

High performance  
2 phase stepper motor driver

**DPYHHAB1400000000**

**DPYHHAB1600000000**

# User Manual

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● If any change in the performance and specification, appearance of products all take as the material object, no separate informs. Respectfully supplicate understanding.

● Products inquiry or if any question in use are welcome to contact us.

Please read and be familiar with the notices of specification and security in the user guide before to use the driver.  
Please reserve this user guide for looking up at any time.

# 1. The summary

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The driver is the appropriate driver which offer bipolar connecting method, it's just for the 2 phase stepper motor. Utilize CPLD component design to reduce internal components to enhance confidential, SMT component design has a lot of merits, as scaling bulk and stable quality; unique drive technic and protection function enhance the speed of motor, acceleration and torque output. The feature are as follows :

- Excite mega tic method : Full step is 2 phase excite mega tic, each step 1.8 degree. Half step is 1-2 phase excite mega tic, each step 0.9 degree.
- Drive method : Bipolar driving with constant current, there are a lot of merits, as the angle accuracy is better and torque is larger and so on....
- Special function : 1P/2P function for option, over heat protection(AHO), auto-adjustment current (ACD), external mega tic release (C.OFF), self-test and zero timing output (ZRO) and so on....
- Output signal : There is over heat and zero timing output, it can auto-control with external circuit.

# 2. The confirmation of content

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The content of package is listed below for confirmation; please check out after taking off a seal, if any damage or lack, please contact us at once.

- The Driver..... 1unit
- Moveable sockets ( It had be inserted in driver )
  - 10 holes..... 1piece
- EN Series Terminals
  - 8 holes ..... 1 piece
- Accessories
  - L form fixed socket..... 2 piece
  - form fixed socket..... 2 piece
  - Pan Head cross M3 screw ..... 4 piece
  - Round Head cross M3 screw ..... 4 piece
- User guide (This book)..... 1 book

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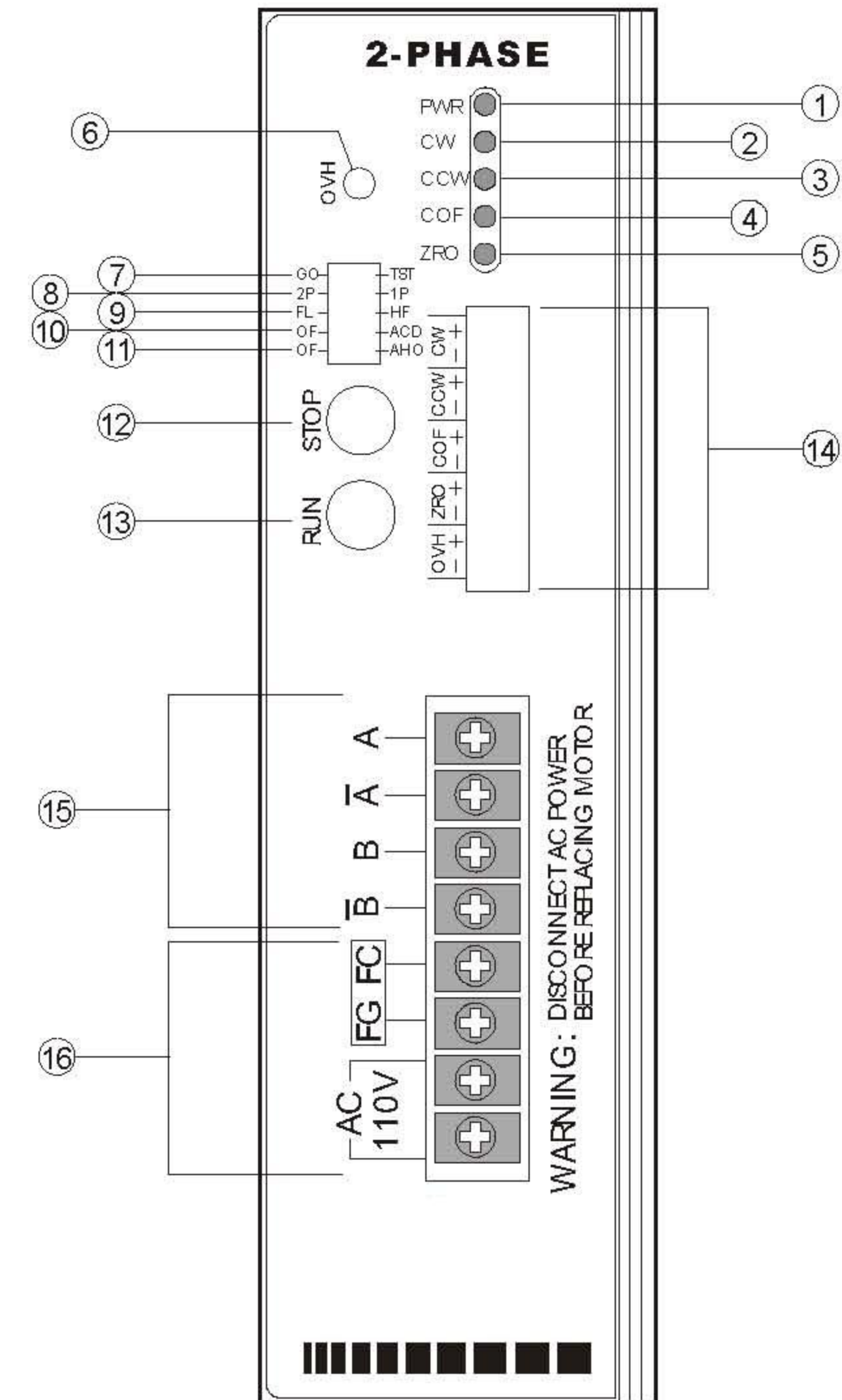
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## 9. Leads of motor connection

		A	/A	B	/B	
TECO	4 leads	black	green	red	blue	-----
	6 leads	black	green	red	blue	Yellow, white: don't connect and forbid short circuit
	6 leads	red	red white	green	green white	Black, white: don't connect and forbid short circuit
	8 leads (Series)	red	black	green	yellow	Connect red white and black white Connect green white and yellow white Two group of leads: forbid short circuit
	Series connection: double impedance, quadri- inductive reactance, it is suitable for low speed running.					
VEXTA	8 leads (Parallel)	Red \ black white	black \ red white	green \ yellow white	yellow \ green white	-----
	Parallel connection: halve impedance, inductive reactance constant, it is suitable for high speed running.					
VEXTA	6 leads	black	green	red	blue	Yellow, white: don't connect and forbid short circuit

Above information is just for reference, if original manufacture change color of leads, we won't further inform.

## 3. Introduction of panel



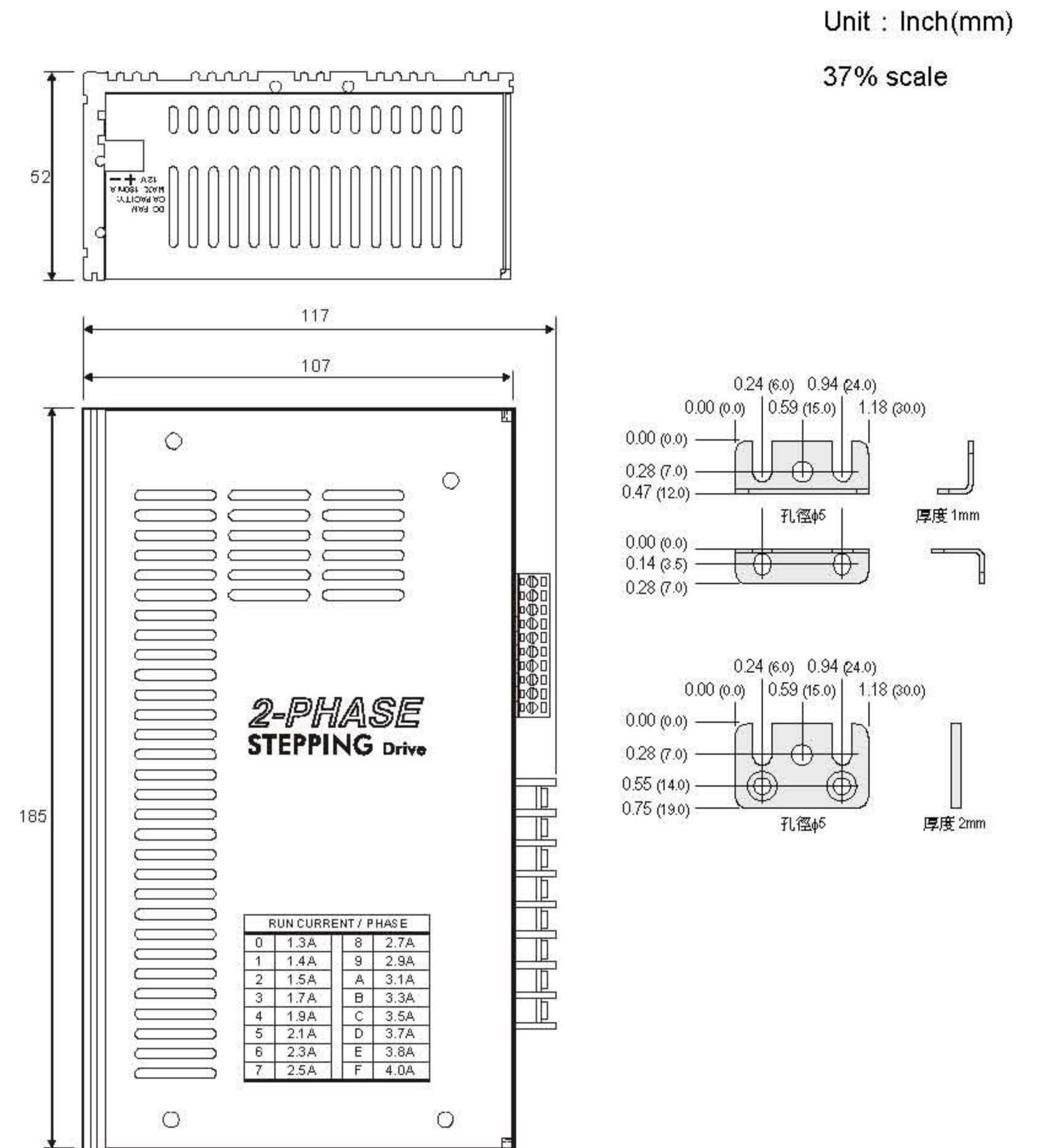
### 3.1 Introduction of LED

LED	Name	Color	Description	
①	PWR	Power light	Green	When the driver accept AC110, PWR will be light.
②	CW	Clock-wise light	Green	When the driver receive pulse signal, CW will blink once each pulse signal.
③	CCW	Count clock-wise light	Green	When the driver receive pulse signal, CCW will blink once each pulse signal.
④	COF	Excite mega tic release light	Red	When the driver receive external excite mega tic release signal, COF will be light.
⑤	ZRO	Zero timing light	Green	When full step, ZRO will blink once each 4 pulse signals. When half step, ZRO will blink once each 8 pulse signals.
⑥	OVH	Over heat light	Red	When the temperature of driver is over 85°C, OVH will be light.

### 3.2 Switch setting 、 knob adjustment

Switch & Knob	Name	Original setting	Description
⑦	GO/TST	Self-test switch	GO In normal running, to set the switch GO. When self-test, to set the switch TST.
⑧	2P/1P	Option switch for pulse control method	2P If use CW pulse and CCW pulse to control the running direction of motor, to set the switch 2P. If just only input a group of pulse, another signal control the running direction of motor, to set the switch 1P。
⑨	FL/HF	Option switch for angle of step	FL If have motor to run 1.8° each pulse, please use FL( full step)。 If have motor to run 0.9° each pulse, please use HF(half step)。
⑩	OF/ACD	Function switch for auto-current down	ACD When motor stop, if want to have the drive current auto-down, to set the switch ACD。 When motor stop, if want to maintain fixed drive current, to set the switch OF.
⑪	OF/AHO	Function switch for over heat output	AHO When the driver is over heat(>85°C), if want to have the motor stop, to set the switch AHO。 If to set the switch OF; it will only output signal, but the motor wouldn't stop.
⑫	RUN	Knob for adjustment of running current	8 To set 16 step of the drive current, when the motor run. (1.0~4.0A,SD245,1.5A~6.0A,SD265)
⑬	STOP	Knob for adjustment of stop current	8 To set percentage of current down, when the motor stop. (15%~100%16 step、16 step setting)

### 8. Dimensions



- The screws size is M3 \* 0.5 mm and dimension are as above.
- If the driver needs to run for a long time or high current, it is better to mount the driver in a place decreasing heat easily.
- When mounting two or more drivers, separate them by a space at least 20mm.
- Don't expose to continuous vibration or excessive impact。
- Don't expose to dust, water or oil.

## 7. Specification

Model number	2 phase stepper driver
Drive method	Bipolar Bridge Rectifier's Driving with Constant Current method
Drive current	1.0A / phase ~ 4.0A/ phase DPYHHAB1400000000 1.5A / phase ~ 6.0A/ phase DPYHHAB1600000000
excite mega tic method	Full step : 1.8°/step (2 phase excite mega tic) Half step : 0.9°/step (1-2 phase excite mega tic)
Input signal spec	Input impedance 220Ω · Input current under 20mA Signal voltage H : +4~+10V · L : 0~+0.5V
CW pulse input (pulse input)	Negative Lever Excite Input · pulse width 5μSec (above) When 2P, it is CW pulse input. When 1P, it is pulse input.
CCW pulse input (direction input)	Negative Lever Excite Input · pulse width 5μSec(above) When 2P, it is CCW pulse input. When 1P, it is direction signal (OFF→CCW · ON→CW)
Excite mega tic release signal input COF	When ON · the driver will release drive current to the motor When OFF, the driver will drive motor according to the setting of drive current.
Output signal spec	Open Collector Condition: under DC24V · under 10mA
Excite mega tic zero timing signal output	When full step, output a signal each 4 pulses. When half step, output a signal each 8 pulses.
Over heat signal output	When the driver is over 85°C · the drive current auto-close. It is optional on or off by function switch.
Noise insulation	Photo Coupler
Function switch setting	Pulse input method, Step angle option, Auto-current down function option, Auto-over heat signal output option
LED light	Power input light, Pulse input light, excite mega tic release input light, excite mega tic zero timing output light · over heat alarm output light
Cooling mothed	By heat sink alloy
Work temperature	0 ~ 40°C
Work humidity	< 85%RH
Power	Single phase AC110V±10% , 50/60Hz
Dimension (mm)	185(L) x 107(W) x 52(H) DPYHHAB1400000000 207(L) x 109(W) x 69(H) DPYHHAB1600000000
Weight	950g DPYHHAB1400000000 1200g DPYHHAB1600000000

## 3.3 Connection Terminal

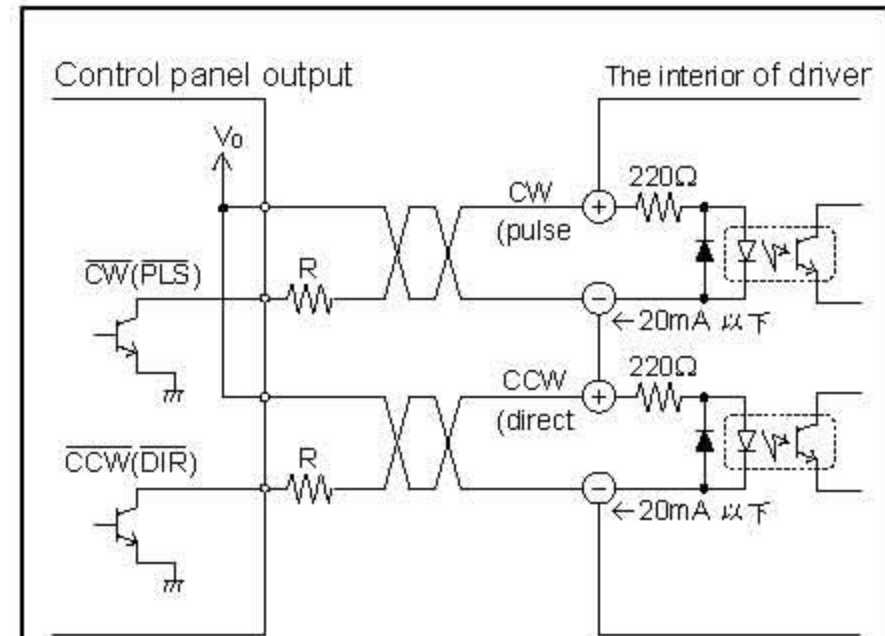
Code	Name	Description	Page	
⑭	CW+	CW pulse input terminals / Pulse signal input terminals	<ul style="list-style-type: none"> <li>• 2P drive method               <ul style="list-style-type: none"> <li>– The pulse input terminals which have the motor CW.</li> </ul> </li> <li>• 1P drive method               <ul style="list-style-type: none"> <li>– The pulse input terminals which have the motor running.</li> </ul> </li> </ul>	P.5
	CW-			
⑭	CCW+	CCW pulse input terminals / gyro-direction pulse input terminals	<ul style="list-style-type: none"> <li>• 2P drive method               <ul style="list-style-type: none"> <li>– The pulse input terminals which have motor CCW.</li> </ul> </li> <li>• 1P drive method               <ul style="list-style-type: none"> <li>– The pulse input terminals which control the running direction of the motor. ("L"→CCW, "H"→CW)</li> </ul> </li> </ul>	P.5
	CCW-			
⑭	COF+	Excite mega tic release signal input terminals	<ul style="list-style-type: none"> <li>• When add a High voltage in this point, the current of the driver would down to zero at once, then torque of the motor is released.</li> </ul>	P.6
	COF-			
⑭	ZRO+	Excite mega tic zero timing signal input terminals	<ul style="list-style-type: none"> <li>• When full step (1.8°/step) · the driver receive each 4 pulses, this point will output a signal.</li> <li>• When full step (0.9°/ step), the driver receive each 8 pulses, this point will output a signal.</li> </ul>	P.7
	ZRO-			
⑭	OVH+	Over heat input terminals	<ul style="list-style-type: none"> <li>• When the temperature of driver is over 85°C, this point will be active at once ·</li> </ul>	P.7
	OVH-			
⑮	A	Motor wiring terminals	<ul style="list-style-type: none"> <li>• Motor A phase ·</li> <li>• Motor /A phase ·</li> <li>• Motor B phase ·</li> <li>• Motor /B phase ·</li> </ul>	P.8
	/A			
	B			
	/B			
⑯	FG	Ground Terminals	<ul style="list-style-type: none"> <li>• Ground of AC input (connected to case)</li> <li>• Single phase AC110V ± 10% · 50/60Hz</li> </ul>	P.8
	FG			
	AC110V	Power input terminals		
	AC110V			

## 4. Output/ Input signal specification

### 4.1 Input signal

#### 4.1.1 CW/ pulse(CW/PLS) signal、CCW/direction (CCW/DIR) signal

##### • Input loop signal connecting diagram



The words in bracketing, it means 1P input method.  
When  $V_0=5\text{V}$ , No need for external impedance R.  
Forbid current input over 20mA to avoid damaging Photo Coupler.

- \*\*  $V_0=12\text{V}$ 、add  $1.0\text{K}\Omega / \frac{1}{4}\text{W}$  resistor
- \*\*  $V_0=15\text{V}$ 、add  $1.5\text{K}\Omega / \frac{1}{4}\text{W}$  resistor
- \*\*  $V_0=24\text{V}$ 、add  $2.0\text{K}\Omega / \frac{1}{4}\text{W}$  resistor

##### 2P When input

###### • CW pulses input

When negative lever excite input CW, the motor run with CW direction.

###### • CCW pulses input

When negative lever excite input CCW, the motor run with CCW direction.

##### 1P When input

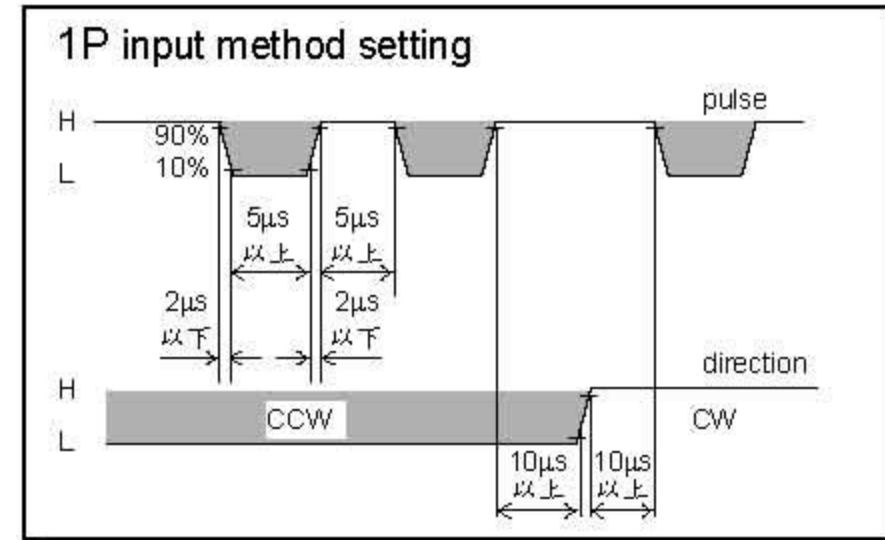
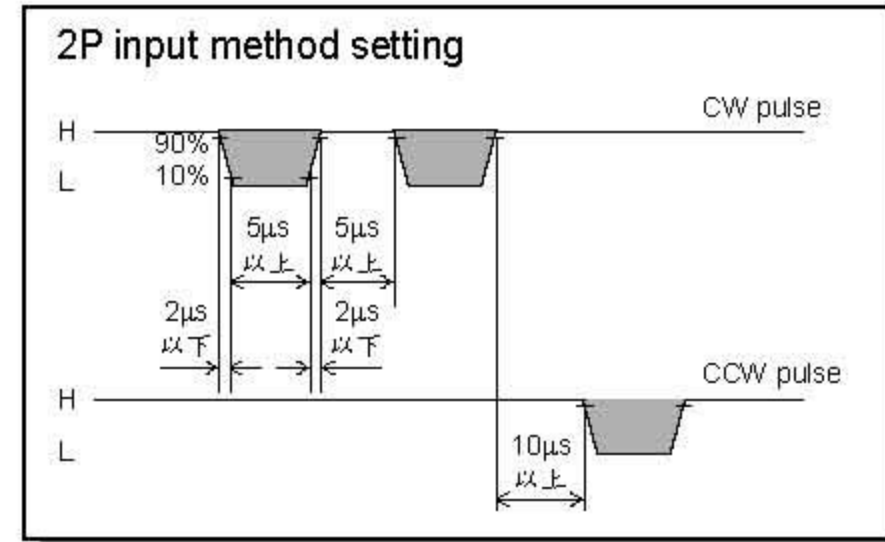
###### • Pulses input

When negative lever excite input CW, the running direction of motor is according to direction signal.

###### • running direction input

When running direction signal input CCW terminal, "L" the motor run with CCW direction.  
"H" the motor run with CW direction.

##### • Pulse Diagram



- Pulses voltage value,  $H = 4\sim 10\text{V}$ 、 $L = 0\sim 0.5\text{V}$ 。
- Pulses width above  $5\mu\text{s}$ , the changeover interseptal time of  $H \rightarrow L$  is under  $2\mu\text{s}$ .
- Acceptable maximum accessible chopping speed is up to 60 KHz.
- It needs the echo time for  $10\mu\text{s}$  between the changeover point of CW/CCW direction and starting pulses。
- Utilize negative lever excite to avoid noise, thus it needs maintain in H status before pulses input.
- When use 2P input method、forbid input CW and CCW

##### NOTE :

If the running direction of the motor is opposite, the leads of A, B phase of motor can be changed. For example:

$$A \rightarrow B \\ \text{or } /A \rightarrow /B$$

### 6.2 Current adjustment

#### 6.2.1 The current when the motor run (RUN)

- When the motor is running, its drive current value can be set by 「RUN」 knob of 16 step micro adjustment.
- If the drive current value of driver is higher than the current value of specification of motor, the motor will be over heat and even burn out.
- If the drive current value of driver is lower than the current value of specification of motor, then in torque and speed, it will be getting bad, but the motor will be better in ascendant temperature and percussion noise.
- Original setting value of driver is 「8」. Refer to right table to set a suitable current value according to current value of spec of motor.

##### DPYHHAB140000000

「RUN」 scale	Running current(A/phase)
0	1.0
1	1.2
2	1.4
3	1.6
4	1.8
5	2.0
6	2.2
7	2.4
8	2.6
9	2.8
A	3.0
B	3.2
C	3.4
D	3.6
E	3.8
F	4.0

##### DPYHHAB1600000000

「RUN」 scale	Running current(A/phase)
0	1.5
1	1.8
2	2.1
3	2.4
4	2.7
5	3.0
6	3.3
7	3.6
8	3.9
9	4.2
A	4.5
B	4.8
C	5.1
D	5.4
E	5.7
F	6.0


#### 6.2.2 The current when the motor stop (STOP)

- When the motor stop run, its current value can be set by the 「STOP」 of 16 step micro adjustment.
- If use current auto-drop function, it can be set by the 「OF/ACD」 of switch。
- Knob can adjust descendant percentage for range 0%~80%.  
「RUN」  $\times$  (1 - descendant percentage %) = current when stop
- Knob scale 0  $\rightarrow$  80%、F  $\rightarrow$  0%
- Original setting value of driver is in the middle (scale 8)、please according to real needs to adjust digressions for the current value, it is helpful to reduce temperature of the motor. 10


## 6. Function setting and current adjustment

### 6.1 Function setting


#### 6.1.1 Self-test switch

- GO
- 
- TST
- This switch is for driver self-test.
  - If move this switch to the place 「GO」, it means common running model, the driver accept external control.
  - If move this switch to the place 「TST」, it means self-test model, the driver will bring pulses about 5Hz to drive motor.


#### 6.1.2 Pulse input method

- 2P 1P
- 
- If move this switch to the place 「2P」, it means to use 2 groups pulses input, one group is CW pulses, another one group is CCW pulses.
  - If move this switch to the place 「1P」, it means just only to use a group pulse input (CW), and to control CW/CCW direction of motor by ON/OFF of CCW input terminal.


#### 6.1.3 Step angle setting

- FL HF
- 
- If move this switch to the place 「FL」, it means the motor will run with full step method, each step is 1.8°, to run a circle need 200 pulses.
  - If move this switch to the place 「HL」, it means the motor will run with full step method, each step is 0.9°, to run a circle need 400 pulses.

#### 6.1.4 Current auto-drop function

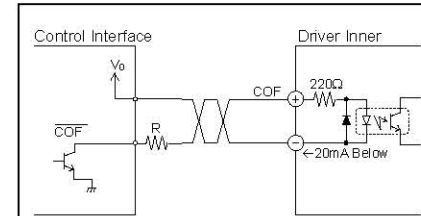
- OF ACD
- 
- If move this switch to the place 「ACD」, it means after motor stop about 0.3 sec, the driver will according to the setting of current descendant percentage to auto-drop drive current to avoid motor over heat. (Regarding current descendant percentage, please refer to P.10 「current adjustment」)
  - If move this switch to the place 「OF」, it means when the motor stop, the driver still maintains original current, no auto-drop function.

#### 6.1.5 Over heat auto-protection input

- OF AHO
- 
- If move this switch to the place 「AHO」, it means when temperature of the drive is over 85°C, except output alarm signal and auto-release drive current (The motor stop).
  - If move this switch to the place 「OF」, it means temperature of the driver is over heat, just only OVH LED light and output the over heat signal, but the drive current won't be released (The motor keep running).

### 4.1.2 Excite mega tic current release (COF) Signal

#### • Input loop signal connecting diagram



If  $V_0 = 5V$ , it doesn't need to connect external resistor R.

If  $V_0$  is higher than 5V, you should connect an external resistor R. The input current must stay under 20mA, otherwise, it will burnout the photo-coupler.

\*\*  $V_0 = 12V$ ,  $R = 1.0K\Omega / \frac{1}{4}W$

\*\*  $V_0 = 15V$ ,  $R = 1.5K\Omega / \frac{1}{2}W$

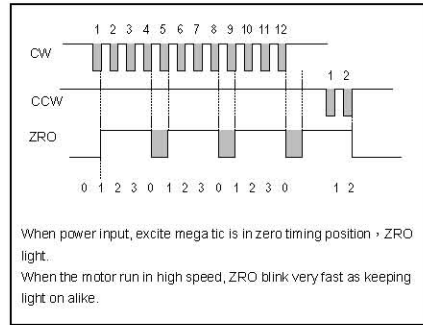
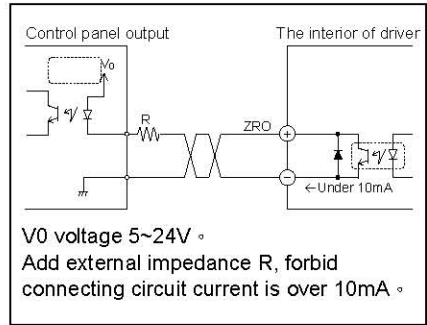
\*\*  $V_0 = 24V$ ,  $R = 2.0K\Omega / \frac{1}{2}W$

- When "COF" terminal is active, the driver will release current. Motor now is without torque, it could easily rotate shift by hand.
- The terminal is negative trigger, when it is not active, it remain at H status.
- When COF is active, and there is external force to rotate the shift. There will have  $\pm 3.6$  degree tolerance after COF release.

## 4.2 Output signal

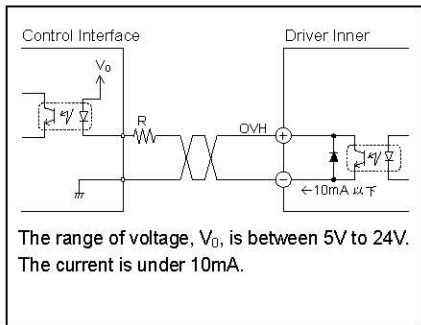
### 4.2.1 Zero Timing Signal(ZRO)

#### • Output Signal Connecting Circuit



- There is a Zero-point output when the motor rotated per  $7.2^\circ$ . For example as following:  
When  $200s/r(1.8^\circ/s)$  : Per 4 pulse input, one Zero signal output.  
When  $400s/r(0.9^\circ/s)$  : Per 8 pulse input, one Zero signal output.  
In the mean time, the ZRO LED light on when Zero signal output.
- For best zero timing performance, it is combined with mechanical zero timing together.

#### • Output Signal Connecting Circuit



- When temperature is over  $85^\circ C$ , the driver will output an alarm signal. OVH LED light on at the same time. It protects inner components in driver PCB.
- If function switch on OF/AHO, driver not only output overheat signal and light on, but also decrease excite mega tic current, then motor stop.
- In operating status, when alarm signal happened, you should turn off the power immediately. After find out the reason and wait for the driver is cool then restarts it.

## 5. Connecting diagram

