output



★Note:
Please add proper external resistor(R) to keep the current of the circuit below 10mA

$$R = \frac{Vo}{10mA} - RS$$

TIMING signal：This timing signal indicates that the excitation state of conforms to the initial detect home position with greater precision by setting the mechanical home position of equipment to coincide with the excitation home position (step0) of the motor.

The time (TIMING) lamp on the front panel turns on every 4 pulses at full-step (1.8°/step) ；every 8 pulses at half-step (0.9°/step)；every 16 pulses at 1/4 step(0.45°/step)and every 32 pulses at 1/8 step (0.225°/step).The TIMING lamp is continuously on during high-speed operation, and the transistor is on.

5.Operation

According to the inquiry and select the stepping mode(Tip switch M1、M2) then switch the tip switch ACD to the ACD

M1	M2	M1	M2	M1	M2	M1	M2
ON	ON	OFF	ON	ON	OFF	OFF	ON
Running by full step(1.8°/step)		Running by half step (0.9°/step)		Running by 1/4 step (0.45°/step)		Running by 1/8 step (0.225°/step)	

5.1CW、CCW input via external of TR21PM

(1)Switching the toggle switch to the EXT

(2)Selecting the tip switch according to the pulse generator mode(1P or 2P):1P/2P

Select 1P:PULSE connect to the CW terminal，DIR connect to the CCW terminal (Clockwise/counterclockwise rotation control)

Select 2P:Clockwise PULSE connect to the CW terminal，counterclockwise PULSE connect to the CCW terminal

5.2Pulse generated from internal of TR21PM

(1)Switching the toggle switch to the INT

(2)Tip switch:1P/2P,please switch to the 1P

(3)－CW:STRT/STOP switch at "H" level is STOP(Stop operation condition)；at "L" level is START(Start operation condition)

－CCW:CCW/CW switch at "H" level is clockwise rotation；at "L" level is counterclockwise rotation

Note:

Because of the auto current down(ACD) function,please set the －CCW terminal at "H" level when motor didn't run.If motor only need counterclockwise rotation while motor start running.Switching the motor leads A→B and $\overline{A}$→$\overline{B}$

(5)According to the inquiry and regulate the variable resistor:Pulse speed(SPEED)
Acceleration(ACC)、deceleration(DEC)

5.3TEST(Self-test for drive part)

(1)Switching the toggle switch to the INT

(2)Do not input any signal to the terminal CW and CCW

(3)Tip switch TEST switch to the TEST

(4)Checking the accuracy of TIMING lamp lit up(Please refer to the TIMING output P.11)

5.4Measuring via motor phase current

(1)Turn off the driver power and switch the tip switch ACD to the OFF、TEST to the OFF

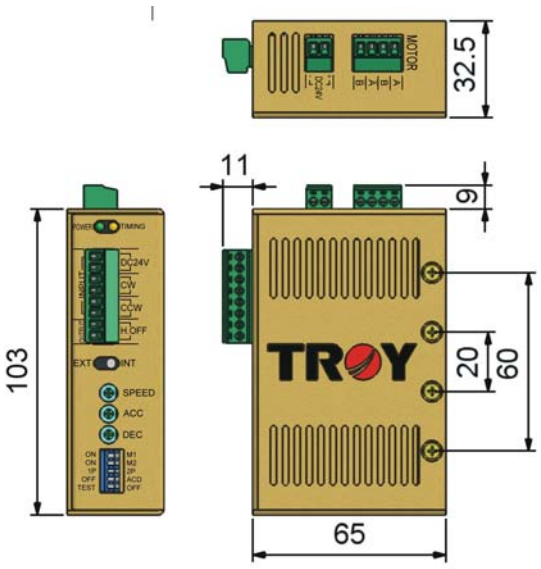
(2)First connect the driver to the ammeter then connect to the motor contact A

(3)Turn on the driver power and do not output the pulse to the motor(Motor at standstill without running)；the value of ammeter indicated is phase current

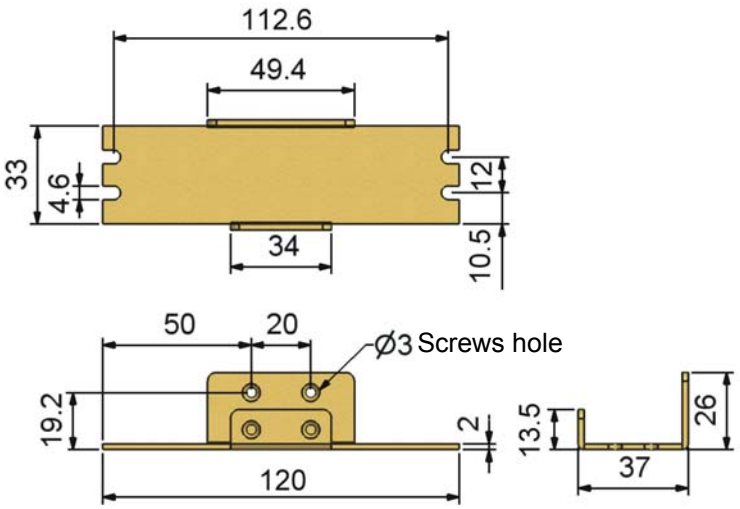
(4)Switching the tip switch ACD to the ACD and the value of ammeter indicated is the phase current(Holding current) during auto current down condition with motor at standstill without running current drop rate is approx 60％

6.Installation and dimension

●Driver dimension



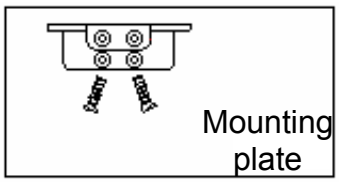
Driver dimension

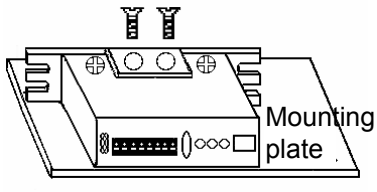


Mounting bracket dimension

●Driver installation

1.Horizontal installation

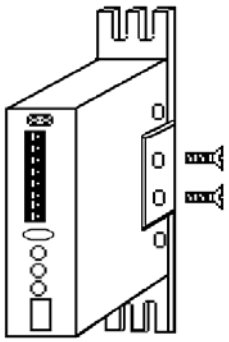


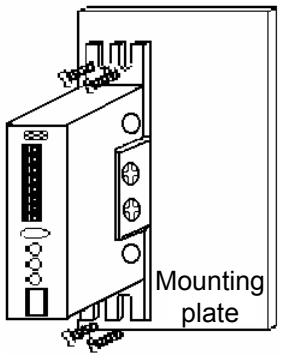


＜Step 1＞
Locking the installation seat onto the mounting plate by using 2 screws

＜Step 2＞
Fit the driver into the groove of mounting plate. Mounted with 2 screws

2.Vertical installation





<Step 1＞
Remove the middle 2 screws of driver. Vertically fit the driver into the groove of the mounting base. Then re-mount the 2 removed screws

<Step 2>
Lock the mounting base onto the mounting plate by using 4 screws

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Ready for request!.

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