

Orientalmotor

Driver for 5-Phase Stepper Motors

CVD Series Fully Closed-Loop Control Type

A fully closed-loop control type product line is now part of the CVD Series. It retains the ease of use of a stepper motor and enables high precision positioning operation when combined with external sensors. These are useful in facilities and equipment that require highly accurate control.

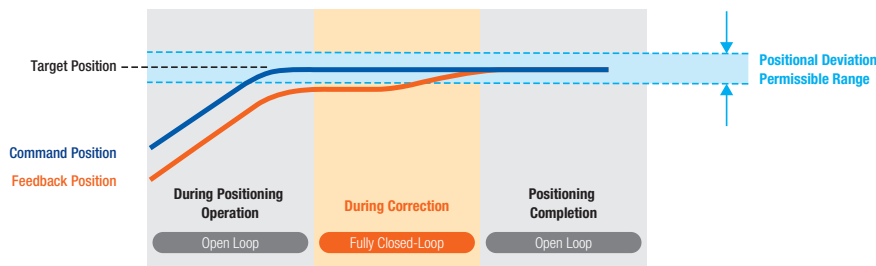


With Mounting Plate: **CVD5B-KF**
Right Angle with Mounting Plate: **CVD5BR-KF**

Fully Closed-Loop Stepper Motor Control

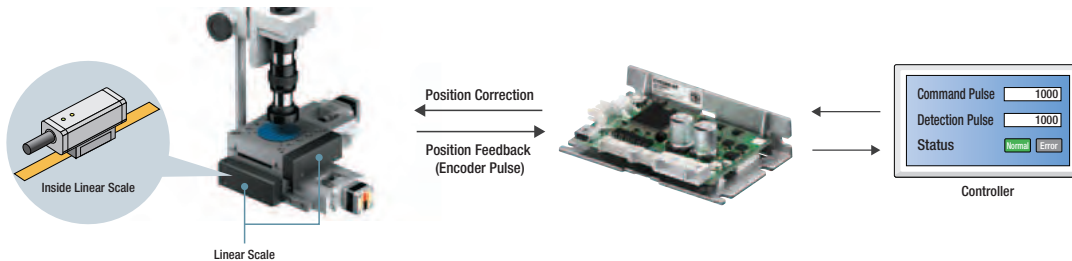
Uses open loop control at the start of positioning to take advantage of the high response of the stepper motor. After the positioning command has been completed, it uses feedback from external sensors to correct the position.

CVD Series Fully Closed-Loop Control



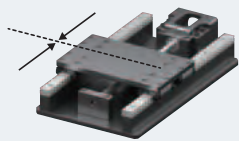
Enables High Precision Positioning

The use of fully closed-loop control, which provides direct feedback for the mechanism position, allows for the correction of any deviations between the command position and the feedback position. This capability is helpful when designing high-precision equipment that requires submicron-level positioning accuracy.



Reference

● Lost motion^{*1} Actual measurement data



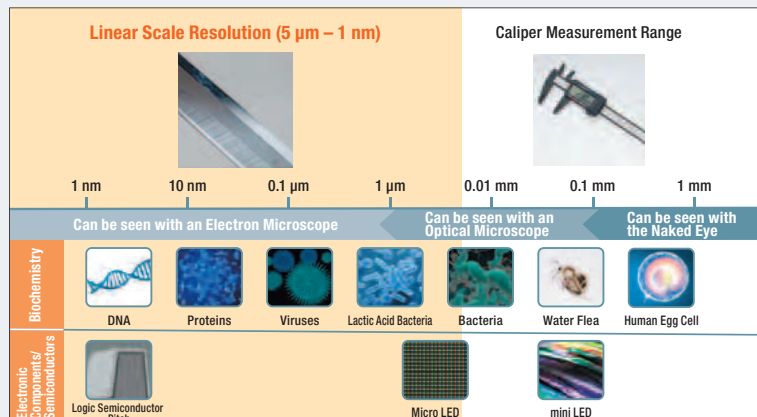
[Measurement Conditions]
Feed screw lead 1 mm
Linear scale resolution 0.1 μm
In-position range: 1 cnt^{*2}
Measurement using laser

| Open Loop | Fully Closed-Loop |
|----------------|--|
| 0.51 μm | 0.15 μm (Target accuracy within ±0.2 μm) |

*1 The motor is positioned in the CW and CCW directions compared to the target position, and the result is the difference of the stop position relative to the rotation direction.

*2 The position is corrected with a target error of 1 encoder pulse count (-0.2 to 0.2 μm).

● Linear scale resolution



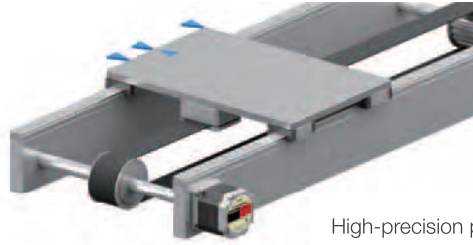
No Gain Adjustment or Hunting with Stepper Motors

No Gain Adjustment Required

Unlike servo motors, gain adjustment to match the mechanism is not necessary. Since the positioning operation does not use the usual feedback from an encoder, adjustments to mechanisms like belt pulleys, cams, or loads become unnecessary.

Holding the Stop Position without Hunting

When positioning is completed, the motor stops with its own holding force without hunting. This is ideal for applications where absence of vibration upon stopping is required.



High-precision positioning without gain adjustment, even with belt pulleys

Supports Various External Sensors to Match the Mechanism

Compatible with various encoders from a variety of manufacturers, allowing for feedback from the encoder best suited to the mechanism to be used.

Mitutoyo

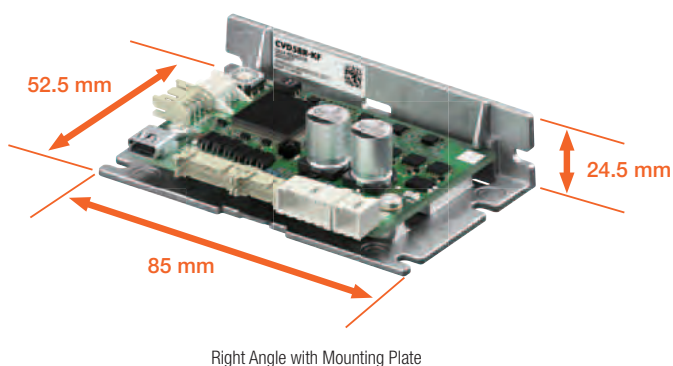
HEIDENHAIN

Magnescape
SPEED × PRECISION

RENISHAW
apply innovation™

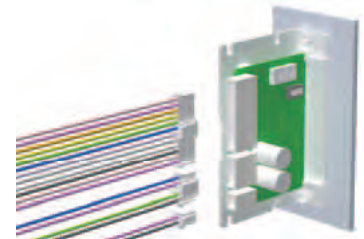
Common Driver Sizes and Installation Method

Drivers with different connector directions are available to match the end user's driver installation methods. The mounting plate common to the **CVD** Series is used, with the same mounting hole pitch.



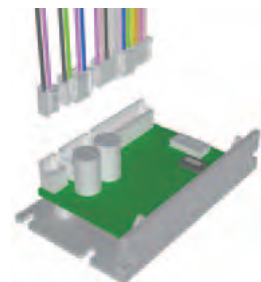
Installation Example > Vertically Aligned Driver Installation

The connector points outward from the board. DIN rail mounting brackets and circuit product covers are also available as accessories.

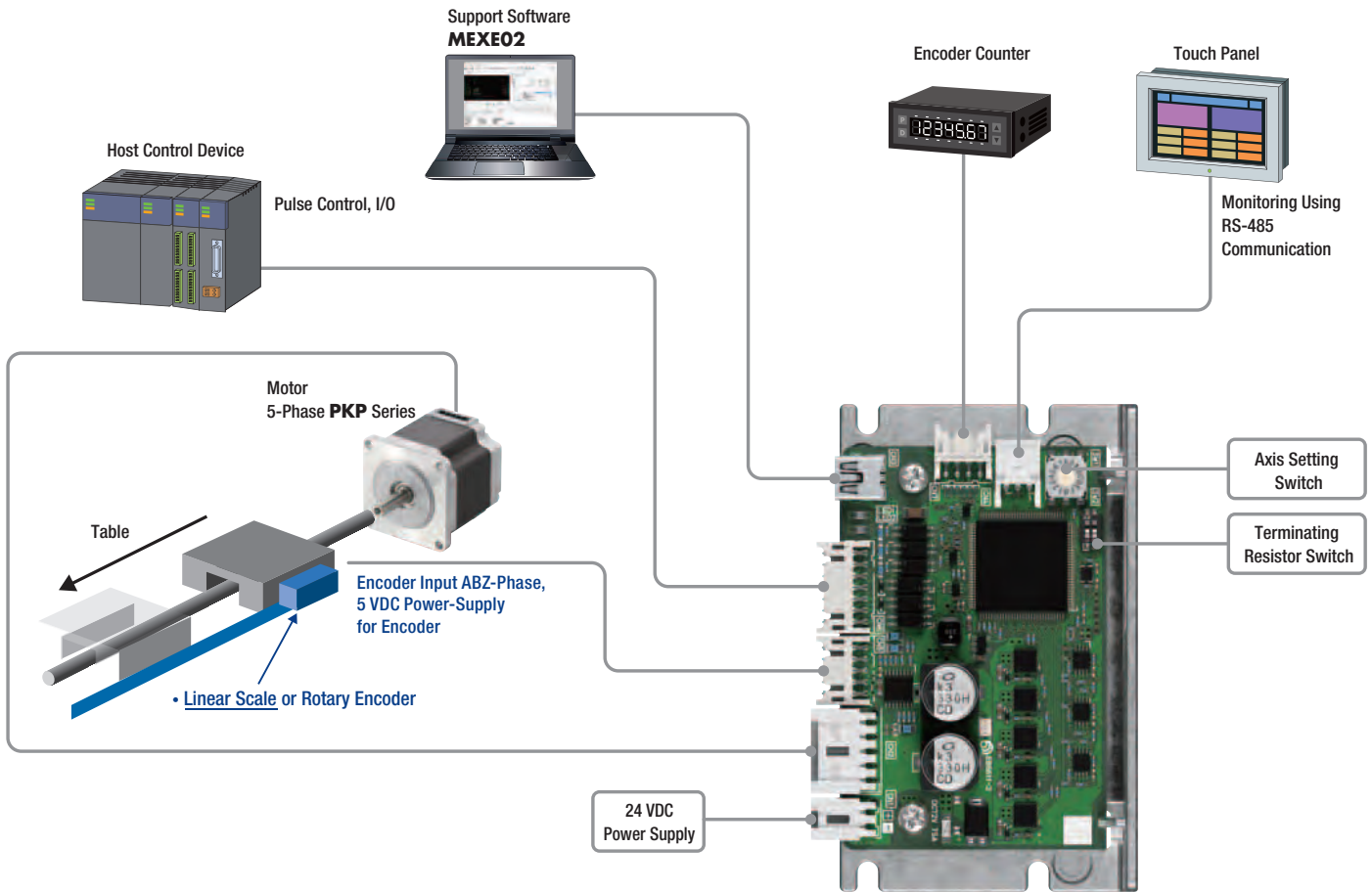


Installation Example > Horizontally Aligned Driver Installation

The connector points upward from the board.



System Configuration



Driver Specifications

| Driver Product Name | CVD5B-KF, CVD5BR-KF | |
|----------------------|--|---|
| Drive System | Microstep Drive, Bipolar Constant Current Drive Method | |
| Power Supply Voltage | 24 VDC±10% | |
| Input Current | 0.6~3.0 A * | |
| Interface | Pulse Input | 3~5.25 VDC Maximum Input Pulse Frequency Line Driver Output: 1 MHz (at 50% duty) Open-Collector Output: 250 kHz (at 50% duty) |
| | Control Input | 4.5~5.25 VDC |
| | Control Output | 30 VDC max. (Output Saturation Voltage: 0.5 VDC max.) 10 mA max. |
| | Encoder Input | <ul style="list-style-type: none"> Input Format: Incremental (A-phase, B-phase, Z-phase) Count Method: 90-degree phase difference input Multiplier: 1×/2×/4× Input Frequency: 4.0 MHz max. (frequency for each of A-phase and B-phase) Interface: Differential line receiver (26C32 or equivalent) |
| | 5 VDC Power Supply Output for Encoder Input | 300 mA max. |
| | Field Network | Modbus RTU (RS-485 communication) |

*Varies depending on the combined product.

List of Applicable Motors

| Driver Product Name | | Motor Drive Current | Input Current (A) | Applicable Motor | |
|---------------------|---------------------------------|---------------------|-------------------|--|--|
| With Mounting Plate | With Mounting Plate Right-Angle | | | Applicable Series | Product Name |
| CVD5B-KF | CVD5BR-KF | 0.35 A/Phase | 0.6 | 5-Phase Stepper Motors PKP Series | PKP52□MN03 |
| | | 0.75 A/Phase | 1.4 | | PKP52□MN07 |
| | | 1.2 A/Phase | 1.7 | | PKP52□N12 |
| | | 1.8 A/Phase | 2.8 | | PKP54□MN, PKP54□N18■2, PKP54□N18■ |
| | | 2.4 A/Phase | 3.0 | | PKP56□FMN, PKP56□FN24■2 |
| | | 0.35 A/Phase | 0.6 | 5-Phase Stepper Motors PK Series | PK513, PK52□P |
| | | 0.75 A/Phase | 1.4 | | PK52□H, PK54□ |
| | | 1.4 A/Phase | 1.8 | | PK56□ |
| | | 0.75 A/Phase | 1.4 | Hollow Rotary Actuators DH Series | DHM28PAK2, DHM42PAK |
| | | 0.35 A/Phase | 0.6 | Compact Electric Cylinders DRL II Series | DRLM20 |
| | | 0.75 A/Phase | 1.4 | | DRLM28, DRLM42 |
| | | 1.4 A/Phase | 1.8 | | DRLM60 |

Some product names are listed here. Can be combined with products containing the product names listed here.

However, encoders are excluded.

A number indicating the length of the motor case is entered where the box □ is located within the motor product name.

Either A (single shaft) or B (double shaft) indicating the configuration is specified where the box ■ is located in the motor product name.

General Specifications

| | | |
|--------------------------------------|---------------------|---|
| Operating Environment (In operation) | Ambient Temperature | 0~+50°C (Non-freezing) |
| | Ambient Humidity | 85% or less (Non-condensing) |
| | Atmosphere | No corrosive gases or dust. The product should not be exposed to water, oil or other liquids. |

Compatible with RS-485 Communication (Modbus RTU)

- Operating data, parameter settings and operation commands can be input via RS-485 communication.
- Use of remote I/O contributes to reduced wiring and space saving.
- Detection position, alarm information, driver temperature, etc., can be monitored.

| | |
|----------------------------|--|
| Electrical Characteristics | EIA-485 compliant Use twisted-pair wire. The max. total extension length is 3 m. |
| Communication Format | Half duplex Asynchronous mode (data: 8 bits, stop bit: 1 bit or 2 bits, parity: none, even, or odd) |
| Transmission Speed | Select from 9,600 bps/19,200 bps/38,400 bps/57,600 bps/115,200 bps/230,400 bps |
| Protocol | Modbus RTU Mode |
| Connection Type | Up to 31 units can be connected to a single host control device. |

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For further information (specifications, dimensions, speed-torque characteristics)