STEPPERONLINE CL57T

STEPPERONLINE CL57T Closed Loop Stepper Motor Kit User Manual

Model: CL57T Driver & 23HS30-5004D-E1000 Motor

1. Introduction

This manual provides detailed instructions for the installation, operation, and maintenance of the STEPPERONLINE Closed Loop Stepper Motor Kit. This kit includes a Nema 23 closed-loop stepper motor (model 23HS30-5004D-E1000) and a CL57T V4.1 closed-loop stepper driver, along with necessary cables. The closed-loop system offers enhanced precision and reliability by monitoring the motor's position and correcting for any missed steps, making it suitable for applications such as 3D printers, CNC machines, carving machines, dispensers, and other automation systems.

Kit Contents:

- 1 x 23HS30-5004D-E1000: 2.0Nm Closed Loop Stepper Motor
- 1 x CL57T: Nema 23/Nema 24 Closed Loop Stepper Motor Driver V4.1
- 1 x RS232 Debugging Cable
- 1 x CE2-M2-20: 1.7m Motor and Encoder Extension Cables

2. Setup and Wiring

Proper wiring is crucial for the correct and safe operation of the closed-loop stepper motor kit. Follow the diagrams and instructions carefully.

2.1 Component Overview

Figure 2.1: CL57T Closed Loop Stepper Driver. This image shows the front panel of the CL57T driver, detailing the DIP switch settings for pulse/revolution and current/gain, as well as mode settings for direction and pulse filter.

Figure 2.2: 23HS30-5004D-E1000 Nema 23 Closed Loop Stepper Motor. This image displays the physical appearance of the stepper motor, including its shaft and integrated cables.

Figure 2.3: RS232 Debugging Cable. This image shows the RS232 cable used for connecting the driver to a computer for debugging and configuration.

2.2 Connection Diagrams

Refer to the following diagrams for proper connection of the motor, encoder, and power supply to the CL57T driver.

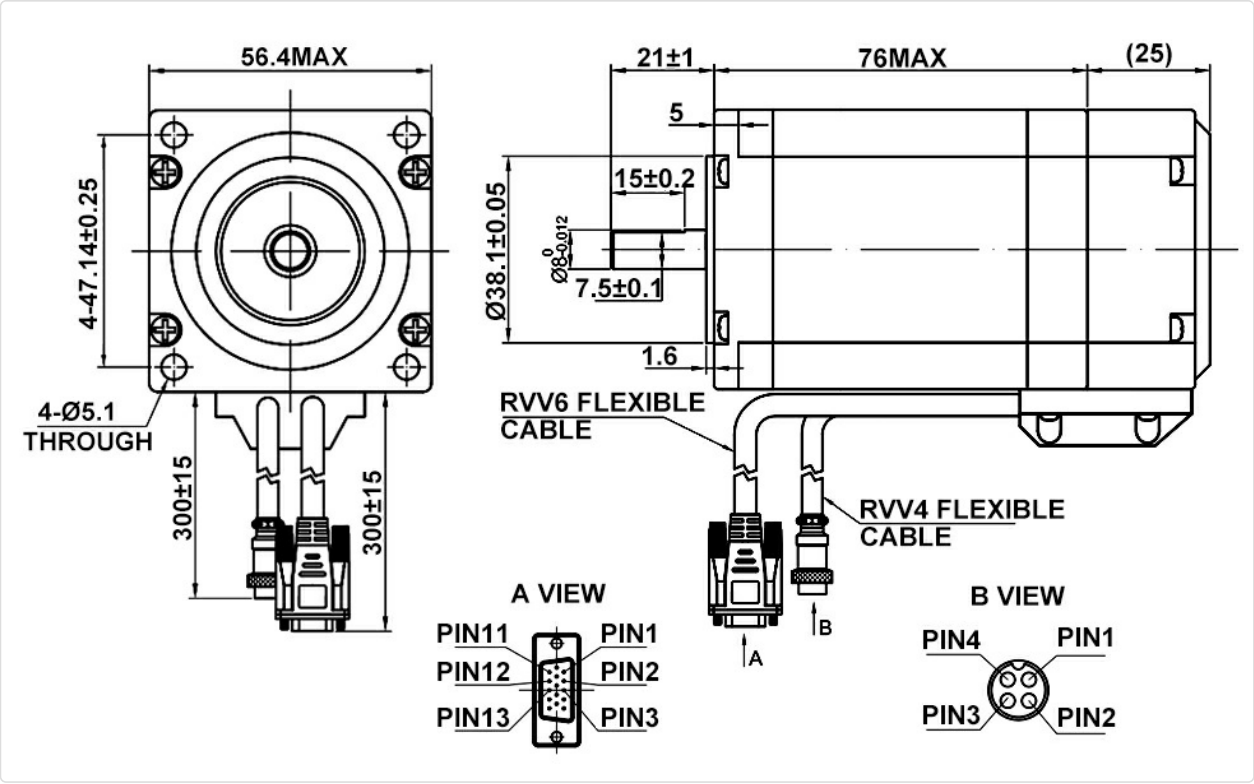

Figure 2.4: Detailed Wiring Diagram. This diagram illustrates the connections for control signals (PUL, DIR, ENA, ALM), encoder, motor, and DC power supply to the CL57T driver. It also provides a table of pin definitions for each connection type.

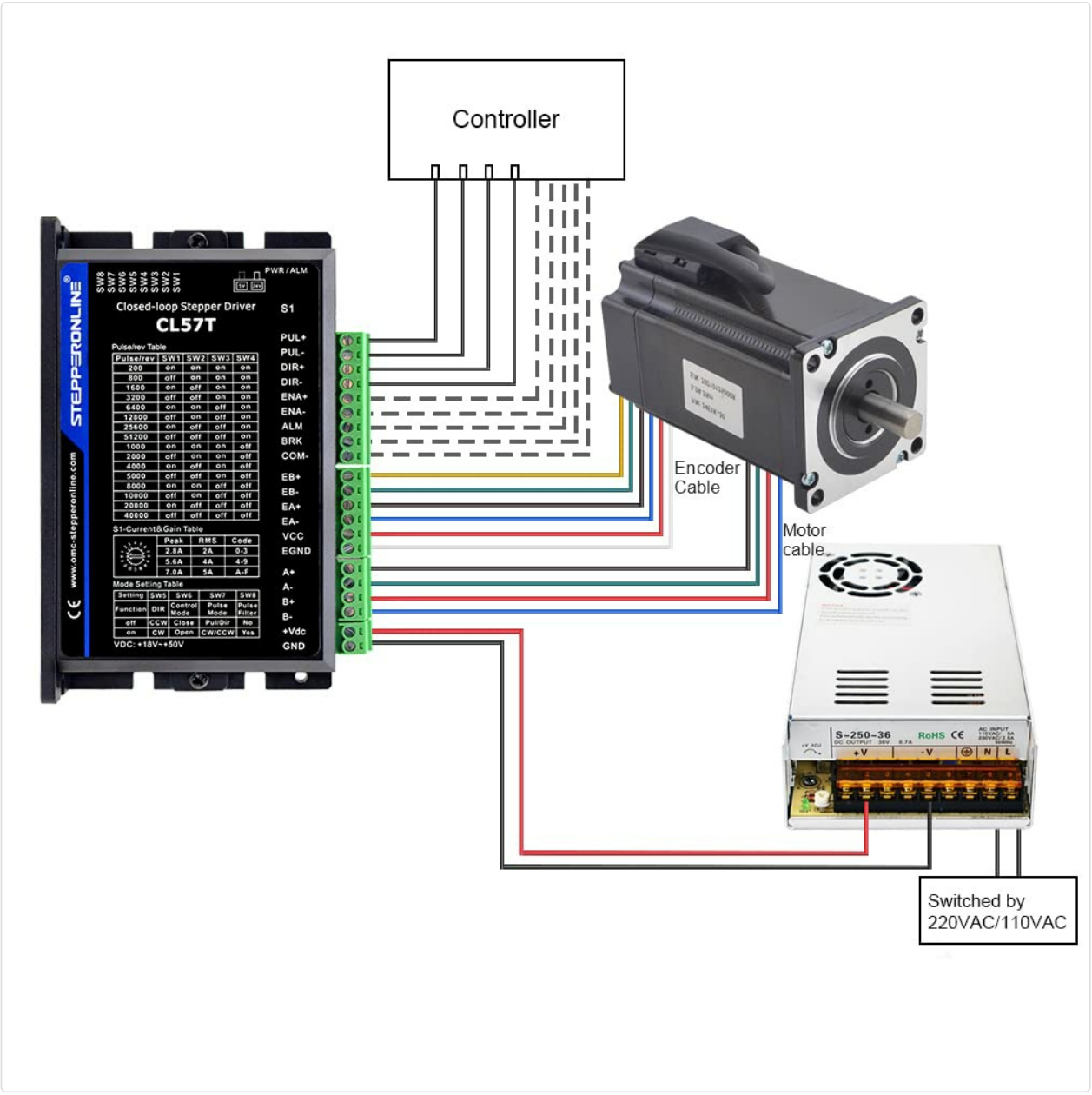

Figure 2.5: Overall System Wiring Diagram. This image shows a comprehensive wiring schematic connecting the controller, CL57T driver, stepper motor with encoder, and power supply. It provides a visual guide for the complete system setup.

Motor and Encoder Connection:

PIN	1	2	3	4
Motor	A+	A-	B+	B-

PIN	2	3	1	13	11	12
Encoder	VCC	EGND	EA+	EA-	EB+	EB-

Motor Extension Cable Connection

PIN	1	2	3	4
Color	Black	Green	Red	Blue

Encoder Extension Cable Connection

PIN	2	3	1	13	11	12
Color	Red	White	Black	Blue	Yellow	Green

PLEASE NOTE: The thick black wire can be used for shielding, but it is not required, so you can leave it unconnected.

Figure 2.6: Motor and Encoder Extension Cable Connections. This image provides tables detailing the pin assignments for the motor and encoder connections, as well as the color codes for the motor and encoder extension cables.

Important Note on Shielding: The thick black wire on the motor cable can be used for shielding, but it is not required for basic operation. You may leave it unconnected if shielding is not necessary for your application.

3. Operating Instructions

The CL57T driver's functionality is configured using DIP switches. Ensure the power is off before changing any DIP switch settings.

3.1 Pulse/Revolution Settings (SW1-SW4)

Use DIP switches SW1, SW2, SW3, and SW4 to set the desired pulses per revolution for the motor. The table below shows the configurations:

Pulse/rev	SW1	SW2	SW3	SW4
200	on	on	on	on
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
51200	on	on	on	off
1000	off	on	on	off
2000	on	off	on	off
4000	off	off	on	off
5000	on	on	off	off
8000	off	on	off	off
10000	on	off	off	off
20000	off	off	off	off
40000	off	off	off	off

3.2 Current & Gain Settings (SW5-SW8)

Use DIP switches SW5, SW6, SW7, and SW8 to set the peak current and RMS current for the motor. The table below shows the configurations:

Peak	RMS	SW5	SW6	SW7	SW8
2.6A	2A	on	on	on	on
5.6A	4A	off	on	on	on
7.0A	5A	on	off	on	on
8.0A	6A	off	off	on	on

3.3 Mode Settings (SW5-SW8)

The remaining DIP switches control various operational modes:

Setting	SW5	SW6	SW7	SW8	Function
DIR	off				CCW (Counter-Clockwise)
	on				CW (Clockwise)
Control Mode		off			Closed Loop
		on			Open Loop
Pulse Filter			off		Full/Dir No
			on		CW/CCW Yes

4. Maintenance

To ensure the longevity and optimal performance of your STEPPERONLINE Closed Loop Stepper Motor Kit, observe the following maintenance guidelines:

- **Environmental Conditions:** Operate the kit within recommended temperature and humidity ranges. Avoid environments with excessive dust, moisture, or corrosive gases.
- **Cleaning:** Periodically clean the motor and driver surfaces to prevent dust buildup, which can impede heat dissipation. Use a soft, dry cloth. Do not use liquid cleaners directly on electronic components.
- **Connections:** Regularly inspect all wiring connections for tightness and integrity. Loose connections can lead to intermittent operation or damage.
- **Heat Management:** Ensure adequate ventilation around the driver and motor to prevent overheating. If operating in an enclosed space, consider active cooling solutions.
- **Shaft Inspection:** Check the motor shaft for any signs of wear or damage. Ensure it rotates freely without excessive friction.

5. Troubleshooting

The CL57T driver incorporates built-in protection features to improve reliability. The red LED on the driver indicates various fault conditions. Refer to the table below for troubleshooting common issues:

Figure 5.1: CL57T Driver Troubleshooting Table. This table details different blink patterns of the red LED, their corresponding descriptions (e.g., Over-current, Over-voltage, Chip error), and recommended troubleshooting steps.

General Troubleshooting Tips:

- Always turn off power before inspecting or adjusting wiring.
- Verify all connections are secure and correctly wired according to the diagrams in Section 2.
- Check the power supply voltage to ensure it is within the specified range (24-48VDC).
- If the motor fails to lock or tune, ensure DIP switch SW6 is set to 'on' for closed-loop operation and restart the power supply.
- For persistent issues or errors not listed, contact STEPPERONLINE customer service.

6. Specifications

6.1 Motor Specifications (23HS30-5004D-E1000)

- **Motor Type:** Nema 23 Closed Loop Stepper Motor
- **Holding Torque:** 2.0 Nm (283.28 oz.in)
- **Shaft Diameter:** 15 mm
- **Material:** Metal
- **Rated Voltage:** 5 Volts (Control Signal Voltage)
- **Speed:** Up to 100 RPM (typical, application dependent)
- **Horsepower:** 0.42 Horsepower (approximate)

6.2 Driver Specifications (CL57T V4.1)

- **Input Voltage:** 24-48 VDC (recommended, allowing for voltage fluctuation)
- **Output Current:** 0-8.0A (Peak)
- **Compatible Motors:** Nema 23 / Nema 24 Closed Loop Stepper Motors
- **Control Signal Voltage:** 5V/24V (factory setting is 24V, must be set to 5V/24V)

6.3 Physical Dimensions

Control signal		
PUL	Pulse	The factory setting of control signal voltage is 24V, must need to set 5V/24V
DIR	Direction	
ENA	Enable	
ALM	Alarm output	Open collector

Encoder Connection					
EB+	EB-	EA+	EA-	VCC	Gnd
Encoder phase B output		Encoder phase A output		Encoder power supply/provided by the driver	

Motor Connection				
A+	A-	B+	B-	The motor wires need to correspond one by one cannot be exchanged
Motor A+	Motor A-	Motor B+	Motor B-	

Power supply-DC		
V-	Power supply positive	24-80VDC recommended, leaving rooms for voltage fluctuation and back-EMF.
V+	Power supply negative	
NC	Undefined	

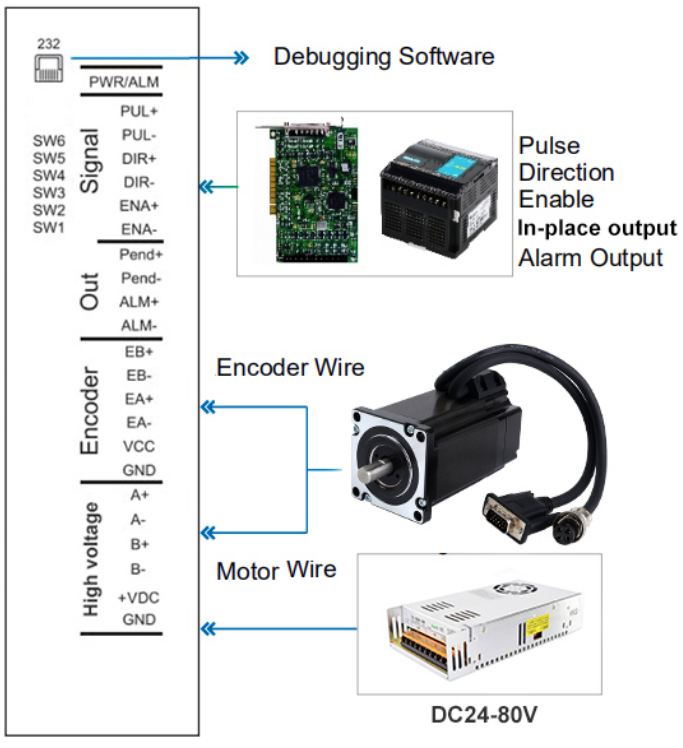

Figure 6.1: Dimensional Drawing of the Stepper Motor. This diagram provides detailed measurements and pin configurations for the motor, including its mounting holes and cable connections.

- **Package Dimensions:** 10.43 x 6.97 x 5.43 inches
- **Item Weight:** 4.42 pounds

7. Warranty and Support

STEPPERONLINE is committed to providing high-quality products and customer satisfaction.

- **Warranty:** This stepper motor kit comes with a 1-year warranty from the date of purchase.
- **Returns/Replacements:** A 30-day free replacement or refund policy is offered.
- **Customer Service:** Lifetime customer service is provided for technical assistance and support.

For support, please visit the official STEPPERONLINE website or contact their customer service department directly.