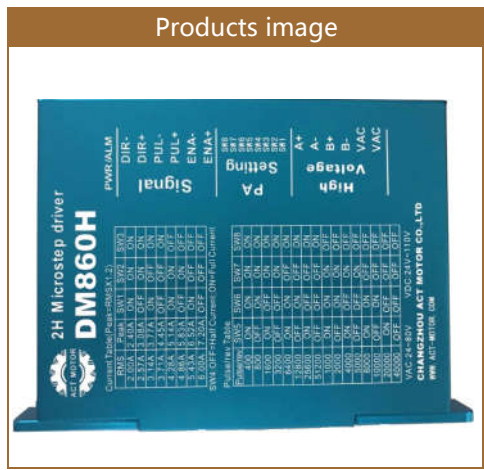


# Changzhou ACT Motor Co., Ltd

**DM** Stepper Motor Driver  
**DM860H**  
 MicroSteps Setting:400~51200    AC : 24~80V    DC:24~110V



- ### Overview
- The latest 32-bit digital processing technology
  - Advanced control algorithm for variable current and variable frequency conversion
  - Low heat generation, low motor vibration and stable operation
  - Built-in micro-segmentation
  - Smooth operation and low noise
  - Integrated parameter power-on auto-tuning function
  - Subdivision setting (within 400~51200)
  - With overcurrent, overvoltage, undervoltage protection

Features	
Input voltage	24~80VAC/24~110VDC
Output current	2.1~7.2A (PEAK)
Pulse frequency	0~100KHz
MicroSteps	16 MicroSteps
Using environment	-5~50°C, avoid dust, high temperature and corrosive gas
Storage environment	-20~+80°C, avoid direct sunlight

The drive power supply AC and DC power supply is universal, the AC power supply range is 24~80VAC, the DC power supply range is 24~110VDC, and the DC power supply has positive and negative power supply anti-reverse connection functions.

### LED status indication

Number of flashes	Red LED flashing waveform	Fault description
1		Overcurrent or phase-to-phase short circuit fault
2		Overvoltage fault

### Motor and power

Symbol	Name	Remark
A+	Phase A+	
A-	Phase A-	
B+	Phase B+	
B-	Phase B-	
AC	AC power input	
AC	AC power input	

### Control signal

Symbol	Name	Remark
PUL+	Pulse signal +	/
PUL-	Pulse signal -	/
DIR+	Direction signal+	/
DIR-	Direction signal-	/
ENA+	Enable signal +	Only connected when used
ENA-	Enable signal -	Only connected when used

- ### Strengthen the heat dissipation method
- 1) The reliable operating temperature of the driver is usually within 66 °C, and the motor operating temperature is within 85 °C;
  - 2) It is recommended to use the automatic semi-flow mode when using the motor. When the motor stops, the current is automatically reduced by half to reduce the heat of the motor and the drive;
  - 3) Install the drive with vertical side mounting, so that the heat dissipating teeth form a strong air convection; if necessary, install a fan near the drive to force heat dissipation to ensure that the drive works within a reliable operating temperature range.

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## DIP switch setting

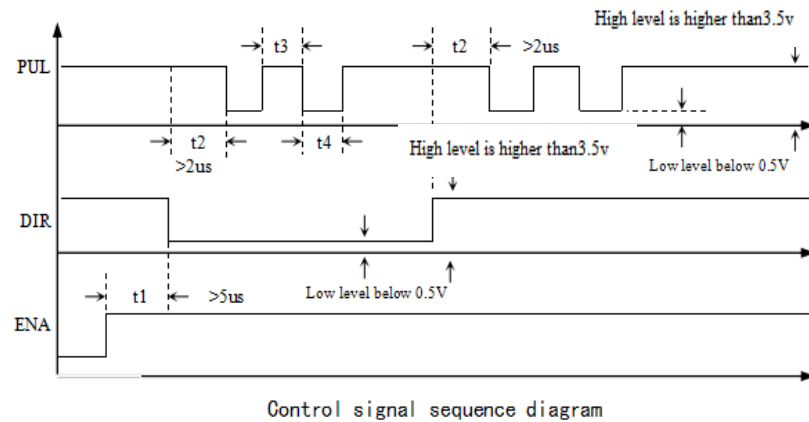
SW1	ON	OFF	ON	OFF	ON	OFF	ON	OFF
SW2	ON	ON	OFF	OFF	ON	ON	OFF	OFF
SW3	ON	ON	ON	ON	OFF	OFF	OFF	OFF
PEAK(A)	2.40A	3.08A	3.77A	4.45A	5.14A	5.83A	6.52A	7.20A
RMS(A)	2.00A	2.57A	3.14A	3.71A	4.28A	4.86A	5.43A	6.00A

SW4: The quiescent current can be set by the SW4 dial switch. OFF means that the quiescent current is set to half of the dynamic current. ON means that the quiescent current is the same as the dynamic current.

## Microsteps setting

RPM	400	800	1600	3200	6400	12800	25600	51200	1000	2000	4000	5000	8000	10000	20000	40000
SW5	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF
SW6	ON	ON	OFF	OFF	ON	ON	OFF	OFF	ON	ON	OFF	OFF	ON	ON	OFF	OFF
SW7	ON	ON	ON	ON	OFF	OFF	OFF	OFF	ON	ON	ON	ON	OFF	OFF	OFF	OFF
SW8	ON	ON	ON	ON	ON	ON	ON	ON	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF

## Control signal sequence diagram



### Note:

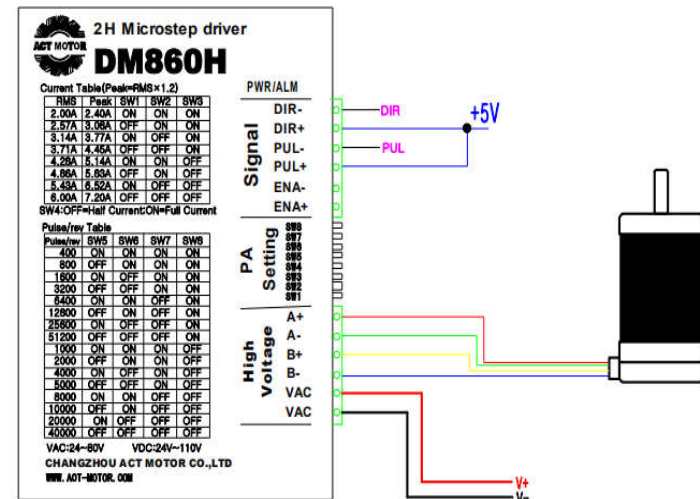
T1: ENA (enable signal) should be determined to be high by a DIR of at least 5  $\mu$ s. In general, it is recommended that ENA+ and ENA- be left floating.

T2: DIR determines its state high or low at least 2  $\mu$ s along the PUL falling edge.

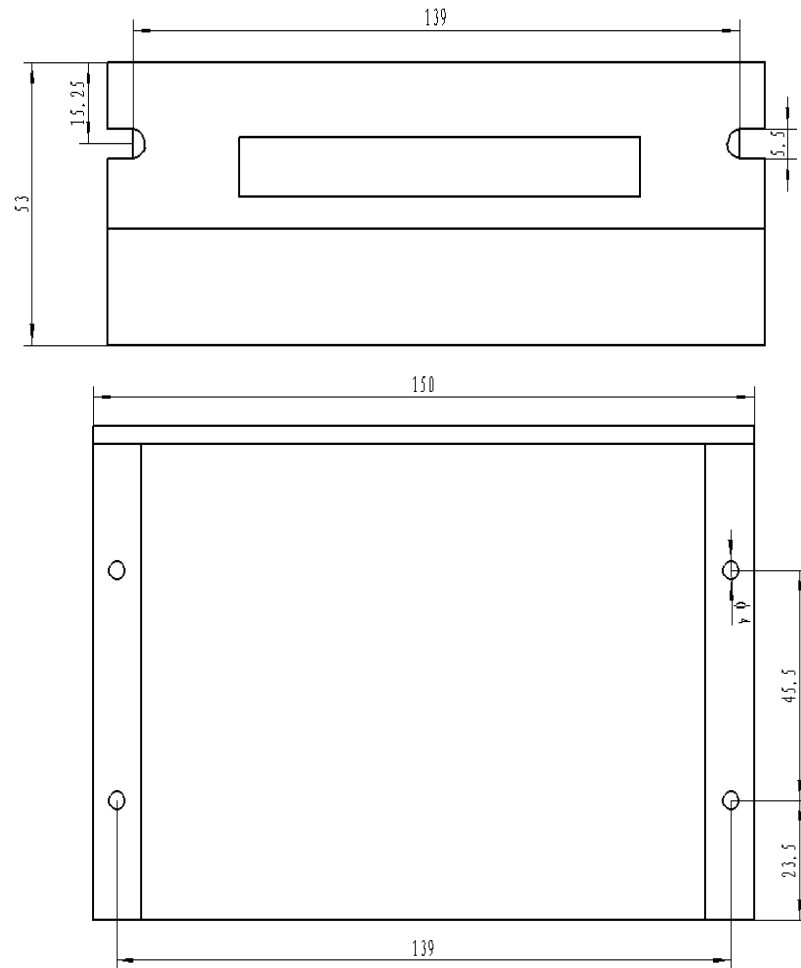
T3: The pulse width is at least not less than 2  $\mu$ s.

T4: The low level width is not less than 2  $\mu$ s.

## Normal connection diagram

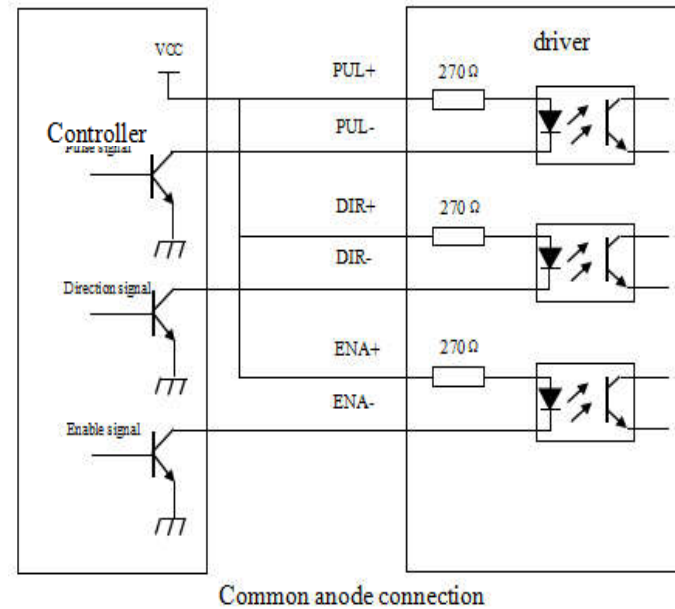


Drive dimensional chart(mm)



Note: With side mounting, the heat dissipation effect is better. When designing and installing, consider the terminal size and wiring.

Control signal connection



Common anode connection

The characteristic of the output torque

- 1) The larger the actual current of the motor, the greater the output torque, but the more copper loss ( $P=I^2R$ ) of the motor, the more heat the motor generates;
- 2) The higher the supply voltage of the driver, the higher the high-speed torque of the motor;
- 3) It can be seen from the moment frequency characteristic diagram of the stepping motor that the high speed is smaller than the medium and low speed torque.

## Wiring requirements

1) In order to prevent the driver from being disturbed, it is recommended to use the shielded cable for the control signal, and the shield layer is shorted to the ground wire. Unless otherwise specified, the shielded cable of the control signal cable is grounded at one end: the upper end of the shielded wire is grounded, and the shielded wire The drive is suspended at one end. Only the grounding at the same point is allowed in the same machine. If it is not a real grounding wire, the interference may be serious. At this time, the shielding layer is not connected.

2) The pulse and direction signal lines and the motor lines are not allowed to be bundled side by side, preferably separated by at least 10 cm. Otherwise, the motor noise easily interferes with the pulse direction signal, causing the motor to be inaccurately positioned, and the system is unstable.

3) If one power supply is provided for multiple drives, parallel connections should be made at the power supply. It is not allowed to connect one to the other and then to another chain.

4) It is forbidden to electrify the P2 terminal of the driver. When the charged motor stops, there is still a large current flowing through the coil. Pulling the P2 terminal will cause a huge moment to induce the electromotive force to burn the driver.

5) It is strictly forbidden to add the tin to the terminal after adding the tin, otherwise the terminal may be overheated due to the contact resistance becoming larger.

## Output current setting value

For the same motor, the larger the current setting value, the larger the motor output torque, but the heat of the motor and the driver is also more serious when the current is large. The magnitude of the specific heat generation is not only related to the current set value, but also to the type of exercise and the dwell time. The following setting method uses the rated current value of the stepping motor as a reference, but the optimum value in practical applications should be adjusted based on this. In principle, if the temperature is very low (<40 °C), the current setting value can be appropriately increased to increase the motor output power (torque and high-speed response).

1) Four-wire motor: The output current is set to be equal to or slightly smaller than the rated current of the motor;

2) Six-wire motor high torque mode: the output current is set to 50% of the rated current of the motor unipolar connection;

3) Six-wire motor high-speed mode: the output current is set to 100% of the rated current of the motor unipolar connection;

4) Eight-wire motor series connection method: the output current can be set to 70% of the rated current of the motor unipolar connection;

5) Eight-wire motor and connection method: The output current can be set to 140% of the rated current of the motor unipolar connection.

## Motor selection

The DQ860HA can be used to drive 4, 6 and 8 wire two-phase, four-phase hybrid stepping motors with a step angle of 1.8 degrees and 0.9 degrees. When selecting a motor, it is mainly determined by the torque and rated current of the motor. The torque is mainly determined by the size of the motor. The large-sized motor has a large torque; the current is mainly related to the inductance, and the small-inductance motor has high-speed performance, but the current is large.

Determine the load torque, the ratio of the working speed range:

$$T_{\text{motor}} = C (J\varepsilon + T_{\text{load}})$$

J: Moment of inertia of the load

$\varepsilon$ : Maximum angular acceleration of the load

C: Safety factor, recommended value 1.2-1.4

T load: maximum load torque, including effective load, friction, transmission efficiency and other resistance torque

Frequently questions and troubleshooting
<b>The motor does not turn:</b>
■Check if the power supply circuit is powered normally
■Whether the signal current is increased to 7-16mA
■Whether the subdivision is selected
■Whether the current is selected correctly
<b>Motor steering error:</b>
■The motor line phase sequence is wrong, you need to exchange any two wires.
■The motor line has an open circuit, check and connect
<b>The alarm indicator lights up:</b>
■Whether the motor line is connected incorrectly
■Check is there any overvoltage and undervoltage
■Motor or drive damage
<b>Inaccurate location:</b>
■Signal interference
■The shield is not connected or not connected well.
■The motor line has an open circuit, check and connect
■Subdivision setting error
■The current is too small
<b>Stall when the motor accelerates:</b>
■Short acceleration time
■The motor torque is too small
■The voltage is low or the current is too small