PEMENOL SMC04

PEMENOL SMC04 Stepper Motor Controller User Manual

Model: SMC04

Introduction

The PEMENOL SMC04 is a high-performance 6.6A stepper motor controller designed for precise control of NEMA 17, 23, and 34 stepper motors. This integrated controller and driver module simplifies wiring and installation, making it suitable for various applications including CNC milling, 3D printers, and automation systems. It features adjustable micro-step resolution for smooth, low-vibration movement and robust protection functions for reliable operation.

Product Features

- **High-Performance 6.6A Output:** Optimized for 42 and 57 stepper motors, providing powerful and precise control.
- **All-in-One Design:** Integrated controller and driver reduces wiring complexity and saves space.
- **External Signal Support:** Compatible with PUL/DIR/ENA inputs for PLC, Arduino, or industrial PC connections.
- **Efficient Cooling:** Equipped with a heatsink and fan for stable performance under high load.
- **Adjustable Micro-step Resolution:** Offers 1 to 256 subdivisions for smooth, low-vibration motor movement.
- **Wide Voltage Range:** Operates with 12-48V DC input.
- **Comprehensive Protection:** Includes overcurrent, overvoltage, and short-circuit protection.
- **Universal Compatibility:** Supports NEMA 17, 23, 24, 42, and 57 stepper motors.
- **High-Resolution LCD Display:** For clear monitoring and parameter adjustment.
- **15 Operating Modes:** Supports both automatic and manual operation.

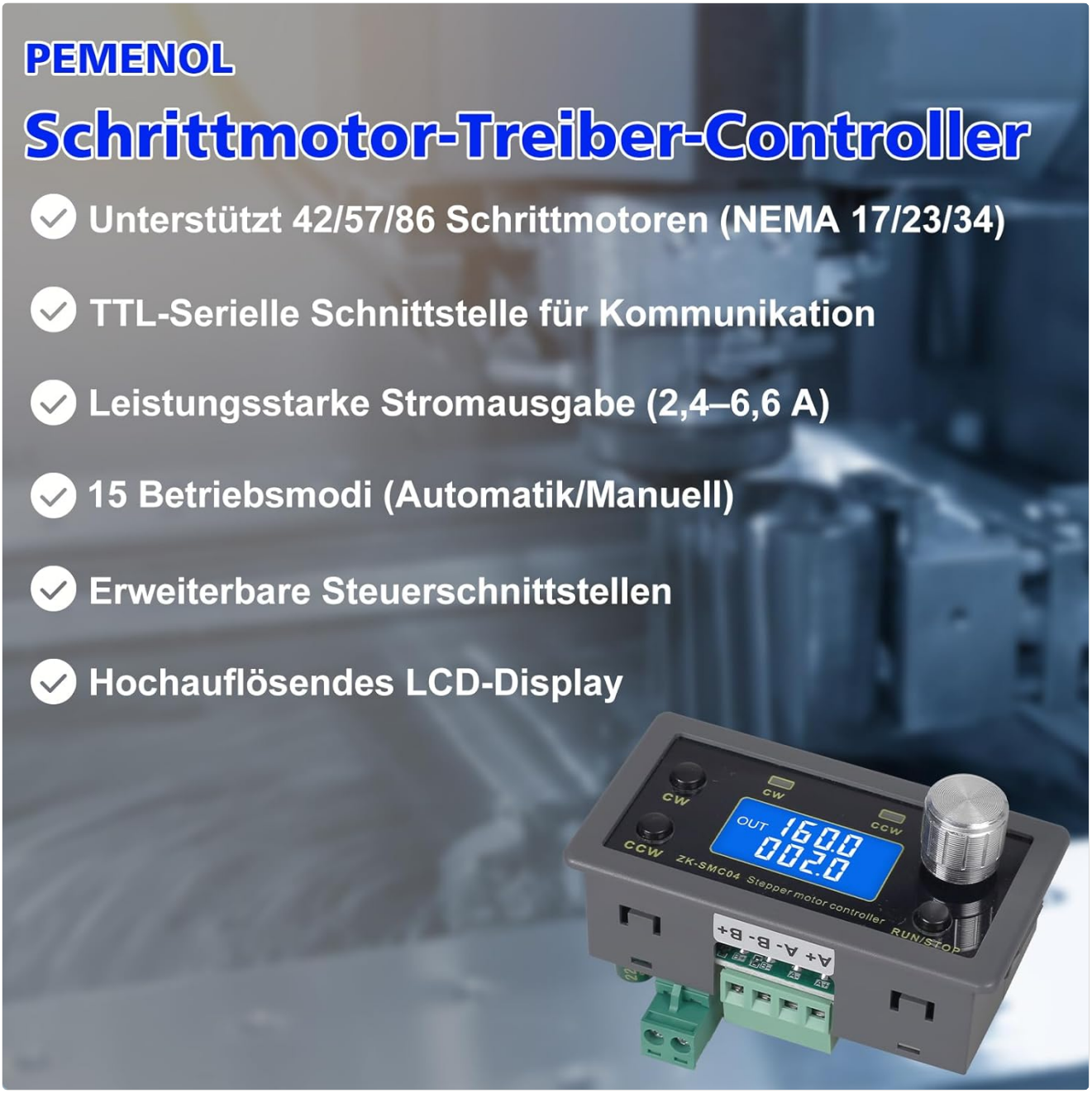

Figure 1: PEMENOL Stepper Motor Driver Controller. This image shows the overall appearance of the PEMENOL SMC04 controller, highlighting its key features such as support for NEMA 17/23/34 motors, TTL serial interface, powerful current output (2.4-6.6A), 15 operating modes, expandable control interfaces, and a high-resolution LCD display.

Product Details and Connections

The SMC04 controller integrates various interfaces for power, motor connection, and external control signals. Understanding these connections is crucial for proper setup and operation.

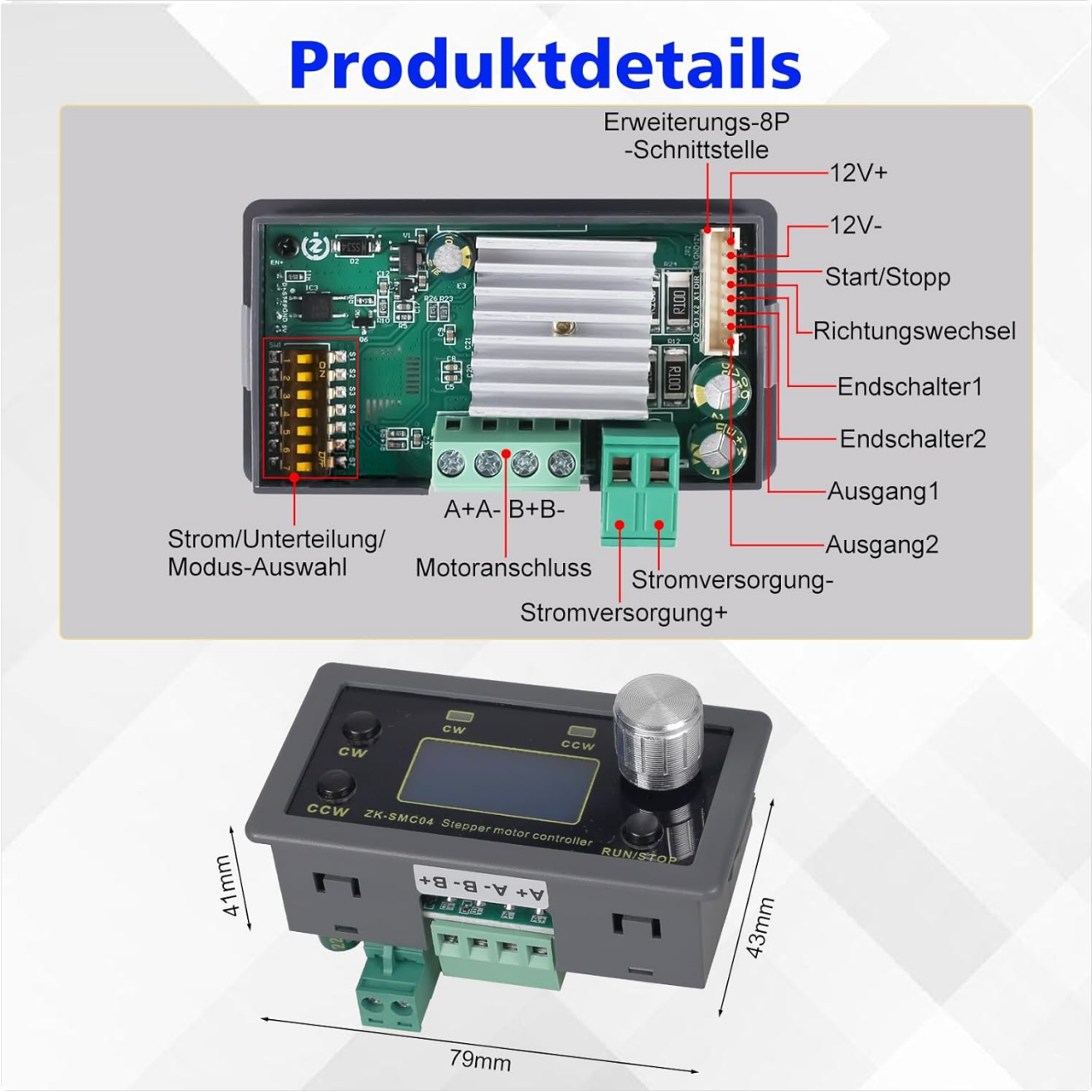

Figure 2: Product Details and Connection Diagram. This diagram illustrates the various connection points on the SMC04 controller. Key interfaces include the Expansion 8P Interface (for 12V+, 12V-, Start/Stop, Direction Change, Limit Switch 1, Limit Switch 2, Output 1, Output 2), Current/Subdivision/Mode Selection jumpers, Motor Connection (A+, A-, B+, B-), and Power Supply (+ and -). The physical dimensions of the module are approximately 79mm x 43mm x 41mm.

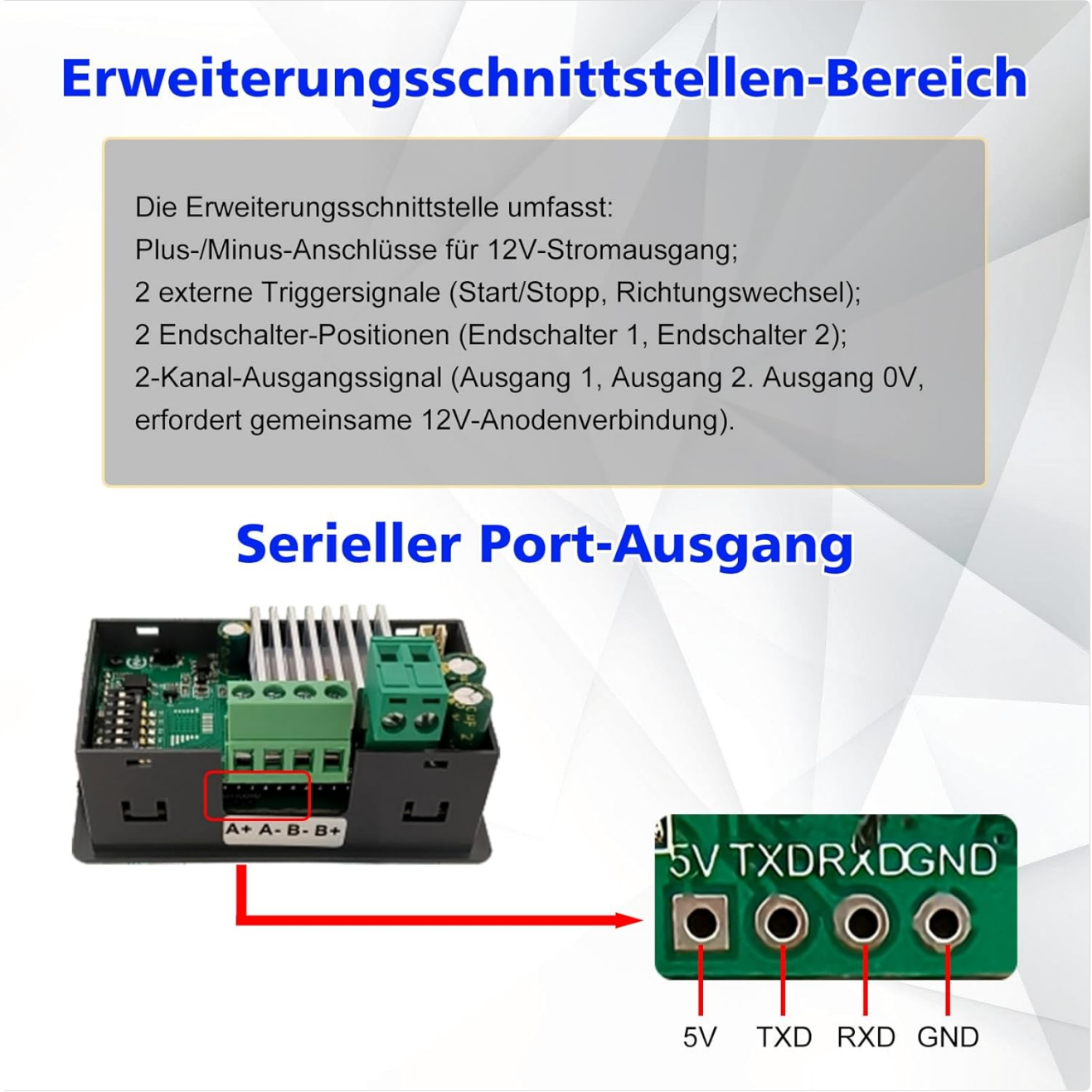

Figure 3: Expansion Interface and Serial Port Output. This image details the expansion interface and serial port. The expansion interface includes Plus/Minus connections for 12V power output, two external trigger signals (Start/Stop, Direction Change), two limit switch positions (Limit Switch 1, Limit Switch 2), and a 2-channel output signal (Output 1, Output 2, Output 0V, requiring common 12V anode connection). The serial port output provides 5V, TXD, RXD, and GND connections for communication.

Setup

1. **Power Supply Connection:** Connect a DC power supply (12-48V) to the 'Power Supply+' and 'Power Supply-' terminals as indicated in Figure 2. Ensure correct polarity.
2. **Motor Connection:** Connect your NEMA 17/23/34 stepper motor to the 'Motor Connection' terminals (A+, A-, B+, B-). Refer to your motor's wiring diagram for coil identification.
3. **External Control (Optional):** If using external control signals (e.g., from a PLC or Arduino), connect the PUL (Pulse), DIR (Direction), and ENA (Enable) signals to the corresponding pins on the expansion interface. Refer to Figure 3 for pinout details.
4. **Limit Switches (Optional):** Connect limit switches to 'Limit Switch 1' and 'Limit Switch 2' terminals on the expansion interface if required for your application.
5. **Serial Communication (Optional):** For serial communication, connect to the 5V, TXD, RXD, and GND pins

on the serial port output.

6. **Current/Subdivision/Mode Selection:** Adjust the jumpers for Current, Subdivision (micro-steps), and Mode selection according to your motor's specifications and desired operation. These jumpers are typically located near the motor connection terminals (see Figure 2).

Operating Instructions

The SMC04 controller features an intuitive interface with an LCD display and an encoder adjustment wheel for easy operation.

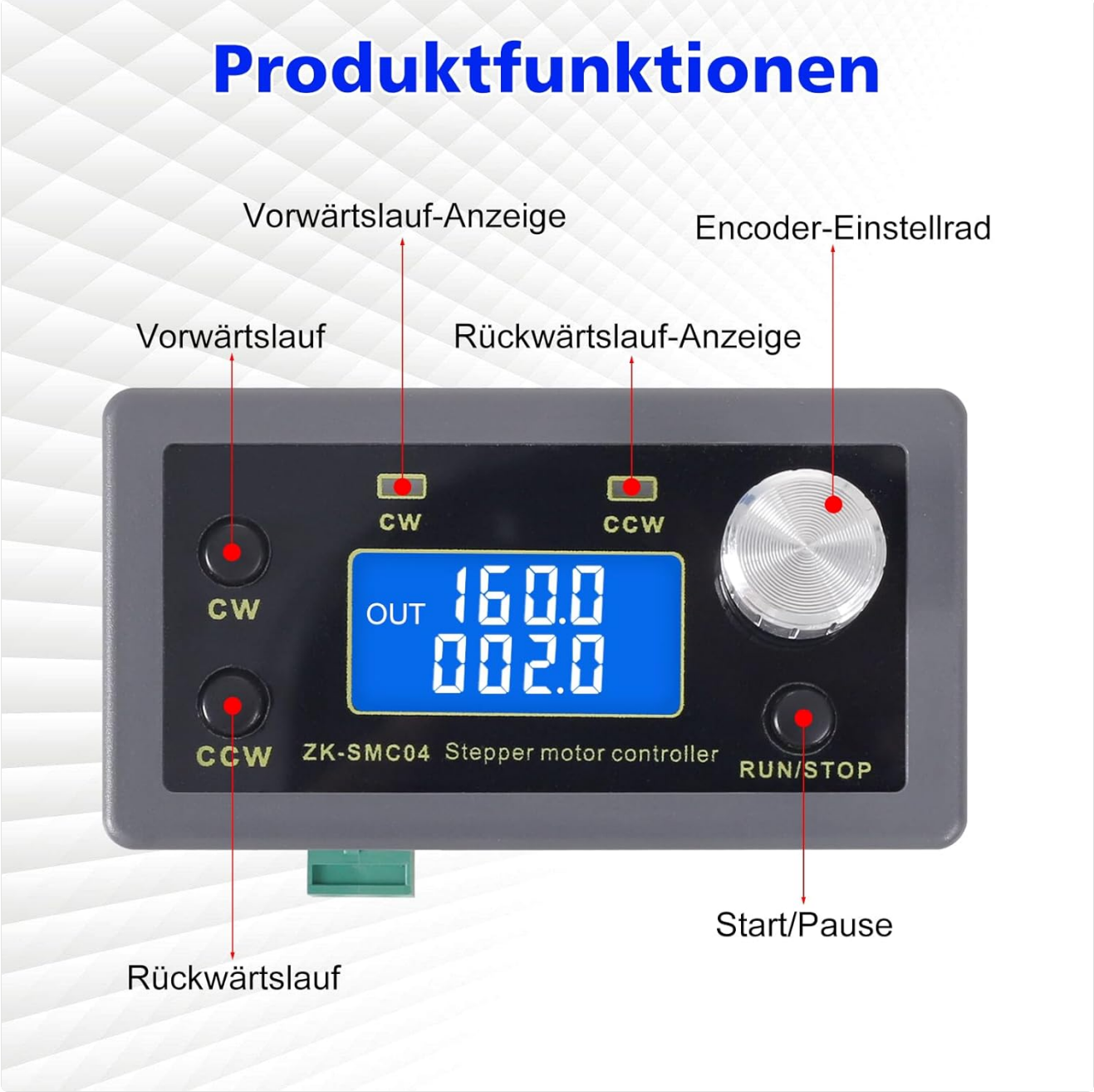

Figure 4: Product Functions and Controls. This image highlights the control elements of the SMC04. It includes the Forward Run Indicator (CW), Reverse Run Indicator (CCW), Encoder Adjustment Wheel, CW (Forward Run) button, CCW (Reverse Run) button, and the RUN/STOP (Start/Pause) button. The LCD display shows output values (e.g., OUT 160.0, 002.0).

1. **Power On:** Apply power to the controller. The LCD display will illuminate.
2. **Mode Selection:** Use the encoder adjustment wheel to navigate through the 15 operating modes. Press the wheel to confirm selection.

3. **Parameter Adjustment:** In the selected mode, rotate the encoder wheel to adjust parameters such as speed, steps, or micro-step resolution. Press the wheel to set the value.
4. **Direction Control:** Press the 'CW' button for forward rotation or the 'CCW' button for reverse rotation. The corresponding indicator will light up.
5. **Start/Stop:** Press the 'RUN/STOP' button to start or pause motor operation.
6. **External Control:** If using external PUL/DIR/ENA signals, ensure the controller is set to the appropriate external control mode. The motor will then respond to the external signals.

Maintenance

- **Keep Clean:** Regularly clean the controller to prevent dust accumulation, especially around the heatsink and fan, to ensure optimal cooling.
- **Check Connections:** Periodically inspect all wiring connections for tightness and signs of wear or corrosion.
- **Environmental Conditions:** Operate the controller within its specified temperature and humidity ranges to prolong its lifespan. Avoid exposure to moisture or extreme temperatures.
- **Firmware Updates:** Check the manufacturer's website for any available firmware updates that may improve performance or add features.

Troubleshooting

- **Motor Not Moving:**
  - Check power supply voltage and current.
  - Verify motor wiring (A+, A-, B+, B-).
  - Ensure the 'ENA' (Enable) signal is active (low for enable on most drivers).
  - Check if the controller is in the correct operating mode (manual or external control).
  - Confirm that the 'RUN/STOP' button is pressed to start operation.
- **Motor Jittering or Losing Steps:**
  - Adjust the current setting to match your motor's specifications.
  - Reduce the motor speed or acceleration settings.
  - Check for mechanical binding or excessive load on the motor.
  - Ensure micro-step settings are appropriate for the application.
- **Overheating:**
  - Ensure adequate ventilation around the controller.
  - Verify the fan is operating correctly.
  - Reduce the motor current if it's set too high.
  - Check for short circuits in motor wiring.
- **No Display:**
  - Check power supply connection and voltage.
  - Ensure the power supply is switched on.

Specifications

Manufacturer	PEMENOL
Model Number	GY21902-1-DEFBA (SMC04)
Dimensions (L x W x H)	7.9 x 4.3 x 4.1 cm
Weight	96 grams
Input Voltage	12-48V DC
Peak Current Output	6.6A
Supported Motors	NEMA 17, 23, 24, 42, 57 Stepper Motors
Micro-step Resolution	1 to 256 subdivisions
Communication Interface	TTL Serial Interface, External PUL/DIR/ENA
Protection Functions	Overcurrent, Overvoltage, Short-circuit

Applications

The PEMENOL SMC04 Stepper Motor Controller is versatile and suitable for a wide range of applications requiring precise motor control.

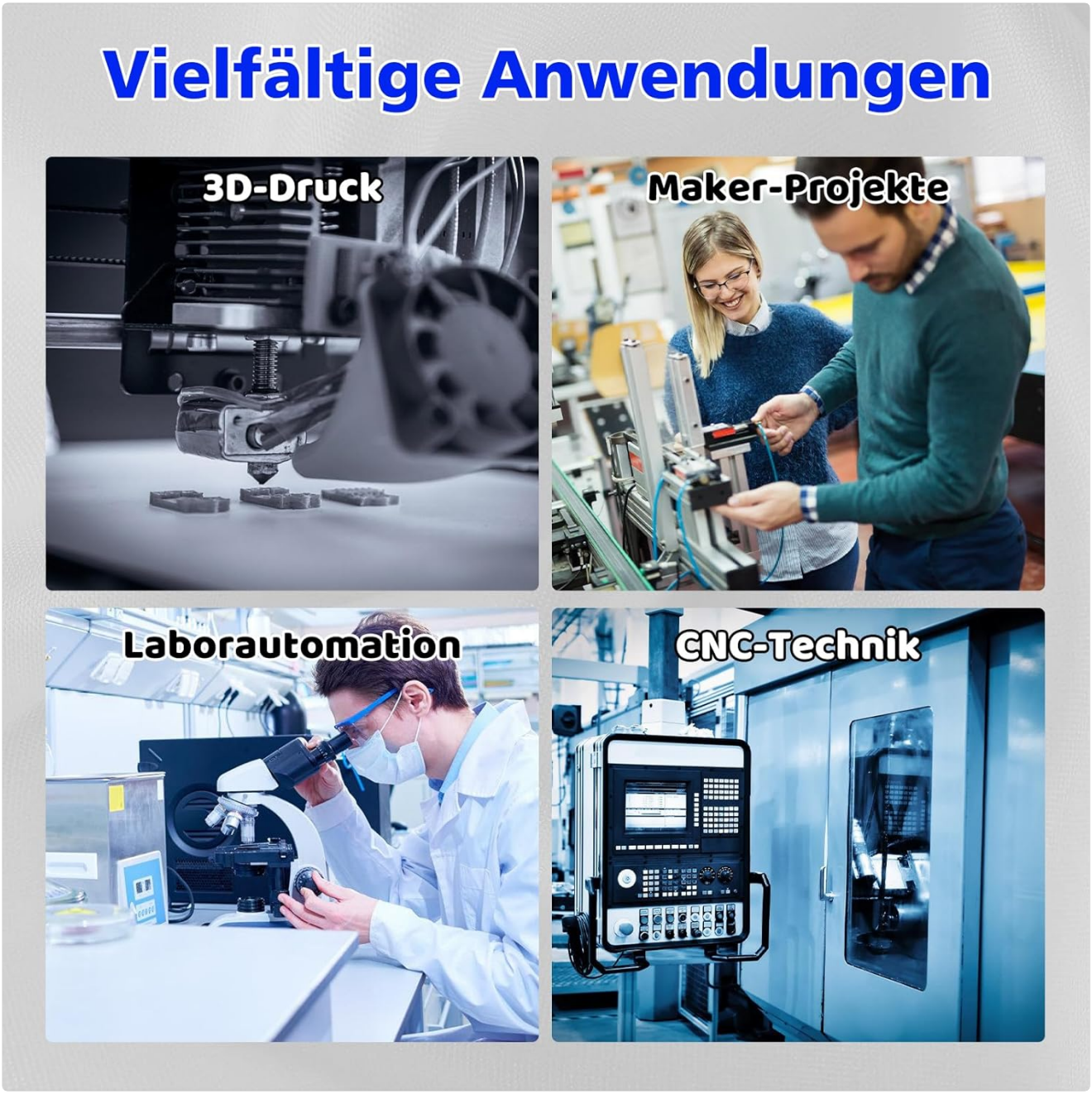

Figure 5: Diverse Applications. This image illustrates various fields where the SMC04 controller can be utilized, including 3D Printing, Maker Projects, Lab Automation, and CNC Technology. Its robust design and flexible control options make it ideal for these demanding environments.

- **3D Printing:** For precise movement of print heads and build platforms.
- **CNC Milling Machines:** Controlling axes for accurate material removal.
- **Robotics:** Enabling controlled motion in robotic arms and other automated systems.
- **Laser Engravers:** Achieving high-resolution engraving with smooth motor operation.
- **Lab Automation:** For automated laboratory equipment and experimental setups.
- **Maker Projects:** Ideal for hobbyists and DIY enthusiasts building custom automation solutions.

Warranty and Support

PEMENOL products are designed for reliability and performance. For warranty information, technical support, or service inquiries, please refer to the contact details provided with your purchase or visit the official PEMENOL website. Please have your model number (SMC04 or GY21902-1-DEFBA) ready when contacting support.