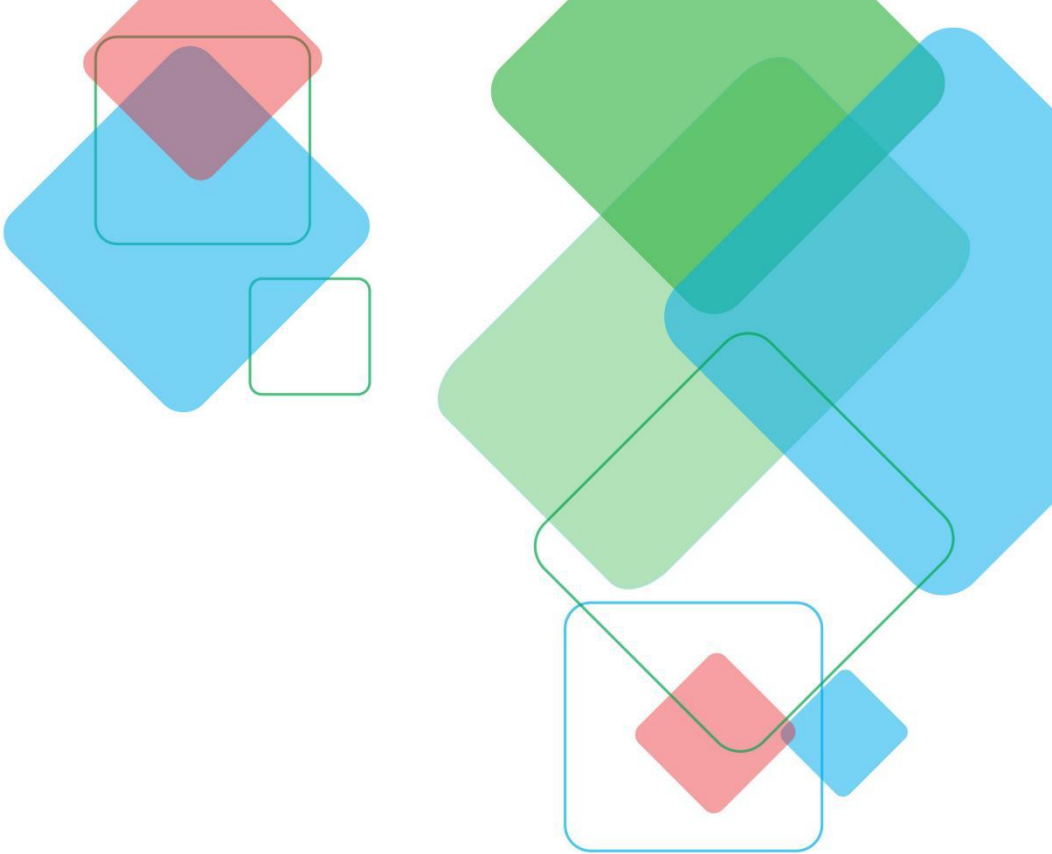
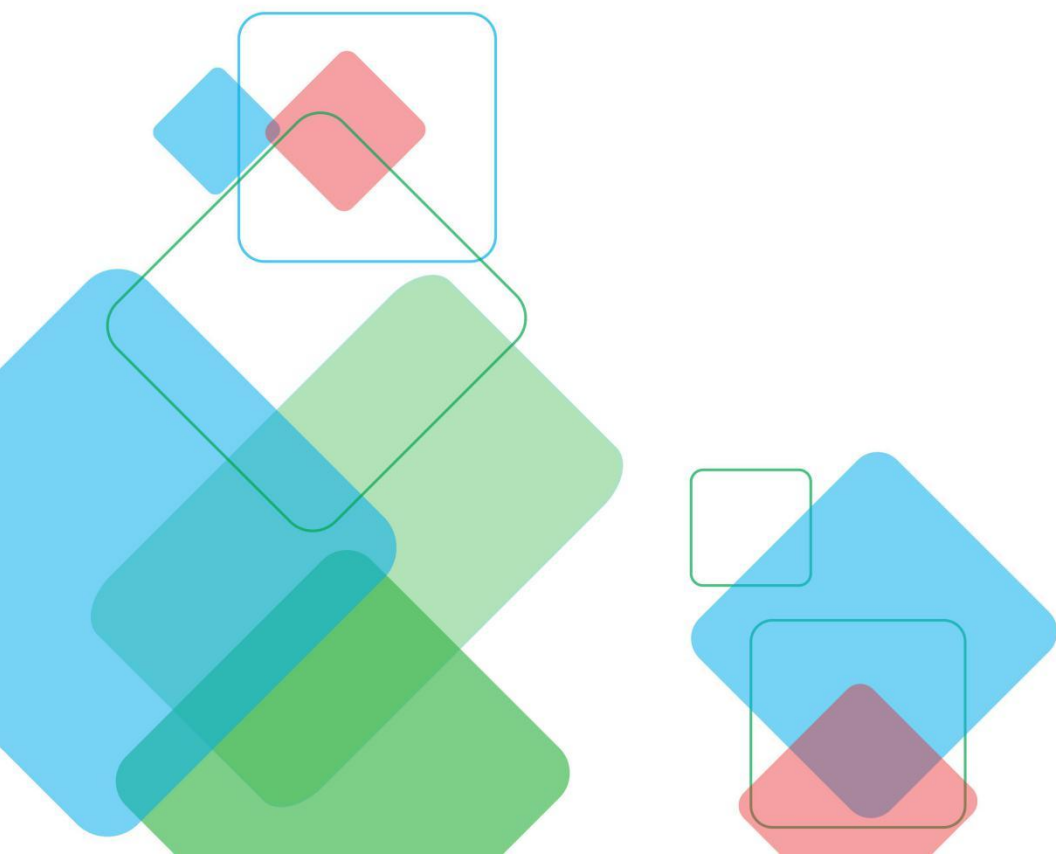




High-Voltage Built-in Brushless Driver EA-BLDC20-400-H-R User Manual



Before Use

Before operating this product, carefully read and observe the relevant safety information to ensure personal safety and product safety.

DANGER	• This product is a high-voltage product. Before wiring or installing the driver, make sure the power is turned off. Do not change power wiring while the power is on; otherwise, electric shock or personal injury may occur. • Circuit components on the internal PCB of the driver are easily damaged by static electricity. Do not touch the circuit board by hand before taking anti-static measures. • Do not modify the internal parts or wiring of the driver by yourself. • Do not use this product in locations with moisture, corrosive gas, flammable gas, or similar substances; otherwise electric shock or fire may occur. • Install the driver and accessories away from heat sources, fire sources, and flammable materials. • Before the machine starts operating, set user parameters according to the machine. Incorrect settings may cause loss of control or malfunction. • Before starting the machine, confirm that the emergency stop device can be activated at any time. • When power is applied, ensure that the motor shaft remains stationary and will not rotate due to mechanical inertia or other factors.
WARNING	• Do not connect AC or DC power to the driver I/O terminals. • The rated voltage of the power system for driver installation is AC220 V / 50 Hz. • First test whether the driver and motor operate normally without load, then connect the load to avoid unnecessary danger. • Do not switch the power on and off frequently. If continuous switching is required, limit it to no more than once per minute. • Do not use this product for vertical lifting motion of loads. • Only qualified professionals may install, wire, and maintain the driver.

Note:

1. To explain product details thoroughly, this manual may describe the product with the housing removed or safety covers disassembled. During operation, the housing must be installed, and wiring must be correct as specified. Operate according to this manual to ensure safety.
2. Illustrations in this manual are for explanation and may differ slightly from the actual product; this does not affect customer rights.

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1. Product Inspection and Description

1.1 Product Inspection

To prevent oversights during purchase and transportation, carefully check the items listed below:

- Whether it is the product you intended to purchase check the product model on the driver package nameplate and refer to the model description in the next section.
- Whether the appearance is damaged: visually check for any damage or scratches.
- Whether there are loose screws: check whether any screws are not tightened or have fallen off.
- Whether any accessories are missing check against the complete component list below.

If any of the above conditions occur, contact the company or agent promptly for proper resolution.

A complete operable driver set should include:

- (1) EA-BLDC20-400-H-R driver — 1 unit;
- (2) 12-pin I/O terminal — 1 piece;
- (3) 3-pin power terminal — 1 piece;
- (4) Port connecting wire / AWG 24 — 5 pieces.

1.2 Nameplate / Model Description

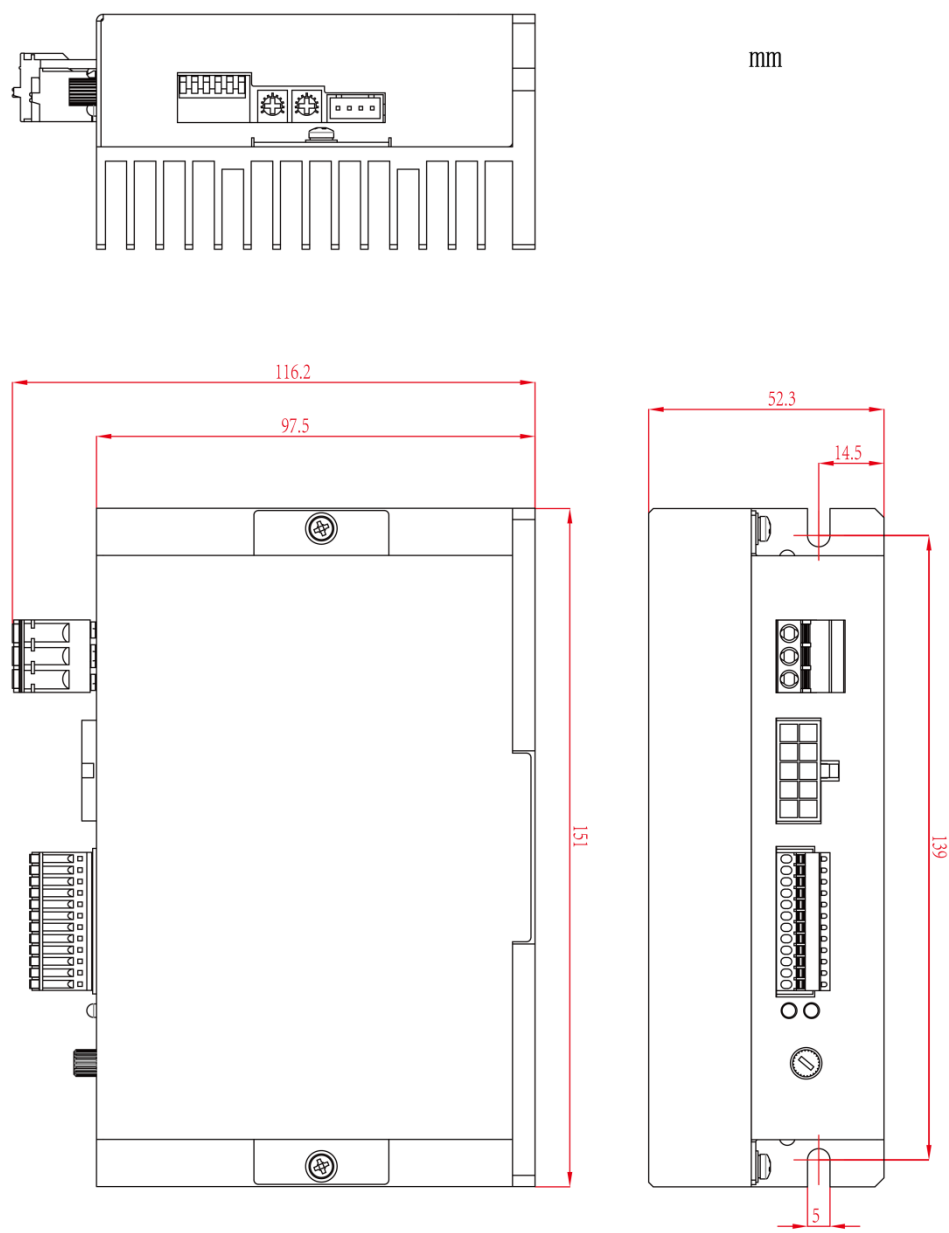
Nameplate description:

Model Description	
input voltage	AC220 V($\pm 10\%$)/50 Hz
Output current	0.3 A–2.4 A (current-limit output value adjustable by knob)
Output power	400 W
Compatible Motor	AC220 V, motor $\leq$ 400 W
Default Speed	3000 rpm
Pole Pairs	5 (other pole-pair settings can be set by DIP switch or keypad)
Digital Input	DI1~DI5 NPN
Digital Output	DO1 Fault output, DO2 Speed output
Analog Input	External analog voltage (0–5 V / 10 V) or or PWM
HDIInput	None
Knob	Speed adjustment knob, acceleration adjustment knob, current-limit adjustment knob
cooling method	Natural air cooling

communication	RS485 Modbus communication; 1200~57600/ ≥ 50 ms
Protection Rating	IP20
Protection Functions	Undervoltage, overvoltage, overcurrent, overload, stall, short circuit, phase loss, overtemperature, etc.
External Keypad (Optional)	Supported
Type	Built-in
Operating Mode	Open loop, closed loop (control accuracy $\pm 0.5\%$)
brake	Electromagnetic Brake

2. Product Dimensions, Environmental Conditions and Installation

2.1 Product Dimension Drawing



2.2 Operating, Storage, and Transportation Environmental Characteristics

The driver must never be exposed to harsh environments, such as dust, sunlight, corrosive or flammable gases, grease, humidity, water droplets, or vibration.				
The salt content in the air must be kept below 0.01 mg/cm² per year.				
Protection Rating		IP20: Prevents ingress of solid foreign objects larger than 12 mm, No moisture protection		
Environmental Characteristics	Ambient temperature	Operation	Standalone installation	-10~40℃ -20~-10℃ or 40~50℃ (derating required)
			Side-by-side installation	-10~30℃ -20~-10℃ or 30~40℃ (derating required)
		Storage		-33~65℃
		Transportation		-20~50℃
		Non-condensing and non-freezing		
		Rated Humidity	Operation	Max.85%
	Storage		Max.90%	
	Transportation			
	Condensation prohibited			
	Atmospheric Pressure	Operation	86~106 k Pa	
		Storage Transportation	70~106 k Pa	
	Altitude		Operation 1000 lower (1000, 2.2.2)	
Package Drop	Storage Transportation	/ Dropping from height is prohibited; damage risk exists		
Vibration	Operation/Storage/ Transportation	Continuous vibration is prohibited		
Shock	Operation/Storage/ Transportation	Excessive impact is prohibited		

2.2.1 Storage Environmental Conditions

Before installation, this product must be kept in its packaging box. If it is not used for the time being, observe the following storage requirements so that they remain within the company warranty scope and can be maintained later:

1. It must be stored in a dust-free and dry location;
2. The ambient temperature and relative humidity of the storage location must be within the required range;
3. Avoid storage in environments containing corrosive gases or liquids;

4. Preferably store it properly packaged on a shelf or flat surface.

2.2.2 Operating Environmental Conditions

Operating Conditions	Ambient Temperature Limit
Abnormal ambient temperature operation	When operating at rated current, the ambient temperature must be between -10°C and 40°C. When the ambient temperature exceeds 40°C, reduce the rated current by 2.5% for every 1°C increase. The maximum ambient temperature is 50°C.
High-altitude operation	When the driver is used at an altitude of 0–1000 m, normal operating limits apply. When used at 1000–2000 m, reduce the rated current by 1% or reduce the operating ambient temperature by 0.5°C for every 100 m increase in altitude. Contact the manufacturer for use above 2000 m.

For long-term operations, an ambient temperature below 40°C and a well-ventilated location are recommended to ensure reliable product performance.

At altitudes above 1000 m, thinner air reduces equipment insulation strength and heat dissipation performance; derating is required, and high-altitude use is not recommended.

In addition, the operating conditions also include:

1. A location without large heat-generating equipment;
2. A location without water droplets, steam, dust, or oily dust;
3. A location without corrosive or flammable gases or liquids;
4. A location without floating dust or metal particles;
5. A firm location without vibration;
6. A location without electromagnetic noise interference.

2.3 Installation Instructions

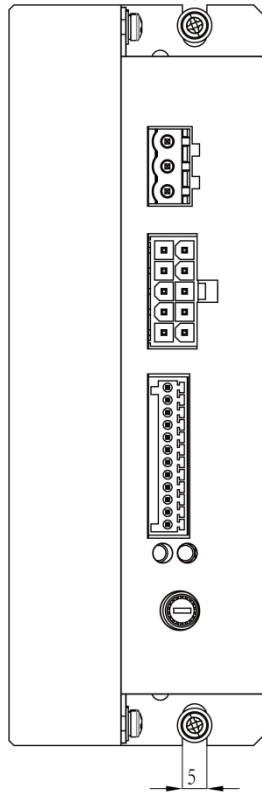
This product is installed by wall mounting. It is recommended to use M 5, It is recommended to install it on a metal mounting surface with good heat dissipation and proper grounding; otherwise, fire accidents may occur easily.

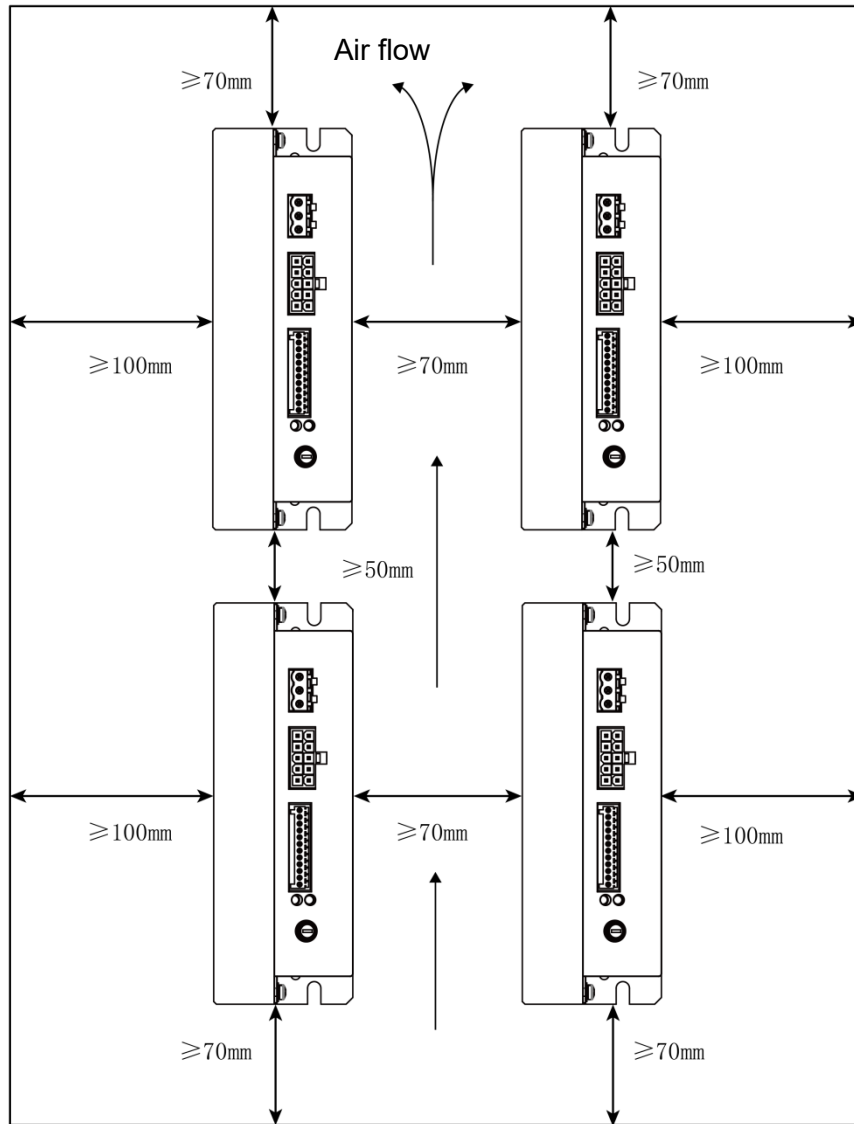
Recommended driver installation spacing: when multiple drivers are installed side by side, keep the spacing at 70 mm upper.

When using the side port or RS485 communication, increase the installation distance and pay attention to cable layout (see Section 6.2).

The installation diagram and installation-spacing diagram are shown below. The actual installation direction is determined according to customer requirements:

M5 Crew





*The spacing distances and text annotations in the installation figure are not to scale; refer to the text annotations.

Precautions

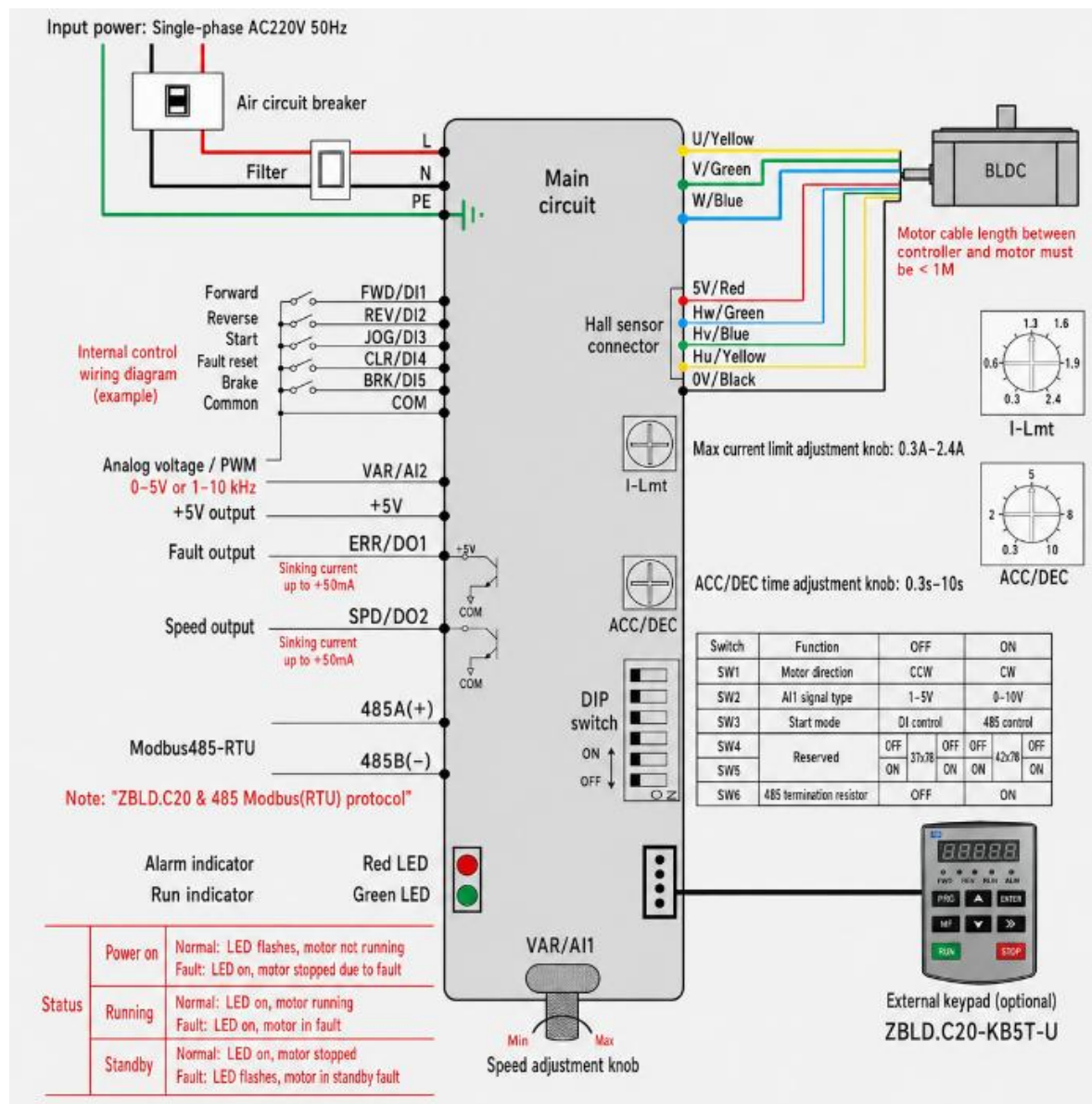
Users should pay special attention to the following:

1. The connecting cable between the driver and motor must not be pulled tight, to prevent loosening or falling off;
2. When fixing the driver, all mounting screws must be tightened;
3. The motor shaft center must be well aligned concentrically with the equipment shaft center;
4. The screws fixing the motor must be tightened.

3. Wiring Method

3.1 Wiring Diagram

The figure below is the C20-400 HR wiring diagram:

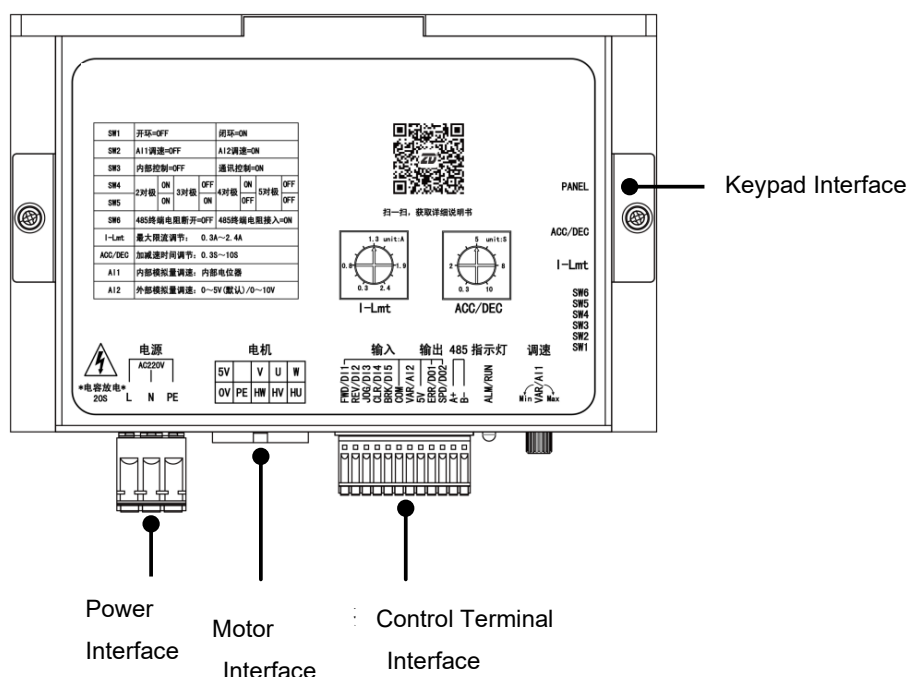


Precautions:

1. Before wiring, turn off the power. Wiring must be performed by qualified personnel to ensure personal safety;
2. Do not connect the power cable to any terminal other than the power terminal; otherwise the driver may be damaged;

3. The grounding terminal must be properly grounded;
4. Screws between connection terminals and wires must be securely tightened to prevent loosening due to vibration;
5. When wiring, select the wire gauge according to electrical regulations;
6. Ensure that the power supply capacity is more than twice the rated motor power;
7. It is recommended that the cable length between the motor and driver be less than 1 m;
8. After completing circuit wiring, check the following again:
 - (1) Are all connections correct? Pay special attention to whether the power cable is connected incorrectly.
 - (2) Are there any missing connections?
 - (3) Is there any short circuit between terminals and wires, or any short circuit to ground?

3.2 Port

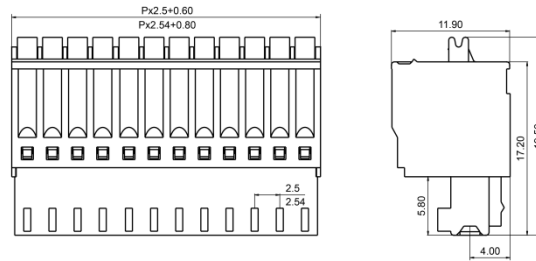


3.2.1 Power Interface

Plug-in terminal block, 3 P, spring wiring method. Use a flat-blade screwdriver (tip width ≤ 4 mm). The power input is AC220 V. Wire according to the top-cover markings: L to live wire, N to neutral wire, and PE to ground. Do not connect incorrectly.

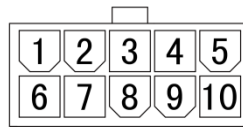
3.2.2 Control Terminal

Plug-in terminal block, 12 P, spring wiring method. Use a flat-blade screwdriver (tip width ≤ 2 mm). During use, press the button above the wiring hole, insert the wire, and release it; the wire should not come loose.



3.2.3 Motor Interface

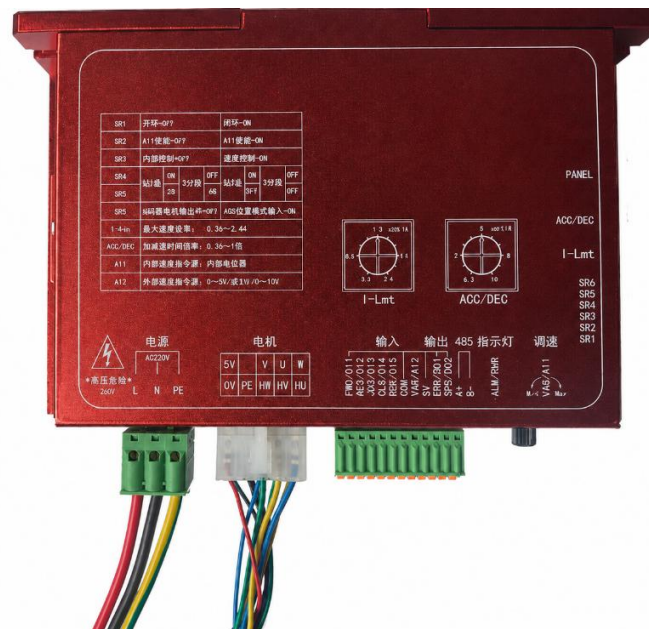
The high-voltage motor terminal is a plug-in crimp terminal provided by the motor.



Description of corresponding wiring signals and wire colors (ZD motor model):

No.	1	2	3	4	5	6	7	8	9	10
Signal	5 V	/	V	U	W	0 V	PE	HW	HV	HU
Wire Color	thin red	/	thick green	thick yellow	thick blue	thin black	shield wire	thin blue	thin green	thin yellow

Wiring diagram:



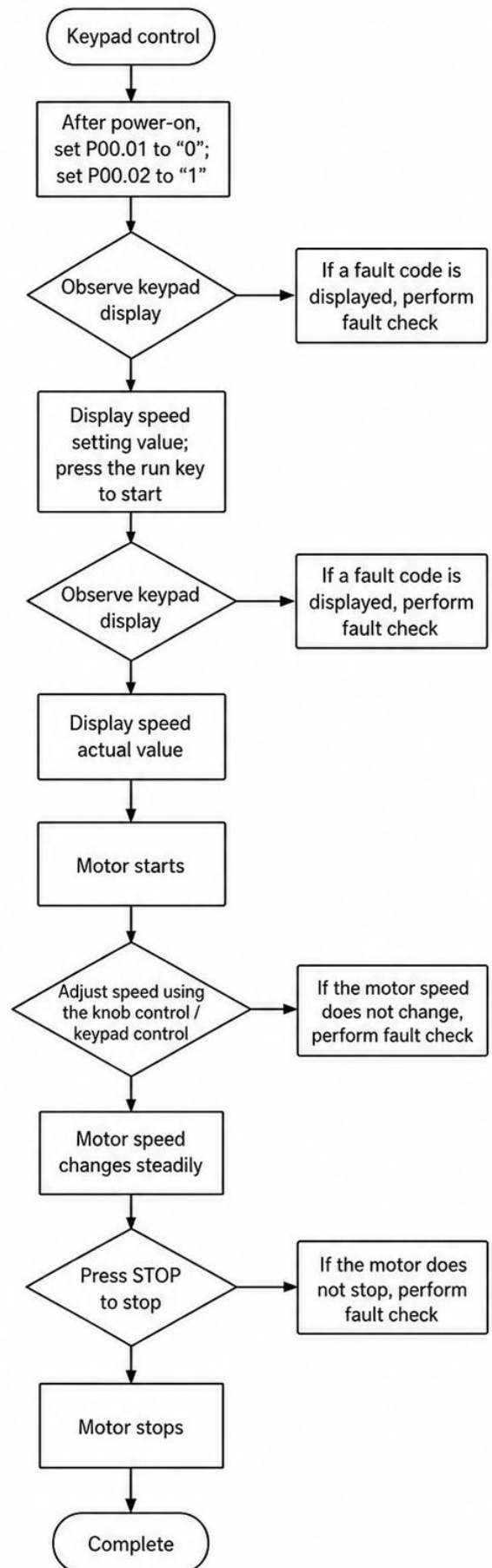
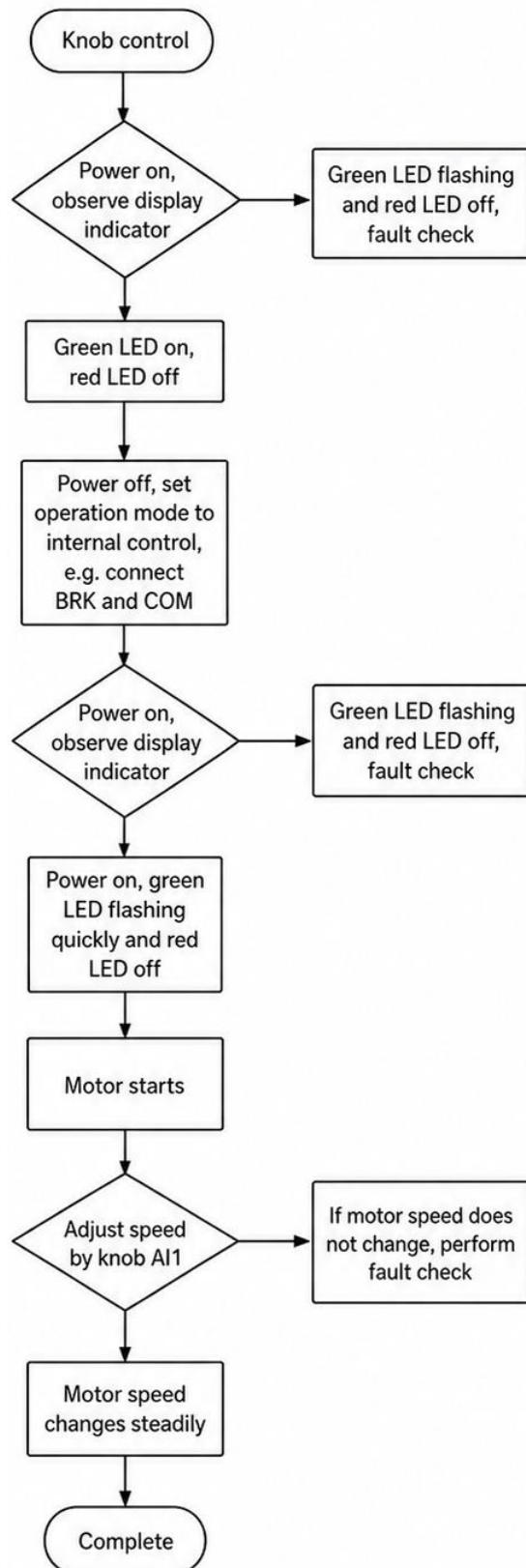
3.2.4 Keypad Interface

The keypad interface is a 2.54-4 P interface. The keypad connecting cable is an externally purchased keypad accessory (see Section 4.2.1).

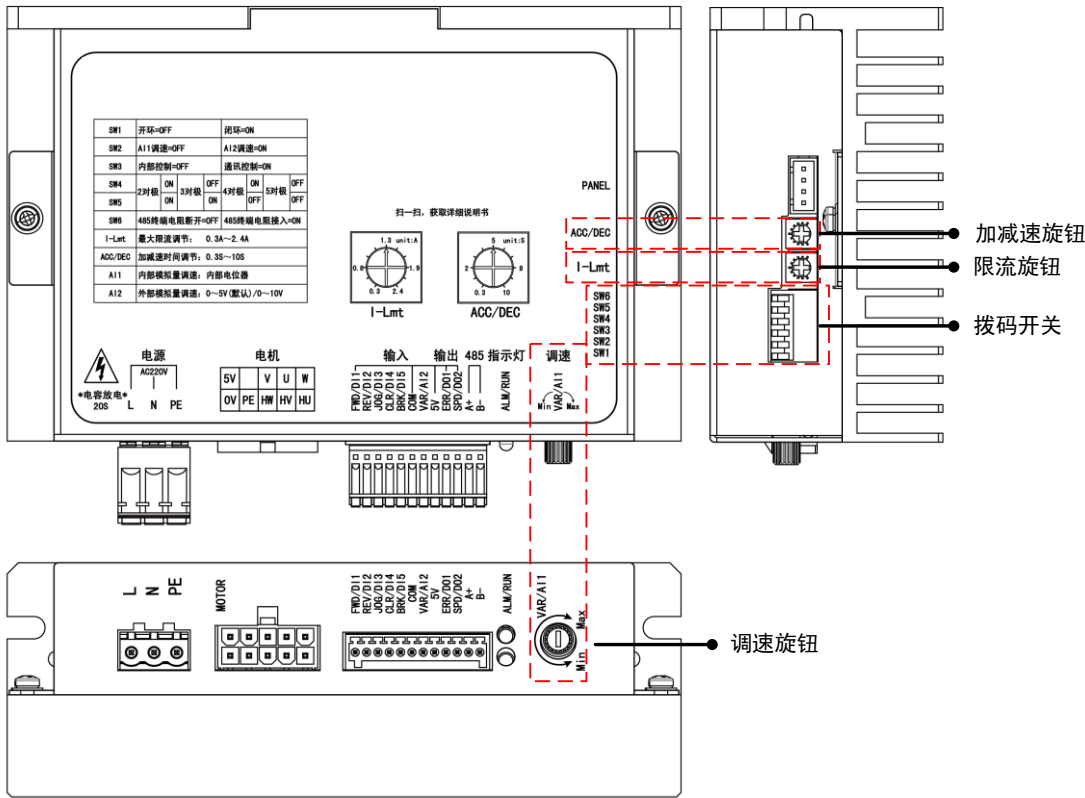
4. Operation Instructions

Precautions:

- 1、 Unless otherwise specified, the factory default control mode of this product is terminal control. Keypad control requires purchasing the keypad accessory (ZBLD.C20-KB5T-U);
- 2、 The keypad function codes listed in this manual apply to ZBLD.C20-400HRproducts and also apply to other C20-series products. For details, refer to the C20 Series Keypad Function Code Instructions;
- 3、 Before operation, personnel must have a basic understanding of this product; operation should be performed by professionals;
- 4、 Before formal use, perform no-load commissioning. The following figure shows the no-load commissioning flowchart (left: terminal control; right: keypad control; default factory settings):



4.1 Terminal control

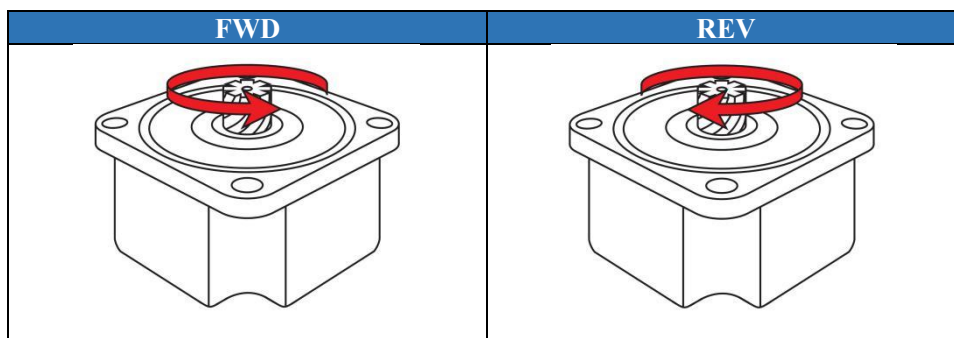


4.1.1 Port

Users who have not purchased a keypad can refer to the default values of the keypad function codes to understand the product parameters (see Section 4.2.3).

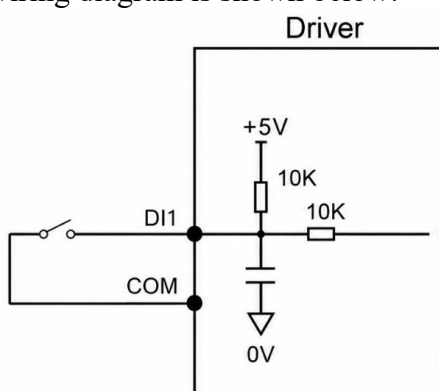
Port	Name	Function
Input	FWD/DI1	Forward rotation
	REV/DI2	Reverse rotation
	JOG/DI3	Jog
	CLR/DI4	reset
	BRK/DI5	brake(Electromagnetic Brake)
Common Terminal	COM	
analog	VAR/AI2	Analog voltage(0~5 V/10 V)/PWM
Output	5 V	+5 Vpower supply Output
	ERR/DO1	Fault output(open Output)
	SPD/DO2	Speed output(open Output)
485	A+	Signal transmission
	B-	Signal transmission

Motor running direction under factory default status (motors with different pole pairs may have different default directions; perform a no-load test before use to confirm the direction!):

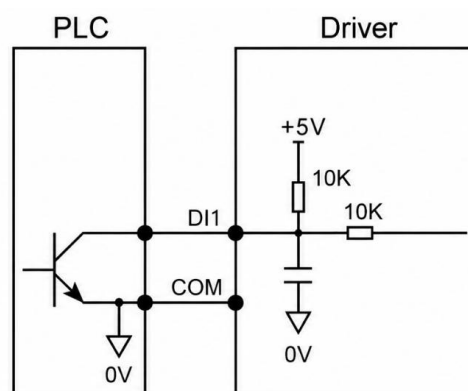


4.1.2 Input Terminal Start/Stop, Jog, and Reset Control

During terminal control, directly short the input terminal (FWD) to common (COM) for forward rotation; short the input terminal (REV) to common (COM) for reverse rotation. Users may externally connect switches (relays) or PLC (NPN) to control start/stop. The wiring diagram is shown below:



Switch (Relay) Wiring Diagram



External PLC (NPN) Wiring Diagram

When jog (JOG) is connected to common (COM), jog operation starts and the motor creeps at low speed.

When the driver has a fault, connect reset (CLR) to common (COM) to perform a reset.

When brake (BRK) is connected to common (COM) during operation, the motor enters braking state. If the motor is running at high speed or the load inertia is large, braking can impact the electrical and mechanical devices and cause significant damage. Except for emergency safety braking, such braking should be avoided. To reduce action time, reduce the speed to a safer range before breaking.

Note:

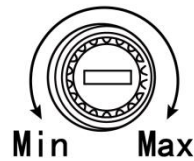
1. Do not connect FWD and REV terminals simultaneously;
2. Avoid changing motor direction at high speed; it is best to switch direction after stopping;
3. If using the brake function, calculate the safe braking speed and ensure that the motor speed is below that speed when braking.

4.1.3 analog AI1(internal Knob potentiometer) Speed setting

Analog AI1 (built-in knob potentiometer) speed setting is the factory default speed setting method for this product; adjust the knob to change speed.

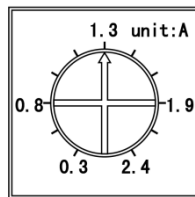
Adjust by hand or with a flat-blade screwdriver (tip diameter ≤ 3.6 mm). Turn the potentiometer clockwise to increase speed and counterclockwise to decrease speed.

调速旋钮



4.1.4 I-Lmt Current Limit Adjustment Knob

The I-Lmt current-limit adjustment knob is the factory default current-limit adjustment method. Use a Phillips screwdriver (tip diameter ≤ 3 mm) to adjust it. Turn the potentiometer clockwise to increase current and counterclockwise to decrease current. Maximum current-limit adjustment range: 0.3 A – 2.4 A.



I-Lmt

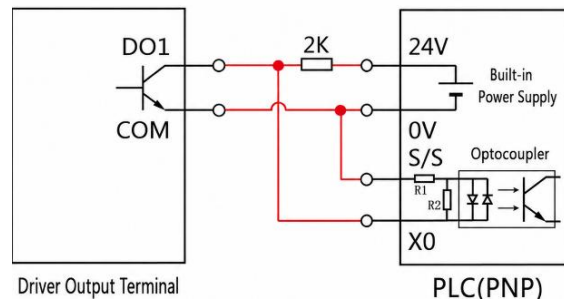
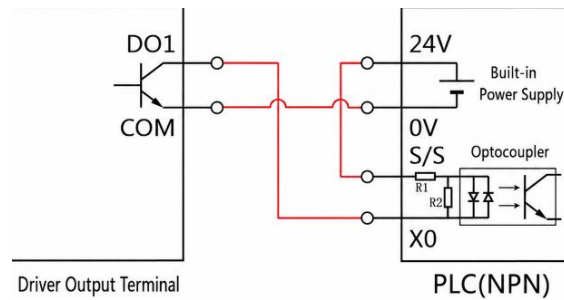
4.1.5 Analog AI2 (External Voltage) Speed Setting

Analog AI2 (external voltage) speed setting requires changing function code F00.02 to “2” through the keypad. Speed is adjusted by changing the external input voltage (default 0–5 V). Users must connect an external potentiometer themselves (recommended resistance: 10 k Ω). If a 0–10 V external voltage input is required, change function code F05.39 to “10” through the keypad. The input upper limit is 10 V. The connection diagram and actual wiring photo are shown below.

4.1.6 Output terminal

Open-collector output, sink current less than 50 mA. The DO1 port defaults to fault output, and the DO2 port defaults to speed output. Function codes F06.01 and F06.02 can be modified through the keypad to change the output selections.

When the DO1 output terminal is connected to PLC control, no function code modification is required. Two example wiring diagrams are given; actual wiring depends on the PLC brand and customer requirements.



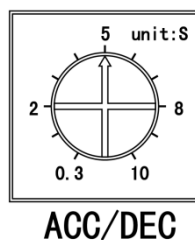
4.1.7 RS485 communication Port

This product supports RS485 communication control using the MODBUS (RTU) protocol (see Chapter 6).

4.1.8 Analog ACC/DEC (built-in knob potentiometer) acceleration/deceleration time setting

Analog ACC/DEC (built-in knob potentiometer) acceleration/deceleration time setting is the factory default acceleration/deceleration time setting method. Adjust the knob to set acceleration/deceleration time (0.3 s–10 s). To set acceleration and deceleration times separately, change function code F00.08 to 0 through the keypad, then set F00.11 acceleration time and F00.12 deceleration time.

Use a Phillips screwdriver (tip diameter ≤ 3 mm) to adjust. Turn the potentiometer clockwise to lengthen the acceleration/deceleration time (decrease acceleration), and counterclockwise to shorten the acceleration/deceleration time (increase acceleration).



4.1.9 DIP Switch

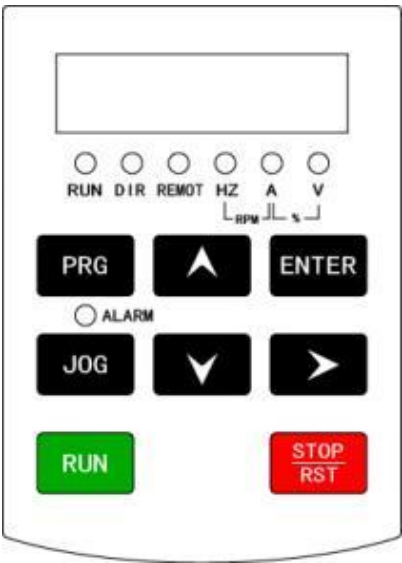
The DIP switch has six positions, SW1–SW6. Switching down is ON and is the factory default control mode of the driver.

SW1(open loopselect)	Closed		Open loop=OFF				Closed loop=ON			
SW2(analogselect)			AI1=OFF				AI2=ON			
SW3(controlmethodselect)			internal=OFF				485=ON			
SW4(Motor pole pairs)	2	ON	3	OFF	4	ON	5	OFF		
SW5(Motor pole pairs)		ON		ON		OFF		OFF		
SW6(termination resistor)	485 termination resistors =ON									

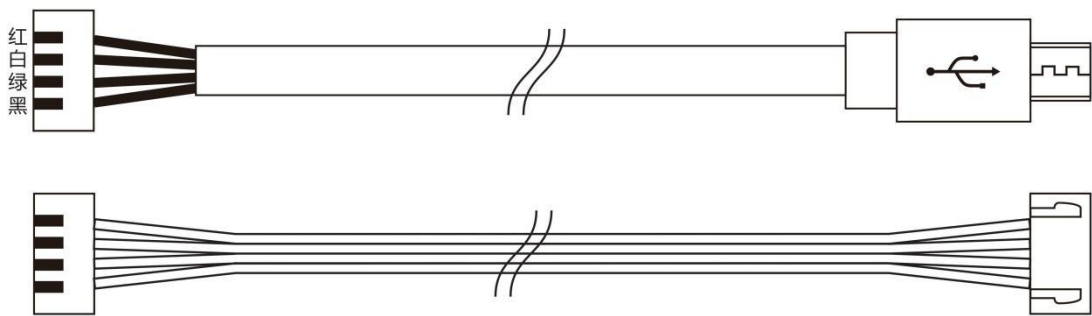
4.2 keypad control

4.2.1 Keypad Introduction

The external keypad ZBLD.C20-KB5T-U can be used to set driver parameters and read driver status.



Select the appropriate keypad connecting cable according to the keypad interface type of the driver.



键盘连接线，长度500mm

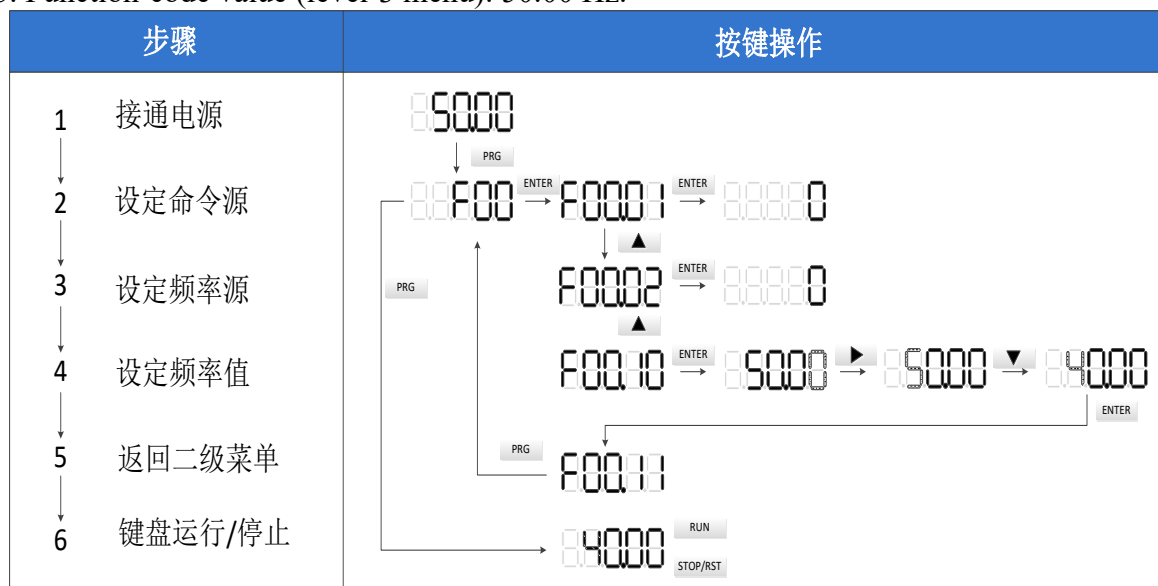
No.	Name	Description	
1	Digital display area	5, display Function Code, run parameter fault alarm.	
2	Status indicator	RUN	Off: stopped state; Flashing: parameter identification; On: running state
		DIR	Off: Forward rotation; On: Reverse rotation
		REMOT	Off: keypad control; Flashing: terminal control; On: communication control
		ALARM	Off: No fault; Flashing: pre-alarm state; On: fault state
3	Unit indicator	Hz	frequency unit
		A	current unit
		V	voltage unit
		RPM	speed unit
		%	percentage
4	Button area	PRG	Programming key enter or exit level-1 menu
		ENTER	Confirm key enter menu screens step by step and confirm parameter settings

No.	Name	Description		
		Λ	Increase key	increase data or function code
		V	Decrease key	decrease data or function code
		>	Right-shift key	In stop/run display mode, press the Down or Right key to select the parameter to be displayed. When modifying parameters, select the parameter to be modified.
		JOG	Jog key	Jogrun Operation (External Keypad Yes JOG)
		RUN	Run key	run Operation
		STOP/RST	Stop/Reset key	used for stopping during running state used for reset in fault state

4.2.2 Keypad Operation

The driver has a three-level operation menu:

1. Function-code group number (level-1 menu): such as F00;
2. Function-code number (level-2 menu): F00.00;
3. Function-code value (level-3 menu): 50.00 Hz.



In the level-3 menu, if no parameter digit flashes, the function code cannot be modified.

Possible reasons include:

- 1) The function code is read-only, such as operating frequency or fault code;
- 2) The function code is writable only when stopped and can be modified only after stopping.

4.2.3 Function Code

The parameters of the C20 driver are grouped by function. There are 11 groups from F00 to F10; other undisplay groups are reserved. Each function group includes several function codes.

Attribute description: “R/W” = readable/writable; “R/W*” = readable/writable when stopped; “RO” = read-only; “N” = reserved.

parameter	Name	Setting Range	default value	Attribute
F00 Basic function group				
F00.00	Control mode	0: Test mode 1: Hall open loop 2: Hall closed loop	3	R/W*

parameter	Name	Setting Range	default value	Attribute
		3: DIP switch setting(SW1 valid)		
F00.01	Run command selection	0: Keypad run-command channel(LED Off) 1: Terminal run-command channel(LEDflashing) 2: Communication run-command channel(LED On) 3: DIP switch setting(SW3 valid)	3	R/W
F00.02	Speed selection reference	0: Keypad digital setting 1: Analog AI1 setting(Knob potentiometer) 2: Analog AI2 setting(external voltage) 3: MODBUS communication setting 4: Multi-speed setting 5: DIP switch setting(SW2/SW3 valid) 6: Simple PLC setting(F04) 7: High-speed pulse input setting(F05.00 select HDI) 8: CAN communication setting(valid for some models)	5	R/W
F00.03	Upper operating frequency	F00.04~500.00 Hz	250.00 Hz	R/W*
F00.04	Lower operating frequency	0.00 Hz~F00.03(maximum frequency)	5.00 Hz	R/W*
F00.05	Communication run command channel selection	0: MODBUS communication channel 1: CAN communication channel(valid for some models)	0	R/W*
F00.06	Pole-pair selection setting	0: Function-code setting(F02.05) 1: DIP Switch (valid for some models)	1	R/W*
F00.07	Current selection setting	0: Function-code setting(F02.04) 1: Analog setting(valid for some models)	1	R/W*
F00.08	Acceleration/deceleration time setselect	0: Function-code setting(F00.11, F00.12) 1: Analog setting(keypad terminal valid)	1	R/W*
F00.09	Jog set frequency	0.00 Hz~F00.03(maximum frequency)	10.00 Hz	R/W
F00.10	Keypad set frequency	0.00 Hz~F00.03(maximum frequency)	250.00 Hz	R/W
F00.11	Acceleration time 1	0.1~600.0 s	1.0 s	R/W
F00.12	Deceleration time 1	0.1~600.0 s	1.0 s	R/W
F00.13	Running direction selection	0: Run in default direction 1: Run in opposite direction 2: Reverse rotation prohibited	0	R/W
F00.14	Carrier setting frequency	8.0~20.0 k Hz	Determined by model	R/W*
F00.15	Parameter selection restore	0: No operation 1: Restore function-code default values 2: Restore CANOPEN communication parameter defaults 3: Restore all parameters	0	R/W*
F01 Start/stop control group				
F01.05	Stop mode selection	0: Deceleration stop	1	R/W

parameter	Name	Setting Range	default value	Attribute
		1: Coast stop		
F01.06	Forward/reverse dead time	0.000~9.999 s	0.200 s	R/W
F01.07	Reserved	0~1	0	R/W*
F1.08	Electronic brake current-limit point	0.1%~200.0%	5.0%	R/W
F01.09	Electronic brake adjustment time	0.1~999.9 s	5.0 s	R/W
F01.10	Stop speed	0.00~50.00 Hzdeceleration stop valid	0.20 Hz	R/W
F01.11	Forward/reverse switching limit frequency	0.0~500.0 Hzdeceleration stop valid	50.0 Hz	R/W
F01.12	Electronic braking torque holding time	0.1~600.0 s	0.0 s	R/W
F01.13	Braking enable during deceleration stop	0: Disabled 1: Enabled deceleration stop brake(F01.05=0 valid)	1	R/W
F01.14	Reduction ratio numerator	1~9999	1	R/W
F01.15	Reduction ratio denominator	display speed=Motor speed/(Reduction ratio numerator/Reduction ratio denominator)	1	R/W
F02 Motor parameter group				
F02.00	Rated motor power	15~2200 W	Determined by model	R/W*
F02.01	Rated motor frequency	0.01 Hz~500 Hz	Determined by model	R
F02.02	Rated motor speed	1~9999 rpm	Determined by model	R
F02.03	Rated motor voltage	0~1200 V	Determined by model	R
F02.04	Rated motor current	0.8~999.9 A	Determined by model	R/W*
F02.05	Motor pole pairs	1~20	5	R/W*
F02.08	Special setting parameter	Bit0: 0=Hall count in default direction 1=Hall count reverse(F09.29, F09.30) BIT1: 0=Speed display actual value 1=Speed display set value	0	R/W*
F03 Control parameter group				
F03.00 ~ F03.18	Reserved	Reserved	16.0	N
F04 Simple PLC and multi-speed group				

parameter	Name	Setting Range	default value	Attribute
F04.00	Simple PLC mode	0: Stop after one run 1: Keep final value after one run 2: Cyclic operation 3~n: Stop after n-1 cycles, nlarge 9999	0	R/W
F04.01	Multi-speed 0	-100.0~100.0%	0.0%	R/W
F04.02	Multi-speed 1	-100.0~100.0%	0.0%	R/W
F04.03	Multi-speed 2	-100.0~100.0%	0.0%	R/W
F04.04	Multi-speed 3	-100.0~100.0%	0.0%	R/W
F04.05	Multi-speed 4	-100.0~100.0%	0.0%	R/W
F04.06	Multi-speed 5	-100.0~100.0%	0.0%	R/W
F04.07	Multi-speed 6	-100.0~100.0%	0.0%	R/W
F04.08	Multi-speed 7	-100.0~100.0%	0.0%	R/W
F04.09	Multi-speed 8	-100.0~100.0%	0.0%	R/W
F04.10	Multi-speed 9	-100.0~100.0%	0.0%	R/W
F04.11	Multi-speed 10	-100.0~100.0%	0.0%	R/W
F04.12	Multi-speed 11	-100.0~100.0%	0.0%	R/W
F04.13	Multi-speed 12	-100.0~100.0%	0.0%	R/W
F04.14	Multi-speed 13	-100.0~100.0%	0.0%	R/W
F04.15	Multi-speed 14	-100.0~100.0%	0.0%	R/W
F04.16	Multi-speed 15	-100.0~100.0%	0.0%	R/W
F04.17	0 segment run time	0.0~999.9 s(m)	0.0 s	R/W
F04.18	1 segment run time	0.0~999.9 s(m)	0.0 s	R/W
F04.19	2 segment run time	0.0~999.9 s(m)	0.0 s	R/W
F04.20	3 segment run time	0.0~999.9 s(m)	0.0 s	R/W
F04.21	4 segment run time	0.0~999.9 s(m)	0.0 s	R/W
F04.22	5 segment run time	0.0~999.9 s(m)	0.0 s	R/W
F04.23	6 segment run time	0.0~999.9 s(m)	0.0 s	R/W
F04.24	7 segment run time	0.0~999.9 s(m)	0.0 s	R/W
F04.25	8 segment run time	0.0~999.9 s(m)	0.0 s	R/W
F04.26	9 segment run time	0.0~999.9 s(m)	0.0 s	R/W
F04.27	10 segment run time	0.0~999.9 s(m)	0.0 s	R/W
F04.28	11 segment run time	0.0~999.9 s(m)	0.0 s	R/W
F04.29	12 segment run time	0.0~999.9 s(m)	0.0 s	R/W
F04.30	13 segment run time	0.0~999.9 s(m)	0.0 s	R/W
F04.31	14 segment run time	0.0~999.9 s(m)	0.0 s	R/W
F04.32	15 segment run time	0.0~999.9 s(m)	0.0 s	R/W
F04.33	PLC restart mode	0: Restart from the first segment	0	R/W*

parameter	Name	Setting Range	default value	Attribute
	selection	1: Continue from the stage frequency at interruption		
F04.34	Multi-segment time unit selection	0: seconds(s) 1: minutes(m)	0	R/W*
F05 Input terminal parameter group				
F05.00	HDIFunctionselect	0: DI3 used as normal IO input 1: DI3 used as HDI high-speed pulse input	0	R/W*
F05.01	DI1 terminal function selection	0: No function 1: Forward run 2: Reverse run 3: Three-wire run control 4: Forward jog 5: Reverse jog 6: Coast stop 7: fault reset 8: Electronic brake 9: External fault input 10~13: Reserved 14: Forward limit 15: Reverse limit 16: Multi-speed 1 17: Multi-speed 2 18: Multi-speed 3 19: Multi-speed 4 Other: reserved	1	R/W*
F05.02	DI2 terminal function selection		2	R/W*
F05.03	DI3 terminal function selection		4	R/W*
F05.04	DI4 terminal function selection		7	R/W*
F05.05	DI5 terminal function selection		0	R/W*
F05.06	DI6 terminal function selection		0	R/W*
F05.07	DI7 terminal function selection		0	R/W*
F05.08	DI8 terminal function selection		0	R/W*
F05.09	Reserved		0	R/W*
F05.10	Input terminal polarity selection	0x000~0x1 FF	0x000	R/W
F05.11	Digital input filter time	0.000~1.000 s	0.010 s	R/W
F05.12	Virtual terminal setting	0x000~0x10 F(0: disable, 1: Enabled) BIT0: DI1 terminal BIT1: DI2 terminal BIT2: DI3 terminal BIT3: DI4 terminal BIT4: DI5 terminal BIT5: DI6 terminal BIT6: DI7 terminal BIT7: DI8 terminal	0x000	R/W*
F05.13	Terminal control run mode	0: Two-wire control 1 1: Two-wire control 2 2: Three-wire control 1 3: Three-wire control 2	0	R/W*
F05.14	DI1 terminal ON delay time	0.000~9.999 s	0.000 s	R/W
F05.15	DI1 terminal OFF delay time	0.000~9.999 s	0.000 s	R/W

parameter	Name	Setting Range	default value	Attribute
F05.16	DI2 terminal ON delay time	0.000~9.999 s	0.000 s	R/W
F05.17	DI2 terminal OFF delay time	0.000~9.999 s	0.000 s	R/W
F05.18	DI3 terminal ON delay time	0.000~9.999 s	0.000 s	R/W
F05.19	DI3 terminal OFF delay time	0.000~9.999 s	0.000 s	R/W
F05.20	DI4 terminal ON delay time	0.000~9.999 s	0.000 s	R/W
F05.21	DI4 terminal OFF delay time	0.000~9.999 s	0.000 s	R/W
F05.22	DI5 terminal ON delay time	0.000~9.999 s	0.000 s	R/W
F05.23	DI5 terminal OFF delay time	0.000~9.999 s	0.000 s	R/W
F05.24	DI6 terminal ON delay time	0.000~9.999 s	0.000 s	R/W
F05.25	DI6 terminal OFF delay time	0.000~9.999 s	0.000 s	R/W
F05.26	DI7 terminal ON delay time	0.000~9.999 s	0.000 s	R/W
F05.27	DI7 terminal OFF delay time	0.000~9.999 s	0.000 s	R/W
F05.28	DI8 terminal ON delay time	0.000~9.999 s	0.000 s	R/W
F05.29	DI8 terminal OFF delay time	0.000~9.999 s	0.000 s	R/W
F05.30	Reserved	0.000~9.999 s	0.000 s	R/W
F05.31	Reserved	0.000~9.999 s	0.000 s	R/W
F05.32	AI1 Lower limit value	0.00 V~F05.34	0.50 V	R/W
F05.33	AI1 Lower-limit corresponding setting	-300.0%~300.0%	0.0%	R/W
F05.34	AI1 Upper limit value	F05.32~10.00 V	8.50 V	R/W
F05.35	AI1 Upper-limit corresponding setting	-300.0%~300.0%	100.0%	R/W
F05.36	AI1 Input filter time	0.000 s~9.999 s	0.030 s	R/W
F05.37	AI2 Lower limit value	0.00 V~F05.39	0.20 V	R/W
F05.38	AI2 Lower-limit corresponding setting	-300.0%~300.0%	0.0%	R/W
F05.39	AI2 Upper limit value	F05.37~10.00 V	4.80 V	R/W
F05.40	AI2 Upper-limit	-300.0%~300.0%	100.0%	R/W

parameter	Name	Setting Range	default value	Attribute
	corresponding setting			
F05.41	AI2 Input filter time	0.000 s~9.999 s	0.030 s	R/W
F05.42	AI3 Lower limit value	0.00 V~F05.44	0.50 V	R/W
F05.43	AI3 Lower-limit corresponding setting	-300.0%~300.0%	0.0%	R/W
F05.44	AI3 Upper limit value	F05.42~10.00 V	8.50 V	R/W
F05.45	AI3 Upper-limit corresponding setting	-300.0%~300.0%	100.0%	R/W
F05.46	AI3 Input filter time	0.000 s~9.999 s	0.030 s	R/W
F05.47	AI4 Lower limit value	0.00 V~F05.49	0.50 V	R/W
F05.48	AI4 Lower-limit corresponding setting	-300.0%~300.0%	0.0%	R/W
F05.49	AI4 Upper limit value	F05.47~10.00 V	8.50 V	R/W
F05.50	AI4 Upper-limit corresponding setting	-300.0%~300.0%	100.0%	R/W
F05.51	AI4 Input filter time	0.000 s~9.999 s	0.030 s	R/W
F05.52	HDI Lower frequency value	0.00 KHZ~F05.54	0.00 KHZ	R/W
F05.53	HDI Lower-limit corresponding setting	-100.0%~100.0%	0.0%	R/W
F05.54	HDI Upper frequency value	F05.52~20.00 KHZ	19.99 KHZ	R/W
F05.55	HDI Upper-limit corresponding setting	-100.0%~100.0%	100.0%	R/W
F05.56	HDI Input filter time	0.000 s~9.999 s	0.030 s	R/W
F06 Output terminal parameter group				
F06.00	Reserved	0~1	0	R/W*
F06.01	DO1 Output selection	0: invalid 1: Running 2: running forward 3: running reverse 4: Jog running 5: Driver fault 6: Overload pre-alarm 7: Underload pre-alarm 8: Communication virtual terminal output 9: Low bus voltage 10: Speed output (Hall signal) Other: reserved	5	R/W
F06.02	DO2 Output selection		10	R/W
F06.03	DO3 Output selection		0	R/W
F06.04	DO4 Output selection		0	R/W
F06.05	Output terminal select		00	R/W
F06.06	DO1 ON delay time	0.000~9.999 s	0.000 s	R/W
F06.07	DO1 OFF delay time	0.000~9.999 s	0.000 s	R/W

parameter	Name	Setting Range	default value	Attribute
F06.08	DO2 ON delay time	0.000~9.999 s	0.000 s	R/W
F06.09	DO2 OFF delay time	0.000~9.999 s	0.000 s	R/W
F06.10	DO3 ON delay time	0.000~9.999 s	0.000 s	R/W
F06.11	DO3 OFF delay time	0.000~9.999 s	0.000 s	R/W
F06.12	DO4 ON delay time	0.000~9.999 s	0.000 s	R/W
F06.13	DO4 OFF delay time	0.000~9.999 s	0.000 s	R/W
F07 Fault and protection group				
F07.00	Driver or motor overload/underload pre-alarm selection	0x000~0x131 LED: 0: motor underload alarm, relative to motor current 1: driver underload alarm, relative to driver rated current LED ten: 0: driver underload alarm then run 1: driver underload alarm then run, overload fault then stop running 2: Driver overload alarm then run, underload fault then stop running 3: driver underload fault then stop running LED: 0: Always detect 1: Detect during constant-speed operation	0x000	R/W
F07.01	Overload pre-alarm detection level	F07.03~200%	140%	R/W
F07.02	Overload pre-alarm detection time	0.1~999.9 s	1.0 s	R/W
F07.03	Underload pre-alarm detection level	0%~F07.01	50%	R/W
F07.04	Underload pre-alarm detection time	0.1~999.9 s	1.0 s	R/W
F07.05	Motor overload protection selection	0: No protection 1: Protect	0	R/W*
F07.06	Motor overload protection coefficient	20.0%~120.0%	100.0%	R/W
F07.07	MOS self-check enable	0: Disabled 1: Enabled	0	R/W*
F07.08	Automatic current-limit level	10.0%~420.0%(relative to driver)	260.0%	R/W*
F07.09	Fault auto-reset time	0.0~999.9 s: Auto-reset time	5.0 s	R/W
F07.10	Fault auto-reset count	0: No auto reset 1~9999: Reset count	0	R/W
F07.11	Stall detection time	0.0~999.9 s: stall	3.0 s	R/W*
F07.12	Stall limit current	1.0~200.0%(relative to driver rated current)	70.0%	R/W*
F07.13	UP/DN keypad	0: Set speed fine adjustment(valid only for keypad	0	R/W

parameter	Name	Setting Range	default value	Attribute
	function setting	speed setting) 1: UP Forward jog, DNReverse jog (valid only in keypad stop or run screen)		
F07.14	Undervoltage fault detection time	0~9.999 s	1.0 s	R/W
F07.15	Phase-loss detection time	0~999.9 s	3.0 s	R/W
F07.16	User password	0: Clear user password 1~9999: User password protection active	0	R/W
F07.19	Fan control	0:Fan on during running state 1:Fan always running		
F08 Communication group				
F08.00	485 slave address	1~247, 0 broadcast address	1	R/W*
F08.01	485 communication baud-rate setting	0: 1200 BPS 1: 2400 BPS 2: 4800 BPS 3: 9600 BPS 4: 19200 BPS(default value) 5: 38400 BPS 6: 57600 BPS Note:Some drivers do not support changing the baud rate	4	R/W*
F08.02	485 data-bit parity setting	0:No parity(N, 8, 1)for RTU 1:Even parity(E, 8, 1)for RTU 2:Odd parity(O, 8, 1)for RTU 3:No parity(N, 8, 2)for RTU Note:Some drivers do not support changing parity setting	0	R/W*
F08.03	485 communication response delay	0~200 ms	5	R/W*
F08.04	485 communication timeout fault time	0.0(invalid), 0.1~60.0 s	0.0 s	R/W*
F08.05	Reserved		0	R/W*
F08.06	485 communication processing action selection	0x0~0x1 LED: 0: write operation has response 1: write operation has no response	0x00	R/W*
F08.10	CAN slave address	1~127	1	R/W*
F08.11	CAN baud rate	0: 10 K(not supported by some models) 1: 20 K 2: 50 K 3: 100 K 4: 125 K(Default) 5: 250 K 6: 500 K	4	R/W*

parameter	Name	Setting Range	default value	Attribute
		7: 1 M		
F08.12	CAN communication response delay	0~200 ms	5 ms	R/W*
F08.13	CANcommunication select	0: CANModbus 1: CANOpen ()	0	R/W*
F08.14	CAN function setting	CAN Open function setting BIT0~BIT7: BIT0:action selection when not in Operational state during running 0=stop and report fault E.CAN5 1=keep previous state BIT1:heartbeat timeout action selection 0=stop and report fault E.CAN4 1=keep previous state BIT2:enable CAN receive/transmit faults 0=disable E.CAN2, E.CAN3 fault 1=allow E.CAN2, E.CAN3 fault CAN Modbus function setting BIT8~BIT15: BIT8:CANModbus broadcast response selection 0=broadcast without response 1=broadcast with response	0x00	R/W*
F09 Monitoring parameter group				
F09.00	Set frequency	0.00 Hz~F00.03	0.00 Hz	RO
F09.01	Output frequency	0.00 Hz~F00.03	0.00 Hz	RO
F09.02	Ramp reference frequency	0.00 Hz~F00.03	0.00 Hz	RO
F09.03	output voltage	0.0~1200.0 V	0.0 V	RO
F09.04	Output current	0.00~100.00 A	0.00 A	RO
F09.05	Set speed	0~65535 RPM	0 RPM	RO
F09.06	Motor speed	0~65535 RPM	0 RPM	RO
F09.07	Output power	0~2200 W	0 W	RO
F09.08	DC bus voltage	0.0~2000.0 V	0 V	RO
F09.09	Hall value	0~7	0	RO
F09.10	Software version	1.00~99.99	1.00	
F09.11	Current fault type	0: No fault	0	RO
F09.12	Previous fault type 1	1: Hardware overcurrent during acceleration(E.OCH1)	0	RO
F09.13	Previous fault type 2	2: Hardware overcurrent during deceleration(E.OCH2)	0	RO
F09.14	Previous fault type 3	3: Hardware overcurrent at constant speed(E.OCH3) 4: acceleration current(E.OC1)	0	RO

parameter	Name	Setting Range	default value	Attribute
F09.15	Previous fault type 4	5: deceleration current(E.OC2) 6: constant speed current(E.OC3) 7: Overvoltage during acceleration(E.OV1) 8: Overvoltage during deceleration(E.OV2) 9: Overvoltage at constant speed(E.OV3) 10: Bus undervoltage fault(E.Uv) 11: Motor overload(E.OL1) 12: Driver overload(E.OL2) 13: Hall fault(E.HALL) 14: Stall fault(E.LOC) 15: Rectifier module overheat(E.OH1) 16: Inverter module overheat fault(E.OH2) 17: external fault(E.EF) 18: 485 communication fault(E.485) 19: Current detection fault(E.CUr) 20: U Protect(E.OUt 1) 21: V Protect(E.OUt 2) 22: W Protect(E.OUt 3) 23: overload(E.OL3) 24: underload fault(E.LL) 25: MOS Short-circuit fault(E.Sht) 26: Panel communication error(E.bo Ad) 27: EEPROM storage fault(E.EEP) 28: MOS conduction fault(E.Cnd) 29: Hardware overcurrent feedback fault(E.OCHF) 30: Output phase-loss fault(E.POUT) 31: CAN Bus-off fault(E.CAN1) 32: CAN transmit error(E.CAN2) 33: CAN receive error(E.CAN3) 34: Internal communication fault(E.Conn) 35: CAN Open heartbeat timeout(E.CAN4) 36: CAN Open NMT operation fault(E.CAN5)	0	RO
F09.16	Inverter temperature	-20.0~120.0°C	0.0°C	RO
F09.17	Digital input terminal status	0000~1 FF BIT0: DI1 terminal BIT1: DI2 terminal BIT2: DI3 terminal BIT3: DI4 terminal BIT4: DI5 terminal	0	RO
F09.18	Digital output terminal status	0000~000 F Bit0: DO1 Bit1: DO2	0	RO
F09.19	AI1 input voltage	0.00~10.00 V	0.00 V	RO
F09.20	AI2 input voltage	0.00~10.00 V	0.00 V	RO
F09.21	AI3 input voltage	0.00~10.00 V	0.00 V	RO
F09.22	Peak current	0.00~100.00 A	0.00 A	RO
F09.23	DIP Switch	0x00~0xFF	0x00	RO
F09.24	Rated-current setting value	0.00~100.00 A	0.00 A	RO
F09.25	AI4 input voltage	0.00~10.00 V	0.00 V	RO

parameter	Name	Setting Range	default value	Attribute
F09.26	HDInput frequency	0.00~20.00 KHZ	0.00 KHZ	RO
F09.27	Simple PLC cycle count	0~9999	0	RO
F09.28	Pole-pair setting value	1~20	0	RO
F09.29	Hall count high 16 bits	0~65535	0	RO
F09.30	Hall count low 16 bits	0~65535	0	RO

4.3 PC Software

4.3.1 Software Introduction

1、Driver Studio is the PC software for ZD Motor driver products. It supports online commissioning of ZD Motor C20 brushless drivers with RS485 communication.

Combined with the company's series of brushless drivers, Driver Studio provides the following functions to meet most motion-control application requirements: 1, parameter 2, motor parameter 3, motor control 4, PLC Multi-speed 5, current and historical fault display 6, advanced user operation functions

4.3.2 Software Acquisition Method

Log in to the official website www.zd-motor.com, click "Product Center → Drivers," find the PC software page, and download it.

After downloading and installing the software, click "Help → Software Help" to view the operating instructions.



5. Status Display and Fault Maintenance

Precautions:

- 2、 Except for faults that require parameter modification through the keypad, all other fault maintenance must be performed with power disconnected;
- 3、 Before use, confirm that the indicator light or keypad works properly;
- 4、 Do not move, wire, or maintain the unit while the indicator is lit;
- 5、 After preliminary troubleshooting, a trial run test is recommended;
- 6、 Simple maintenance should be performed by qualified personnel familiar with basic operation of this product;
- 7、 If the fault cannot be resolved, do not disassemble the driver housing for repair without authorization. Contact sales or technical support.

5.1 Indicator Fault Alarm

The following table shows the indicator-light display when operating normally under different driver states. Refer to the table to confirm current driver status.

stop	Normal: green lightsteady on, red lightsteady off
	fault: red light, green lightflashing alternately fault
run	Normal: green lightflashing, red lightsteady off
	Current limit: green lightflashing, red lightflashing
	brake: green lightsteady on, red lightrapid flashing

The following table shows how the LED (red/green) alternately flashes to indicate the fault cause after the driver detects a fault and stops. Users can troubleshoot and repair according to the fault code.

One green flash represents 5 red One red flash represents 1. Fault code = number of green flashes × 5 + number of red flashes.

Fault Code	Fault Name	Fault Indication	Fault Cause	Corrective Action
1	Hardware overcurrent during acceleration	0 green 1 red	1, acceleration/deceleration too fast 2, voltage too low 3, driver power too small 4, sudden load applied 5, phase-to-phase short circuit 6, there is a strong external interference source	1, increase acceleration/deceleration time 2, check input voltage 3, select a higher-power driver 4, check whether the load is normal 5, check/replace cable or motor 6, check whether strong interference sources exist
2	Hardware overcurrent during deceleration	0 green 2 red		
3	Hardware overcurrent at constant speed	0 green 3 red		
4	Software overcurrent during acceleration	0 green 4 red		
5	Software overcurrent during deceleration	0 green 5 red		

Fault Code	Fault Name	Fault Indication	Fault Cause	Corrective Action
6	Software overcurrent at constant speed	1 green 1 red		
7	Overvoltage during acceleration	1 green 2 red	1, input voltage too high 2, rapid forward/reverse switching 3, driven by external force, in generating state	1, check power supply voltage 2, increase forward/reverse switching time 3, add an external braking device
8	Overvoltage during deceleration	1 green 3 red		
9	Overvoltage at constant speed	1 green 4 red		
10	Bus undervoltage fault	1 green 5 red	1, power supply voltage too low 2, acceleration too fast, external power supply protection 3, supply voltage drop 4, driver hardware abnormal	1, check power input 2, increase acceleration time 3, fault reset 4, seek technical support
11	Motor overload	2 green 1 red	1, power supply voltage low 2, motor power too large 3, motor stalled or sudden load change	1, check power input 2, set rated motor current 3, reduce load and check motor and machinery
12	Driver overload	2 green 2 red	1, power supply voltage low 2, speediest 3, load too large	1, check power input 2, increase acceleration time 3, replace large onecontrol
13	Hall fault	2 green 3 red	1, Hall wire disconnected 2, there is a strong external interference source	1, check connecting cable 2, check whether strong interference sources exist
14	Stall fault	2 green 4 red	1, load too large 2, motor	1, check motor mechanical connection 2, check motor connecting cable
16	Driver overheat fault	3 green 1 red	1, load too large 2, driver hardware abnormal	1, cooling treatment 2, derated use
19	Current detection fault	3 green 4 red	1, driver hardware damaged	1, replace driver
27	Parameter storage fault	5 green 2 red	1, upper	1, power on again
29	Overcurrent feedback fault	5 green 4 red	1, driver hardware damaged	1, replace driver
30	Output phase-loss fault	5 green 5 red	1, U/V/WOutput phase loss 2, driver hardware damaged	1, check whether U/V/W are securely connected 2, replace driver

5.2 Keypad Fault Alarm

The following table is used with the keypad. After the driver detects a fault and stops, the external keypad indicates the fault code; users can troubleshoot and repair according to the fault code.

Fault No.	Fault Code	Fault Name	Fault Cause Check	Corrective Action
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Fault No.	Fault Code	Fault Name	Fault Cause Check	Corrective Action
1	E.OCH1	Hardware overcurrent during acceleration	1, deceleration fast 2, voltage too low 3, driver power too small 4, sudden load applied 5, short circuit to ground, phase-to-phase short circuit 6, there is a strong external interference source	1, increase acceleration/deceleration time 2, check input supply voltage 3, select a driver one power level higher 4, check whether the load is short-circuited or stalled 5, check/replace cable or motor 6, check whether strong interference exists
2	E.OCH2	Hardware overcurrent during deceleration		
3	E.OCH3	Hardware overcurrent at constant speed		
4	E.OC1	Software overcurrent during acceleration		
5	E.OC2	Software overcurrent during deceleration		
6	E.OC3	Software overcurrent at constant speed		
7	E.OV1	Overvoltage during acceleration	1, input voltage too high 2, Electronic brake	1, check power supply voltage 2, modify electronic brake parameters
8	E.OV2	Overvoltage during deceleration		
9	E.OV3	Overvoltage at constant speed		
10	E.UV	Bus undervoltage fault	1, power supply voltage too low 2, acceleration fast, external power supply protection 3, 4, driver hardware abnormal	1, check grid input power supply 2, large acceleration time 3, reset fault 4, seek technical support
11	E.OL1	Motor overload	1, power supply voltage low 2, rated motor current setting is inappropriate 3, motor stalled or sudden load change large	1, check power supply voltage 2, set rated motor current 3, reduce load and check motor and mechanical condition
12	E.OL2	Driver overload	1, acceleration time fast 2, power supply voltage low 3, load too large	1, large acceleration time 2, check power supply voltage 3, replace with a driver one size larger

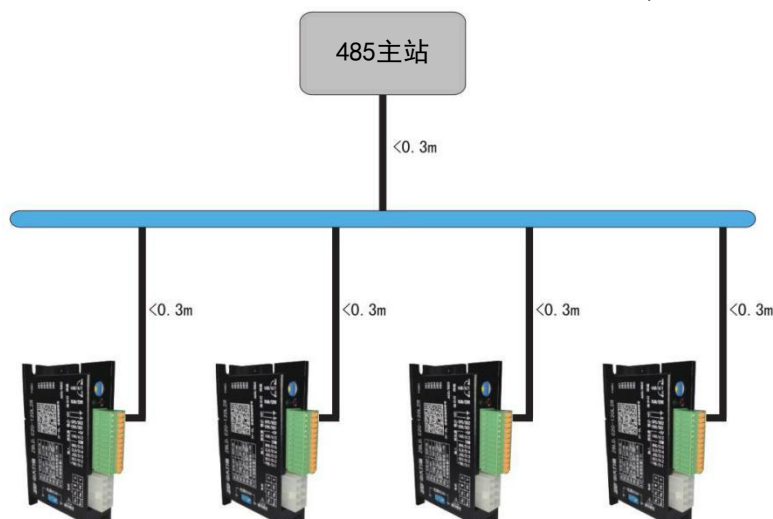
Fault No.	Fault Code	Fault Name	Fault Cause Check	Corrective Action
13	E.HALL	Hall fault	1, Hall wire disconnected 2, there is a strong external interference source	1, check Hall wiring 2, check whether strong interference exists
14	E.LOC	Stall fault	1, load too large 2, motor is jammed 3, motor phase-to-phase short circuit	1, large one driver 2, check motor mechanical connection 3, check wiring
15	E.OH1	Module overheat 1	1, ambient temperature too high	1, lower ambient temperature 2, replace the whole unit
16	E.OH2	Module overheat 2	2, thermistor damaged 3, inverter module damaged	
17	E.EF	External input fault	external fault input terminal	check terminal input source
18	E.485	485 communication fault	1, baud rate or data parity setting is incorrect 2, communication line fault 3, communication address error 4, communication subject to strong interference	1, check baud-rate parameter settings 2, check communication line 3, check communication address setting 4, replace with shielded cable to improve interference immunity
19	E.CUr	Current detection fault	circuit abnormal	replace driver
20	E.OUT1	Inverter U-phase fault	1, acceleration fast 2, inverter circuit damaged by interference 3, malfunction caused by interference	1, large acceleration time 2, replace power device 3, check Yes interference
21	E.OUT2	Inverter V-phase fault		
22	E.OUT3	Inverter W-phase fault		
23	E.OL3	Electronic overload fault	Overload pre-alarm Function	check load and overload pre-alarm point
24	E.LL	Electronic underload fault	Underload pre-alarm Function	check underload value and underload pre-alarm point
25	E.Sht	Short-circuit fault	1, MOS or inverter unit short-circuited 2, short circuit to ground	1, replace driver 2, check wiring
26	E.bo Ad	keypadcommunication fault	1, keypad 2, keypad, interference	1, check replacewiring 2, check interference
27	E.EEP	Parameter storage fault	1, EEPROMdamage 2, upperupper limit	1, reset fault 2, power on again 3, seek technical support
28	E.Cnd	fault	1, connectionmotor 2, MOS damage	1, checkmotorwiring 2, replace driver
29	E.OCHF	Overcurrent	driver hardware damaged	replace driver

Fault No.	Fault Code	Fault Name	Fault Cause Check	Corrective Action
		feedback fault		
30	E.POUT	Output phase loss	1, U/V/WOutput phase loss 2, driver hardware abnormal	1, check driver motor wiring 2, seek technical support
31	E.CAN1	CANBus-off		check CAN, wiring connection
32	E.CAN2	CAN transmit error	send	check CAN, wiring,
33	E.CAN3	CAN receive error	receive	1, check 2, check Yesinterference
34	E.Conn	Internal communication fault	internalhardwaredamage	replace driver
35	E.CAN4	timeout	CANOpen time	1, fault 2, check CAN 3, check CAN open
36	E.CAN5	NMTOperationf ault	motor run, CAN Open receive NMT, stop command	1, fault 2, NMTstate, motorstop running

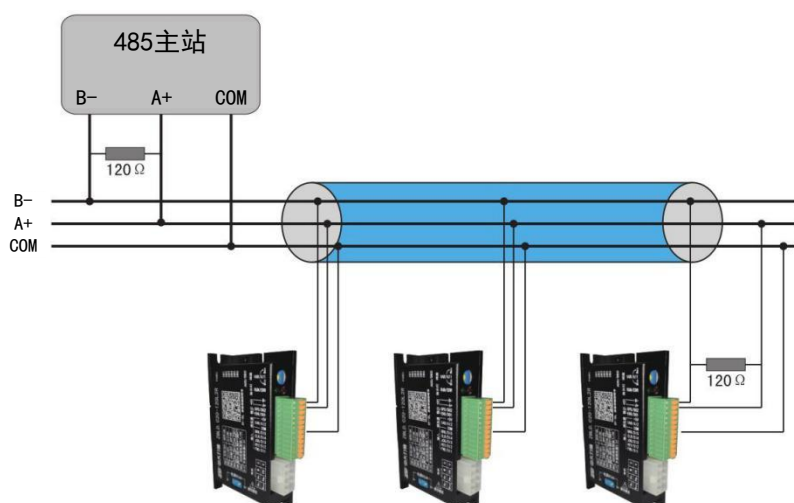
6. RS485 Communication

6.1 485 Communication Network

The RS485 communication network uses a bus connection method, as shown below.



Each RS485 transceiver device is connected to the bus, and each branch length must not exceed 10 m. Otherwise, reflections may occur and cause communication problems. The wiring diagram is shown below.

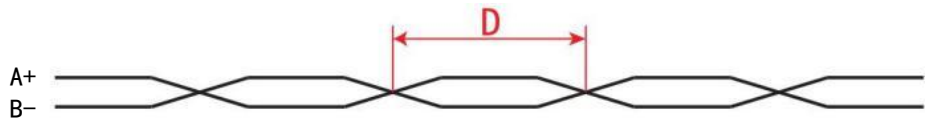


- 1、 It is recommended to use shielded twisted-pair cable. Connect two 120 Ω termination matching resistors at the two ends of the bus to prevent signal reflection. The shield layer is generally grounded reliably at a single point.
- 2、 Use a multimeter to measure the resistance between A+ and B- to confirm whether the on-site termination resistors are correct. The normal resistance should be about 60 Ω (two resistors in parallel).
- 3、 128.
- 4、 For long-distance RS485 communication, the COM common grounds of different RS485

circuits must be connected together.

6.2 485 Communication Cable

Twisted-pair cable is recommended for RS485 communication networks. Twisted pairs have good resistance to high-frequency magnetic-field noise interference and can also reduce radiation from the cable. The following figure shows the twisted pair.



The twist pitch D of the twisted pair should be less than 2 cm; the smaller the twist pitch, the better the anti-interference effect.

For short-distance, low-speed communication, shielded twisted-pair cable can be used to improve anti-interference ability, with the shield connected to PE at both ends.

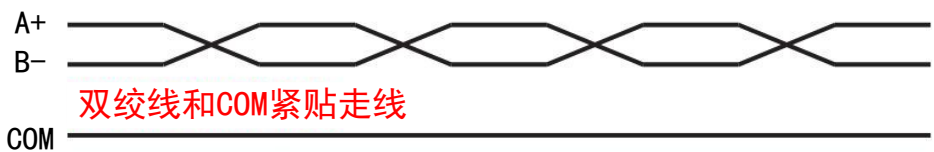
For long-distance, high-speed communication, shielded cable is not recommended because the large distributed capacitance between the shield and signal wires can cause signal transmission delay.

bus recommended:

	Signal
200 internal	0.3 mm 2, twisted pair, sheathed cable
200-500	0.5 mm 2, twisted pair, sheathed cable
500-1200	0.75 mm 2, shieldedtwisted pair, sheathed cable
1200 upper	1.0 mm 2, shieldedtwisted pair, sheathed cable, 1200 middle

6.2.1 Recommended 485 Communication Wiring Method

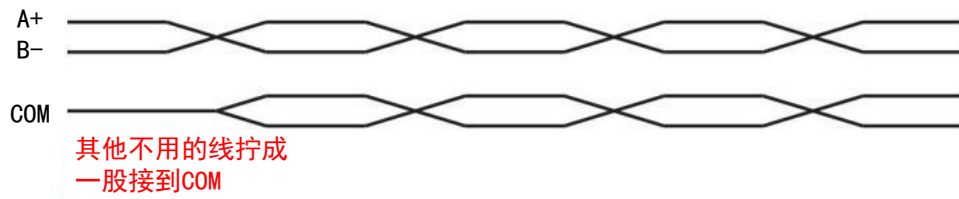
recommendedone



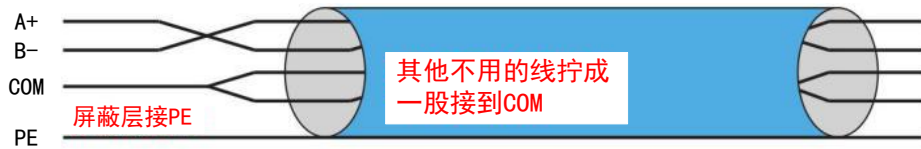
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recommendedthree



recommended four

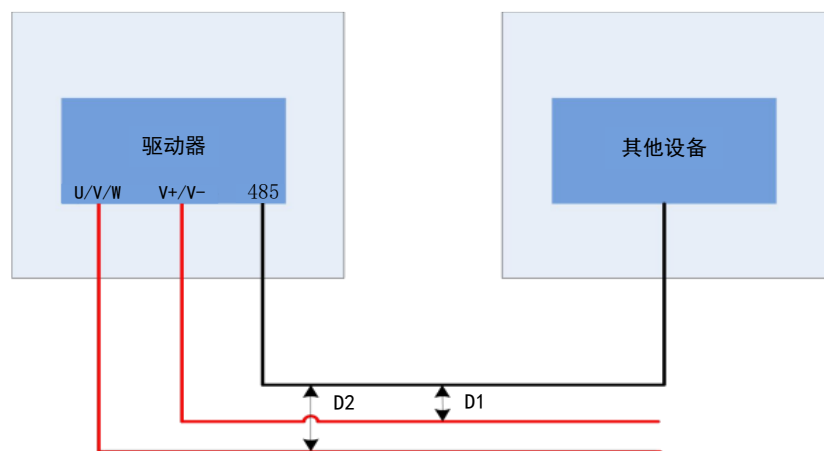


recommended five



6.2.2 Recommended 485 Communication Cable Layout

RS485 communication is susceptible to interference. If field wiring is close to interference sources, problems can easily occur. Recommended wiring method:



Route interference lines and RS485 lines as perpendicular as possible. When routed in parallel, keep the distance between the power cable and RS485 signal line $D_1 > 10 \text{ cm}$, and the distance between U/V/W and RS485 signal line $D_2 > 20 \text{ cm}$;

After leaving the cabinet, route the power cable, U/V/W power cable, and RS485 communication cable separately. If interference cables and RS485 communication cables are routed in the same cable trough, observe the same spacing principles above.

6.3 System Settings

To correctly connect the ZBLD.C20 series driver to an RS485 bus network, the related function codes must be set.

parameter	Name	Setting Range	default value	Attribute
F00.00	Control mode	0: Test mode 1: Hall open loop 2: Hall closed loop 3: DIP switch setting(SW1 valid)	3	R/W*
F00.01	Run command selection	0: Keypad run-command channel(LED Off) 1: Terminal run-command channel(LEDflashing) 2: Communication run-command channel(LED On) 3: DIP switch setting(SW3 valid)	3	R/W
F00.02	Speed reference selection	0: Keypad digital setting 1: Analog AI1 setting(Knob potentiometer) 2: Analog AI2 setting(external voltage) 3: MODBUS communication setting 4: Multi-speed setting 5: DIP switch setting(SW2/SW3 valid) 6: Simple PLC setting(F04) 7: High-speed pulse input setting(F05.00 select HDI) 8: CAN communication setting(valid for some models)	5	R/W
F00.05	Communication run command channel selection	0: MODBUS communication channel 1: CAN communication channel(valid for some models)	0	R/W*
F08.00	485 slave address	1~247, 0 broadcast address	1	R/W*
F08.01	485 communication baud-rate setting	0: 1200 BPS 1: 2400 BPS 2: 4800 BPS 3: 9600 BPS 4: 19200 BPS(default value) 5: 38400 BPS 6: 57600 BPS Note:Some drivers do not support changing the baud rate	4	R/W*
F08.02	485 data-bit parity setting	0:No parity(N, 8, 1)for RTU 1:Even parity(E, 8, 1)for RTU 2:Odd parity(O, 8, 1)for RTU 3:No parity(N, 8, 2)for RTU Note:Some drivers do not support changing parity setting	0	R/W*
F08.03	485 communication response delay	0~200 ms	5	R/W*
F08.04	485 communication timeout fault time	0.0(invalid), 0.1~60.0 s	0.0 s	R/W*
F08.05	Reserved		0	R/W*

parameter	Name	Setting Range	default value	Attribute
F08.06	485 communication processing action selection	0x0~0x1 LED: 0: write operation has response 1: write operation has no response	0x00	R/W*

6.4 Data Frame Format

MODBUS--RTUmethod				
address code	Function Code	Data	Checksum	
ADDR	CMD	DATA	CRC 16_L	CRC 16_H
1 Byte	1 Byte	n Bytes	1 Byte	1 Byte
Baud rate: 19200 (default); start bit: 1 bit; data bits: 8 bits; parity: none; stop bit: 1 bit.				
MODBUS In RTU mode, if the interval between sending or receiving any two characters exceeds 1.5 character times, the data is invalid. If the interval exceeds 3.5 character transmission times, one frame is considered complete and a new frame may begin.				

Note:

- a. address code: 1 Byte
0x00(0) broadcast address, None,;
0x01(1)-0x7 F(127) slave address;
0x80(128)-0xff(255) system reserved, do not use;
- b. Function Code: 1 Byte
0x03(3) Read Register Operation;
0x06(6) Write Single Register Operation;
0x10(16) Write Multiple Register Operation;
- c. Data: n Byte
Yes Data!
- d. Checksum: 2 Byte
CRC 16 checksum object: address code+Function Code+Data;
CRC 16 checksum algorithm: MODBUS($x_{16}+x_{15}+x_{2+1}$);
CRCChecksum, send low byte first, then high byte.

6.4.1 0x03 Read Register Operation

1, 0x03(read register)Data Frame Format

Master request			
Frame Data	Data Length	Data Content	Description
Address	1 Byte	0x01-0xf 7	
Function Code	1 Byte	0x03	
Register Address	2 Byte	0x2000-0x30 ff	High Byte+Low Byte
Number of Registers	2 Byte	0x0001	High Byte+Low Byte
Checksum	2 Byte	CRC 16 L+CRC 16 H	Low Byte+High Byte
Slave response after correct reception			
Frame Data	Data Length	Data Content	Description
Address	1 Byte	0x01-0xf 7	
Function Code	1 Byte	0x03	
Byte Count	1 Byte	0x02	Total bytes in data area
Data	2 Byte	read data content	High Byte+Low Byte
Checksum	2 Byte	CRC 16 L+CRC 16 H	Low Byte+High Byte
Slave response after abnormal reception			
Frame Data	Data Length	Data Content	Description
Address	1 Byte	0x01-0xf 7	
Function Code	1 Byte	0x83	Msb=1
Exception Code	1 Byte	0x00-0xff	see 6.4.4 Exception Code
Checksum	2 Byte	CRC 16 L+CRC 16 H	Low Byte+High Byte

Note:

All register addresses are 2 bytes, high byte first and low byte second;

All register data is 2 bytes, high byte first and low byte second;

This operation can only be performed on W/R, W/R*, or R type registers.

2, 0x03(read holding register)

A) 0x01 0x0001 Register Data

	Address	Function Code	Register Address		Number of Registers		Checksum	
			High Byte	Low Byte	High Byte	Low Byte	Low Byte	High Byte
	0x01	0x03	0x20	0x01	0x00	0 X 01	CRCL	CRCH
	Address	Function Code	Byte Count		Data		Checksum	
					High Byte	Low Byte		
	0x01	0x03	0x02		0x00	0 X 01	CRCL	CRCH

B) 0x01 0x0001 Register Dataconstant

	Address	Function Code	Register Address		Number of Registers		Checksum	
			High Byte	Low Byte	High Byte	Low Byte	Low Byte	High Byte
	0x01	0x03	0x20	0x01	0x00	0 X 01	CRCL	CRCH
	Address	Function Code	Exception Code				Checksum	
			see 6.4.4 Exception Code				CRCL	CRCH

6.4.2 0x06 Write Single Register Operation

1, 0x06(write single register)Data Frame Format

Master request			
Frame Data	Data Length	Data Content	Description
Address	1 Byte	0x01-0xf 7	
Function Code	1 Byte	0x06	
Register Address	2 Byte	0x2000-0x30 ff	High Byte+Low Byte
Data	2 Byte	written data content	High Byte+Low Byte
Checksum	2 Byte	CRC 16 L+CRC 16 H	Low Byte+High Byte
Slave response after correct reception			
Frame Data	Data Length	Data Content	Description
Address	1 Byte	0x01-0xf 7	
Function Code	1 Byte	0x06	
Register Address	2 Byte	0x2000-0x30 ff	High Byte+Low Byte
Data byte count	2 Byte	written data content	High Byte+Low Byte
Checksum	2 Byte	CRC 16 L+CRC 16 H	Low Byte+High Byte
Slave response after abnormal reception			
Frame Data	Data Length	Data Content	Description
Address	1 Byte	0x01-0xf 7	
Function Code	1 Byte	0x86	Msb=1
Exception Code	1 Byte	0x00-0xff	see 6.4.4 Exception Code
Checksum	2 Byte	CRC 16 L+CRC 16 H	Low Byte+High Byte

Note:

All register addresses are 2 bytes, high byte first and low byte second;

All register data is 2 bytes, high byte first and low byte second;

This operation can only be performed on W/R or W/R* type registers.

2, 0x06(write single register)

A) 0x01 0x2001 Register Data

	Address	Function Code	Register Address		Data		Checksum	
			High Byte	Low Byte	High Byte	Low Byte	Low Byte	High Byte
	0x01	0x06	0x20	0x01	0x00	0 X 01	CRCL	CRCH
	Address	Function Code	Register Address		Data		Checksum	
			High Byte	Low Byte	High Byte	Low Byte		
	0x01	0x06	0x20	0x01	0x00	0 X 01	CRCL	CRCH

B) 0x01 0x0001 Register Dataconstant

	Address	Function Code	Register Address		Data		Checksum	
			High Byte	Low Byte	High Byte	Low Byte	Low Byte	High Byte
	0x01	0x06	0x20	0x01	0x00	0 X 01	CRCL	CRCH
	Address	Function Code	Exception Code				Checksum	
			see 6.4.4 Exception Code				CRCL	CRCH

6.4.3 0x10 Write Multiple Register Operation

1, 0x10(write multiple registers)Data Frame Format

Master request			
Frame Data	Data Length	Data Content	Description
Address	1 Byte	0x00-0xf 7	
Function Code	1 Byte	0x10	
Starting Register Address	2 Byte	0x2000-0x30 ff	High Byte+Low Byte
Number of Registers	2 Byte	N	High Byte+Low Byte
Total data bytes	1 Byte	2*N	
Data	2*NByte		High Byte+Low Byte
Checksum	2 Byte	CRC 16 L+CRC 16 H	Low Byte+High Byte
Slave response after correct reception			
Frame Data	Data Length	Data Content	Description
Address	1 Byte	0x01-0xf 7	
Function Code	1 Byte	0x10	
Starting Register Address	2 Byte	0x2000-0x30 ff	High Byte+Low Byte
Number of Registers	2 Byte	N	High Byte+Low Byte
Checksum	2 Byte	CRC 16 L+CRC 16 H	Low Byte+High Byte
Slave response after abnormal reception			
Frame Data	Data Length	Data Content	Description
Address	1 Byte	0x01-0xf 7	
Function Code	1 Byte	0x90	Msb=1
Exception Code	1 Byte	0x00-0xff	see 6.4.4 Exception Code
Checksum	2 Byte	CRC 16 L+CRC 16 H	Low Byte+High Byte

Note:

All register addresses are 2 bytes, high byte first and low byte second;

All register data is 2 bytes, high byte first and low byte second;

This operation can only be performed on W/R or W/R* type registers.

2, 0x10(write multiple registers)

Write data to registers 0x2000 and 0x2001 of slave 0x01.

	Address	Function Code	Starting Register Address		Number of Registers		Total data bytes	
			High Byte	Low Byte	High Byte	Low Byte		
	0x01	0x10	0x20	0x00	0x00	0x02	0x04	
	Register 1 Data		Register 2 Data		Checksum			
	High Byte	Low Byte	High Byte	Low Byte				
	Data 1		Data 2		CRCL	CRCH		
Normal	Address	Function Code	Starting Register Address		Number of Registers		Checksum	
			High Byte	Low Byte	High Byte	Low Byte		
	0x01	0x10	0x20	0x00	0x00	0x02	CRCL	CRCH
constant	Address	Function Code	Exception Code				Checksum	
	0x01	0x90	see 6.4.4 Exception Code				CRCL	CRCH

6.4.4 Exception Code

MODBUSException Code		
Exception Code		Description
0x01	Illegal command	The slave does not support this command or processes this request in an error state.
0x02	Illegal data address	The host request data address is out of range.
0x03	Illegal data value	The received data contains a value that is not allowed.
0x04	Operation failed	During parameter write operation, an invalid setting was made for the parameter, such as writing a function code without enabling write permission (0x200 E).
0x05	Password error	The password written to the password verification address is incorrect.
0x06	Data frame error	The data frame length is incorrect or the RTU CRC check bit is incorrect.
0x07	Parameter is read-only	The parameter changed by the host write operation is read-only.
0x08	Parameter cannot be changed during running	The parameter changed by the host write operation cannot be changed while running.

6.5 Register List

Function Description	Address	Data Description	R/W
Communication control command	2000 H	0001 H: Forward run	W/R
		0002 H: Reverse run	
		0003 H: Forward jog	
		0004 H: Reverse jog	
		0005 H: stop	
		0006 H: stop(stop)	
		0007 H: fault reset	
		0008 H: Jogstop	
		0009 H: brakestop	
communication value Address	2001 H	Communication speed setting(0~3000(unit: 1 RPM))	W/R
	2002 H	Motor pole pairs(1~20)	W/R*
	2003 H	accelerationtime(1~6000(unit: 0.1 S))	W/R
	2004 H	decelerationtime(1~6000(unit: 0.1 S))	W/R
	2005 H	Control mode selection(0~3): 0: Test mode 1: Open loop 2: Closed loop 3: DIP switch setting(SW1 valid), close	W/R*
	2006 H	Run command selection(0~4): 0: Keypad run-command channel 1: Terminal run-command channel 2: Communication run-command channel 3: DIP switch setting(SW3 valid), close	W/R
	2007 H	Speed reference selection(0~5): 0: Keypad digital setting 1: Analog AI1 setting(Knob potentiometer) 2: Analog AI2 setting(external voltage) 3: MODBUS communication setting 4: Multi-speed setting 5: DIP switch setting(SW2/SW3 valid), close 6: PLC	W/R
	2008 H	Local communication address 1~127, 0 broadcast address	W/R*
	2009 H	communication set(0~6): 0: 1200 BPS 1: 2400 BPS 2: 4800 BPS 3: 9600 BPS 4: 19200 BPS(Default) 5: 38400 BPS	W/R*

Function Description	Address	Data Description	R/W
		6: 57600 BPS Note:	
	200 AH	Input terminal command, range: 0x000~0x1 FF	W/R
	200 BH	Output terminal command, range: 0x00~0x0 F	W/R
	200 EH	communication function code Operation Enabled: (F00~F10 Function Code) 0: function codes cannot be written via communication(Default) 1: function codes can be written via communication	W/R
	200 FH	Function code restore default values: 0: No operation 1: restore default parameters	W/R*
	2010 H	communication: (Reserved)	W/R
	2011 H	value Operation: (software Version close) 0: No operation 1: 0	W/R
	2012 H	Stop mode selection: (software Version close) 0: Deceleration stop 1: Coast stop	W/R
Driver status word 1	2100 H	0001 H: running forward	R
		0002 H: running reverse	
		0003 H: driver stopped	
		0004 H: Driver faultmiddle	
		0005 H: driver OFFstate	
		0006 H: Electronic brakestate	
Driver status word 2	2101 H	Bit0: =0: voltage =1: voltage Bit4: =0: overload =1: overload Bit5~Bit6: =00: keypad control =01: terminal control =10: communication control Bit7: =0: keypad connection =1: keypad connection	R
Driver fault	2102 H	fault Type Description	R
Driver identification code	2103 H	C20 0x0020	R
Set frequency	3000 H	0~Fmax(unit: 0.01 Hz)	R
Output frequency	3001 H	0~Fmax(unit: 0.01 Hz)	R
Ramp reference frequency	3002 H	0~Fmax(unit: 0.01 Hz)	R
output voltage	3003 H	0.0~2000.0 V(unit: 0.1 V)	R

Function Description	Address	Data Description	R/W
Output current	3004 H	0.0~300.00 A(unit: 0.01 A)	R
Set speed	3005 H	0~3000(unit: 1 RPM)	R
motor Outputspeed	3006 H	0~3000(unit: 1 RPM)	R
motor Output power	3007 H	0~2200 W	R
DC bus voltage	3008 H	0.0~2000.0 V(unit: 0.1 V)	R
Hall value	3009 H	0~7	R
Software version	300 AH	1.00~99.00	R
Most recent fault type	300 BH	fault Type Description	R
Inverter temperature	300 CH	-20.0°C~120°C(hardware supported)	R
Input terminal status	300 DH	000~1 FF	R
Output terminal status	300 EH	00~0 F	R
analog 1 input voltage	300 FH	0.00~10.00 V(unit: 0.01 V)	R
analog 2 input voltage	3010 H	0.00~10.00 V(unit: 0.01 V)	R
analog 3 input voltage	3011 H	0.00~10.00 V(unit: 0.01 V)	R
Reserved	3012 H	0~65535	R
Hall count high 16 bits	3013 H	0~65535(software Versionclose)	R
Hall count low 16 bits	3014 H	0~65535(software Versionclose)	R

Registerparameter Attribute Description:

Attribute	Description
W/R	parameter value driver state readable/writable.
W/R*	parameter value driver stopped state, readable in any state.
R	Parameter is read-only,.

6.6 Common Command Examples

slave address 0x01, 19200, N-8-1.

Operation	Data	Description
Forward run	send Data: 01 06 20 00 00 01 43 CA response Data: 01 06 20 00 00 01 43 CA	Address 2000 H 0x01
Reverse run	send Data: 01 06 20 00 00 02 03 CB response Data: 01 06 20 00 00 02 03 CB	Address 2000 H 0x02
stop	send Data: 01 06 20 00 00 05 42 09 response Data: 01 06 20 00 00 05 42 09	Address 2000 H 0x05
fault reset	send Data: 01 06 20 00 00 07 C 3 C 8 response Data: 01 06 20 00 00 07 C 3 C 8	Address 2000 H 0x07
Set speed	send Data: 01 06 20 01 0 B B 8 D 4 88 response Data: 01 06 20 01 0 B B 8 D 4 88	Address 2001 H 0x0 BB 8 Set speed 3000 RPM
Enabled Function Code	send Data: 01 06 20 0 E 00 00 E 3 C 9 response Data: 01 06 20 0 E 00 00 E 3 C 9	Address 200 FH 0x01
Function Code	send Data: 01 03 00 0 A 00 01 A 4 08 response Data: 01 03 02 13 88 B 5 12	Function Code F00.10 value 50.00 Hz (1388 H)
Function Code	send Data: 01 06 00 0 A 09 C 4 AE 0 B response Data: 01 06 00 0 A 09 C 4 AE 0 B	Function Code F00.10 value 25.00 Hz (09 C 4 H)
state 1	send Data: 01 03 21 00 00 01 8 E 36 response Data: 01 03 02 00 05 78 47	Address 2100 H
state 2	send Data: 01 03 21 01 00 01 DF F6 response Data: 01 03 02 00 41 78 74	Address 2101 H
Fault Code	send Data: 01 03 21 02 00 01 2 F F6 response Data: 01 03 02 00 0 A 38 43	Address 2102 H Fault Code: 0x0 A under voltage fault
	send Data: 01 03 00 32 00 01 25 C 5 response Data: 01 83 02 C 0 F1	Function Code F00.50 Address: 0x02
	send Data: 01 06 00 00 00 05 49 C 9 response Data: 01 86 03 02 61	Function Code F00.00 value 5 Data: 0x03

7. Basic Inspection and Maintenance

7.1 Basic Inspection

	Content
one	check driver, terminal wiring, motor machinery connection screw Yes.
	check,, driver internal.
	driver set Yes, Yes.
	wiring, wiring Yes, occur DANGER.
Operation previous (power supply)	wiring previous, motor stop running state lower.
	wiring terminal.
	wiring forward, damage occur constant.
	screw, driver internal.
	External control switch OFF state.
	Electromagnetic Brake, check stop power supply Normal.
	driver interference, low interference.
	driver external voltage forward.
previous (power supply)	motor,, occur.
	motor Yes driver Vibration, large,.
	parameter forward, machinery Yes. parameter terminal.
	new parameter, driver stop(STOP) state lower, fault occur.
	LED display Yes constant.
	keypad display set Yes constant.

7.2 Maintenance and After-sales Service

Routine maintenance

- Store and use under suitable environmental conditions.
- Clean the appearance of the driver and motor as needed to prevent dust and dirt accumulation.
- Do not disassemble mechanical parts during wiping or maintenance.
- Clean gaps in the driver housing as needed to prevent foreign matter from entering.
- Avoid long-term use in extreme environments that may cause driver faults.

Service life of components

- Electrolytic capacitor

The life of the electrolytic capacitor is mainly affected by ambient temperature and

operating conditions. According to the supplier data, under the limit condition of the maximum operating temperature of 105°C, the service life is 7000 hours. Ideally, for every 10°C decrease in operating temperature, the service life doubles.

If electrolytic capacitors are stored unused for a long time, the electrolyte gradually loses activity. Rated voltage must be applied periodically to stimulate and maintain electrolyte activity.

■ Knob potentiometer

According to supplier data, the knob potentiometer has a total rotation angle of $250^{\circ} \pm 10^{\circ}$ and rotational life of 100 cycles, $\Delta R/R \leq \pm(2\Omega + 3\%)$.

■ Knob potentiometer

Data, with the shaft rotating at 600 cycles/hour (back and forth counted as 1 cycle), 5000–8000 cycles in 24 hours, valid 90%, 10000 ± 200 Total resistance change: $\pm 15\%$ of the initial value.

■ MTBF

Mean time between failures: MTBF > 500,000 h.

After-sales service

- For usage questions, contact sales or technical support. Technical support contact information is provided at the end of this manual.
- The warranty period of this product is valid for one year from the date of shipment; free repair service is provided during the warranty period.
- If a fault occurs under normal use according to this manual, contact sales to return the product for repair. To facilitate inspection, please indicate the detailed fault cause or symptom as much as possible.
- In the following cases, responsibility lies with the user:
 - 1、 Damage caused by improper use, inappropriate repair, or modification;
 - 2、 Damage after delivery due to dropping or transportation;
 - 3、 Damage caused by use outside the product specification range;
 - 4、 Damage caused by fire, earthquake, lightning, wind disaster, chloride corrosion, or other natural disasters;
 - 5、 Damage caused by intrusion of water, oil, metal chips, or other foreign matter.

Parts for which a standard service life is specified are excluded after exceeding their respective service