

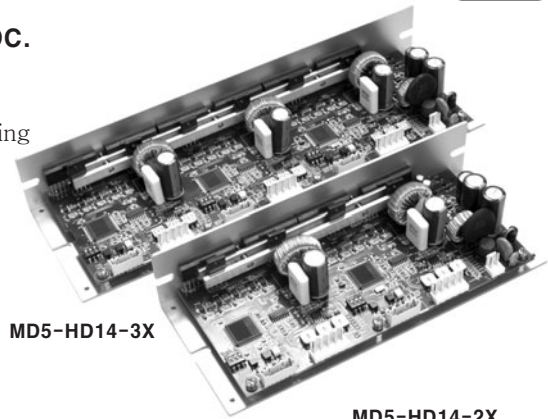
Multi-Axis 5-Phase Stepping Motor Driver

Low noise, low vibration multi axis 5-phase stepping motor driver

NEW

■ Features

- **Simultaneous operation of 2, 3-axis by single 24–35VDC.**
- Small, light weight and advanced quality by custom IC and surface mounted circuit.
- Realizing low noise, low vibration rotation with microstep-driving
- Low speed rotation and high accuracy controlling with microstep-driving
- Max. resolution – 250 division : In case of 5-phase stepping motor of which basic step angle is 0.72°, it enables to control up to 0.00288° per pulse and it requires 125,000 pulses per rotation.
- Includes auto current down and self-diagnosis function
- Photocoupler input insulation method to minimize the effects from external noise.



⚠ Please read "Caution for your safety" in operation manual before using.



■ Ordering information

MD	5	–	H	D	14	–	2X	
Item		Motor phase		Step type (Resolution)		Power supply		Axis
								2X 2-Axis
								3X 3-Axis
								14 1.4A/Phase
								D 20–35VDC
								H Micro Step(250divisions)
								5 5-Phase
								MD Motor Driver

※Bulit-in zero point excitation output signal is optional.

■ Specifications

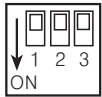
Model	MD5-HD14-2X	MD5-HD14-3X
Power supply	(※1) 20–35VDC 5A Max.(–10%, +20%)	20–35VDC 7A Max.(–10%, +20%)
RUN current	0.4 to 1.4A / Phase	
RUN method	Bipolar constant current pentagon drive	
Basic step angle	0.72° / 1Step	
Resolution	1, 2, 4, 5, 8, 10, 16, 20, 25, 40, 50, 80, 100, 125, 200, 250 division (0.72° to 0.00288° / 1Step)	
Input pulse width	Min. 0.5μs	
Pulse duty	Max. 50%	
Rising/Falling time	Max. each 120ns	
Max. input pulse frequency	1MHz	
Input voltage level	High : 4–8VDC, Low : 0–0.5VDC	
Input resistance	270Ω (CW, CCW), 390Ω (HOLD OFF)	
Ambient temperature	0 to 40℃ (Storage condition : –20 to 60℃ at non-freezing status)	
Ambient humidity	30 to 85%RH(at non-freezing status)	
Approval	CE	
Unit weight	Approx. 292g	Approx. 411g

※(※1)When using over 30VDC, it should be mounted at ventilated place due to increasing heat.

- (A) Photo electric sensor
- (B) Fiber optic sensor
- (C) Door/Area sensor
- (D) Proximity sensor
- (E) Pressure sensor
- (F) Rotary encoder
- (G) Connector/Socket
- (H) Temp. controller
- (I) SSR/Power controller
- (J) Counter
- (K) Timer
- (L) Panel meter
- (M) Tacho/Speed/Pulse meter
- (N) Display unit
- (O) Sensor controller
- (P) Switching power supply
- (Q) Stepping motor & Driver & Controller
- (R) Graphic/Logic panel
- (S) Field network device
- (T) Production stoppage models & replacement

MD5-HD14-2X, 3X

◎Function selection switch



NO	Name	Function	Switch position	
			ON	OFF
1	TEST	Self-diagnosis	Rotate in 30rpm	—
2	1/2 CLK	Pulse input method	1 Pulse input	2 Pulse input
3	C/D	Auto current down	Not using	Using

●TEST

- ※ Self-diagnosis function is to test motors and drivers.
 - ※ Motors rotate with 30 rpm in full-step. Motor rotation speed is subject to change depending on resolution setting.
 - ※ Rotation speed = 30 rpm / resolution
 - ※ The motor will rotate in CCW direction when in 1-pulse input mode and in CW direction when in 2-pulse input mode.
- Note) Make sure that TEST switch is set to OFF before supplying the power.
It may cause injury or danger if TEST switch is set to ON when power is supplied.

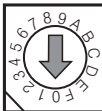
●1/2 CLK

- ※ 1/2 CLK switch is to select pulse input mode.
- ※ 1-pulse input mode : CW → operation command pulse input, CCW → rotation direction pulse input
([H]: CW rotation, [L]: CCW rotation)
- ※ 2-pulse input mode : CW → CW direction rotation pulse input, CCW → CCW direction rotation pulse input

●C/D (Auto current down)

- ※ This function is reducing current automatically according to STOP current setting value in order to suppress generated heat when motor is stop.
- ※ It activates when there is no pulse input of motor operation for over 200ms.

◎RUN current setting



Switch No.	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
Current (A/Phase)	0.4	0.5	0.57	0.63	0.71	0.77	0.84	0.9	0.96	1.02	1.09	1.15	1.22	1.27	1.33	1.4

- ※ RUN current is a phase current provided to 5-phase stepping motor.
 - ※ Be sure to set RUN current at the rated current or below. If not, it may cause heat generation, loss of torque or step-out.
 - ※ Adjust the RUN current in case severe heat generation occurs. Be sure that torque decreasing may occur when adjusting the current.
 - ※ RUN current setting value may have some deviation depending on motor's running frequency.
- Note) Be sure to adjust RUN current while motor is running.

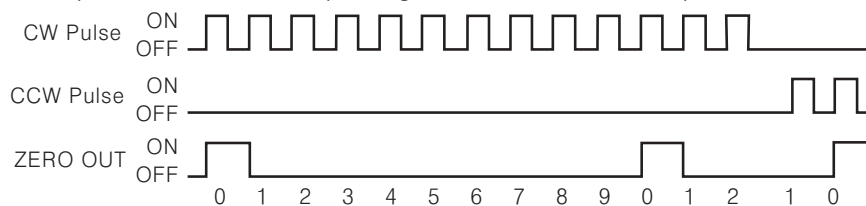
◎STOP current setting



Switch No.	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
%	27	31	36	40	45	50	54	58	62	66	70	74	78	82	86	90

- ※ STOP current is a phase current provided to 5-phase stepping motor at standstill.
 - ※ It will be activated when C/D (Auto current down) is set to ON. By setting STOP current, it is possible to suppress the heat generation at motor standstill.
 - ※ STOP current setting value is the ratio of RUN current setting value (%).
- Ex) In case RUN current setting value is set to 1.4A and STOP current setting value is set to 50%, auto current down current is set to 0.7A.
- ※ STOP current setting value may have some deviation depending on resistance impedance of motor.
 - ※ Auto current down function will be activated when HOLD OFF signal is [L]. When HOLD OFF signal is [H], the function is not activated since the current provided to each phase is cut off.
- Note) Be sure to adjust STOP current while motor is at standstill.

◎Zero point excitation output signal (ZERO OUT)[※Option]



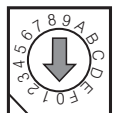
- ※ The signal is output to indicate when the motor excitation status is in the initial stage. / Used to check the rotation position of motor's axis
 - ※ In case of full step, the signal is output every 7.2°. (50 times / rotation)
- EX) Full step (0.72°/Step): Signal is output every 10 pulses.
20 divisions (0.036°/Step): Signal is output every 200 pulses.

Multi-Axis 5-Phase Stepping Motor Driver

◎HOLD OFF function

- ※ When HOLD OFF input signal is [H], motor excitation is released.
- When HOLD OFF input signal is [L], motor excitation is in a normal status.
- ※ A function used to rotate motor's axis using external force or used for manual positioning.
- ※ HOLD OFF Input signal [H] and [L] represent Photocoupler ON/OFF in a circuit.
- ※ Please do not use for stopping motor.

◎Setting microstep(Microstep : Resolution)



Switch No.	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
Resolution	1	2	4	5	8	10	16	20	25	40	50	80	100	125	200	250
Step angle	0.72°	0.36°	0.18°	0.144°	0.09°	0.072°	0.045°	0.036°	0.0288°	0.018°	0.0144°	0.009°	0.0072°	0.00576°	0.0036°	0.00288°

●Resolution setting(Same as MS1, MS2)

- ※ Microstepping is to make basic step angle of 5-phase motors (0.72°) divided into smaller angle according to setting values.
- ※ The formula for microstep angle is ;

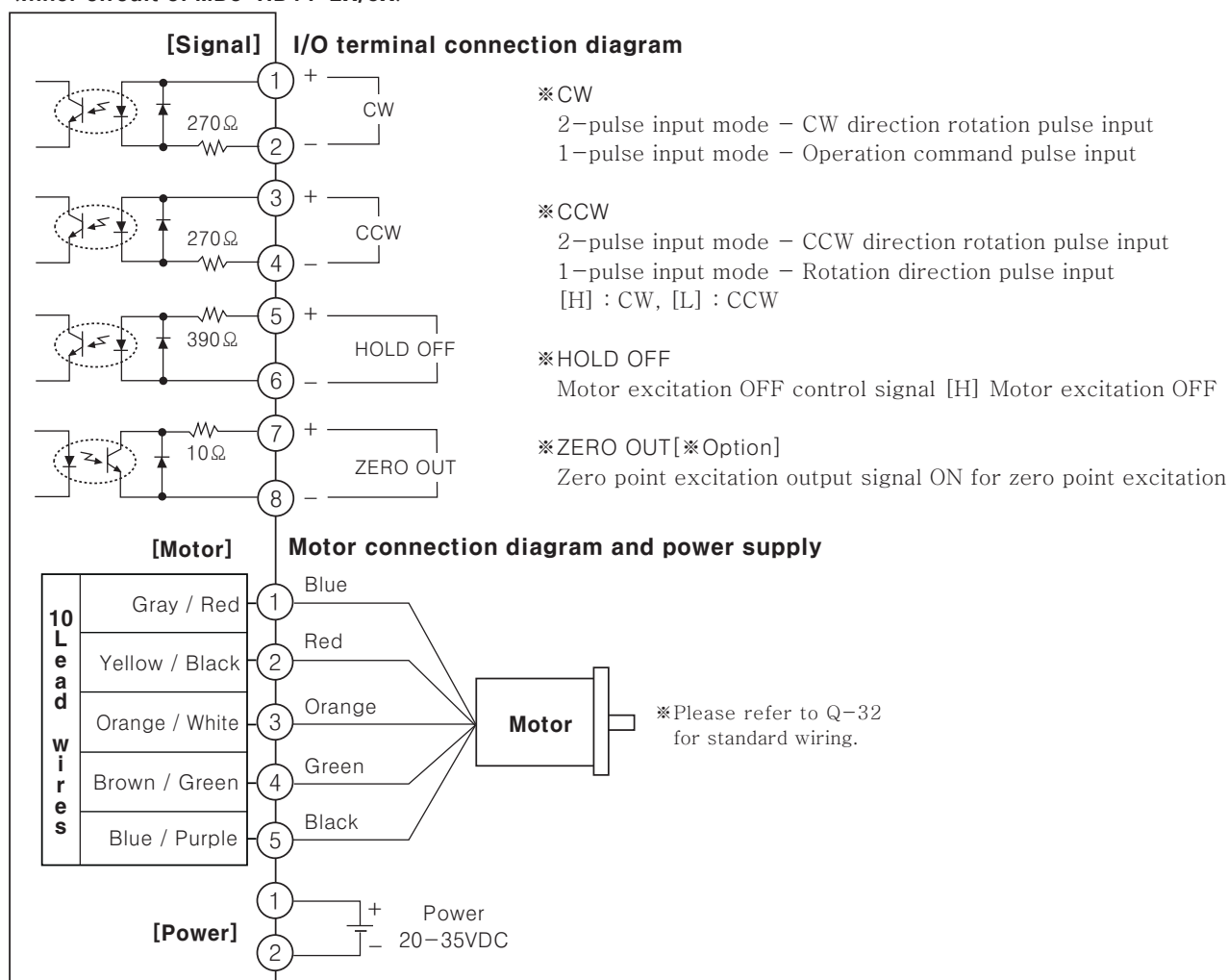
$$\text{Motor revolution angle (5-phase motors)} = \frac{\text{Basic step angle}(0.72^\circ)}{\text{Resolution}}$$

- ※ In case of geared motors, step angle shall be determined by dividing step angle by gear ratio.
- EX) $0.72^\circ / 10 (1:10) = 0.072^\circ$

- ※ It may cause step-out if resolution is changed while motor is running.

■Input · Output diagram

<Inner circuit of MD5-HD14-2X/3X>



Note) Add external resistance when power for pulse from the external of the unit exceeds +5V. (Input current:10 to 20mA)

Note) 2/3-axis use power supply in common and input/output terminals are proportional to the number of axes of model.

(A) Photo electric sensor

(B) Fiber optic sensor

(C) Door/Area sensor

(D) Proximity sensor

(E) Pressure sensor

(F) Rotary encoder

(G) Connector/Socket

(H) Temp. controller

(I) SSR/Power controller

(J) Counter

(K) Timer

(L) Panel meter

(M) Tacho/Speed/Pulse meter

(N) Display unit

(O) Sensor controller

(P) Switching power supply

(Q) Stepping motor & Driver & Controller

(R) Graphic/Logic panel

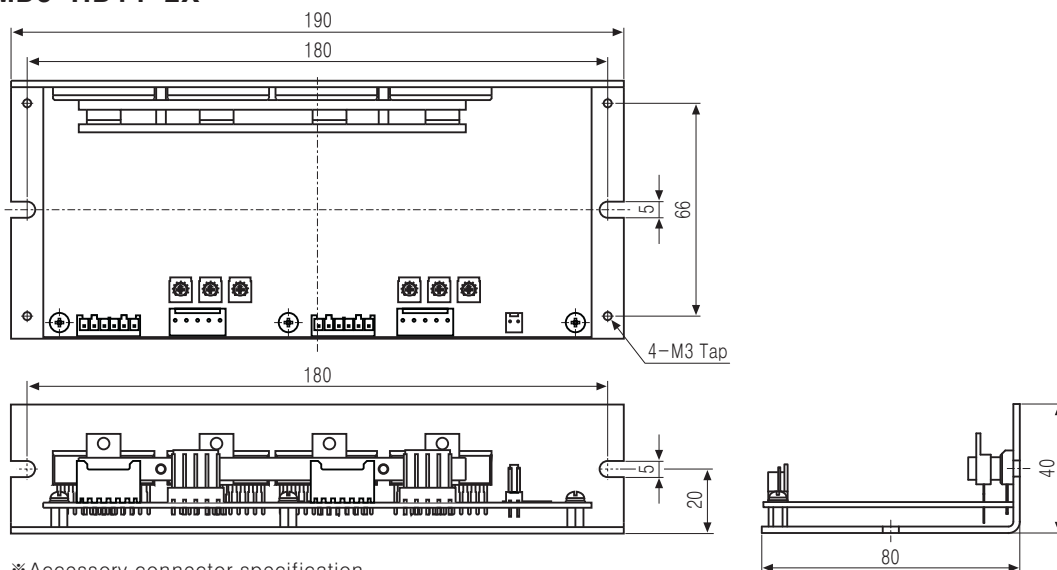
(S) Field network device

(T) Production stoppage models & replacement

MD5-HD14-2X, 3X

■ Dimensions

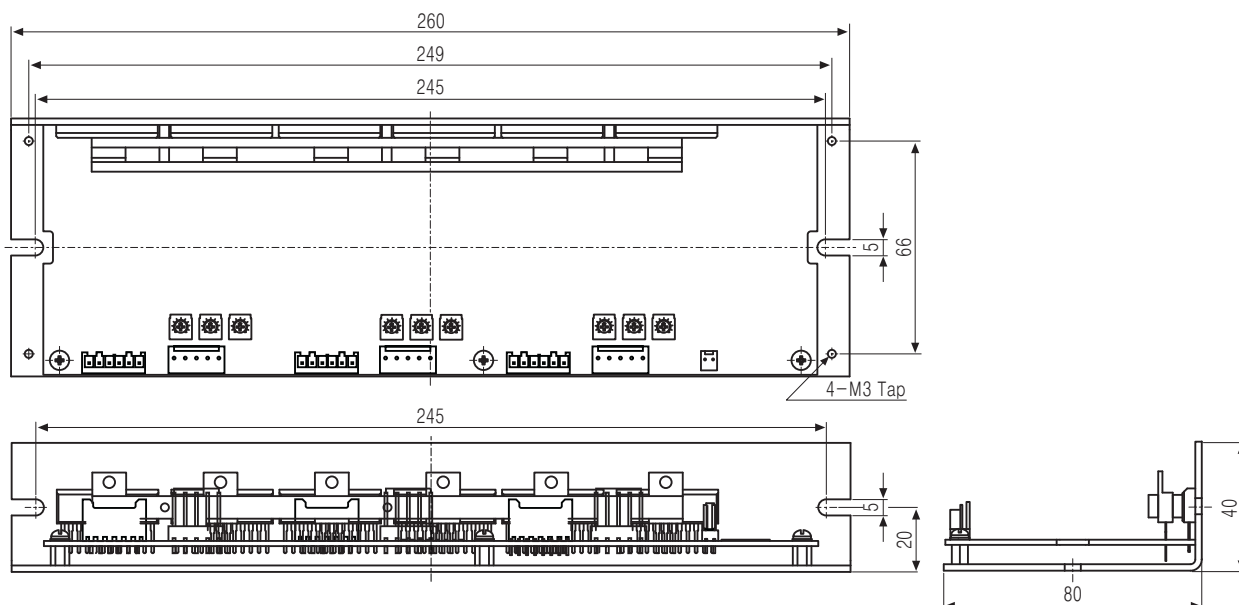
◎MD5-HD14-2X



※Accessory connector specification

	Connector		Qty
	Manufacturer	Model No.	
Power 2P Housing	Yeonho electronics	YH396-02V	1
Motor 5P Housing	Yeonho electronics	YH396-05V	2
Signal 6P Housing	JST	XAP-06V-1	2
Power/Motor Terminal Pin	Yeonho electronics	YT396	12
Signal Terminal Pin	JST	SXA-001T-P0.6	12

◎MD5-HD14-3X



※Accessory connector specification

	Connector		Qty
	Manufacturer	Model No.	
Power 2P Housing	Yeonho electronics	YH396-02V	1
Motor 5P Housing	Yeonho electronics	YH396-05V	3
Signal 6P Housing	JST	XAP-06V-1	3
Power/Motor Terminal Pin	Yeonho electronics	YT396	17
Signal Terminal Pin	JST	SXA-001T-P0.6	18

(Unit:mm)