STEPPERONLINE DM456AI

STEPPERONLINE DM456AI 2-Channel Stepper Motor Controller Instruction Manual

Model: DM456AI

1. Introduction

The STEPPERONLINE DM456AI is a versatile 2-channel stepper motor controller designed for precise speed regulation. It features an integrated pulser, allowing control of two stepper motors with a maximum current of 2.8A each (5.6A total) using a PLC or potentiometer. This controller is suitable for various applications, including band carriers, and can operate two motors simultaneously without an external controller. It offers eight selectable current settings and eight speed ranges.

2. Key Features

- Designed for two-phase stepper motors, compatible with Nema 14, Nema 17, and Nema 23 sizes.
- Input voltage range: DC 20V to 40V.
- Maximum output current: 5.6A (allocated 50% to each motor when two are connected).
- Input signal support: 24VDC.
- Two digital input signals: ENA for Start/Stop control and DIR for direction control.
- Eight selectable current settings via DIP switches.
- Eight selectable speed ranges via DIP switches.
- Control via PLC or external potentiometer (with 0-10V analog output).

3. Product Overview and Components

The following image illustrates the main components and connection points of the DM456AI controller.

Figure 1: DM456AI Stepper Motor Controller Front View. This image displays the main body of the DM456AI controller, highlighting the input/output terminals, DIP switches for current and speed settings, and status indicators. Key labels include PWR/Fault, OPTIO, ENA, DIR, +10V, GND, SW1-SW8, A+, A-, B+, B- for M1 and M2, and +Vdc, -Vdc.

Component Identification:

- **PWR/Fault:** Power and fault indicator LED.
- **OPTIO:** Opto-isolated input.
- **ENA:** Enable/Disable input (Start/Stop control).
- **DIR:** Direction control input.
- **+10V, GND:** Power output for external potentiometer or analog control.
- **SW1-SW8:** DIP switches for current and speed configuration.
- **A+, A-, B+, B-:** Motor winding connections for Motor 1 (M1) and Motor 2 (M2).
- **+Vdc, -Vdc:** DC power input terminals.

4. Installation and Wiring

4.1 Power Supply Connection

Connect a DC power supply within the range of **+20VDC to +40VDC** to the +Vdc and -Vdc terminals. Ensure correct polarity to prevent damage to the controller.

4.2 Motor Connection

Connect your two-phase stepper motors (Nema 14, 17, or 23) to the M1 and M2 terminals. Each motor requires four connections: A+, A-, B+, B-. When two motors are connected, the driver automatically allocates 50% of the total current to each motor, and both motors will move synchronously.

4.3 Control Signal Connection

The DM456AI accepts digital input signals for control. Connect your PLC or other control device to the ENA and DIR terminals. The ENA signal controls the start/stop function, while the DIR signal controls the direction of motor rotation. For speed adjustment, an external potentiometer or a controller with a 0-10V analog output can be connected to the +10V and GND terminals.

5. Configuration (DIP Switches)

The DM456AI features DIP switches for setting the motor current and speed range. The switches are located on the top side of the unit, as shown in Figure 2.

Figure 2: DM456AI Top View with DIP Switches. This image provides a clear view of the DIP switch bank, labeled 1 through 6, and the 'ON' indicator. These switches are used to configure the current and speed settings of the stepper motor controller.

5.1 Current Setting (SW1, SW2, SW3)

Use DIP switches SW1, SW2, and SW3 to set the desired peak and RMS current for the motors. Refer to the table below for specific configurations. 'ON' typically represents the closed position of the switch.

Table 1: Current Setting (Peak = RMS * 1.4)

Peak Current	RMS Current	SW1	SW2	SW3
1.0A	0.7A	on	on	on
1.4A	1.0A	off	on	on
2.1A	1.5A	on	off	on
2.8A	2.0A	off	off	on
3.5A	2.5A	on	on	off
4.2A	3.0A	off	on	off
4.9A	3.5A	on	off	off
5.6A	4.0A	off	off	off

5.2 Speed Setting (SW4, SW5, SW6, SW7, SW8)

Use DIP switches SW4 through SW8 to select the desired speed range for the motors. Refer to the table below for specific configurations. 'ON' typically represents the closed position of the switch.

Table 2: Speed Setting (r/min)

Speed Range	SW4	SW5	SW6	SW7	SW8
0-100	on	on	on	on	on
0-150	off	on	on	on	on
0-200	on	off	on	on	on
0-250	off	off	on	on	on
0-300	on	on	off	on	on
0-350	off	on	off	on	on
0-400	on	off	off	on	on
0-450	off	off	off	on	on

6. Operation

6.1 Start/Stop Control

The ENA (Enable) input controls the start and stop functionality of the motors. A specific signal state (e.g., high or low, depending on configuration) will enable motor operation, while the opposite state will disable it, effectively stopping the motors.

6.2 Direction Control

The DIR (Direction) input determines the rotation direction of the connected stepper motors. Changing the signal state on this input will reverse the motor's direction of movement.

6.3 Speed Adjustment

Motor speed can be adjusted using an external potentiometer connected to the +10V and GND terminals, or by providing a 0-10V analog output from a PLC or other controller. The selected speed range via DIP switches (Section 5.2) defines the maximum speed achievable.

6.4 Dual Motor Operation

When two motors are connected to the DM456AI, the controller automatically distributes the total current equally (50% to each motor). Both motors will operate with synchronized movement, making it suitable for applications requiring coordinated motion.

7. Maintenance

Proper maintenance ensures the longevity and reliable operation of your DM456AI controller.

7.1 Cooling

The DM456AI is designed for natural cooling. However, in environments with high ambient temperatures or when operating at maximum current, forced cooling (e.g., a fan) may be necessary to maintain optimal operating temperatures. The unit features a heatsink on its underside to dissipate heat.

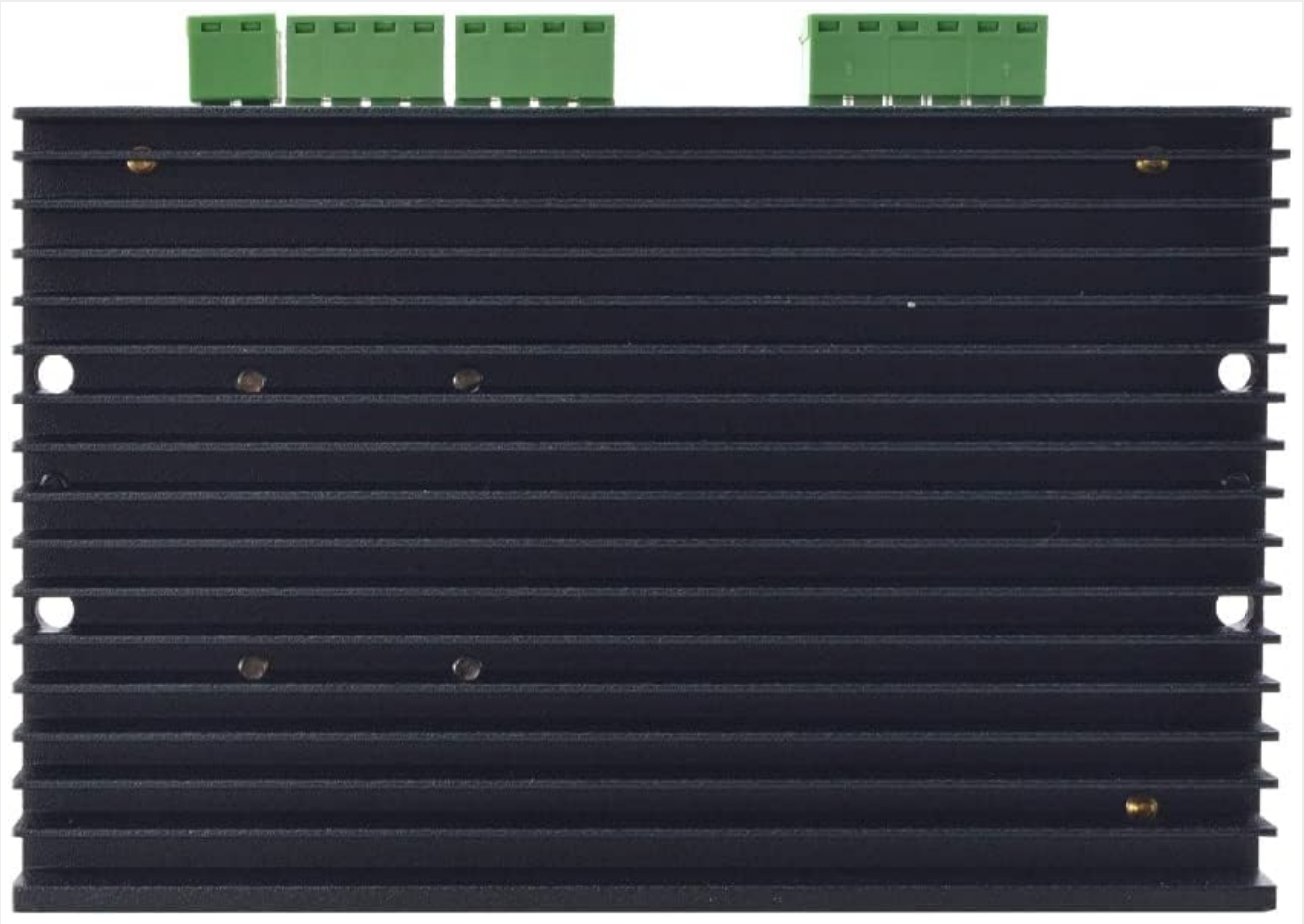

Figure 3: DM456AI Bottom View. This image shows the underside of the controller, revealing the heatsink fins designed for efficient heat dissipation, crucial for maintaining operational stability.

7.2 Operating Environment

To prevent damage and ensure optimal performance, operate the controller in an environment free from:

- Excessive dust
- Oil fog
- Corrosive gases

7.3 Temperature and Humidity

Adhere to the following environmental specifications:

- **Ambient Temperature:** 0°C to 65°C (32°F to 149°F)
- **Operating Temperature:** -10°C to 45°C (14°F to 113°F)
- **Storage Temperature:** -20°C to 65°C (-4°F to 149°F)
- **Humidity:** 40%RH to 90%RH (non-condensing)

8. Troubleshooting

If you encounter issues with your DM456AI controller, consider the following common problems and solutions:

- **Motor not moving:**
  - Check power supply voltage and polarity.
  - Verify motor wiring connections (A+, A-, B+, B-).
  - Ensure the ENA signal is in the 'enabled' state.
  - Confirm current settings via DIP switches are appropriate for your motor.

- **Incorrect motor direction:**
  - Check the DIR signal state.
  - Reverse the connections of one motor winding (e.g., swap A+ and A-).
- **Motor overheating:**
  - Reduce the current setting via DIP switches.
  - Ensure adequate cooling (natural or forced).
  - Verify motor specifications match the controller's capabilities.
- **Inconsistent speed:**
  - Check the stability of the analog speed control signal (potentiometer or 0-10V source).
  - Verify speed range settings via DIP switches.

9. Specifications

The following table details the technical specifications of the DM456AI controller.

Figure 4: DM456AI Side View. This image displays the side of the controller, clearly showing the model number DM456AI and a QR code for additional information or support.

Table 3: DM456AI Technical Specifications

Parameter	Value
Model Number	DM456AI
Input Voltage	+20VDC ~ +40VDC
Max Output Current	5.6A (2.8A per motor when two are connected)
Input Signal Voltage	24VDC
Compatible Motors	Nema 14, Nema 17, Nema 23 Stepper Motors
Cooling	Natural Cooling or Forced Cooling

Parameter	Value
Ambient Temperature	0°C ~ 65°C (32°F ~ 149°F)
Operating Temperature	-10°C ~ 45°C (14°F ~ 113°F)
Storage Temperature	-20°C ~ 65°C (-4°F ~ 149°F)
Humidity	40%RH ~ 90%RH
Weight	Approx. 210g (7.4oz)
Package Dimensions	6.1 x 4.57 x 2.36 inches

10. Warranty and Support

STEPPERONLINE products are manufactured to high-quality standards. For specific warranty information, please refer to the product packaging or the official STEPPERONLINE website. For technical support, troubleshooting assistance, or further inquiries, please visit the official STEPPERONLINE website or contact their customer service.
Official Website: www.omc-stepperonline.com
Brand Store: STEPPERONLINE Amazon Store