

TR Series Mini Type

5-Phase Stepping Motor Driver User's Manual

 Made by TROY Enterprise Co., Ltd



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 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.

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

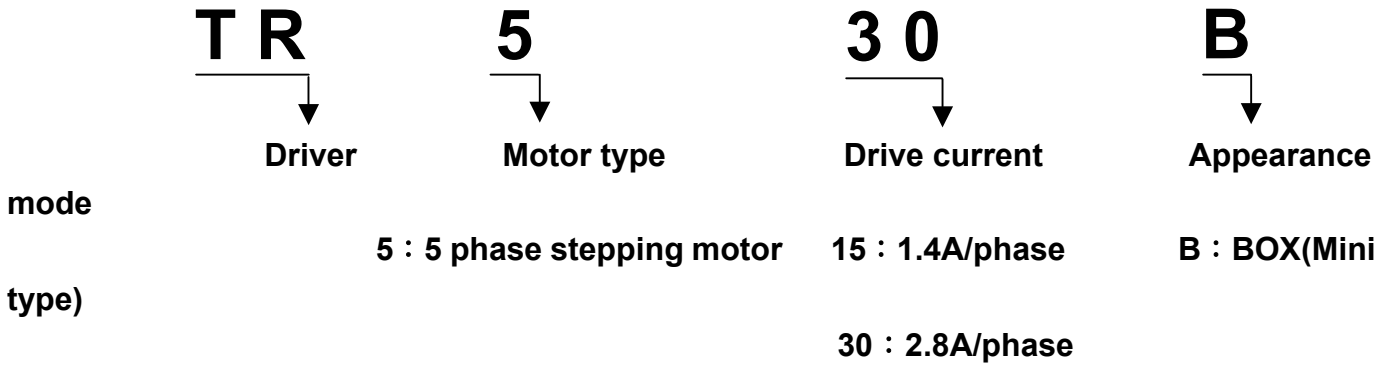
1. Specifications

Driver model		TR515B		TR530B		
Current		0.36~1.4 A/Phase		0.75~2.8 A/Phase		
Compatible motor spec		0.75 A/Phase	1.4 A/Phase	0.75 A/Phase	1.4 A/Phase	2.8 A/Phase
Input power		DC24~36V※1 MIN : > 1.5A	DC24~36V※1 MIN : > 3.0A	DC24~36V※1 MIN : > 1.5A	DC24~36V※1 MIN : > 3.0A	DC24~36V※1 MIN : > 6.0A
Excitation mode		Full step (0.72°/4 phase excitation) Half step (0.36°4-5 phase excitation)				(Convertible)
Signal input/output mode		●Photo coupler input ●Open collector output				
Input signal	CW Pulse input	CW pulse input for 2 pulse input mode Pulse input for pulse input mode				
	CCW Pulse input	CCW pulse input for 2 pulse input mode Direction input for 1 pulse input mode				
	H.OFF input	Holding Off input				
Output signal	TIMING Output	Excited phase origin output Full step : Every 10 pulses output a signal. Half step : Every 20 pulses output a signal.				
Functions		●Automatic Current Down(ACD) ●Self-test (TEST) ●Step angle switch(H/F) ●Pulse input switch(1P/2P)				
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 ●Overheat protection : Auto disconnection in the case of the temperature of driver over 80°C ※2				
LED indication		POWER, TIMING				
Dimensions		90(L)×65(W)×32(H)mm				
Weight		270g				
Ambient temperature		0°C~40°C				

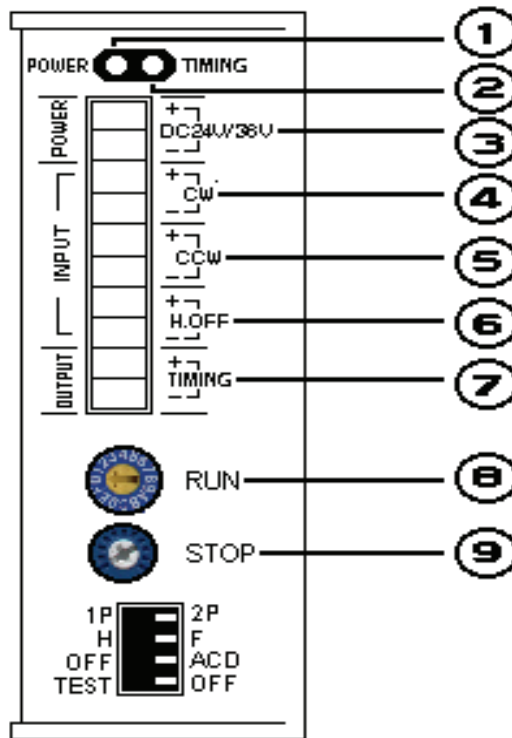
※1 「a」 Max peak voltage=40V. Do not exceed 36V in routine operation, which may otherwise cause driver damage. 「b」 Please follow recommendations provide in the table to use compatible power supplies.

※2. When overheat protection acted, power indicator will light up, motor unexcited (Please make proper protection when motor using at vertical load) ◦ Revive the excitation, it has to turn off the power and eliminate the reason of overheat then turn on the power again.

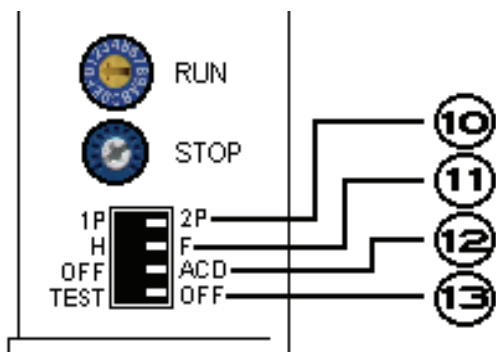
Product number code :



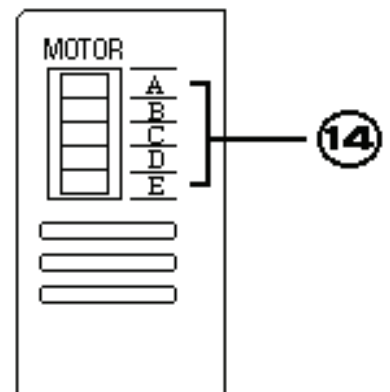
2.Name of driver part



Front panel



Front panel



Left side panel

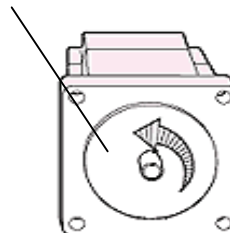
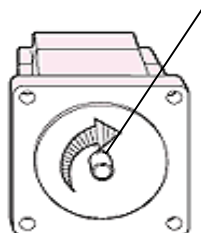
No	Name of panel	Type	Name of function	Switch	Function	Remarks
1.	POWER	LED	Power indicator		LED lamp turns on upon power input	It will light up when overheat
2.	TIMING	LED	Phase origin indicator		Full step : LED lamp turns on once every 10 pulses	
3.	DC24V/36V		Power positive(+)input		Power voltage(V+) of external power supply to be connected to this terminal	DC24V~36V
			Power ground input(-)		Negative voltage(V-) of external power supply to be connected to this terminal	
4.	CW		2 pulse : CW pulse signal input		Clockwise timing pulse input via this terminal	L : 0~0.5V H : 4~5V Input impedance : 220Ω Input current : 20mA below
			1 pulse : Pulse input		Pulse signal input via this terminal	
5.	CCW		2 pulse : CCW pulse signal input		Counterclockwise timing pulse input via this terminal	
			1 pulse : Run rotation control		Clockwise at "L" level Counterclockwise at "H" level	
6.	H.OFF		Holding off		Input (L)potential to dismiss holding and make the motor no excitation, it can easy to turn the axis by hand	
7.	TIMING	○	Excitation phase origin output		10 pulses output a signal when Full step 20 pulses output a signal when Half step	Below DC24V Below 10mA
8.	RUN	SW	Run current regulation		To regulate current of running motor	Default : Scale A
9.	STOP	VR	Stop current regulation		To regulate the current drop rate upon stopping motor	Default : 50%
10	1P/2P	SW	Pulse input mode	1P side	1 pulse input mode	Default : 2P
				2P side	2 pulse input mode	
11.	H/F	SW	Step angle switch	H side	Half step angle : 0.36°/step, 1000 pulses per circle	Default : F (Full step)
				F side	Full step angle : 0.72°/step, 500 pulses per circle	

12.	OFF/ACD	SW	Auto current down (ACD)	OFF side	Motor current to be maintained at run current upon stopping pulse input	Default : ACD * ACD recommended to mitigate temp rise of motor and driver
				ACD side	Motor current drops automatically approx. 0.1 sec. Upon stopping pulse input, so as to mitigate motor temp rise. Drop rate to be set at VR of STOP	
13.	TEST/OFF	SW	Self inspection (TEST) switch	TEST side	CW running of driver at 2PPS	Default : OFF (Turn off)
				OFF side	Stop self-test. Set to OFF side during normal operation	
14.	MOTOR	O	Motor wiring		To connect the motor to the driver	

※Type description : LED→LED lamp, SW→Switch, VR→Adjustable resistor, | →Input , O→Output

Clockwise & counterclockwise running of motor (Axial plane to be front view)

Motor axis



CW (Clockwise)

CCW (Counterclockwise)

3. Current adjustment switch and operation methods

(1) Set run current of motor

- Regulate the run current of motor by adjusting 「RUN」 switch
- The current is defaulted at scale 「A」

Scales of 「RUN」 switch ↔ Current

Scale	TR515B Run current (A/phase)	TR530B Run current (A/phase)
0	0.36	0.75
1	0.36	0.75
2	0.36	0.75
3	0.38	0.76
4	0.44	0.87
5	0.53	1.04
6	0.62	1.25
7	0.70	1.39
8	0.79	1.57
9	0.88	1.75
A	0.97(Default)	1.93(Default)
B	1.06	2.11
C	1.14	2.27
D	1.23	2.44
E	1.32	2.63
F	1.40	2.80

★Caution : To avoid excessive current that may cause abnormal heating or damage, please use proper run current as specified in the motor specifications.

(2) Motor resting current setting

For the stop current of motor, change the drop rate upon motor stopping by regulating 「STOP」 VR

scales (0~10)

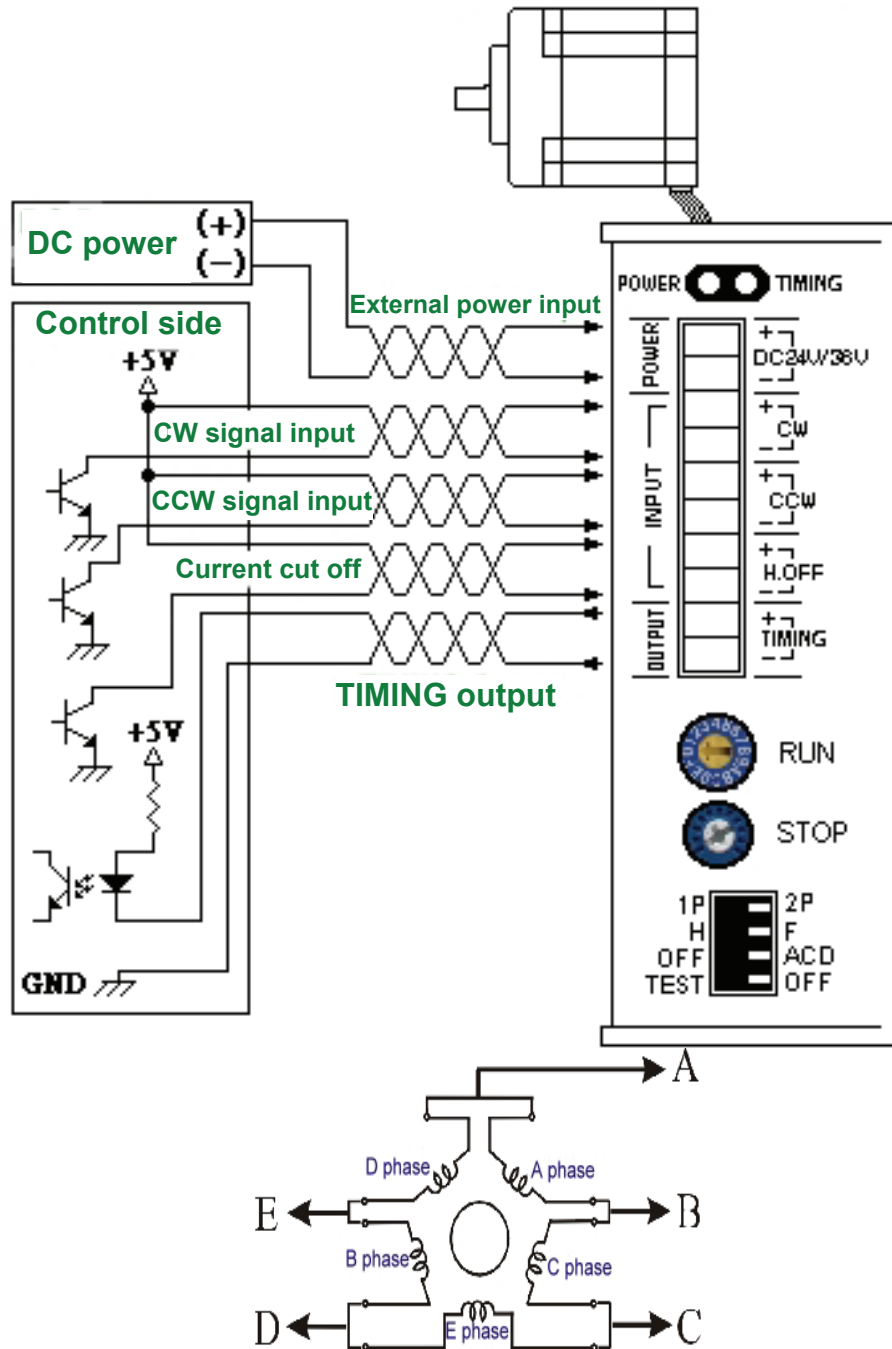
Stop current = 「RUN」 Run current × 「STOP」 drop rate of current (%)

「STOP」 VR scale ↔ Current

Scale	TR515B Drop rate of current (%)	TR530B Drop rate of current (%)
0	27	27
1	27	27
2	27	27
3	41	41
4	51	51
5	57	57
6	63	63
7	67	67
8	70	70
9	72	72
10	74	74

4.Connecting Diagrams

5-Phase stepping motor



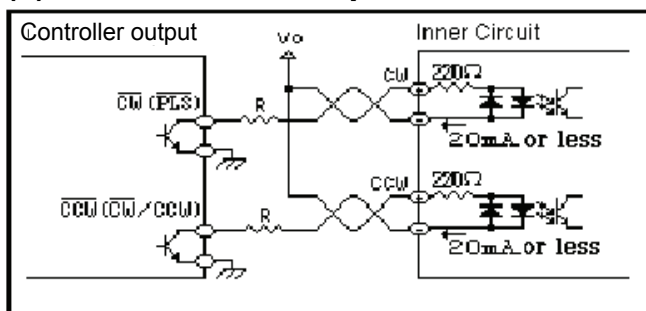
5-phase motor internal connecting diagram

Pin No	TROY		SANYO DENKI		TAMAGAWA		ORIENTAL	
A	5 lines	10 lines	5 lines	10 lines	5 lines	10 lines	5 lines	10 lines
B	Blue	Blue/Black	Black	Black/Yellow	Blue	Blue/Black	Blue	Blue/Black
C	Red	Red/Brown	Orange	Black White/Orange	Red	Red/Brown	Red	Red/Brown
D	Orange	Purple/Orange	Blue	Orange White/Blue	Orange	Purple/Orange	Orange	Purple/Orange
E	Green	Yellow/Green	Red	Red White/White	Green	Yellow/Green	Green	Yellow/Green
F	Black	White/Gray	Yellow	Yellow White/Red	Black	White/Gray	Black	White/Gray

※Note: The mark 『 * 』 means new color of Sanyo 5-phase stepping driver of wiring, it will differ from the old one, please refer to this chart.

5. Wiring illustration and application

(1) CW.CCW Pulse input



★Please Note

External Voltage (VO)	External Resistance (R)
5V	Do not need
12V	390Ω 1/4W
24V	1KΩ 1/2W
36V	1.8KΩ 1W

(a) 2 pulse input mode

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

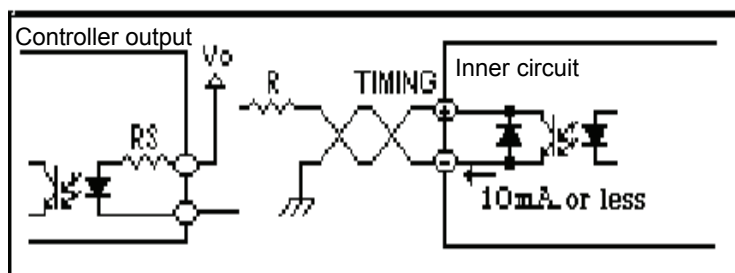
(b) 1 pulse input mode

The negative edge-triggered input is employed. The motor stays at "L" level in the case of no pulse signal input. The pulse signal goes to CW terminal, while the running direction signal goes to CCW terminal. The motor turns clockwise at "L" level and counterclockwise at "H" level.

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

(d) Pulse width > 2 μ sec, Up/Down time < 2 μ sec

(2) H.OFF input

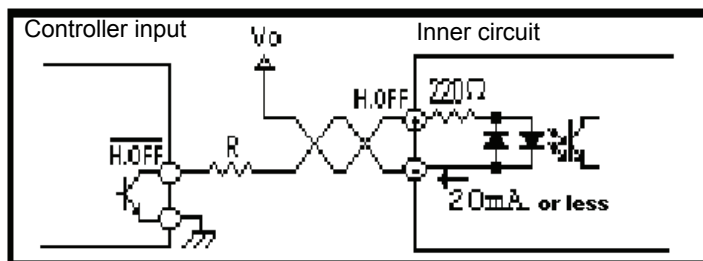


★Please Note

External voltage VO	External Resistance R
5V	Do not need
12V	390Ω 1/4W
24V	1KΩ 1/2W
36V	1.8KΩ 1W

The motor current turns off when the control signal "H.OFF" is set to "L" level then the motor is HOLD OFF.

(3) TIMING output



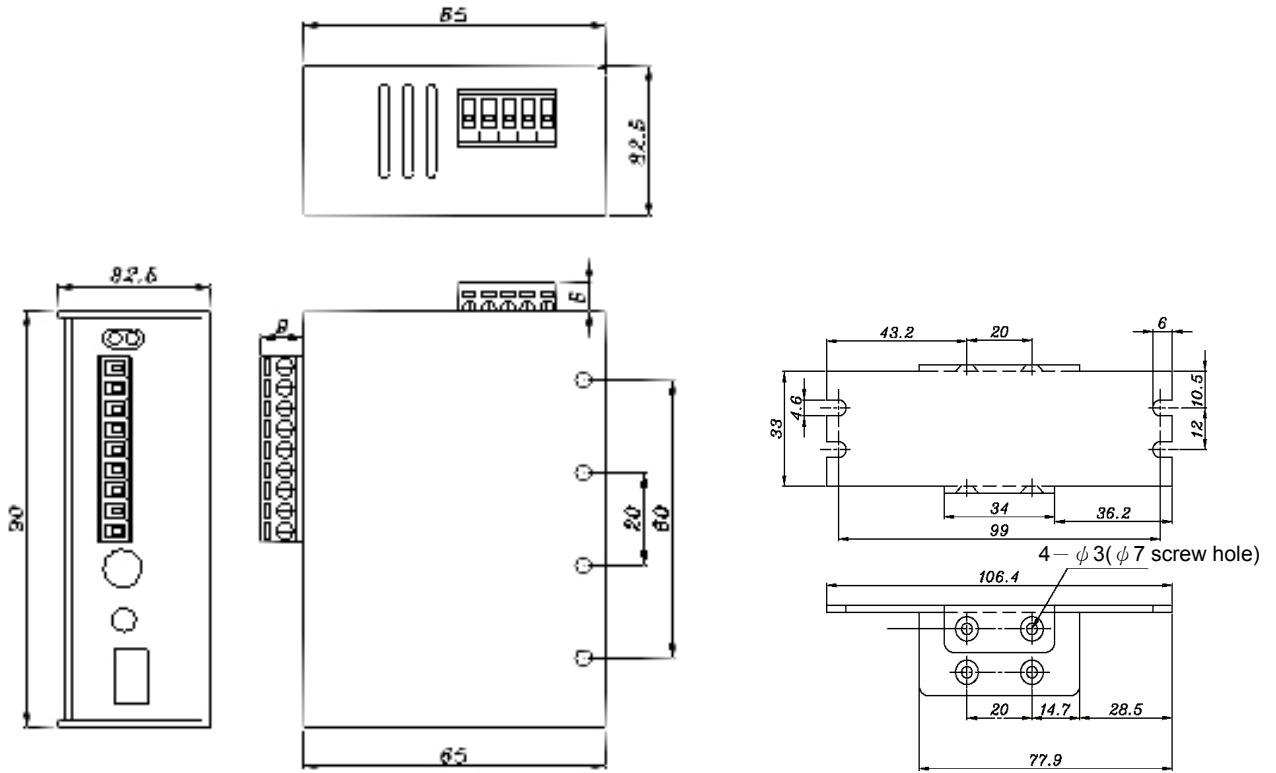
★Please Note

Please connect the external resistance(R) making input current at 10mA or less.

$$R = \frac{V_o}{10\text{mA}} - R_S$$

The excitation timing signal indicates that the excitation state of conforms to the initial detect home position with greater by setting the mechanical home position of equipment to coincide with the excitation home position (Step 0) of motor. The "TIMING" lamp on the front panel lights up every 10 pulses at full-step (0.72°/step) and every 20 pulses at half-step (0.36°/step) and the transistor is on.

6. Dimensions

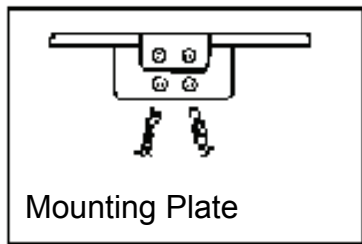


Drive Dimension

Steady dimension

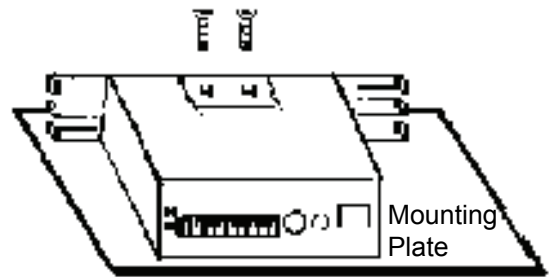
● Driver installation mode

1. Horizontal installation



< Step 1 >

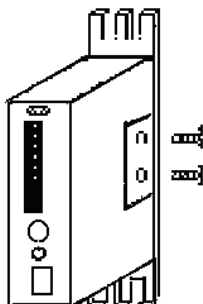
Lock the installation seat onto mounting plate by using 2 screws



< Step2 >

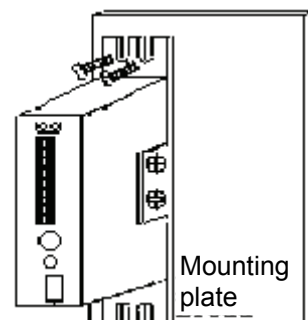
Fit the driver into the groove of mounting plate. Mounted with 2 screws

2. Vertical installation



< Step 1 >

Remove the middle 2 screws of driver. Vertically fit the driver into the groove of the mounting plate. Then re-mount the 2 removed screws.



< Step 2 >

Lock the mounting base onto the mounting plate by using 4 screws.

※For environment protection, paper saving and resources preservation, please download the user's manual directly from SUNHOLY website : <http://www.sunholy.com.tw>

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