WANTAI MOTOR

DQ860HA STEPPER DRIVER 7.2A

DQ860HA is a two phase hybrid stepper motor driver, it designed to get the most out of your stepper motor. This driver can be used with motors requiring a current of up to 7.2A to run and features micro stepping up to 1/256th step. This driver is typically used with CNC machines, 3D printers, laser cutting machines and other automation machines.

Quick Spec

Stepper Type: 2 Phase stepper driver
Input Voltage: 24 - 110VDC or 18 - 80VAC
Input current: <6A
Micro stepping: 15 options up to 256 micro stepping
Optional idle current reduction setting
Output current: 8 channel current setting
Opto-isolated inputs
Manufacturer: Wantai
Manufacturer product code: DQ860HA

DQ860HA STEPPER DRIVER 7.2A

2H Microstep Driver

DQ860HA

WANTAI

PWR/ALM

Current Table(Peak=RMS×1.4)

Peak	RMS	SW1	SW2	SW3
2.8A	2.0A	ON	ON	ON
3.5A	2.5A	OFF	ON	ON
4.2A	3.0A	ON	OFF	ON
4.9A	3.5A	OFF	OFF	ON
5.7A	4.0A	ON	ON	OFF
6.4A	4.6A	OFF	ON	OFF
7.0A	5.0A	ON	OFF	OFF
7.8A	5.6A	OFF	OFF	OFF

SW4:OFF=Half Current;ON=Full Current

Pulse/rev Table

Pulse/rev	SW5	SW6	SW7	SW8
400	ON	ON	ON	ON
800	OFF	ON	ON	ON
1600	ON	OFF	ON	ON
3200	OFF	OFF	ON	ON
6400	ON	ON	OFF	ON
12800	OFF	ON	OFF	ON
25600	ON	OFF	OFF	ON
51200	OFF	OFF	OFF	ON
1000	ON	ON	ON	OFF
2000	OFF	ON	ON	OFF
5000	ON	OFF	ON	OFF
10000	OFF	OFF	ON	OFF
25000	ON	ON	OFF	OFF
50000	OFF	ON	OFF	OFF

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WARNING!
VAC:18~80VAC

Signal:
PUL+(+5V)
PUL-(PUL)
DIR+(+5V)
DIR-(DIR)
ENBL+(+5V)
ENBL-(ENB)

Setting:
SW8
SW7
SW6
SW5
SW4
SW3
SW2
SW1

Power:
A+
A-
B+
B-
VAC
VAC

Control signal

Symbol	Name
PUL+	Pulse signal +
PUL-	Pulse signal -
DIR+	Direction signal+
DIR-	Direction signal-
ENA+	Enable signal +
ENA-	Enable signal -

Motor and power

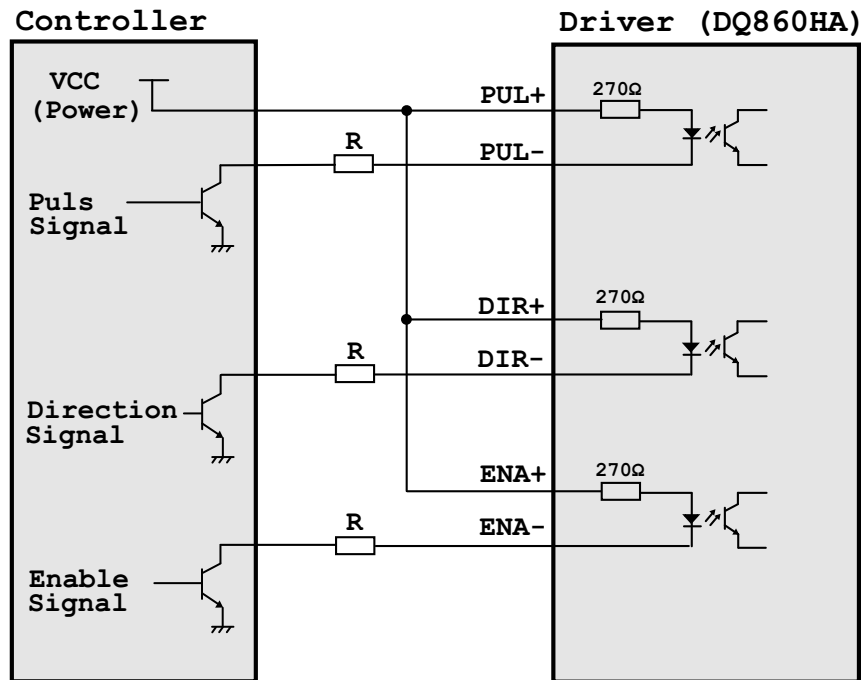| Symbol	Name
A+	Phase A+
A-	Phase A-
B+	Phase B+
B-	Phase B-
AC	AC power input
AC	AC power input

24~80VAC or 24~110VDC

DQ860HA STEPPER DRIVER 7.2A - CONNECTION OPTIONS

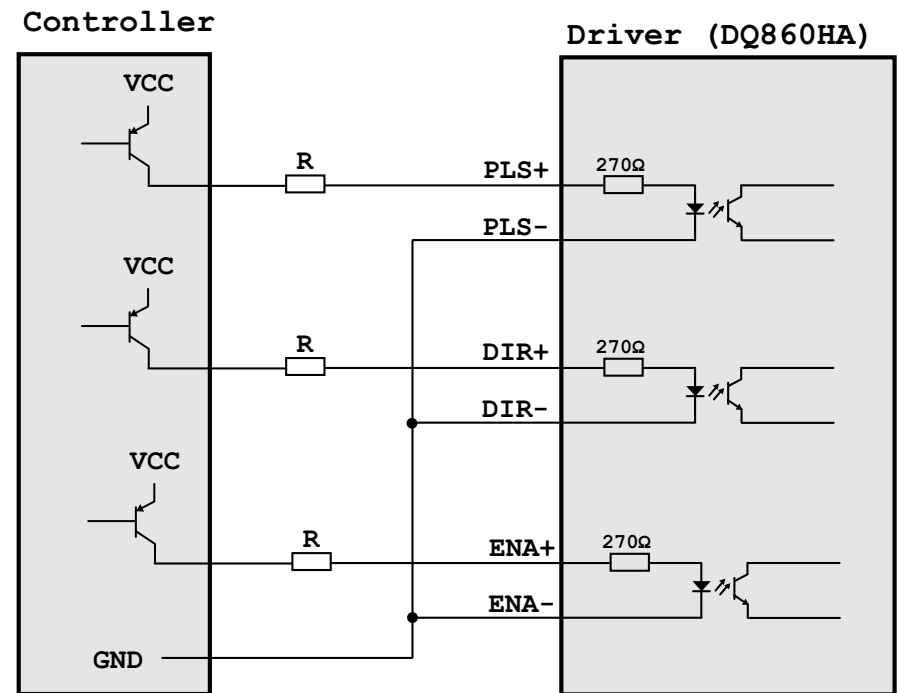## METHOD A - COMMON ANODE CONNECTION
(VCC IS COMMON)

Vcc Value	R Value
When Vcc = 5V	R = 0 Ohm
When Vcc = 12V	R = 1K
When Vcc = 24V	R = 2K

METHOD B - COMMON CATHODE CONNECTION
(GND IS COMMON)

Vcc Value	R Value
When Vcc = 5V	R = 0 Ohm
When Vcc = 12V	R = 1K
When Vcc = 24V	R = 2K

Controller   Driver (DQ860HA)

VCC (Power)
PUL+   270Ω
R   PUL−
Puls Signal

DIR+   270Ω
R   DIR−
Direction Signal

ENA+   270Ω
R   ENA−
Enable Signal

Controller   Driver (DQ860HA)

VCC
R   PLS+   270Ω
PLS−

VCC
R   DIR+   270Ω
DIR−

VCC
R   ENA+   270Ω
ENA−
GND

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DQ
Step motor driver
DQ860HA
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
Signal current	7~20mA
Using environment	0 ~ 70 ℃, avoid dust and corrosive gas
Storage environment	-20~+80℃ , avoid direct sunlight

Generally speaking, the power supply voltage is a little higher, and the motor's high-speed performance will be relatively low when the power supply voltage is good. It is suggested that the normal operating speed range is 36V above power supply for high-speed operation.

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.

DIP switch setting

SW1	ON	OFF	ON	OFF	ON	OFF	ON	OFF	
SW2	ON	ON	OFF	OFF	ON	ON	OFF	OFF	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.
SW3	ON	ON	ON	ON	OFF	OFF	OFF	OFF	
PEAK(A)	Default[2.0A]	3.08A	3.77A	4.45A	5.14A	5.83A	6.52A	7.20A	
RMS(A)		2.57A	3.14A	3.71A	4.28A	4.86A	5.43A	6.00A	

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


Control signal sequence diagram
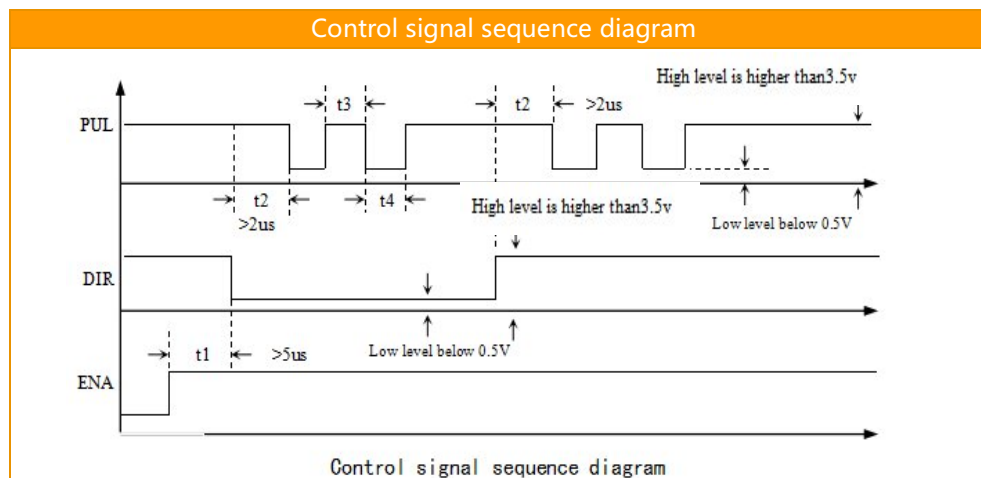
Note:

T1: ENA (enable signal) should be determined to be high by a DIR of at least 5 µs.In general, it is recommended that ENA+ and ENA- be left floating.
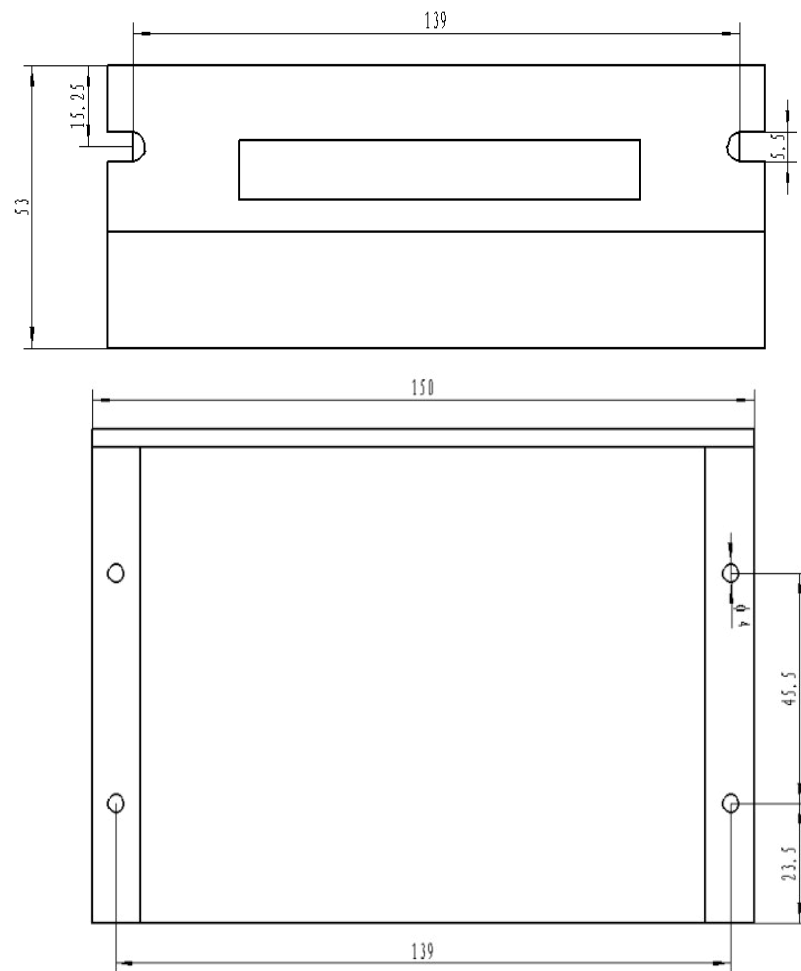
T2: DIR determines its state high or low at least 2 µs along the PUL falling edge.

T3: The pulse width is at least not less than 2 µs.

T4: The low level width is not less than 2µs.

Normal connection diagram
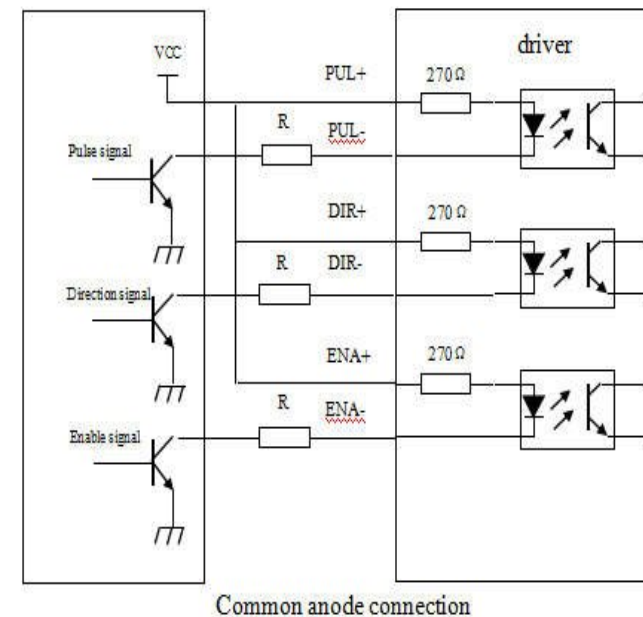
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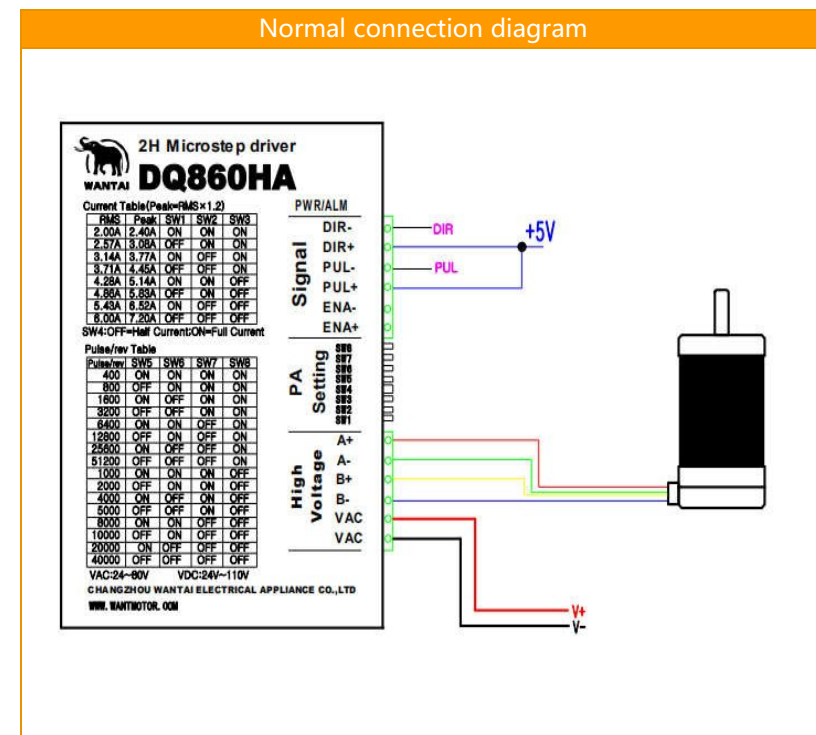
Drive dimensional chart(mm)

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.

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Wiring requirements

1) In order to prevent the driver from being disturbed, it is recommended to use the shieldedcable 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: theupper 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:

$$T\ motor = C\ (J\varepsilon + T\ load)$$

J: Moment of inertia of the load
ε: 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

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

DQ860HA STEPPER DRIVER 7.2A

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2H Microstep driver
WANTAI
DQ860HA

Current Table (Peak=Rms X 1.4)

Peak	SW1	SW2	SW3	Peak	SW1	SW2	SW3
2.6A	ON	ON	ON	5.1A	ON	ON	OFF
3.2A	OFF	ON	ON	5.8A	OFF	ON	OFF
3.8A	ON	OFF	ON	6.5A	ON	OFF	OFF
4.4A	OFF	OFF	ON	7.2A	OFF	OFF	OFF

SW4:off=Half Current; on=Full Current

Pulse/Rev Table

Pulse/rev.	SW5	SW6	SW7	SW8
400	OFF	ON	ON	ON
800	ON	OFF	ON	ON
1600	OFF	OFF	ON	ON
3200	ON	ON	OFF	ON
6400	OFF	ON	OFF	ON
12800	ON	OFF	OFF	ON
25600	OFF	OFF	OFF	ON
1000	ON	ON	ON	OFF
2000	OFF	ON	ON	OFF
4000	ON	OFF	ON	OFF
5000	OFF	OFF	ON	OFF
8000	ON	ON	OFF	OFF
10000	OFF	ON	OFF	OFF
20000	ON	OFF	OFF	OFF
25000	OFF	OFF	OFF	OFF

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Signal
PWR/ALM
PUL(+5~24V)
PUL-(PUL)
DIR(+5~24V)
DIR-(DIR)
ENA(+5~24V)
ENA-(ENA)

Setting
SW8
SW7
SW6
SW5
SW4
SW3
SW2
SW1

Power
A+
A-
B+
B-
AC
AC

WARNING

VAC:18VAC~80VAC
VDC:24VDC~110VDC

Bipolar Stepper Motors

A bipolar stepper motor has four wires and two coils. To make it rotate, you need to send current through the coils. Each wire needs to be capable of being driven high and low.
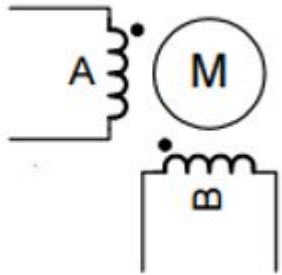
Selecting a Power Supply for your Stepper Motor

When selecting a Power Supply for the Stepper Motor and controller, there is no need to try and match the Stepper Motor Maximum voltage with the Power Supply. The Stepper Controller (DQ860HA) used advance PWM signals and will automatically limit the current before the motor is damaged.

Steppers and Torque

A stepper motor's maximum torque is always at low speed, which makes them a great choice for applications that need low speed without sacrificing precision. Normal DC motors don't normally offer the combination of low speed and high precision needed.