



VER 1.4

DS-OLS22-FPD

Technical Manual



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Warranty

- If a failure occurs within one year from the date of purchase due to reasons other than misuse or improper operation, the product may be returned to DINGS' via courier or freight service for free repair. Please note that repair service may require several working days.
- If a failure is caused by improper operation, misuse, or occurs after the one-year warranty period, repair service will be provided at the customer's expense. The product may be returned to DINGS' via courier or freight service. Since repairs may require several working days, customers using the product in critical applications are advised to keep spare units available.
- DINGS' shall not be responsible for any damage occurring during transportation when the product is returned for repair. Please ensure that sufficient cushioning materials are used and that the product is properly protected from excessive vibration during shipment (less than 0.5 G is recommended).
- The following services are not included in the product purchase price:
 - A. System compatibility review and application evaluation during system design
 - B. Trial operation, commissioning, and parameter adjustment (Motors adjusted or customized for a specific application may not be returned.)
 - C. On-site troubleshooting, fault diagnosis, and repair services

Safety Precautions

- Use this product only within the rated specifications and operating environment described in this manual.
- This product is not designed or manufactured for life-critical applications or environments. If the product is intended for special applications, please consult DINGS' sales representatives before use.
- Although DINGS' strives to provide products of the highest quality and reliability, users must implement appropriate safety measures, including redundant system design, fire protection measures, and malfunction prevention mechanisms, to prevent personal injury, fire, or other damage resulting from system failures.
- Product specifications may be changed without prior notice for performance improvement or product enhancement purposes.
- Disconnect power and wait until all LEDs are off before wiring, moving, servicing, or inspecting the equipment. Do not touch live terminals or internal components.
- Keep hands away from moving parts and rotating shafts. Do not touch hot motors, drivers, or heat sinks during or shortly after operation.
- Do not pull, twist, or overload cables. Use the specified supply voltage and motor–driver combination.
- Do not use or store the product in direct sunlight or where it is exposed to water, oil, chemicals, corrosive or flammable gases, excessive dust, vibration, or impact.
- Do not repair or modify the product yourself. Ground the driver and motor as specified.
- Provide an external emergency-stop circuit.

1. Product Overview

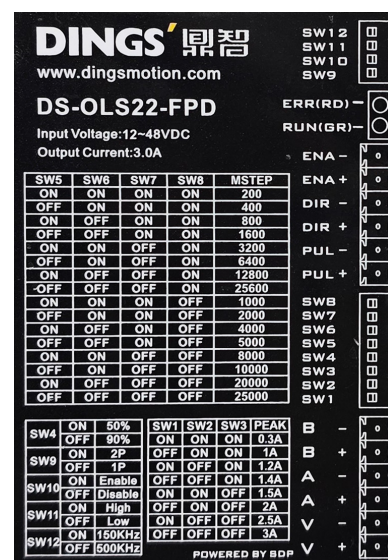
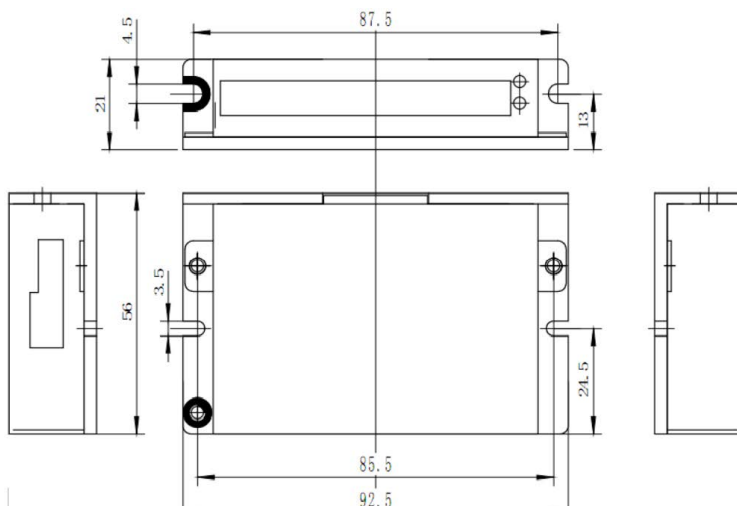
1.1 Features

- Input power: DC 12V – 48V
- Eight current selections, sixteen microstep selections
- PWM constant-current bipolar microstep driver
- Pulse + direction / double pulse selection
- Optocoupler input function, compatible with 5–24VDC signals
- Motor short-circuit protection function
- Self-test function, with offline function
- Low noise and low vibration

1.2 Specifications

Driver Model		DS-OLS22-FPD
Applicable Motor		Two-phase hybrid stepper motor
Power Supply		12 – 48V DC
Output Current		0.3 – 3A/phase (peak)
Driver Method		Full-bridge bipolar microstep driver
Input Signal	Pulse Signal	Optocoupler input voltage H = 3.5–26V, L = 0–0.8V Conduction current: 6–15mA
	Offline Signal	
	Direction Signal	
Dimensions		92.5 × 21 × 56 mm
Weight		About 96 g
Operating Environment	Usage Environment	Avoid dust, oil mist, and corrosive gases
	Humidity	< 85 % RH, no condensation
	Temperature	0°C – +40°C
	Cooling	Install in a ventilated environment

1.3 Dimension Drawings (mm)

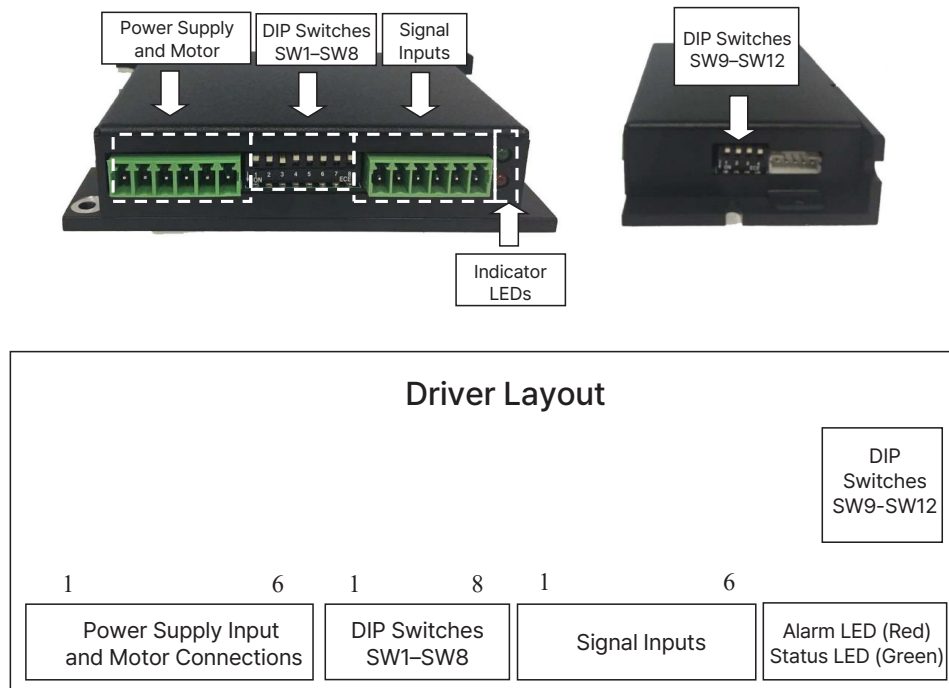


• Driver Installation

Mount the driver on its narrow side using M4 screws through the mounting holes on both sides. The driver's power components generate heat. During continuous operation at high input voltage and high power, increase the effective heat dissipation area or provide forced cooling.

Do not use the driver in locations without air circulation or where the ambient temperature exceeds 40°C. Do not install it in humid locations or where metal shavings are present.

2. Schematic and Interface Definition



2.1 Motor Connection and Power Input

(Pin order from left to right, as shown in the figure)

Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6
V+	V-	A+	A-	B+	B-

2.2 Signal Input

(Pin order from left to right, as shown in the figure)

Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6
PUL+/CW+	PUL-/CW-	DIR+/CCW+	DIR-/CCW-	ENA+	ENA-

PUL: Pulse · DIR: Direction · ENA: Offline

3. Setting Switches

Current Setting			Holding Current	Microstep Setting			
SW1	SW2	SW3	SW4	SW5	SW6	SW7	SW8
Pulse Mode / Self-Test			Smooth Filter		Load Inertia		Input Signal Filtering
SW9			SW10		SW11		SW12

3.1 Current Setting

DIP Switches			DS-OLS22-FPD Phase Current (A, Peak)
SW1	SW2	SW3	
ON	ON	ON	0.3A
OFF	ON	ON	1.0A
ON	OFF	ON	1.2A
OFF	OFF	ON	1.4A
ON	ON	OFF	1.5A
OFF	ON	OFF	2.0A
ON	OFF	OFF	2.5A
OFF	OFF	OFF	3.0A

3.2 Holding Current

SW4	Holding Current
ON	50%
OFF	90%

The driver automatically reduces the operating current 1 second after the motor stops. SW4 sets the holding current as a percentage of the operating current. When high holding torque is required, the 90% setting is most effective. To reduce motor and driver heating, setting the holding current to 50% is recommended.

3.3 Microstep Settings

DIP Switches				Pulses / Revolution
SW5	SW6	SW7	SW8	
ON	ON	ON	ON	200
OFF	ON	ON	ON	400
ON	OFF	ON	ON	800
OFF	OFF	ON	ON	1600
ON	ON	OFF	ON	3200
OFF	ON	OFF	ON	6400
ON	OFF	OFF	ON	12800
OFF	OFF	OFF	ON	25600
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	25000

3.4 Operating Mode

SW9	Operating Mode
ON	CW Pulse + CCW Pulse
OFF	Pulse + Direction

- **Pulse + Direction:** In this mode, the motor rotates in one direction when pulses are input to the pulse input terminal and the direction input terminal's optocoupler is not conducting. It rotates in the opposite direction when the direction input terminal's optocoupler is conducting.
- **CW Pulse + CCW Pulse:** In this mode, the motor rotates in the CW direction when pulses are input to the CW pulse input terminal, and in the CCW direction when pulses are input to the CCW pulse input terminal.
- **Self-Test Function:** This function verifies driver operation. With the power off, set SW9 to ON, then turn on the power. With no pulse input, switch SW9 from ON to OFF. After 1 second, switch it back to ON to start the test run. The motor rotates one revolution forward and one revolution backward at 1 revolution per second.

3.5 Smooth Filter

SW10	Smooth Filter
ON	Enable
OFF	Disable

Smooth filtering of the control signal softens sudden changes in motor speed and direction, reducing wear on the system's mechanical parts and extending equipment service life. This function delays the control signal. Enable or disable it according to the application.

3.6 Load Inertia Selection

SW11	Load Inertia
ON	High Load Inertia
OFF	Low Load Inertia

3.7 Input Signal Filtering

SW12	Input Signal Filtering
ON	150kHz
OFF	500kHz

Pulse and direction signals pass through built-in digital filtering to eliminate externally superimposed noise. In low-microstep mode, select a filtering frequency of 150kHz. In high-microstep mode, select a filtering frequency of 500kHz.

3.8 Indicator LEDs Functions

This product has two surface-mount indicator LEDs, red and green, showing the status.

3.8.1 Status Display

Status Function	LED Flash Pattern	Description
Holding	Green LED flashes	Output enabled; motor holding position but not running
Running	Green LED stays on	Driver operating; motor running
Motor Free	Green LED flashes	Output disabled; motor shaft free to rotate

3.8.2 Alarm Display

Alarm Type	LED Flash Pattern	Description
Motor Overcurrent	1 green flash + 1 red flash	Motor phase overcurrent or driver fault
Motor Phase Loss	1 green flash + 2 red flashes	Motor not connected
Overvoltage	1 green flash + 3 red flashes	Supply voltage above 52 V
Undervoltage	1 green flash + 4 red flashes	Supply voltage below 10 V
Other Faults	1 green flash + 5 red flashes	-

4. Power Supply

4.1 Voltage

The chopper driver continuously changes the magnitude and direction of the voltage applied to the motor windings while monitoring the phase current to achieve accurate current control. To ensure both high efficiency and low noise, the driver supply voltage should be at least five times the motor's rated phase voltage (rated phase current × phase resistance). A higher supply voltage is recommended to improve high-speed performance.

When using a regulated power supply, the supply voltage must not exceed 48V.

For non-regulated power supplies, the rated current is specified under full-load conditions. Under light-load conditions, such as when the motor is not running, the actual output voltage may rise to approximately 1.4 times the rated voltage. If smooth and quiet motor operation is required, a lower supply voltage is recommended.

4.2 Current

The maximum supply current should be equal to the sum of the currents of two motor phases. In general, the required current depends on the motor model, supply voltage, speed, and load conditions. The actual power supply current is typically much lower than this maximum value because the driver uses a switching amplifier to convert high-voltage, low-current power into low-voltage, high-current motor drive power. The higher the driver supply voltage relative to the motor voltage, the lower the required power supply input current.

4.3 Regenerative Discharge

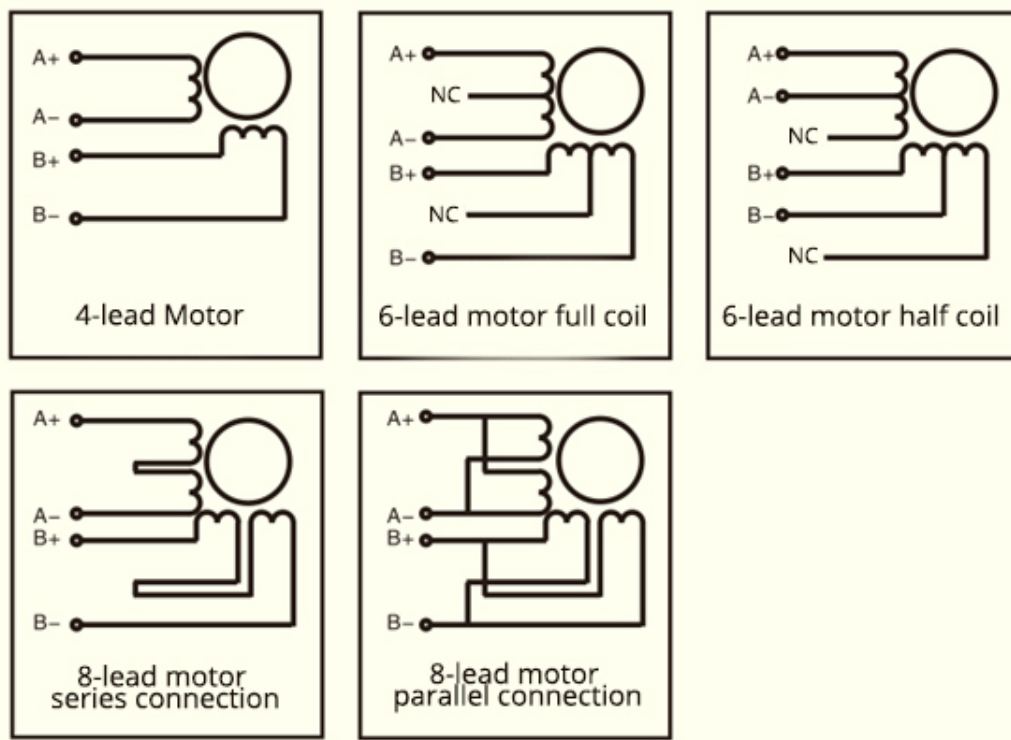
When the motor decelerates, it converts the kinetic energy of the load into electrical energy, similar to a generator. Part of this energy is dissipated by the driver and motor. In applications involving high-speed operation with large loads, a significant amount of kinetic energy may be converted into electrical energy, which can easily trigger a driver overvoltage alarm or, in severe cases, damage the driver.

5. Motor Connection



Warning

When connecting the motor to the driver, ensure the driver's power is turned off first. Ensure that any unused motor leads are not short-circuited with other objects. Do not disconnect the motor while the driver is powered on. Do not connect the motor leads to ground or to the power supply.



1. Four-lead motors can be connected in only one way.
2. Six-lead motors can be connected in two ways: full-coil and half-coil. In full-coil mode, the motor produces greater torque at low speed but cannot run as fast as in half-coil mode. When operating in full-coil mode, the current must be kept below 30% of the half-coil mode current to avoid overheating.
3. Eight-lead motors can be connected in two ways: series and parallel. The series connection produces greater torque at low speed and lower torque at high speed. When operating in series connection, the current must be kept at 50% of the parallel-connection current to avoid overheating.



Notes

1. Motor lead colors vary by manufacturer; please refer to the motor's specification sheet before wiring.
2. Windings from different motor phases must not be connected to the same-phase terminals on the driver (A+/A- form one phase; B+/B- form the other). If the motor rotates in the opposite direction from what is expected, simply swap the A+ and A- connections.
3. This driver can only drive two-phase hybrid stepper motors — not three-phase or five-phase stepper motors.

6. Signal Input

6.1 Pulse Signal: PUL

The driver input circuit includes an optocoupler that accepts either 5–24VDC single-ended or differential signals, with a maximum input voltage of 26V.

A transition from OFF to ON is recognized as a valid pulse edge. In a common-anode configuration, the low level is active (the high level is active in a common-cathode configuration). The driver advances the motor according to the input pulse timing.

For reliable operation, the active signal duty cycle should be less than 50%. To ensure reliable pulse detection, the active pulse width must not be less than 10 μ s. The maximum pulse input frequency is 500kHz. Input frequencies above 500kHz may result in incorrect operation.

6.2 Direction Signal: DIR

The driver accepts either 5–24VDC single-ended or differential signals, with a maximum input voltage of 26V.

The ON/OFF state of the internal optocoupler determines the motor rotation direction. Changing the direction signal will reverse the motor rotation direction. A floating input is interpreted as a logic HIGH.

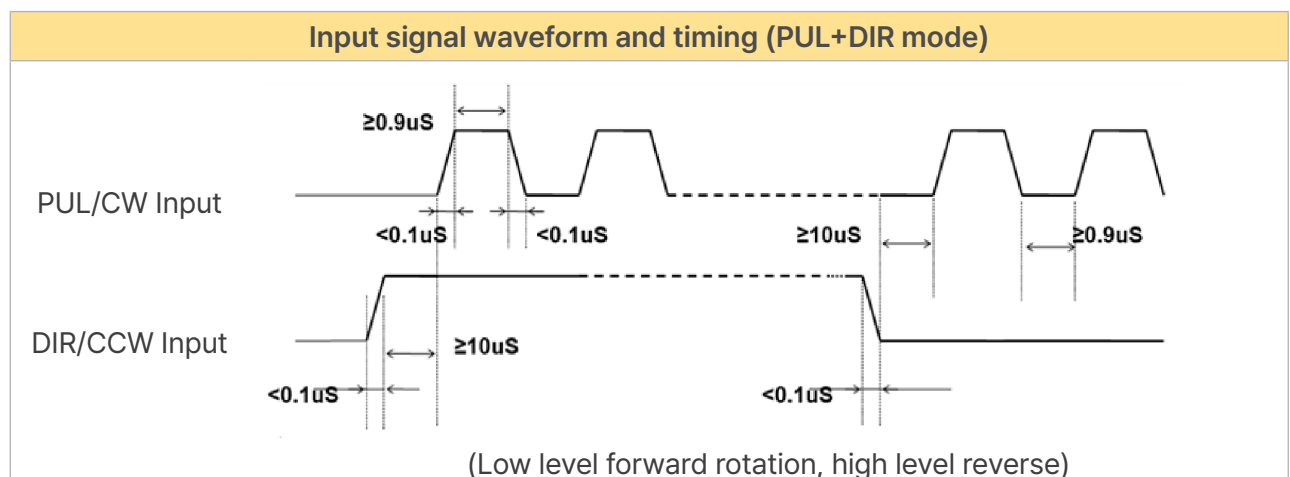
To ensure proper operation, the direction signal must be established at least 10 μ s before the pulse signal. Otherwise, incorrect operation may occur. When changing the motor direction, the motor should first decelerate to the starting frequency before the direction is changed. The direction signal must be changed after the last PUL pulse of the previous direction and before the first PUL pulse of the new direction. If direction switching is not required, the DIR input may be left floating.

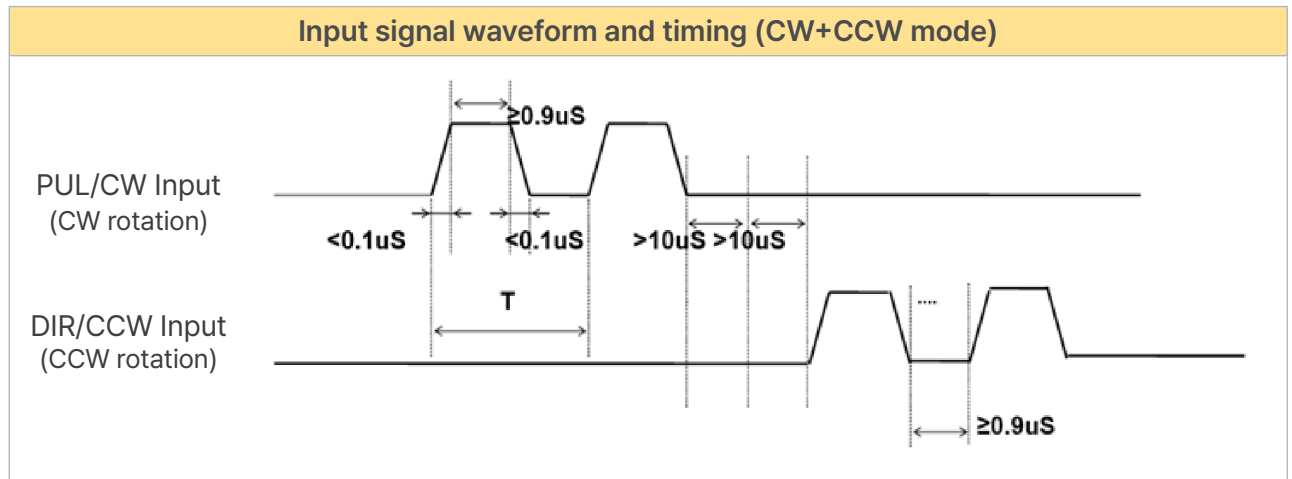
6.3 Offline Signal: ENA

The driver accepts either 5–24VDC single-ended or differential signals, with a maximum input voltage of 26V.

When the internal optocoupler is ON, the motor phase current is disabled and the motor enters a free-running (offline) state. If this function is not required, the ENA input may be left floating.

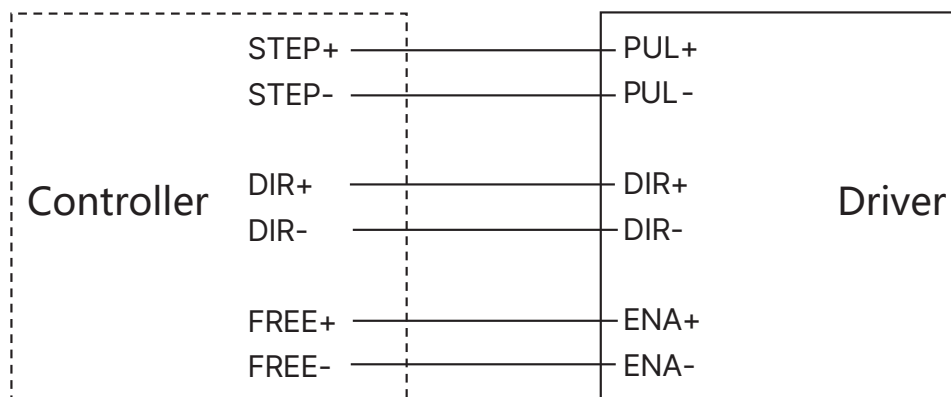
6.4 Pulse / Direction Input Timing Diagram



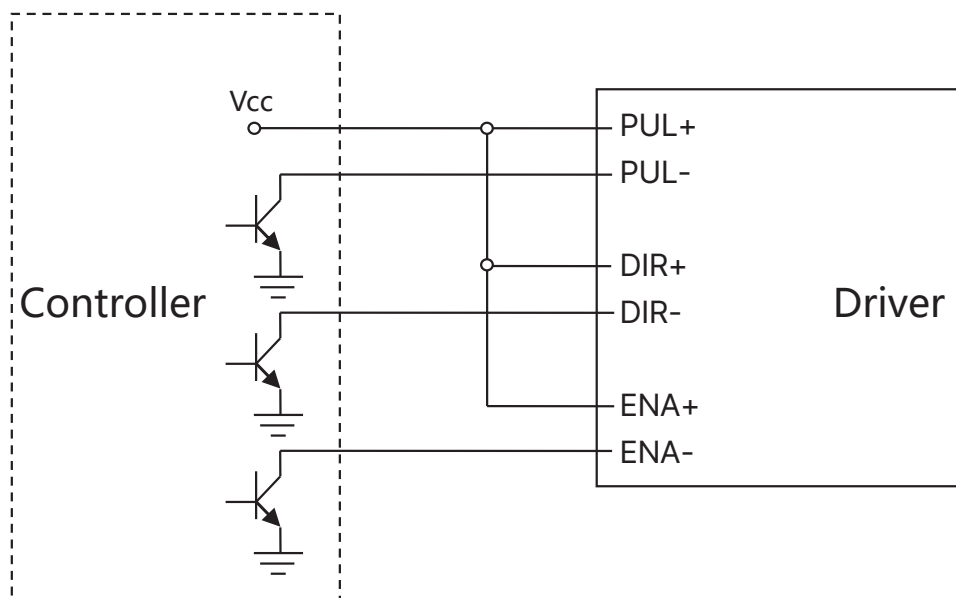


7. Typical Signal Connection Method

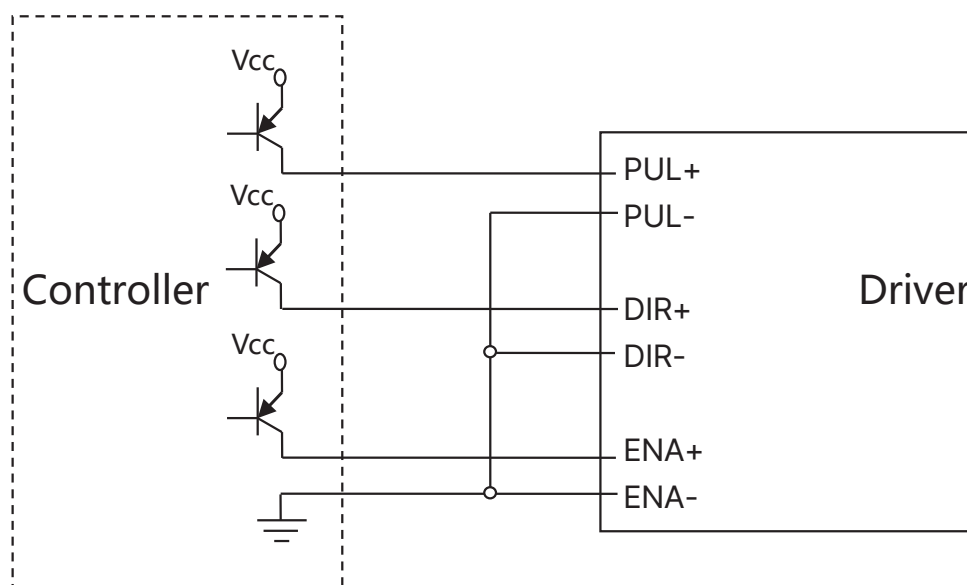
7.1 Differential Connection



7.2 Common-Anode Connection



7.3 Common-Cathode Connection



Notes

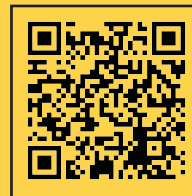
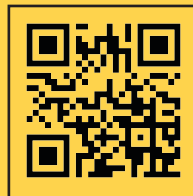
The pulse (PUL), direction (DIR), and enable (ENA) inputs have built-in constant-current circuits. You can connect signals directly without external series resistors. Supported VCC range: 3.5–26 V.

8. Wiring Requirements

1. Use shielded cables for control signals to reduce noise, and connect the shield to ground. Unless otherwise required, ground the shield at one end only: ground it at the controller side and leave it unconnected at the driver side. Use single-point grounding within the same machine. If a proper earth ground is not available, leave the shield unconnected, as a poor ground may cause severe noise.
2. Do not bundle pulse and direction signal wires with motor wires. Keep them at least 10 cm apart if possible. Motor noise can affect these signals and cause positioning errors or unstable operation.
3. When one power supply feeds multiple drivers, connect each driver directly to the power supply in parallel. Do not daisy-chain power from one driver to the next.
4. Never connect or disconnect the motor or power supply terminals while power is on. Even when the motor is stopped, high current still flows through the windings. Disconnecting it can create a high voltage spike that may damage the driver.
5. Do not tin (pre-solder) wire ends before inserting them into the terminals. This can increase contact resistance and cause the terminals to overheat and fail.
6. Do not leave bare wire exposed outside the terminals. This can cause a short circuit and damage the driver.

9. Appendix A. Revision History

Version	Date	Revision Details
1.4	Oct. 2026	Added 0.3 A/phase (peak) support. Corrected product labels to 12–48 V DC and updated minimum pulse width to 10 μ s. Revised power supply guidance, terminal labels, diagrams, LED descriptions, and safety precautions.



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