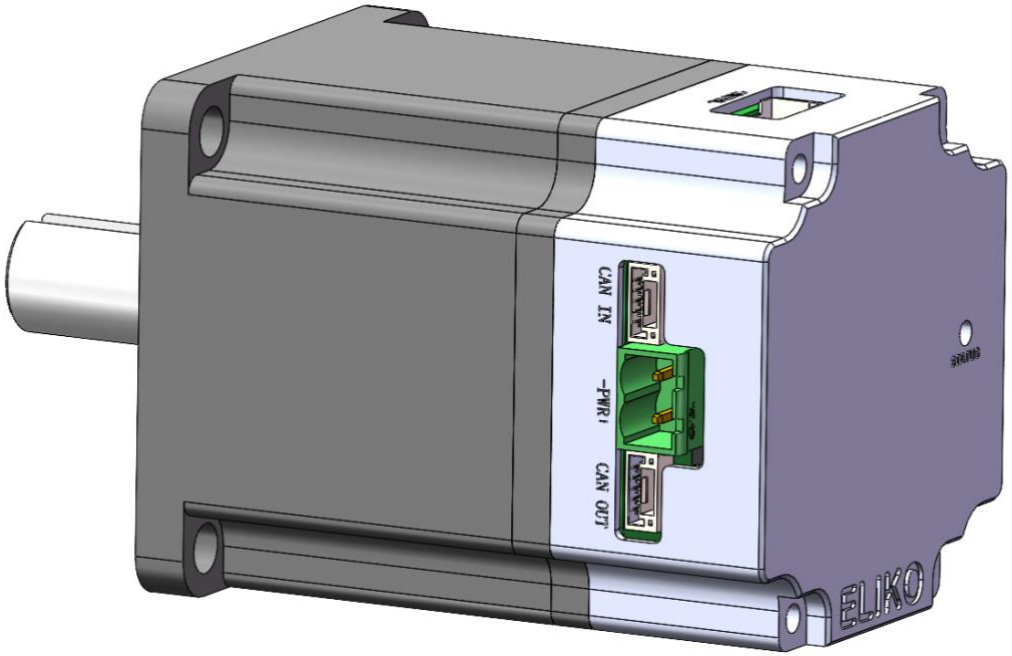
# User manual FLXBL60-300-ELC-N-02

Order command : MOTELI01310




**Revisions**

| Version | Modifications | Writer | Checker | Date |
|---|---|---|---|---|
| 1.0 | Initial version | HZP | ERIC | 02/03/2026 |
| | | | | |
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# 1. Preface

## • Product Quality Guarantee

- If the product experiences quality issues within one year of purchase (excluding issues caused by improper operation or failure to meet specified conditions), it can be returned to us for processing after confirmation by our company.
- If the failure is due to improper operation or non-compliance with the specified usage conditions, or if the failure occurs after one year of purchase, a repair fee may be charged. If the product is used in critical applications, we strongly recommend purchasing additional spare units to ensure system continuity and stability.
- When sending a defective product for repair, please ensure that the product is properly packaged. We are not responsible for any damage caused during transportation.
- Repairs typically require several working days, and we appreciate your understanding.
- The following situations are not covered under the product warranty:

A) Failures caused by usage that does not comply with the instructions, conditions, environment, or operations specified in the product manual.

B) Failures resulting from modifications, repairs, or disassembly performed by parties other than our company.

C) Failures caused by usage methods not specified by the company.

D) Failures caused by reasons that could not have been reasonably predicted based on the scientific and technical standards at the time of shipment.

E) Failures caused by force majeure events (such as natural disasters, wars, etc.).

## • Usage Precautions

- Please adhere to the rated values and conditions specified in this manual when using the product.
- The design and manufacturing purpose of our products is not for use in life-critical applications or environments. If the product is to be used for special purposes, please inform our sales staff for discussion and confirmation.
- Our company is committed to continuously improving product quality and customer trust. However, when using our products, please ensure the design includes multiple backup systems, fire safety measures, fail-safe mechanisms, etc., to prevent accidents such as personal injury, fires, or other societal damages due to system failure.
- To continuously improve performance, product specifications may be changed or upgraded without prior notice.

## • Safety Precautions

To ensure the safety of all users, the following table lists safety precautions to be observed when using this drive board. The precautions are described in detail.

| | |
|---|---|
| Danger | Indicates that a failure could lead to hazardous situations, with the possibility of death or severe injury. |
| Attention | Indicates that a failure could lead to hazardous situations, with the possibility of moderate personal injury or minor injury, and potentially material damage. |
| Prohibition | Indicates that it shall not be violated |
| Enforcement | Indicates that it must be completed |

**Danger**

- Do not touch the terminal section and its interior with your hands while it is energized. **Otherwise, there is a danger of electric shock.**
- Do not pull or twist the cable, or place heavy objects on the cable. **Otherwise, there is a danger of electric shock and fire.**
- Do not touch any of the rotating parts while the motor is running. **Otherwise there is a risk of being caught in the rotor shaft and causing injury.**
- Do not touch the inside of the driver board with your hands under power-up condition. **Otherwise there is a danger of electric shock.**
- Do not touch the terminals within 5 minutes of the power being turned off. **Otherwise there is a danger of electric shock.**
- Be sure to ground the ground terminals of the driver board and motor. **Otherwise there is a risk of electric shock.**
- Movements, wiring, maintenance, inspection, etc. should be performed after confirming that the power is off and the display light on the panel is completely off. **Otherwise, there is a danger of electric shock.**

**Attention**

- Do not use this product in places where water, oil, or pharmaceutical droplets may be contaminated, or where corrosive or flammable gases are present.
- Please strictly observe the requirements in the product manual. Otherwise there is a risk of damage to the product or injury to persons.
- The temperature of the driver board, motor, and the surrounding machine itself will rise so please do not touch it. Otherwise there is a risk of burns.
- Use the motor and driver board in the specified combination. Otherwise, there is a risk of fire.
- The heat sink and motor of the driver board may still be in a high temperature state when the power is turned on or shortly after the power is turned off, so do not touch them. Otherwise, there is a risk of burns.
- Do not apply excessive pressure to the edge areas of the housing. Otherwise there is a risk of deformation.
- Ensure that the driver board is installed in a well-ventilated area that is easy to maintain and inspect.
- If the ambient temperature of the driver board is higher than 40℃ , please check the exhaust or ventilation equipment and request forced air cooling.

| Prohibition |
| --- |
| ● Do not use or store the product in places exposed to direct sunlight.<br>● Do not use the product in places where the ambient temperature and humidity exceed the specified range, or store the product.<br>● Do not use this product in places where there is a lot of dust, dirt, etc., or store it.<br>● Do not use or store this product in locations subject to direct vibration or shock.<br>● Do not use this product in direct sunlight or near magnetic, radioactive or radioactive objects, or store it.<br>● Do not repair or modify the internal or external structure of this product by yourself.<br>● Do not install mechanical equipment with high heat generation and electromagnetic interference around the driver board. |

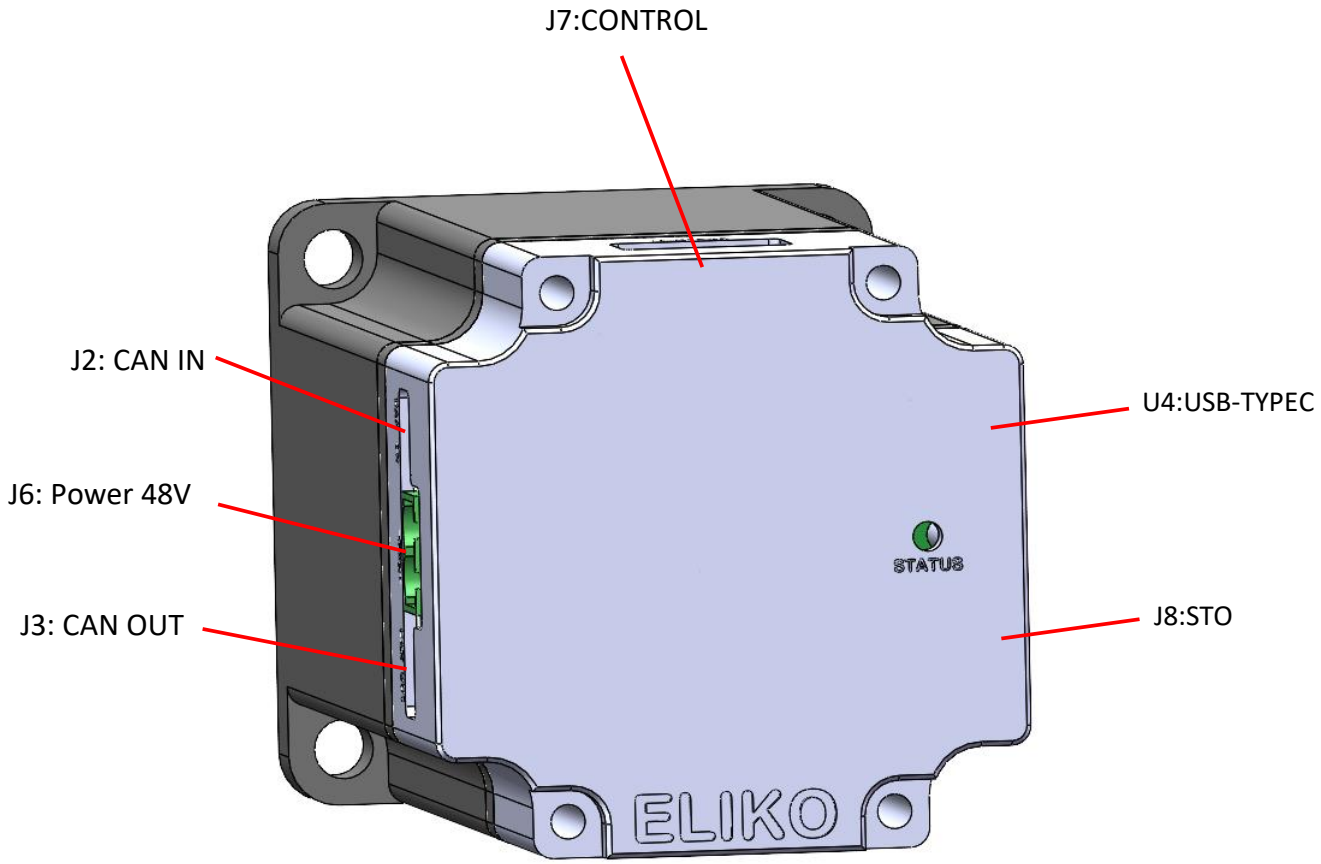
| Enforcement |
| --- |
| ● Before starting operation, check that the emergency switch can be activated at any time to stop the machine.<br>● Maintain at least the following mounting spacing between the driver boards and with other equipment. Ensure adequate mounting spacing as much as possible, otherwise the usability and life of the driver board will be damaged. |

# 2. Product overview

## • Introduction

**MOTELI01310** is a closed loop BLDC motor with GPIO and CANOPEN communication.

The input voltage range of the motor drive is DC 12-75V, Inputs and outputs are available. Communication is CANOPEN or USB.



## • Functional Features

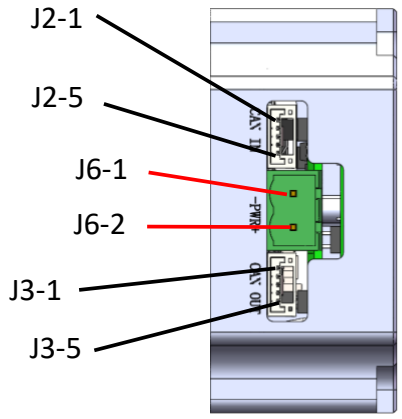
- Input power: DC 12 ~ 75V, Minimum supply voltage is 12V, Nominal supply voltage is 48V, Maximum supply voltage is 75V.
- Supports magnetic encoder closed-loop motors with a rated current of 9.2 A.
- 4 general-purpose digital signal inputs, all can be set to high-speed inputs (can be used for fast capture and precise homing).
- 3 configurable digital outputs.
- 1 differential Analog Input ,12-bit resolution (Input: ±10 V)
- CAN communication interface, supports CANOPEN protocol, and can support up to 127 stations.
- Closed-loop control methods: supports pulse/direction mode, communication control mode, and built-in Program IO trigger mode.
- Control signals: enable the drive board, start/stop, emergency stop, limit switch, and other functions.
- Stable and precise current control, with low motor heating.
- Motor protection functions: short circuit protection, over current protection, over voltage protection, under voltage protection, etc.

## • Technical Parameters

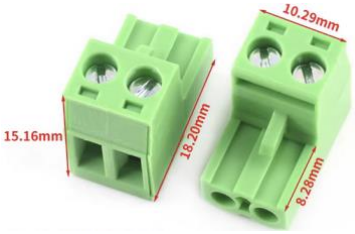
| Item | | | Content |
|---|---|---|---|
| Adapted motor | | | BLDC motor |
| Nominal current | | | 9.2 Arms |
| Over voltage protection | | | 75VDC |
| Under voltage protection | | | 12VDC |
| Digital input / output interface | Input | 4 digital signal inputs | can be set to high-speed inputs<br>can be used for fast capture and precise homing |
| | | | Optocoupler input voltage 12V ~ 30V（typically 24V）<br>Conduction current 920uA ~ 4.5mA |
| | Output | 3 digital outputs | Photoelectric isolated output voltage 12V ~ 30V（typically 24V）and a maximum saturation current of 30mA |
| Digital input details | | | Fast event capture |
| | | | Inhibit/Enable motion |
| | | | Stop motion under control (hard stop) |
| | | | Motion reverse and forward limit switches |
| | | | Begin on input |
| | | | Abort motion |
| | | | Homing |
| | | | General purpose |
| Digital output details | | | Fast event capture |
| | | | Inhibit/Enable motion |
| | | | Stop motion under control (hard stop) |
| | | | Motion reverse and forward limit switches |
| | | | Begin on input |
| | | | Abort motion |
| | | | Homing |
| | | | General purpose |
| Analog input | | | +/-10 VDC (12-bit resolution ) |
| LED indication | | | Status, Fault |
| Communication I/F | | | USB |
| | | | CANOPEN |
| Control method | | | Current loop offset adjustment |
| | | | Current loop gain tuning |
| | | | Current gain scheduling |
| | | | Velocity loop offset adjustment |
| | | | Velocity gain tuning |
| | | | Velocity gain scheduling |
| | | | Position gain tuning |
| Size | | | 60.8 × 60.8 × 82.5 mm（only includes the motor itself） |
| Weight | | | 740g |
| Environmental Specifications | Surrounding Air Conditions | | Avoid dust, oil mist and corrosive gases, and avoid installation in direct sunlight or near magnetic, radioactive or radioactive objects. |
| | Humidity | | <85%RH, no condensation |
| | Operating temperature | | -10 ~ +40℃ |
| | Storage temperature | | -10 ~ +40℃ |
| | Heat dissipation | | Install in a ventilated environment |

# 3. Pin out

## • J2&J6&J3: CAN IN & POWER & CAN OUT




| J2&J6&J3 | Function |
|---|---|
| J2-1 | GND |
| J2-2 | CAN H bus line |
| J2-3 | CAN L bus line |
| J2-4 | Protective Earth |
| J2-5 | Not Connected |
| J6-1 | GND |
| J6-2 | 48V |
| J3-1 | GND |
| J3-2 | CAN H bus line |
| J3-3 | CAN L bus line |
| J3-4 | Protective Earth |
| J3-5 | Not Connected |




WJ2EDGK-5.08-02P-14-00A
Supplier:KANGNEX(康奈克斯电气)



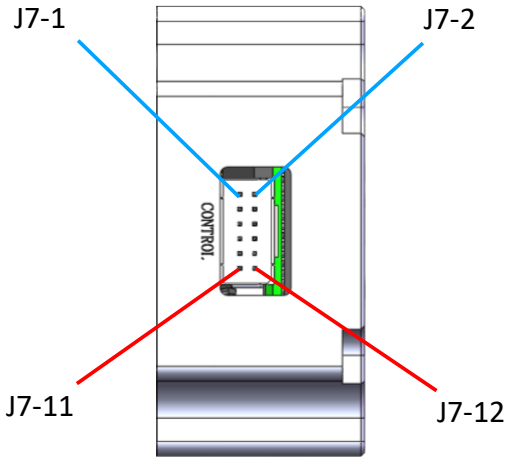
BX-GH1.25-5PJK
Supplier:Bossie(博锡)

Range voltage between 12 and 75 VDC. Nominal voltage : 48 VDC.

CANOPEN cablesare typically available in 22AWG or 24AWG specifications, supporting a communication distance of 500 meters and high-speed data transmission.

**Note : Please ensure correct wiring and pay attention to the power polarity. Ensure no short circuit occurs to prevent damage to the host computer and the driver board.**

## • J7: CONTROL




| J7 | Function |
|---|---|
| J7-1 | Opto-isolated digital input 1 |
| J7-2 | Opto-isolated digital input 2 |
| J7-3 | Opto-isolated digital input 3 |
| J7-4 | Opto-isolated digital input 4 |
| J7-5 | Digital input return |
| J7-6 | Opto-isolated digital output 1 |
| J7-7 | Opto-isolated digital output 2 |
| J7-8 | Opto-isolated digital output 3 |
| J7-9 | Control 24V supply |
| J7-10 | Analog input 1 complement |
| J7-11 | GND |
| J7-12 | Analog input 1 |

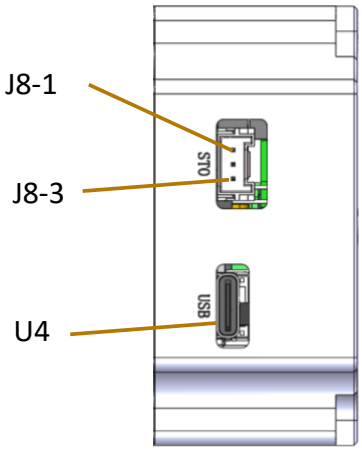


WAFER-PHB2.0-12PJK-GW

Supplier：XUNPU(讯普)

**Note : Please ensure correct wiring and pay attention to the power polarity. Ensure no short circuit occurs to prevent damage to the host computer and the driver board.**

## • J8&U4: STO & USB-TYPEC




| J8&U4 | Function |
|---|---|
| J8-1 | STO 2 opto-isolated input |
| J8-2 | STO 1 opto-isolated input |
| J8-3 | STO signal return |
| U4 | Connect computer |



HC-HY-3Y-05
Supplier： HCTL(华灿天禄)



Counterparts： UGREEN
usb3.0 to Type-C data cable

The Range voltage of STO is between 12 and 28.8Volt. Nominal voltage : 24 Volt

# 4. Electrical specifications

## • Motor Connection

**WARNING** **When connecting the motor to the driver board, first make sure that the driver board power is turned off. Verify that unused motor leads are not shorted to other objects. The motor cannot be disconnected while the driver board is energized.**

## • Input Power

### ▪ Input Voltage

The maximum working voltage range for the driver board is 12 ~ 75V DC, with a recommended supply voltage of 48 DC.

A voltage stabilizing capacitor can absorb current spikes on the power line, preventing the driver board from falsely triggering a protection fault.

When operating the driver board at low voltage, it is recommended to parallel a larger stabilizing capacitor at the power input to prevent low voltage alarms caused by unstable power supply.

The driver board is not recommended for use when the supply voltage is below 12V, as it may result in unreliable operation.

When the driver board uses a regulated power supply and the supply voltage approaches 75V, it is recommended to implement voltage clamping measures at the power input to prevent the supply voltage from exceeding 75V, which could trigger an over-voltage alarm and stop the driver board.

When using an unregulated power supply, ensure that the no-load output voltage does not exceed 53V DC, as the rated current of unregulated power supplies is the maximum load current. When the load is lighter, such as when the motor is not running, the actual voltage can reach up to 1.4 times the rated voltage. For smoother and quieter motor operation, it is recommended to use a lower voltage.

### ▪ Current

The maximum supply current should be the sum of the current from three phases. In general, the required current depends on the motor type, voltage, speed, and load conditions. The actual power supply current is usually much lower than this maximum value because the driver board uses a switching amplifier to convert a high voltage, low current signal into a low voltage, high current signal through a power switch. The rated voltage of the motor windings is often very low, and the higher the supply voltage to the driver board relative to the motor winding's rated voltage, the lower the required power supply current.

### ▪ Regenerative Current

When the motor slows down, it acts like a generator, converting the load’s kinetic energy into electrical energy. Some energy is absorbed by the driver board and the motor. In applications with

large loads running at high speeds, significant kinetic energy may be converted into electrical energy. Typically, simple linear power supplies use a large capacitor to absorb this energy without damaging the system. However, switching power supplies tend to shut down under over-voltage conditions, and the excess energy will be fed back into the driver board, which may trigger an over-voltage alarm and potentially damage the driver board.

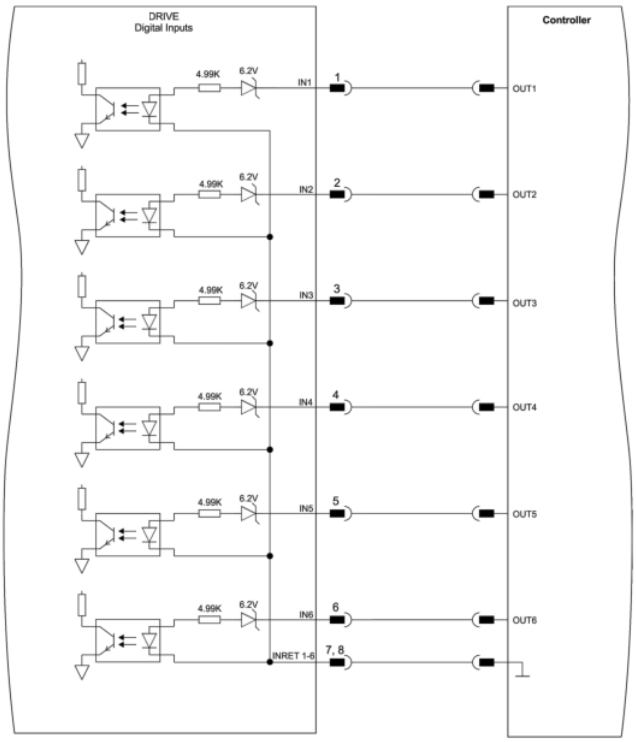
## • Input Port

- Sourcing or sink digital input

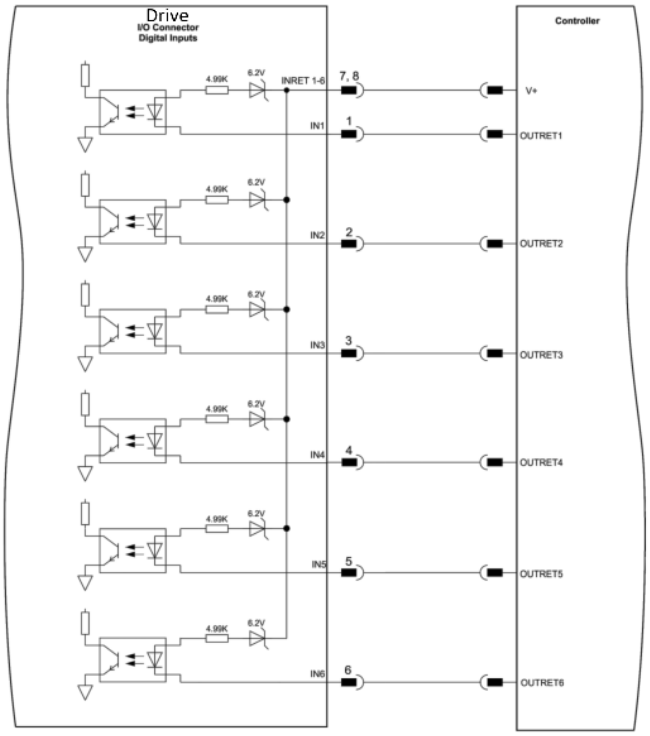
| Feature | Details |
|---|---|
| Standard | Isolated PLC source |
| Input current | Iin= (Vin-7.4)/4.99 Kohm<br>Iin = 920 uA @ Vin = 12 V<br>Iin = 4.5 mA @ Vin = 30 V |
| High-level input voltage sourcing mode | 12V< Vin <30V |
| Low-level input voltage sourcing mode | 0V< Vin <7V |
| Minimum pulse width | >250 µsec |
| Execution time (all inputs):<br>the time from application of voltageon input until execution is complete | 0 <T< 250 µsec |

Any soft configuration is required to switch sourcing or sinking mode.

### a) Sourcing input diagram example

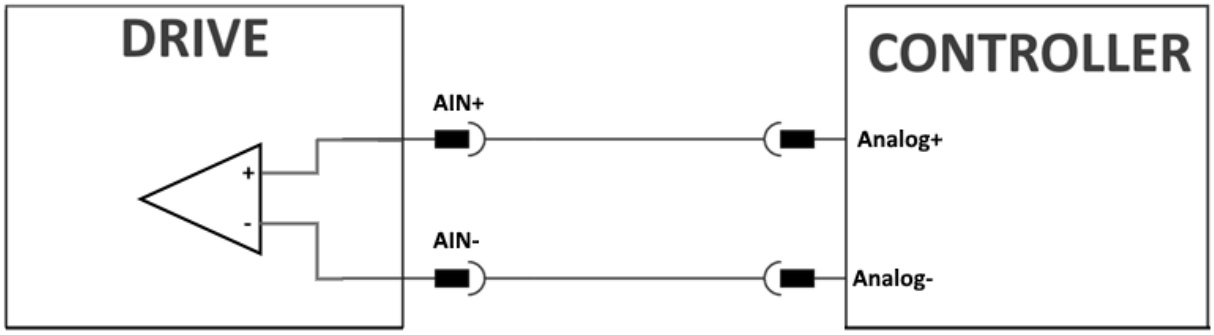


### b) Sinking input diagram example




- Analog input

| Feature | Details |
|---|---|
| Minimum input voltage | -10V |
| Maximal input voltage | 10 V |

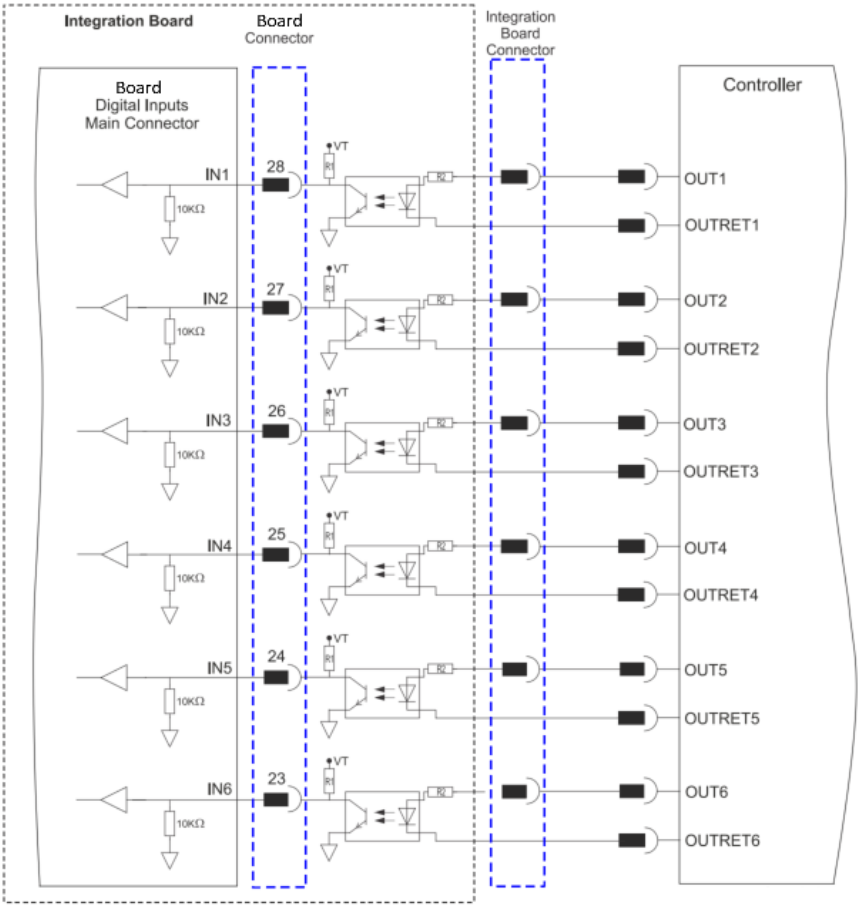


## • High-speed Input Port

The driver board has six high-speed inputs, which can be used for fast capture and precise homing.

| Feature | Details |
|---|---|
| Standard | Optocoupler isolated signal |
| Vih min | 2.2V |
| Vi max | 0.6V |
| Minimum pulse width | >250 usec |
| Execution time (all inputs):<br>the time from application of voltageon input until execution is complete | 0<T<250 usec |
| High-speed inputs-1-6 minimum pulse width, in high-speed mode | T=5 usec if the input functionality is set to latch/capture (index/strobe).<br>Note: Home mode is high-speed mode and can be used for fast capture and precise homing. |

### a) Digital input diagram example



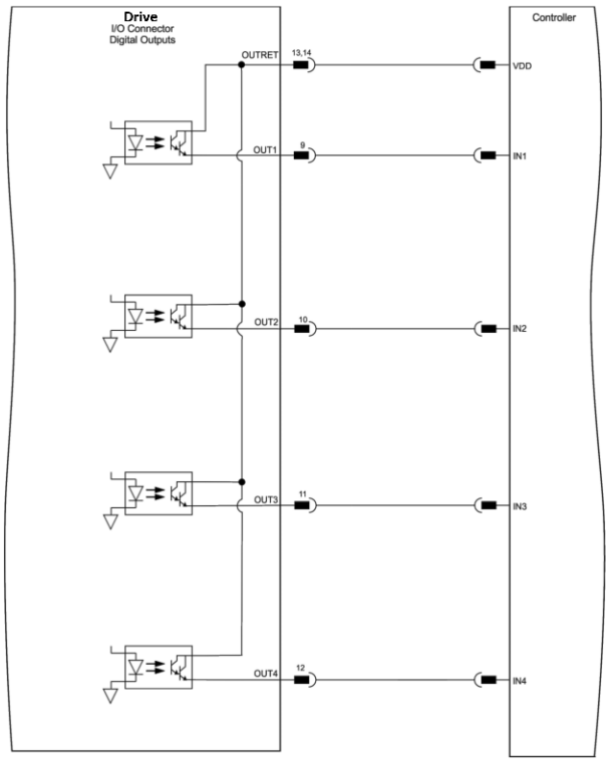
## • Output Port

- Sourcing or Sinkink digital output

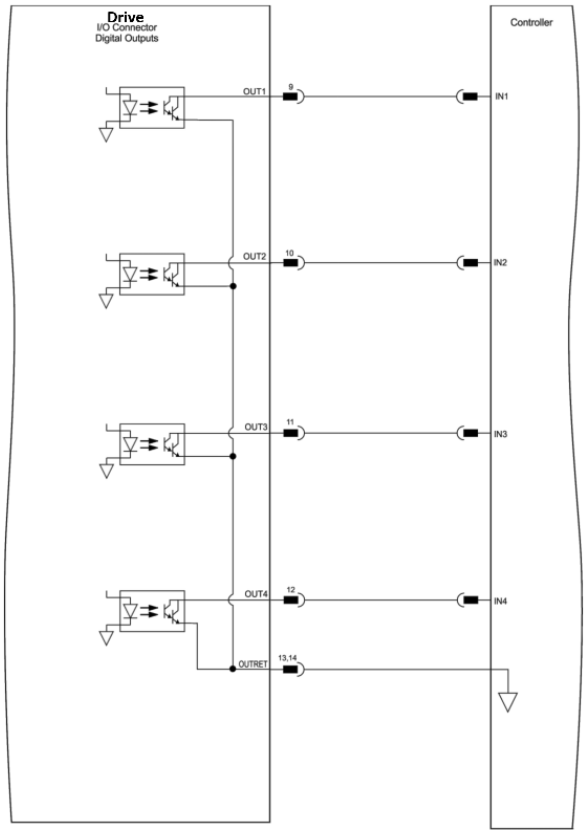
| Feature | Details |
|---|---|
| Standard | Optically isolated PLC sink |
| Supply output (VDD) | 12V to 30V (typically 24V) |
| Max. output current<br>Iout (max) (V.ut = High) | Iout (max)≤ 30 mA |
| Collector emitter saturation voltage | 1V |
| Ton (Time from low to high)<br>If Vdd= 24V | <15usec |
| Toff (Time from high to Low) | <250usec |
| Output signal common | common negative and common positive compatible |

Any soft configuration is required to switch sourcing or sinking mode.

### a) Sourcing output diagram example



### b) Sinking output diagram example




## • Wiring Requirements

- **Please connect the power supply correctly, pay attention to the polarity of the power supply, and make sure that the motor and power connector are correct before powering up!**
- All thread colors mentioned in this article are general, please refer to the real thing!
- When stripping wires, do not put a layer of solder on the wire first, which may prevent proper wiring.
- When wiring, be careful not to kink the core wires, and the core wires must not leak out so as to avoid short-circuiting the wires.
- Please connect the core wires directly, do not solder. Otherwise, sometimes the wire will be broken due to vibration.
- It is strictly prohibited to tin the wire head and connect it to the terminal, otherwise the terminal may be damaged by overheating due to high contact resistance.
- Wiring leads should not be exposed outside the terminals to prevent accidental short-circuiting and damage to the driver board.
- It is strictly prohibited to unplug the strong electric (motor and power) terminals of the drive board with electricity, when the motor stops with electricity, there is still a large current

flowing through the coil, and unplugging the strong electric (motor and power) terminals will result in a huge instantaneous induced electromotive force that will burn out the drive board.

- Tighten the terminals with a special tool.
- No pressure should be applied to the wires after wiring.
- In order to prevent interference with the driver board, it is recommended that the control signals use shielded cable lines, and the shield is shorted to ground, in addition to special requirements, the shield of the control signal cable is grounded at one end: one end of the shielded line of the host computer is grounded, and one end of the shielded line of the driver board is suspended. The same machine is only allowed to be grounded at the same point, if it is not a real grounding line, may interfere with the seriousness of the shield layer is not connected at this time.
- If a power supply feeds multiple driver boards, parallel connections should be taken at the power supply, chaining to one and then the other is not allowed.

# 5. Supplemental directives

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The documentation provided here, is for programmers and engineers only, who are equipped with the necessary skills and have been trained to work with this type of product.

The Target User knows how to responsibly make use of this product without causing harm to himself or others, and without causing damage to systems or devices, in which the user incorporates the product.

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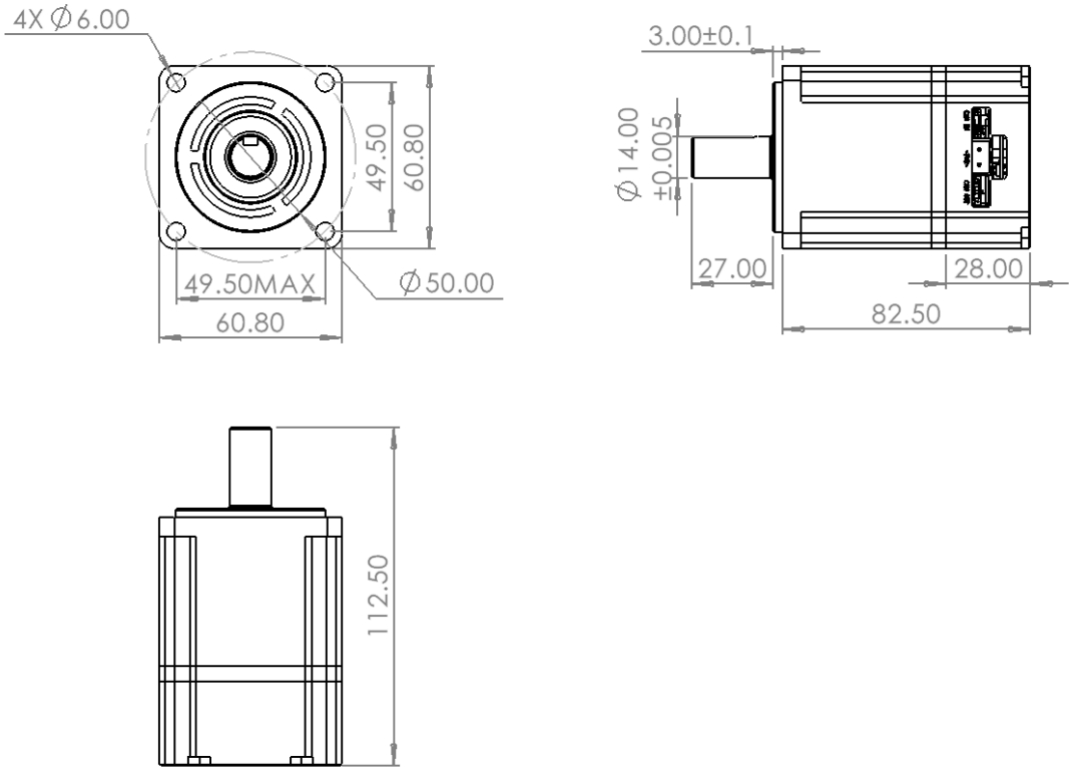
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# 6. Dimensions of motor




# 7. Frequency-magnitude test curve

