Autonics

Motor Driver(5-Phase microstepping driver)

MD5-HD14-2X/3X

M A N U A L

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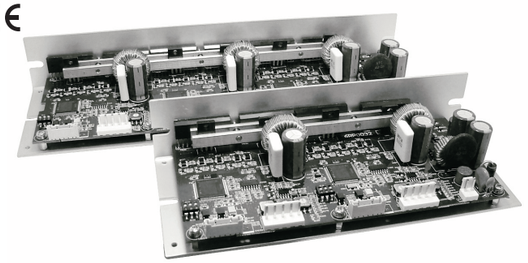


Thank you very much for selecting Autonics products.
For your safety, please read the following before using.

▣ Caution for your safety

※Please keep these instructions and review them before using this unit.

※Please observe the cautions that follow;
⚠ **Warning** Serious injury may result if instructions are not followed.
⚠ **Caution** Product may be damaged, or injury may result if instructions are not followed.

※The following is an explanation of the symbols used in the operation manual.
⚠ Caution : Injury or danger may occur under special conditions.

⚠ Warning

1. **In case of using this unit with machinery(Nuclear power control, medical equipment, vehicle, train, airplane, combustion apparatus, entertainment or safety device etc), it is required to install fail-safe device.**
   It may cause a fire, human injury or give an electric shock.
2. **Installation, connection, operation, control, maintenance should be carried out by person who has been qualified.**
   It may cause a fire, electric shock or human injury.
3. **Please use DC power with reinforced insulating the primary and secondary part for the DC power product.**
   It may give an electric shock.
4. **Please install this unit after consider countplan against power failure.**
   It may cause human injury or damage to product by releasing holding torque of motor.
5. **Do not use this unit outdoors or place where there are explosiveness, flammable, corrosive gas, water and frequent vibration etc.**
   It may cause a fire or give an electric shock.
6. **Do not disassemble and modify this unit, when it is required, please contact us.**
   It may cause a fire, give an electric shock or damage to product.
7. **Please install board type product with protection equipment.**
   It may cause a fire.

⚠ Caution

1. **Power input voltage must be used within rated specification and power line should be over than AWG 18(0.75mm²).**
   It may cause a fire or give an electric shock.
2. **Please check the connection before supplying the power.**
   It may cause a fire or give an electric shock, dam age to product.
3. **Please turn off the power when power is failed.**
   It may cause human injury or damage to product due to sudden movement by recovering from power failure.
4. **Do not touch during the operation or after a while of operation.**
   It may cause a burn due to high temperature in surface.
5. **The emergency stop should be enabled during the operation.**
   It may cause human injury or damage to product.
6. **Please apply power after checking control input signal.**
   It may cause human injury or damage to product by sudden movement.
7. **Do not turn on the HOLD OFF signal input while it is maintaining vertical position.**
   It may cause human injury or damage to product by releasing holding torque of motor.
8. **Please install a safety device when it is required to remain the vertical position after turning off the power.**
   It may cause human injury or damage to product by releasing holding torque of motor.
9. **Please check if HOLD OFF signal input is ON when it is required to set the output manually.**
   It may cause human injury by sudden movement.
10. **Please stop this unit when mechanical problem is occurred.**
    It may cause a fire or human injury.
11. **Do not touch the terminal when during the insulation dielectric strength test or insulation resistance measurement.**
    It may give an electric shock.
12. **Please observe rated specification.**
    It may cause a fire, give an electric shock or damage to product.
13. **In cleaning the unit, do not use water or an oil-based detergent.**
    It may cause a fire or give an electric shock.
14. **Please separate as industrial waste when disuse this unit.**

※**The above specifications are subject to change and some models may be discontinued without notice.**

▣ Specifications

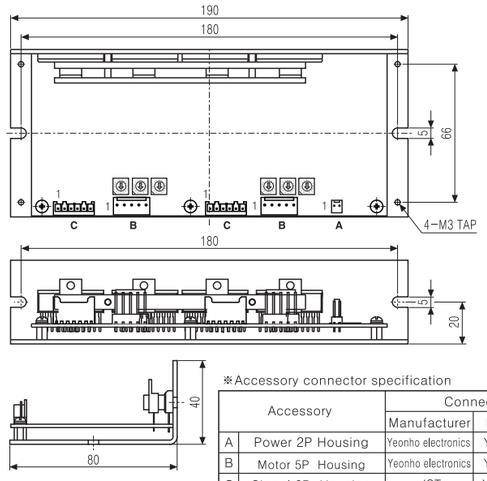
Model		MD5-HD14-2X	MD5-HD14-3X
Power supply※1		20~35VDC 5A MAX. (−10%, +20%)	20~35VDC 7A MAX. (−10%, +20%)
RUN current		0.4~1.4A/Phase	
RUN method		Bipolar constant current pentagon drive	
Resolution		1,2,4,5,8,10,16,20,25,40,50,80, 100,125,200,250 of microstep	
Pulse width		0.5㎲	
Pulse DUTY		Max. 50%	
Rising/falling time		Max. 120ns	
Input pulse frequency		Max. 1MHz	
Pulse input voltage		High: 4V~8VDC, Low: 0~0.5VDC	
Input inner resistance		270Ω(CW, CCW), 390Ω(HOLD OFF)	
Environ−ment	Ambient temperature	0 ~ 40℃, Storage: −20 ~ 60℃	
	Ambient humidity	30 ~ 85%RH, Storage: 30 ~ 85%RH	
Unit weight		Approx. 292g	Approx. 411g

※1: There is torque difference by input power.
※Environment resistance is rated at no freezing or condensation.

▣ Dimensions

(Unit : mm)

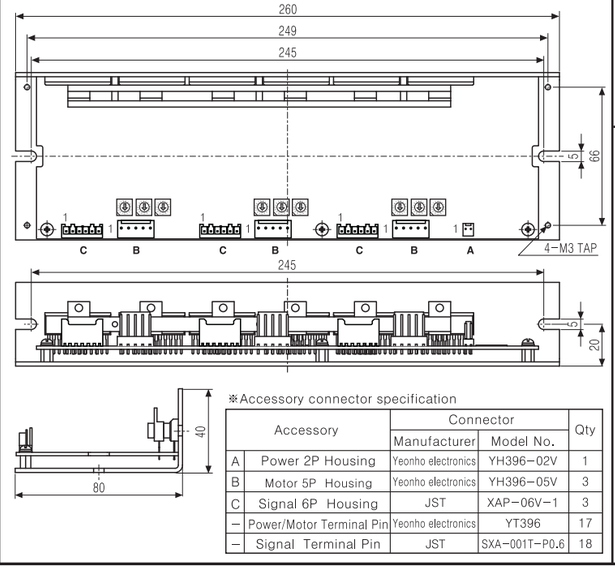
◎**MD5-HD14-2X**



※Accessory connector specification

	Accessory	Connector		Qty
		Manufacturer	Model No.	
A	Power 2P Housing	Yeonho electronics	YH396−02V	1
B	Motor 5P Housing	Yeonho electronics	YH396−05V	2
C	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**



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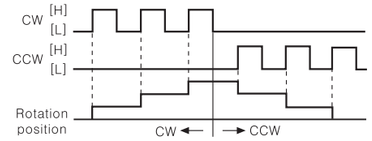
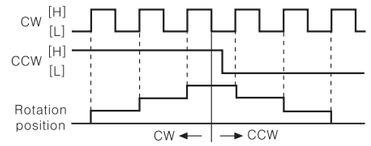
C	Signal 6P Housing	JST	XAP−06V−1	3
−	Power/Motor Terminal Pin	Yeonho electronics	YT396	17
−	Signal Terminal Pin	JST	SXA−001T−P0.6	18

▣ Time charts

◎**2 Pulse input**



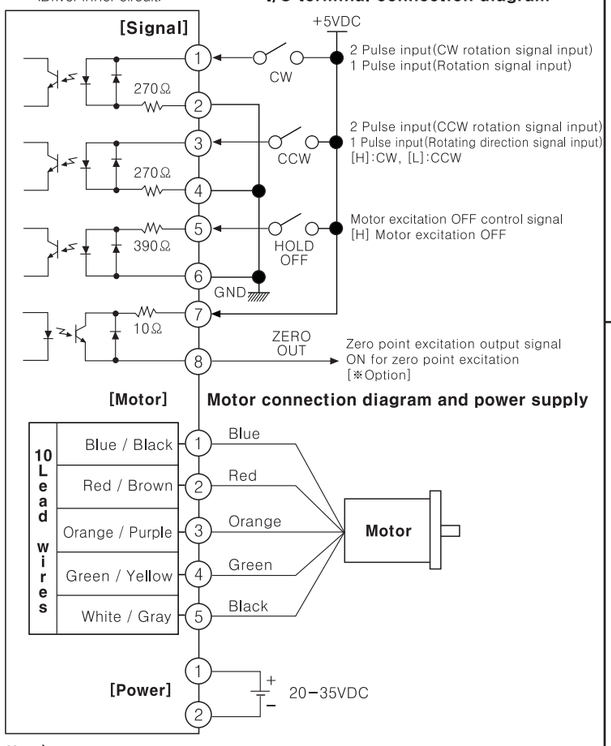
◎**1 Pulse input**



Note) Do not input CW, CCW signals at the same time in 2 Pulse input type.
: It may not work properly if another direction signal is supplied when one of them is ON.

▣ Input • Output diagram

〈Driver inner circuit〉 **I/O terminal connection diagram**



Note) Add external resistance when power for pulse from the external of the unit exceeds +5V.

▣ Function

◎**Selectable function switch**

No	Name	Function	Switch position	
			ON	OFF
1	TEST	Self diagnosis function	30rpm rotation	Normal
2	1/2 CLK	Pulse input method	1 Pulse input	2 Pulse input
3	CURRENT DOWN	Auto Current Down	Not use	Use

●TEST
- It rotates at a speed of 30rpm in Full Step and it is changed depending on resolution.
- It rotates to CCW in 1 Pulse input method and CW in 2 Pulse input method.

●1/2 CLK
- Pulse input method selection
- 1 Pulse method : Input pulse signal input in CW and rotating direction signal in CCW. It rotates to CCW when [L] and CW for [H].
- 2 Pulse method : Motor is rotated to CW when input pulse in CW and to CCW when input pulse in CCW.

●CURRENT DOWN
- A function to reduce RUN current according to the setting rate of STOP current switch when motor stops in order to reduce motor's heat generation.
- Current is reduced from approx.500[ms] after the last pulse input.

◎**Setting of RUN current**

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 phase current provided to 5−phase stepping motor.
- RUN current is set under the rated current, or, it may cause loss of torque.
- Torque is increased as raise RUN current, but, motor emits heat too much, select depending on the load.

◎**Setting of STOP current**

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

- It sets current when motor is at standstill.
- Set STOP current is percentage of RUN current.
- It is operated when HOLD OFF is [L]. Current supplied to each phase is cut in [H], auto CURRENT DOWN function does not work.

◎**Zero point excitation output signal(ZERO OUT)[※Option]**
- It indicates the initial step of excitation status of stepping motor and rotation position of motor axis from previously set zero.
- ZERO OUT means the initial status of motor excitation(STEP 0), it outputs per 7.2° of rotation in Full Step.(It outputs 50times per 1 rotation of motor.)
  Ex) Full step : It outputs one time when input 10 pulse.
  20 division : It outputs one time when input 200 pulse.

◎**HOLD OFF function**
- HOLD OFF is [H], the excitation is released.
- HOLD OFF is [L], the excitation is in a normal status.
- It rotates motor axis by external force or is used for manual positioning.
- Input H/L means ON/OFF of photocoupler in a circuit.

◎**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

●Setting resolution
※It drives a motor dividing basic step angle(0.72°) by setting value of 5−phase stepping motor.
※The calculation formula of divided step angle is as below.

$$\text{Rotation angle of 5−phase stepping motor} = \frac{\text{Basic step angle}(0.72^\circ)}{\text{Resolution}}$$

- When resolution is changed during the operation of motor, it may cause a step−out of motor.

▣ Caution for using

1. Caution for signal input
   ①Do not input CW, CCW signal at the same time in 2 Pulse input type. It may not work properly if another direction signal is supplied when one of them is ON.
   ②Current value of power supply in specifications is max.input of driver.
   ③Use power enough to supply RUN current for power input.
2. Caution for wiring
   ①Use Twist pair(Over 0.2mm²) for the signal wire should be shorter than 2m.
   ②Use electric wire of AWG 18(0.75mm²) for motor (when extend) and power connection.
   ③Check the power polarity before the operation.
3. Caution for installation
   ①In order to increase heat protection efficiency, keep the heat sink as close as possible to metal panel and keep it well−ventilated.
   ②Excessive heat generation may occur on Driver. Keep the heat sink under 80℃ when installing the unit. (In case it is over 80℃, forcible cooling shall be required.)
4. Caution for using function switches
   ①Self−diagnosis function is enable to test motor and driver when 250Hz pulse is outputted in [ON] status.
   ②Check self−diagnosis switch is [OFF] before power ON, or, it may start to drive instantly when it is ON.
   ③Auto CURRENT DOWN function is used to reduce RUN current when motor is at standstill to lower the heat generation automatically.
5. Installation environment
   ①It shall be used indoor
   ②Altitude Max. 2000m
   ③Pollution Degree 2
   ④Installation Category Ⅱ

※**It may cause malfunction if above instructions are not followed.**

▣ Major products

- Photoelectric sensors
- Fiber optic sensors
- Door sensors
- Door side sensors
- Area sensors
- Proximity sensors
- Pressure sensors
- Rotary encoders
- Connectors/Sockets
- Switching mode power supplies
- Control switches/Lamps/Buzzers
- I/O Terminal Blocks & Cables
- Stepper motors/drivers/motion controllers
- Graphic/Logic panels
- Field network devices
- Laser marking system(Fiber, CO_2, Nd:YAG)
- Laser welding/soldering system
- Temperature controllers
- Temperature/Humidity transducers
- Tachometer/Pulse(Rate)meters
- SSR/Power controllers
- Sensor controllers
- Display units
- Panel meters
- Counters
- Timers

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