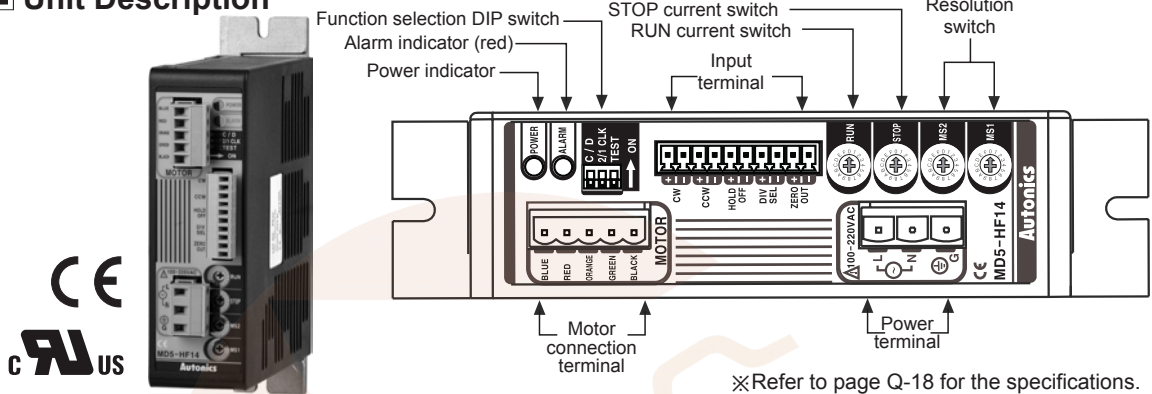




# MD5 Series

## 5-Phase Micro Stepper Motor Driver [MD5-HF14]

### Unit Description



※Refer to page Q-18 for the specifications.

### Function selection DIP switch

No	Name	Function	Switch position	
			ON	OFF (default)
1	TEST	Self diagnosis function	30rpm rotation	Not use
2	2/1 CLK	Pulse input method	1-pulse input method	2-pulse input method
3	C/D	Auto current down	Not use	Use

#### ● TEST

- Self diagnosis function is for motor and driver test.
- This function makes the motor rotate with 30rpm in full step. Rotation speed varies with resolution settings.
- Rotation speed = 30rpm/resolution
- In 1-pulse input method, it rotates to CCW, and in 2-pulse input method, it rotates to CW.

※Be sure that the TEST switch is OFF before supplying the power.

If the TEST switch is ON, the motor operates immediately and it may be dangerous.

#### ● 2/1 CLK

- 2/1 CLK switch is to select pulse input method.
- 1-pulse input method: CW → operating rotation signal input, CCW → rotation direction signal input ([H]: CW, [L]: CCW)
- 2-pulse input method: CW → CW rotation signal input, CCW → CCW rotation signal input.

#### ● C/D (auto current down)

- This function is to reduce the current provided for motor automatically for preventing severe motor's heat when motor stops.

- If motor RUN pulse is not applied, the current provided for motor reduces as the set STOP current.

※Be sure that when motor RUN current is reduced, the stop torque of motor also reduced.

※Set the STOP current by the STOP current switch.

### Setting RUN current

S/W 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 setting is for the current provided for motor when the motor runs.

※When RUN current is increased, RUN torque of the motor is also increased.

※When RUN current is set too high, the heat is severe.

※Set RUN current within the range of motor's rated current according to its load.

※Change RUN current only when the motor stops.

### Setting STOP current

S/W 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 setting is for the current provided for motor when the motor stops for preventing severe motor's heat.

• This setting is applied when using C/D(Current down) function.

• Setting value of STOP current is percentage (%) ratio of the set RUN current.

E.g.) Set RUN current as 1.4A and STOP current as 40%.

STOP current is set as  $1.4A \times 0.4 = 0.56A$

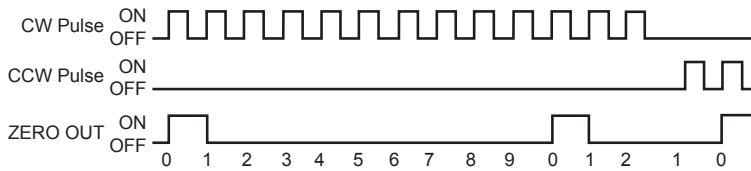
※When STOP current is decreased, STOP torque of the motor is also decreased.

※When STOP current is set too low, the heat is lower.

※Change STOP current only when the motor stops.

# 5-Phase Stepper Motor Driver (1.4A/Phase, AC Power)

## ◎ Zero point excitation output signal (ZERO OUT)



- This output indicates the initial step of excitation order of stepping motor and rotation position of motor axis .
- This signal outputs every 7.2° of rotation of the motor axis regardless of resolution. (50 outputs per 1 rotation of the motor.)  
E.g.) Full step: outputs one time by 10 pulses input, 20-division: outputs one time by 200 pulses input.

## ◎ HOLD OFF function

- This signal is for rotating motor's axis using external force or used for manual positioning.
  - When hold off signal maintains over 1ms as [H], motor excitation is released.
  - When hold off signal maintains over 1ms as [L], motor excitation is in a normal status.
- ※Must stop the motor for using this function.  
※Refer to I/O Circuit and Connections.

## ◎ Setting microstep (Microstep: Resolution)

S/W 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°

### ● Setting resolution (same as MS1, MS2)

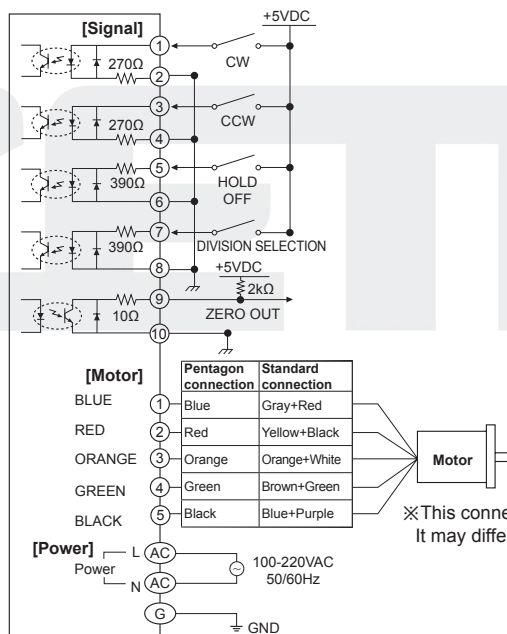
- The MS1, MS2 switches is for resolution setting.
- Select MS2 or MS2 by DIVISION SELECTION signal ([L]: MS1, [H]: MS2)
- Select the step angle (motor rotation angle per 1 pulse).
- The set step angle is dividing basic step angle(0.72°) of 5-phase stepping motor by setting value.
- The calculation formula of divided step angle is as follow.  
$$\text{Set step angle} = \frac{\text{Basic step angle}(0.72^\circ)}{\text{Resolution}}$$
- When using geared type motor, the angle is step angle divided by gear ratio.  
Step angle / gear ratio = Step angle applied gear  
E.g) 0.72° / 10(1:10) = 0.072°

※Must stop the motor before changing the resolution.

## ◎ Alarm output function

- Overheat: When the temperature of driver base is over 80°C, alarm indicator (red) turns ON and motor stops with holding the excision. Turn OFF the power and remove the causes. Turn ON the power and alarm output is OFF.
- Overcurrent: When overcurrent is applied from motor damage by burn, driver damage, or error, alarm LED (Red) is flashed. When overcurrent occurs, the motor becomes HOLD OFF. Turn OFF the power and remove the causes to normal operation.

## ■ I/O Circuit and Connections



※CW

2-pulse input method (CW rotation signal input)

1-pulse input method (operating rotation signal input)

※CCW

2-pulse input method (CCW rotation signal input)

1-pulse input method (rotation direction signal input)

→ [H]: CW, [L]: CCW

※HOLD OFF

Control signal for motor excitation OFF

→ [H]: Motor excitation OFF

※DIVISION SELECTION

Division selection signal

→ [L]: Operated by switch MS1

[H]: Operated by switch MS2

※ZERO OUT

Zero point excitation output signal → Zero point status ON

※If the power for driving pulse from external is over than +5VDC, please connect resistor at the outside. (input power max. 24VDC, input current 10-20mA)

※This connection cable color is only for Autonics motors. It may different cable color when using other motors.

(A) Photoelectric Sensors

(B) Fiber Optic Sensors

(C) Door/Area Sensors

(D) Proximity Sensors

(E) Pressure Sensors

(F) Rotary Encoders

(G) Connectors/ Sockets

(H) Temperature Controllers

(I) SSRs / Power Controllers

(J) Counters

(K) Timers

(L) Panel Meters

(M) Tacho / Speed / Pulse Meters

(N) Display Units

(O) Sensor Controllers

(P) Switching Mode Power Supplies

(Q) Stepper Motors & Drivers & Controllers

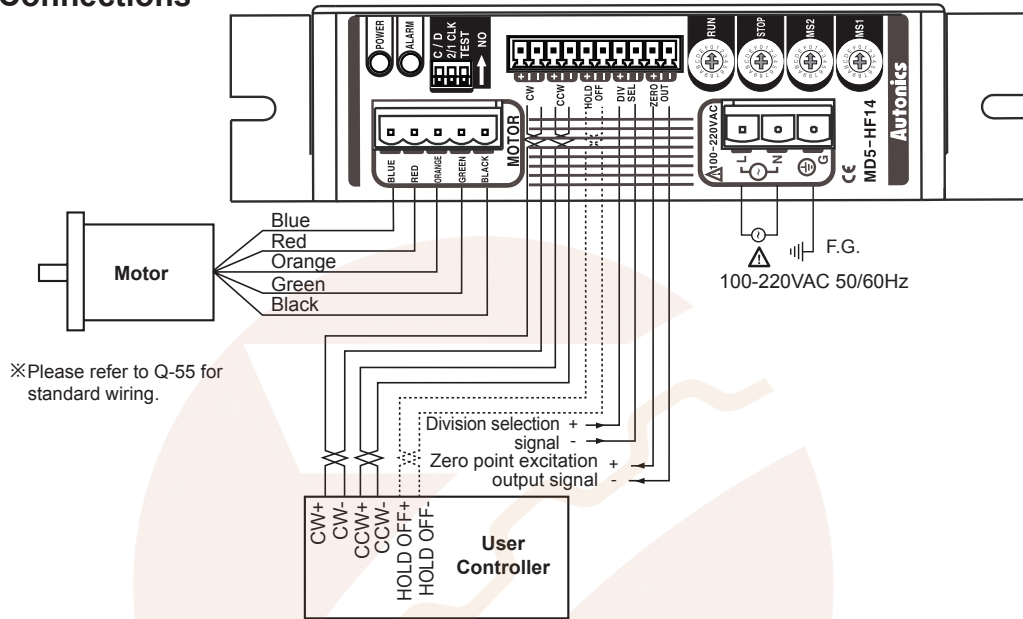
(R) Graphic/ Logic Panels

(S) Field Network Devices

(T) Software

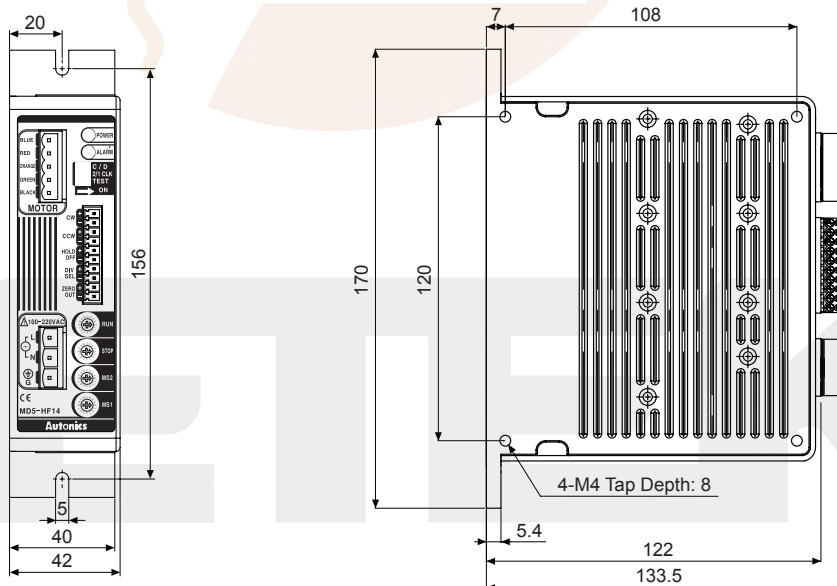
# MD5 Series

## ■ Connections



## ■ Dimensions

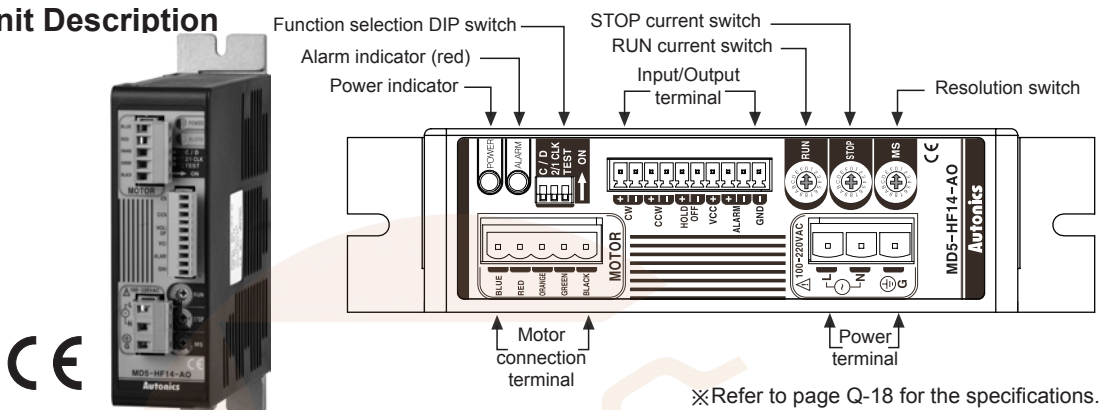
(unit: mm)



# 5-Phase Stepper Motor Driver (1.4A/Phase, AC Power, Alarm Output)

## 5-Phase Micro Stepper Motor Driver [MD5-HF14-AO]

### Unit Description



※Refer to page Q-18 for the specifications.

### Function selection DIP switch

No.	Name	Function	Switch position	
			ON	OFF (default)
1	TEST	Self diagnosis function	30rpm rotation	Not use
2	2/1 CLK	Pulse input method	1-pulse input method	2-pulse input method
3	C/D	Auto current down	Not use	Use

#### ● TEST

- Self diagnosis function is for motor and driver test.
  - This function makes the motor rotate with 30rpm in full step. Rotation speed varies with resolution settings.
  - Rotation speed = 30rpm/resolution
  - In 1-pulse input method, it rotates to CCW, and in 2-pulse input method, it rotates to CW.
- ※Be sure that the TEST switch is OFF before supplying the power.  
If the TEST switch is ON, the motor operates immediately and it may be dangerous.

#### ● 2/1 CLK

- 2/1 CLK switch is to select pulse input method.
- 1-pulse input method: CW → operating rotation signal input, CCW → rotation direction signal input ([H]: CW, [L]: CCW)
- 2-pulse input method: CW → CW rotation signal input, CCW → CCW rotation signal input.

#### ● C/D (auto current down)

- This function is to reduce the current provided for motor automatically for preventing severe motor's heat when motor stops.
  - If motor RUN pulse is not applied, the current provided for motor reduces as the set STOP current.
- ※Be sure that when motor RUN current is reduced, the stop torque of motor also reduced.  
※Set the STOP current by the STOP current switch.

### Setting RUN current

S/W 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 setting is for the current provided for motor when the motor runs.
- ※When RUN current is increased, RUN torque of the motor is also increased.
- ※When RUN current is set too high, the heat is severe.
- ※Set RUN current within the range of motor's rated current according to its load.
- ※Change RUN current only when the motor stops.

### Setting STOP current

S/W 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 setting is for the current provided for motor when the motor stops for preventing severe motor's heat.
- This setting is applied when using C/D(Current down) function.
- Setting value of STOP current is percentage (%) ratio of the set RUN current.  
E.g.) Set RUN current as 1.4A and STOP current as 40%.  
STOP current is set as  $1.4A \times 0.4 = 0.56A$
- ※When STOP current is decreased, STOP torque of the motor is also decreased.
- ※When STOP current is set too low, the heat is lower.
- ※Change STOP current only when the motor stops.

(A)	Photoelectric Sensors
(B)	Fiber Optic Sensors
(C)	Door/Area Sensors
(D)	Proximity Sensors
(E)	Pressure Sensors
(F)	Rotary Encoders
(G)	Connectors/ Sockets
(H)	Temperature Controllers
(I)	SSRs / Power Controllers
(J)	Counters
(K)	Timers
(L)	Panel Meters
(M)	Tacho / Speed / Pulse Meters
(N)	Display Units
(O)	Sensor Controllers
(P)	Switching Mode Power Supplies
(Q)	Stepper Motors & Drivers & Controllers
(R)	Graphic/ Logic Panels
(S)	Field Network Devices
(T)	Software



# MD5 Series

## ⊙ HOLD OFF function

- This signal is for rotating motor's axis using external force or used for manual positioning.
  - When hold off signal maintains over 1ms as [H], motor excitation is released.
  - When hold off signal maintains over 1ms as [L], motor excitation is in a normal status.
- ※Must stop the motor for using this function.  
 ※Refer to ■ I/O Circuit and Connections.

## ⊙ Setting microstep (Microstep: Resolution)

S/W 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°

### ● Setting resolution (MS1)

- The set step angle is dividing basic step angle(0.72°) of 5-phase stepping motor by setting value.
- The calculation formula of divided step angle is as below.

$$\text{Set step angle} = \frac{\text{Basic step angle}(0.72^\circ)}{\text{Resolution}}$$

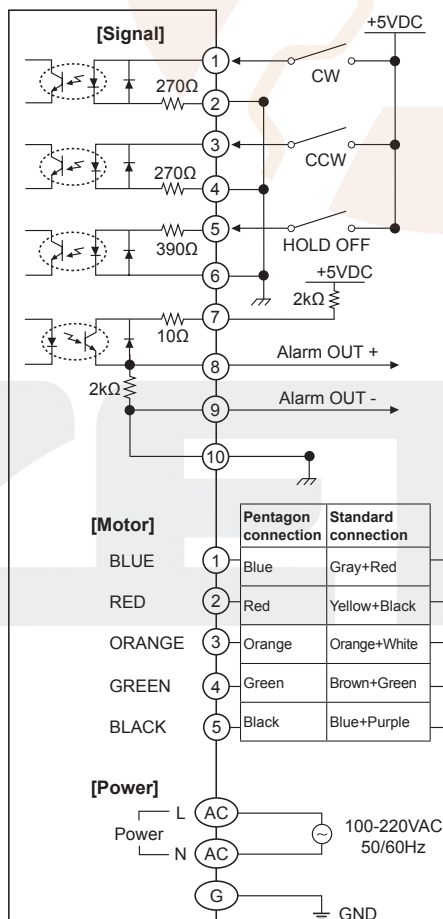
- When using geared type motor, the angle is step angle divided by gear ratio.  
 Step angle / gear ratio = Step angle applied gear  
 E.g)  $0.72^\circ / 10(1:10) = 0.072^\circ$

※Must stop the motor before changing the resolution.

## ⊙ Alarm output function

- Overheat: When the temperature of driver base is over 80°C, alarm indicator (red) turns ON and motor stops with holding the excitation. Turn OFF the power and remove the causes. Turn ON the power and alarm output is OFF.
- Overcurrent: When overcurrent is applied from motor damage by burn, driver damage, or error, alarm LED (Red) is flashed. When overcurrent occurs, the motor becomes HOLD OFF. Turn OFF the power and remove the causes to normal operation.

## ■ I/O Circuit and Connections



※CW

- 2-pulse input method (CW rotation signal input)
- 1-pulse input method (operating rotation signal input)

※CCW

- 2-pulse input method (CCW rotation signal input)
- 1-pulse input method (rotation direction signal input)
- [H]: CW, [L]: CCW

※HOLD OFF

- Control signal for motor excitation OFF
- [H]: Motor excitation OFF

※When alarm occurs, the motor becomes HOLD OFF. Turn OFF the power and remove the causes to normal operation.

• Over heat:

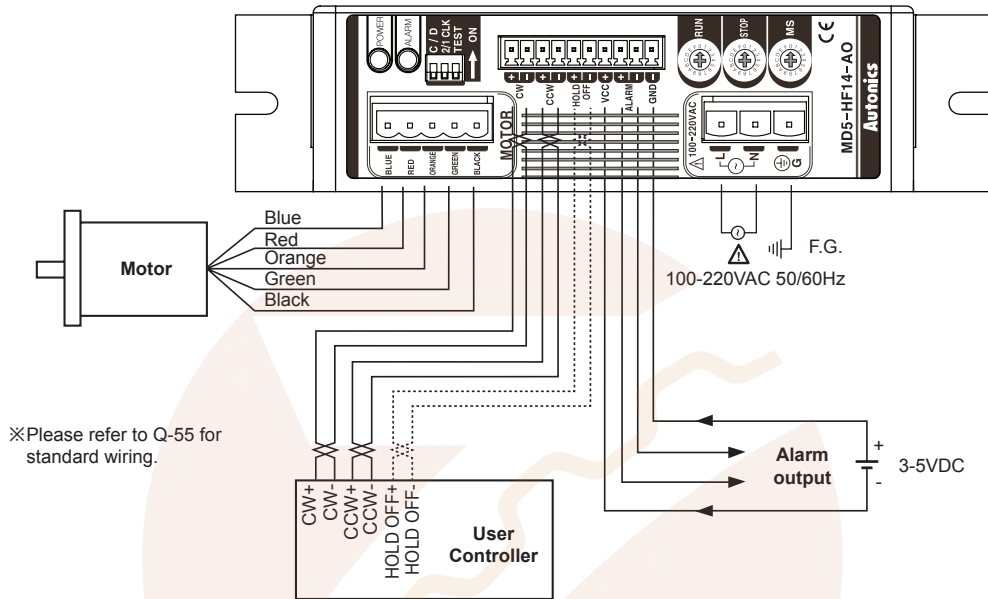
• Over current:

※If the power for driving pulse from external is over than +5VDC, please connect resistor at the outside. (input power max. 24VDC, input current 10-20mA)

※This connection cable color is only for Autonics motors. It may different cable color when using other motors.

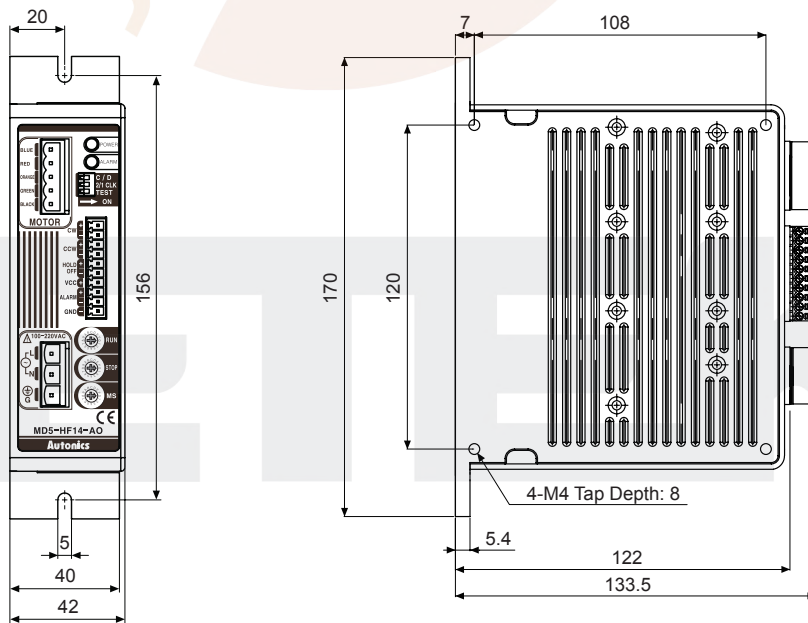
# 5-Phase Stepper Motor Driver (1.4A/Phase, AC Power, Alarm Output)

## ■ Connections



## ■ Dimensions

(unit: mm)



(A) Photoelectric Sensors

(B) Fiber Optic Sensors

(C) Door/Area Sensors

(D) Proximity Sensors

(E) Pressure Sensors

(F) Rotary Encoders

(G) Connectors/Sockets

(H) Temperature Controllers

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