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# SEH750RA

# Instruction book

# Catalogue

# BLDC MOTOR DRIVER

# SEH750RA

## 1 Brief   Instruction

The SEH750RA BLDC Driver is suitable for high voltage three-phase BLDC Motor with a power of 750W and below.   This product has display, easy to operate, supports RS-485 communication protocol, can provide built-in potentiometer speed regulation, external potentiometer speed regulation, analog voltage speed regulation.

## 1.1 Features

- Self-contained digital tube display, intelligent display of various parameters
- Adjustable speed with knob
- External potentiometer speed regulation
- Acceleration and deceleration time setting
- Pole pair setting
- Alarm display
- RS485
- Rated speed accuracy as low as ±0.5%

## 2 Electrical performance and environmental indicators

## 2.1 Electrical Performance

| Parameters | Min | Rated | Max | Unit |
|---|---|---|---|---|
| Voltage Input | 120 | 220 | 250 | VAC |
| Current Input | - | 7 | - | A |
| Current Output | - | - | 12 | A |
| Power output | - | 750 | 750 | W |
| Motor Speed | - | 3000 | Adjustable | rpm |
| The parameters of this table are suitable for normal temperature 25 ℃ | | | | |

## 2.2 Environmental Indicators

| Environmental Factor | Environmental indicators |
|---|---|
| Cooling mode | Air cooling |
| Use occasion | Avoid dust, oil stain and corrosive gas |
| Operating temperature | -10℃~+60℃ |

# 3 Mechanical Dimensions



Unit: mm
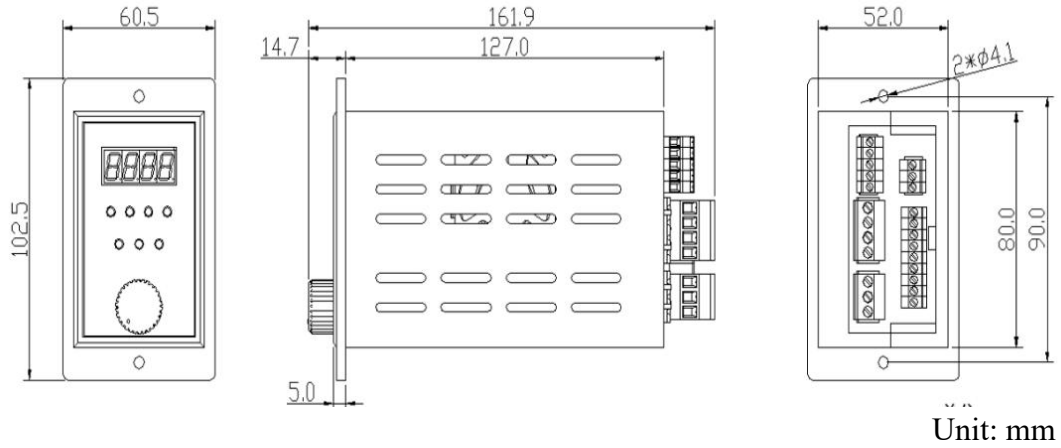
# 4 Driver port and function description

## 4.1 Driver port
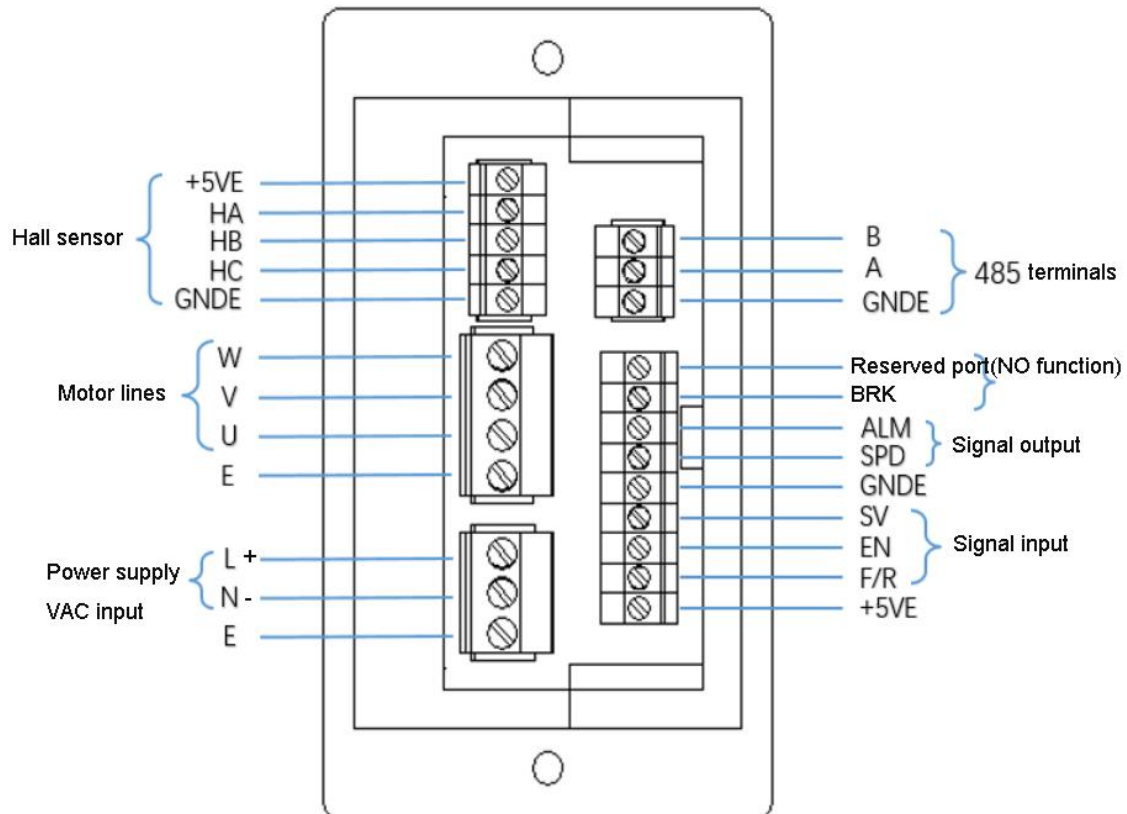
## 4.2 Terminal Description

| Signal | Terminals | Description |
|---|---|---|
| Power input | L | Power+ |
| | N | Power- |
| | E | Ground |
| Motor lines | U | Motor U |
| | V | Motor V |
| | W | Motor W |
| | E | Ground |
| Motor hall lines | +5VE | Hall sensor + |
| | HA | Motor hall sensor Hu |
| | HB | Motor hall sensor Hv |
| | HC | Motor hall sensor Hw |
| | GNDE | Hall sensor - |
| Control signals | SV | External potentiometer speed regulation |
| | EN | If EN and GNDE connect, the motor runs; If EN and GNDE disconnect, the motor stops. (They disconnect by default.) |
| | F/R | If F/ and GNDE connect, the motor runs anti-clockwise If F/ and GNDE disconnect, the motor runs clockwise |
| | GNDE | Control signal common ground port |
| | BRK | Under port control mode P-03-4, BRK connects with GNDE, the motor brake stops |
| Output signals | SPD | Frequency output. The relationship between the frequency detected and the speed is: N(rpm)= F F: Output pulse frequency(Hz） N: Motor speed For example：F=500Hz, then N(rpm)=500 (Note: Motor poles should be set rightly) |
| | ALM | It is a high resistance output, and when a fault occurs, it outputs a low level |

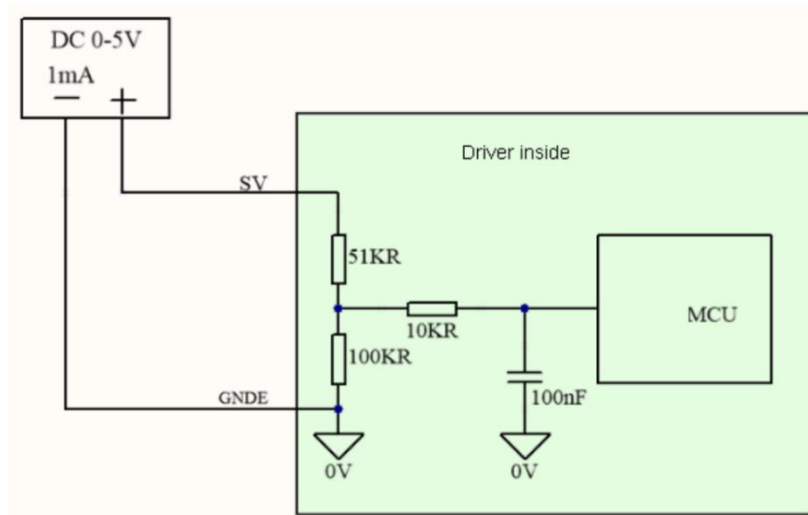## 4.3 Description of external control signal circuit

The F/R and EN terminals are as below，amplitude ranges less than 0.5V, or higher than 2.5VDC
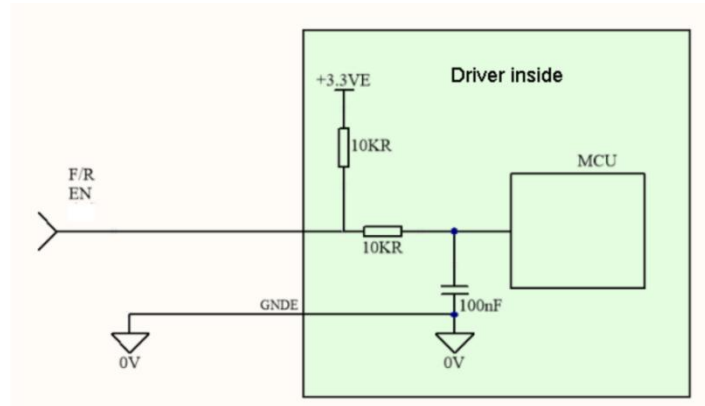
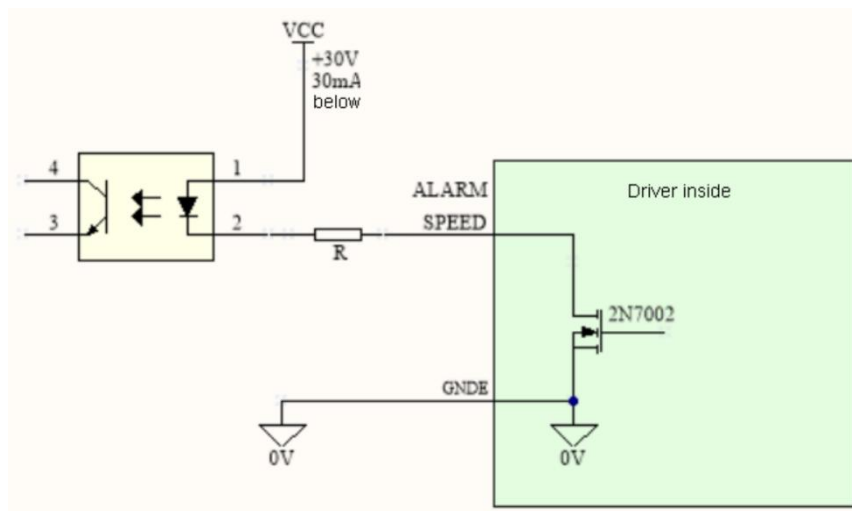The external potentiometer SV input wiring is shown below：
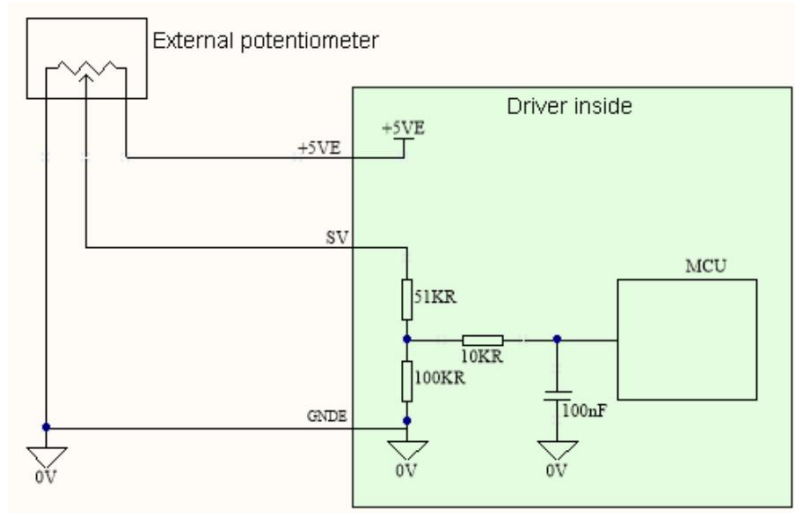


The external analog SV input wiring is shown below:



## 4.4 Output circuit description

ALM and SPD terminals as below,　its connection mode with PLC is related to the type of PLC input terminal.
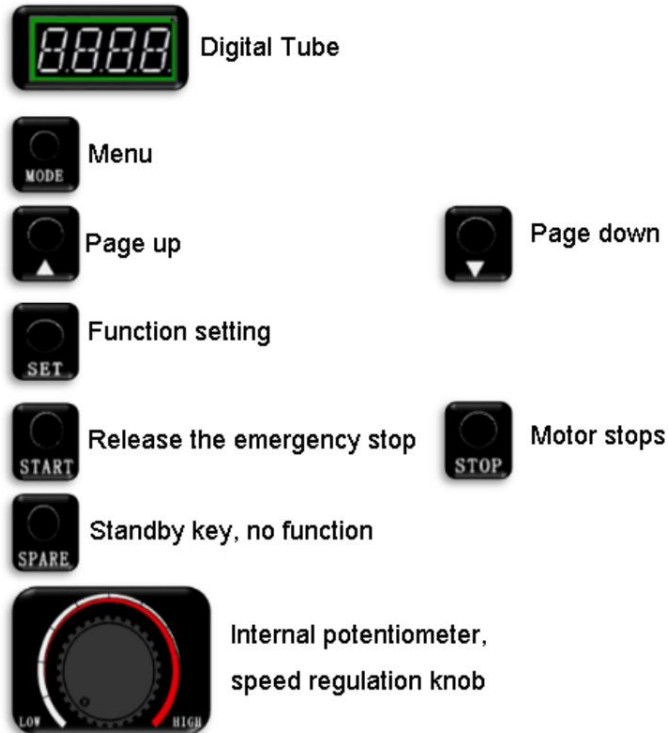
# 5 Introduction to panel functions

## 5.1 Panel functions

| Functions | Description | Operation mode |
|---|---|---|
| Display | Speed display | Display |
| Temperature display | Drive cooling temperature display | |
| Speed regulation mode selection | 0.  Internal knob speed regulation | Parameter setting |
| | 1.  External analog speed regulation | |
| | 2.  Key speed regulation or 485 speed regulation | |
| Speed setting | Step size is 100RPM; The set speed is lower than (400rpm/ pole pairs) and the motor does not rotate； | |
| Direction setting | 0.  Motor stops； | |
| | 1.Enter the relevant menu through the panel key to set the forward rotation； | |
| | 2.Enter the relevant menu through the panel keys, and set the reversal | |
| | 3.Motor brakes； | |
| | 4.Direction port control.(F/R, EN） | |
| Reduction ratio setting | Set the speed ratio of the reducer； | |
| Alarm reset | Display the alarm code and press SET to reset the alarm | |
| Polar number setting | Set the pole pairs of the adaptive motor (It is not recommended to change the pole pairs during motor operation)； | |
| Under speed time setting | Set the under speed time. (E.g, set it as 5s, when the speed of the motor is less than 50% of the set speed for over 5s, the motor will stall.) | |
| Maximum speed setting | Set the upper limit of the speed (it is recommended to set it to the maximum speed of the motor)； | |
| Acceleration and deceleration time setting | Set the ACC and DEC time through the panel keys； | |
| 485 communication address control | Select and control 485 communication address in steps of 1； | |
| 485 communication rate setting | Set the 485 communication rate in steps of 1； | |
| Port indication | Indicates the status of each IO port, read-only； | |
| Data initialization | Restore the operation data to the factory setting； | |

## 5.2 Panel introduction



Digital Tube

Menu

Page up

Page down

Function setting

Release the emergency stop

Motor stops

Standby key, no function

Internal potentiometer, speed regulation knob

## 5.3 Drive panel control settings

| Initial Content | | Functions | First class menu | | Second class menu | | | |
|---|---|---|---|---|---|---|---|---|
| 0000 | Press MODE △ or ▽ to select | Speed regulation mode selection | P-01 | Press SET | 0 | Press△ or▽ to select，SET to confirm | | Knob speed regulation.(By default) |
| | | | | | 1 | | | External analog speed regulation |
| | | | | | 2 | | | Speed regulation with keys |
| | | Speed adjusting | P-02 | Press SET | 0000 | Press△ to speed up，▽ to slow down，press SET to confirm | | Complete the speed setting (step size is 100RPM, the limit is 0-9900 and no higher than the maximum speed, the default value is 0) |
| | | Motor direction setting | P-03 | Press SET | 0 | Press△ or▽ to select，press SET to confirm | | Motor stops |
| | | | | | 1 | | | Clockwise rotation（By default） |
| | | | | | 2 | | | Turn counterclockwise |
| | | | | | 3 | | | Motor brake stops |
| | | | | | 4 | | | Port control.(F/R, EN, BRK) |

| | | | | |
|---|---|---|---|---|
| **Reduction ratio setting** P-04 | Press SET | 001 | Press △to increase reduction ratio, press ▽ to reduce the reduction ratio. Press SET to confirm. | Step size is 1, limit is 1-100, default is 1, feedback speed = motor speed / gear ratio |
| **Alarm reset** P-05 | Press SET | Error code | Press SET to reset the alarm | Reset the alarm |
| **Pole numbers setting** P-06 | Press SET | 004 | Press△ to increase pole pairs number, press▽to reduce pole pairs number. Press SET to confirm. | Limit is 1-100, the default value is 4, it is not recommended to change the number of pole pairs during motor operation |
| **Underspeed time setting** P-07 | Press SET | 002 | Press△to increase, press▽to reduce. Press SET to confirm. | Complete the underspeed time setting (step size is 1S, the limit is 0-100, the default value is 2, and 0 means no underspeed protection) |

| | | | | |
|---|---|---|---|---|
| **Maximum speed setting** P-08 | Press SET | 3000 | Press△ to increase, press▽to reduce. Press SET to confirm | Step size is 100RPM, the limit is 100-9900 and cannot be lower than the set speed, the default value is 3000, it is recommended to set the maximum speed to the rated speed of the motor |
| **Acceleration and deceleration time setting** P-09 | Press SET | 005 | Press△ to increase, press▽to reduce. Press SET to confirm | Step size is 100ms, limit value is 0-150, default value is 5 |
| **Temperature display** P-10 | Press SET | **Displays the heat dissipation temperature of the drive** | | |

| | | | | | |
|---|---|---|---|---|---|
| 0000 | Press MODE △ or ▽to select | **Restore factory settings** P-11 | Press SET | 1 | Press SET to restore factory settins → Restore factory settings |
| | | **Port indication** P-12 | Press SET | Indicates the status of each IO port, read-only | |
| | | **RS485 address setting** P-13 | Press SET | 001 | △ or ▽, Set to confirm → Complete 485 communication address selection (limit 1-247, default 1) |
| | | **RS485 communication rate setting** P-14 | Press SET | 011 | △ or ▽, Set to confirm → Complete 485 communication rate setting (step size is 1, limit value is 0-25, default value is 11, recommended value is 11-18) |
| | | **Motor line sequence detection** P-15 | Press SET | 0 / 1 | △ or ▽, Set to confirm → The last digit of the digital tube appears circularly 5.1.3.2.6.4, it proves the line sequence is correct. Otherwise, it is wrong. |

Note: All settings will be saved automatically immediately, even power off without loss.

# 6.Function setting of external control port.

## 6.1 Start and stop

EN and GNDE are disconnect by default, When the power is turned on, the motor will not rotate. There are two ways to start the motor:
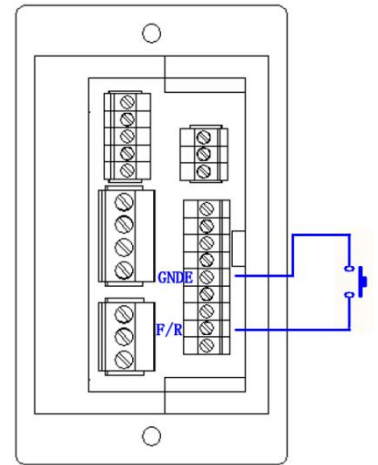1.  Press START to start and STOP to stop the motor.
2.  Connect EN and GNDE. A switch or PLC can be added between EN and GNDE to control the motor start and stop. See right.
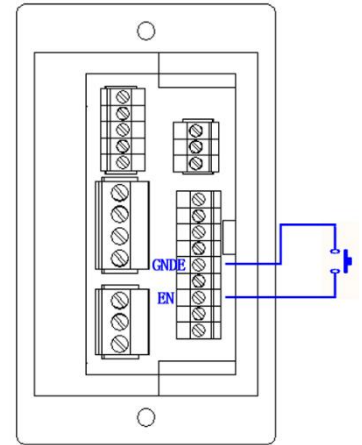
## 6.2 Direction control.

Here are two methods to control the direction.
1. Through the panel MODE->P-03.
2. Disconnect F/R and GNDE, motor runs clockwise.
   Connect F/R and GNDE, motor runs anti-clockwise.

## 6.3 Speed regulation mode.

### 6.3.1. Knob speed regulation.(Default method.)

Internal potentiometer,
speed regulation knob

**6.3.2 MODE->P-01->SET->2 to select speed regulation with keys**,    press page up or page down to select request speed.

**6.3.3** In addition to using the built-in potentiometer knob on the panel for speed regulation, the **external port SV** can be used for the following settings for speed regulation. To start, set MODE->P-01->SET->1.

## 1. External potentiometer speed regulation.

10KΩ is recommended to adjust the speed.
Connect the central pin of the external potentiometer to
the SV terminal, and connect the other two pins to the
GNDE port and the +5VE port respectively.
(Refer to the picture below for details)
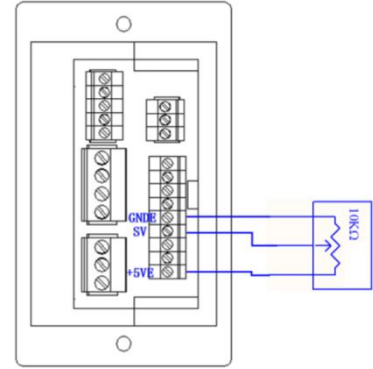


## 2. External analog signal role DC 0-5V

**Note:** Be sure to set the correct number of motor pole pairs.
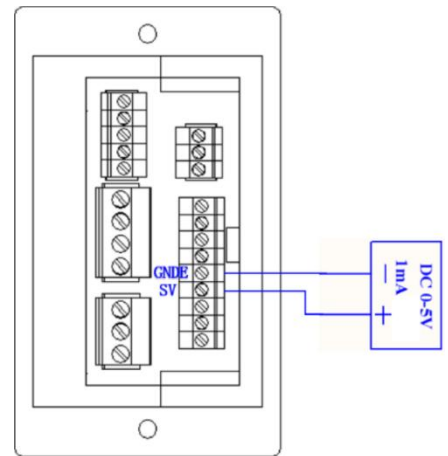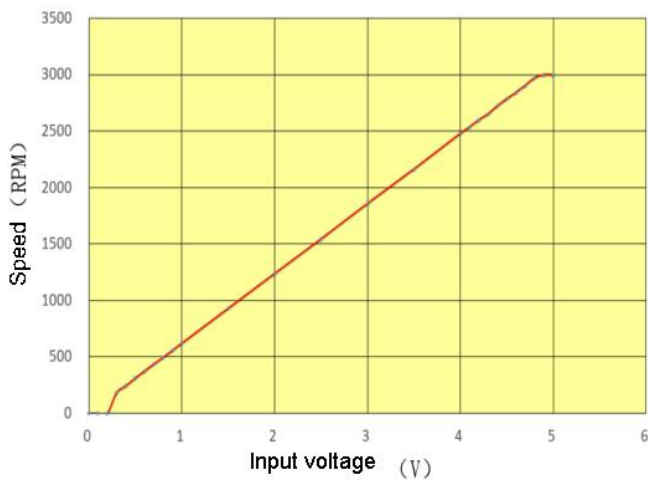


(Relationship between speed command voltage and motor speed)

The above is the measured diagram of a 3000rpm motor. When the input voltage is 0.3V, the motor speed is 183rpm. When the input voltage is about 5V, the motor speed is 3000rpm.

## 6.4 RS485

The communication function of this driver adopts Modbus protocol, which conforms to the standard GB/T 19582.1-2008. Using RS485-based two-wire serial link communication, the physical interface adopts 3.81mm, 3PIN plug-in terminal, the terminal definition is shown in the figure below, and three wires need to be connected: B, A, GNDE. The communication address can be set through the panel operation. The 120Ω terminal matching resistance needs to be externally connected by the user.
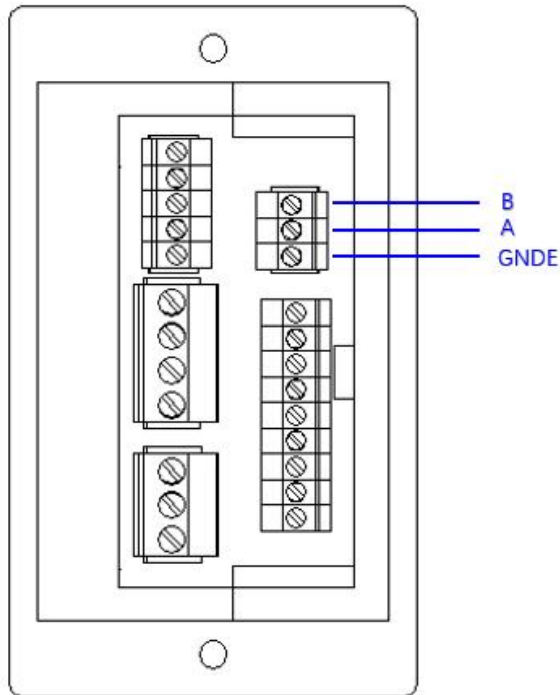
| Communication conditions | |
|---|---|
| Interface | 3.81mm、3PIN Plug-in terminal block |
| Bus | RS485 |
| Protocol | MODBUS |
| Communication mode | Half duplex |
| Standard | GB/T 19582.1—2008 |
| Communication rate | 9600（can be set） |
| Data bit | 8 bit |
| Stop bit | 1 bit |
| Check | ModbusCRC low order first |
| Communication node | 247 |

Refer to the following table for the address of read / write register：

| READ | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Slave address (1byte) | Function code (1byte) | Access address 1* (2byte) | Access address 2* (2byte) | Access data (2byte) | CRC Check (2byte) | Read parameters | Value Range | Default value | Unit |
| 0Xnn | 0X03 (Read data) | 0X0000 | 0X0054 | 0X0001 | CRC Check | Speed mode selection | 0-2 | 0 | |
| | | 0X0001 | 0X0056 | | | Speed setting | 0-Max speed | 0 | RPM |
| | | 0X0002 | 0X005F | | | Speed Value | 0-65535 | 0 | RPM |
| | | 0X0003 | 0X0066 | | | Motor direction | 0-4 | 1 | - |
| | | 0X0004 | 0X0068 | | | Gear ratio | 1-100 | 1 | - |
| | | 0X0005 | 0X0076 | | | Alarm code | | 0 | - |
| | | 0X0006 | 0X0086 | | | Pole pairs number | 1-100 | 4 | |
| | | 0X0007 | 0X0090 | | | Under speed time read | 0-100 | 2 | s |
| | | 0X0008 | 0X0092 | | | Max speed | 100-65535 | 3000 | RPM |
| | | 0X0009 | 0X0098 | | | ACC/DEC time | 0-150 | 5 | 0.1s |
| | | 0X000A | 0X00D2 | | | Temperature | -300-1250 | - | 0.1℃ |
| | | 0X000B | 0X0113 | | | Program version | - | - | - |
| | | | | | | | | | |
| | | 0X000C | 0X0129 | | | Port indication | - | - | - |
| | | 0X000D | 0X012A | | | Port indication | - | - | - |
| *: Access address 1 and access address 2, you can choose one of the two, access address 1 is easy to read, and access address 2 is recommended to use 0X0001 to access data. | | | | | | | | | |

**The write register address can refer to the following table:**

| WRITE | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Slave address (1byte)** | **Function code (1byte)** | **Access address (2byte)** | **Access data (2byte)** | **CRC Check (2byte)** | **Write parameters** | **Value Range** | **Default value** | **Unit** |
| 0Xnn | 0X06 (Write data) | 0X0054 | 0X0000 | CRC Check | Speed adjusting mode | 0-2 | 0 | - |
| | | 0X0056 | 0X0000 | | Speed setting | 0-Max speed | 0 | RPM |
| | | 0X0066 | 0X0001 | | Motor direction setting | 0-4 | 1 | - |
| | | 0X0068 | 0X0001 | | Gear ratio setting | 1-100 | 1 | - |
| | | 0X0076 | 0X0001 | | Alarm Reset | - | - | - |
| | | 0X0086 | 0X0004 | | Pole pairs setting | 1-100 | 4 | - |
| | | 0X0090 | 0X0002 | | Under speed time | 0-100 | 2 | s |
| | | 0X0092 | 0X0BB8 | | Max speed | 100-65535 | 300 | RPM |
| | | 0X0098 | 0X0005 | | ACC/DEC time setting | 0-150 | 5 | 0.1s |
| | | 0X00BC | 0X0001 | | Parameter saving | - | - | - |
| | | 0X00CC | 0X0001 | | Factory setting recovery | 1 | | |

**Parameter description refer to the table below:**

| Parameters | Description or note |
|---|---|
| Speed adjusting modes selection | 0：Knob speed regulation；　1：External analog quantity；　2：key or communication； |
| Speed setting | The motor does not rotate when the set speed is lower than (400RPM/pole pair number) |
| Speed feedback | If the reduction ratio is set, the final speed is speed / reduction ratio |
| Direction setting | 0：Stop；1：Clockwise；2: anti-clockwise；3：Brake；4:Port control（F/R, EN） |
| Gear ratio setting | Note: Speed = motor speed / gear ration； |
| Alarm code | Read: read alarm code; write 0x0001: alarm reset； |
| Poles pairs number | It is not recommended to change the number of pole pairs during motor operation； |
| Under speed time | 0 is for no under speed protection； |
| Max speed | It is recommended to set the maximum speed to the rated speed of the motor； |
| ACC/DEC | ACC/DEC time |
| Temperature | Radiator temperature of the drive |
| Program version | Read: read program version; write 0x0001: parameter restore factory settings |
| Port indication | Indicate the status of each IO port (0X0129 is the upper 16 bits); |

# 7Alarm description and fault handling

## 7.1Alarm code description

When over voltage, or the signal of the Hall sensor is wrong, etc., the following situations will occur:
1.  The ALM port of the driver is automatically connected to the GNDE port, the ALM port becomes low level, and an alarm signal is sent to the upper computer (In this case, wiring operation is required to send a signal to the upper computer).
2.  The motor will stop naturally and the motor output shaft will turn freely.

After a fault alarm occurs, you can press MODE-> P-05 through the display panel and press the SET button to to view the alarm code.

| Alarm Code | Alarm name | Alarm Reasons | Troubleshooting |
|---|---|---|---|
| AL00 | No error | - | - |
| AL02 | Over temperature | 1. There is a foreign object blocking the fan or dust accumulation;<br>2. The motor does not match the driver;<br>3. The drive is damaged; | 1. Clean the driver;<br>2. Re-match the motor and driver selection;<br>3. Replace the driver; |
| AL05 | Hall error | 1. Check whether the motor sensor cable is firmly connected<br>2. Check whether the Hall element in the motor is damaged;<br>3.  Internal communication error of the drive; | Automatic recovery after the fault is cleared; |
| AL08 | Under speed | 1. Check whether the set maximum speed is not greater than the rated speed of the motor;<br>2. Check whether the number of pole pairs is set correctly;<br>3. Try to stop the motor or power on again to reset the alarm; | The time when the feedback speed is lower than the set speed exceeds the set underspeed time, and the default underspeed time is 2 seconds; |
| AL09 | Module alarm | IPM Power Module Alarm | 1. Detect whether there is dust entering;<br>2. Try to lengthen the acceleration and deceleration time;<br>3. Re-power;<br>4. If the alarm still occurs, replace the driver |
| AL10 — AL26 | Hardware failure | Please check for iron filings, corrosion, dust | Re-power on, if it still doesn't work, replace the controller; |
| AL40 — AL43 | Storage error | Please check for iron filings, corrosion, dust | |

## 7.2ALARM RESET

If the above solutions don't work, follow the operations below to reset the alarm signal
1. **MODE->P-05->SET** to check the alarm code, then press SET to reset the alarm.
2. Cut off the power supply, then power on again after 1 minute, the alarm can be released.

# 8 Troubleshooting

| Phenomenon | Possible reason | Troubleshooting |
|---|---|---|
| Motor stop | Alarm | Do as alarm code |
| | Press Stop | Press Start |
| | Wrongly motor lines | Check the wiring and phase |
| | Motor brake is wrong | Make sure the motor brake is open |
| | Driver doesn't match the motor | This driver only supports motors with a Hall electrical angle of 120° |
| | Damage | Replace new motor and driver |
| Over heat | Over load | Make the load lower |
| | Over current | Make the current lower |
| | The ambient temperature is too high | Improve environmental heat dissipation. |
| | Wrong phase | Correct phase connection |
| | Damage | Replace new motor and driver |
| Abnormal motor speed | Overload | Make the load smaller |
| | Signal input wrongly | Signal input checking |
| | Wrong poles pairs numbers setting | Set the right poles numbers |
| | Wrong gear ratio setting | Set the right gear ratio |
| | Wrong max speed setting | Set the maximum speed to the rated speed of the actual motor |
| The motor is running with abnormal noise | Phase wrongly | Check the motor phase |
| | Driver doesn't match the motor | This driver only supports motors with a Hall electrical angle of 120° |
| | Lack of phase wiring | Check the motor phase |
| | Load problem | No load operation motor test |
| | Motor problem | Change the motor |
| Motor speed fluctuations | Signal input wrongly | Change to knob speed setting to check if there is the same error |
| | The load inertia ratio is too large | Decrease load inertia ratio or increase gear box |
| | The load is changeable | Steady load or this condition is normal |
| No signal output | Pull-up resistor not connected | The alarm output interface and the speed output interface are connected with appropriate pull-up resistors |

# After Sales Service

## Warranty:

The warranty is 12months from the date of shipment. We offer free technical support during the time.

## Repair progress:

（1）Contact the sales to tell the details.
（2）Send back the product to:
Room 401, Building 2, No. 7, Xinhe Shengfeng Road, Wanjiang Street, Dongguan City, Guangdong Province, China

## Warranty Limitations

Damage caused by improper use of products is not covered by the warranty.

Product damage caused by the use environment or electric parameters that does not meet the use parameters is not covered by the warranty.

Product damage caused by improper selection is not covered by the warranty.

Product damage caused by unauthorized processing, repair, transformation, or decomposition of this product is not covered by the warranty.

Product damage caused by improper wiring, such as reverse polarity of the power supply and live plugging and unplugging of the motor leads, is not covered by the warranty

| Technical support | Consultation on the selection method and use method of motor and driver<br>Hotline: 400-696-4446<br>TEL:0769-22327568<br>Time：Monday-Friday<br>9:00～12:00、13:00～17:00 |
|---|---|
| Data download | https://www.ican-motor.com |