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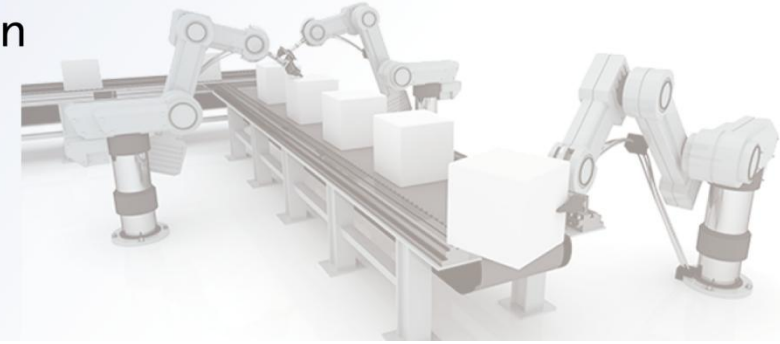
Unlock the infinite possibilities of automation applications.



ZDRV.C30-400C2-BDR-A

产品手册

Product Specification



The table below summarizes the changes and updates made to this document since the last version was issued.

Version	Date	Revision Details	Revised by
V1.01	2024.11.01	Created	Yu Chuang

Before use

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

危险 **DANGER** 	■ When performing wiring operations and installing the drive, be sure to confirm that the power supply is switched off. Changing the power wiring while the power is on is strictly prohibited; otherwise, it may cause electric shock or personal injury. ■ The electronic components on the internal circuit board of the drive are susceptible to damage from electrostatic discharge. Do not touch the circuit board with bare hands unless proper anti-static precautions have been taken. ■ Do not modify the internal components or wiring of the drive without authorization. ■ Do not use this product in environments exposed to moisture, corrosive gases, or flammable gases; otherwise, electric shock or fire may occur. ■ The drive and its accessories should be installed in locations away from open flames, heat sources, and flammable materials. ■ Before the machinery starts operating, the parameter settings must be adjusted according to the user's application requirements. Failure to set correct and appropriate values may result in loss of control or malfunction of the machinery. ■ Before the machine starts operating, please ensure that the emergency stop device can be activated at any time. ■ When powering on, ensure that the motor shaft remains stationary and does not rotate due to mechanical inertia or other factors. ■ The grounding terminals of the motor and the drive must be connected to earth together with the power supply equipment; otherwise, electric shock or equipment damage may occur. ■ It is prohibited to directly connect the drive to a computer using a USB-to-Micro USB cable.
警告 **WARING** 	■ Do not connect an AC power supply to the I/O terminals of the drive. ■ The rated voltage of the power supply system for the drive installation is AC 220 V. ■ First, test whether the drive and the motor operate normally under no-load conditions. After that, connect the load to avoid unnecessary hazards. ■ Do not switch the power supply on and off frequently. If repeated power cycling is required, limit it to no more than once per minute. ■ Do not use this product for vertical lifting or lowering of loads. ■ Only qualified professionals are permitted to install, perform wiring, and carry out maintenance on the drive.

Note:

1、For detailed explanation of product components, this manual may illustrate the product with the enclosure removed or safety covers disassembled. During actual operation, be sure to install the enclosure properly and complete wiring correctly, and operate the product strictly in accordance with this manual to ensure safety.

2、The icons and illustrations in this manual are for explanatory purposes and may differ slightly from the actual product, but this will not affect customer rights.

3、If product documentation is updated or revised, the latest version can be obtained from the SAS official website (www.motorsas.com)or the official Line account (see QR code below), without further notice.

4、For product-related usage inquiries, please consult drive technical support (see QR code below).

Synergy Asia Solution Official Line Account

Drive Technical Support

Table of Contents

1. Product Information 5
    1.1 Product Overview 5
    1.2 Model Definition 5
    1.3 Component Description 6
        1.3.1 Digital Display Module 7
        1.3.2 Run Enable Switch 7
        1.3.3 Encoder Knob 7
        1.3.4 Direction Enable Switch 7
        1.3.5 I/O Expansion Module 7
        1.3.6 Power Input Terminal and Brake Unit Connection 8
        1.3.7 Motor Power Cable 8
        1.3.8 Motor Signal Cable 8
        1.3.9 System Grounding Point 8
    1.4 Specifications 9
2. Installation Instructions 10
    2.1 Operating, Storage, and Handling Environmental Conditions 10
        2.1.1 Storage Conditions 10
        2.1.2 Operating Environment Conditions 11
    2.2 Installation Method 12
    2.3 Mounting Dimensions 14
    2.4 Electrical Wiring 15
3. I/O Module 17
    3.1 I/O Control Circuit 17
        3.1.1 DI Terminal Wiring 17
        3.1.2 DO Terminal Wiring 18
    3.2 Analog Signal Circuit 19
    3.3 Communication Control 20
        3.3.1 Host Computer Software 20
        3.3.2 Communication Methods 20
4. Operation Panel Debugging 21
    4.1 Panel Functions 21
    4.2 Panel Configuration 21
    4.3 Function Codes 22
        4.3.1 Factory Information 22
        4.3.2 Control Parameters 23
        4.3.3 Stop Modes 26
        4.3.4 Motor Parameters 27
        4.3.5 Motor Parameters 28
        4.3.6 Status Parameters 29
        4.3.7 I/O Control 31
        4.3.8 I/O Status 32

4.3.9 Analog Parameters 33
4.3.10 Motor Control 34
4.3.11 Multi-Speed Settings 35
4.3.12 RS-485 Communication Parameters 36
4.3.13 Fault History 37
4.3.14 Fault Protection Parameters 38
5. RS-485 Communication 39
5.1 RS-485 Communication Network 39
5.2 RS-485 Communication Cables 40
5.2.1 Recommended RS-485 Wiring Methods 41
5.2.2 Recommended RS-485 Cable Routing 42
5.3 System Settings 42
5.4 Data Frame Format 43
5.4.1 Recommended RS-485 Wiring Methods 44
5.4.2 0x06 Write Single Register Operation 46
5.4.3 0x10 Write Multiple Registers Operation 48
5.4.4 Exception Codes 50
5.5 Register List 51
5.5.1 Factory Information 51
5.5.2 Control Parameters 52
5.5.3 Stop Modes 55
5.5.4 Motor Parameters 56
5.5.5 Motor Parameters 57
5.5.6 Status Parameters 58
5.5.7 I/O Control 60
5.5.8 I/O Status 61
5.5.9 Analog Parameters 62
5.5.10 Motor Control 63
5.5.11 Multi-Speed Settings 64
5.5.12 RS-485 Communication Parameters 65
5.5.13 Fault History 66
5.5.14 Fault Protection Parameters 67
5.6 Common Command Examples 68
6. Faults and Maintenance 69
7. Basic Inspection and Maintenance 71
7.1 Basic Inspection 71
7.2 Maintenance and After-Sales Service 71

1. Product Information

1.1 Product Overview



Performance Features

-Adopts sensorless brushless FOC control technology

-Supports single-phase/three-phase 220V wide voltage input

-Integrated RS485 MODBUS RTU communication protocol

-Equipped with an encoder knob for precise speed setting with a light turn

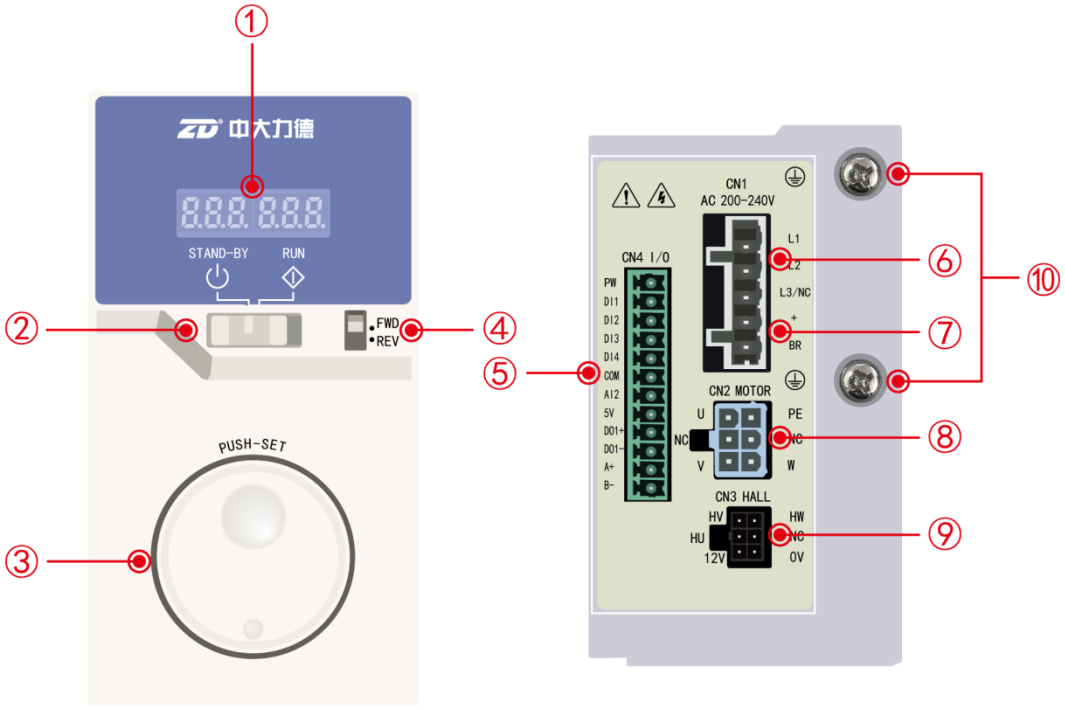
-Built-in regenerative voltage protection circuit; supports external braking unit

1.2 Model Definition

Z	DRV	•	C30	—	400	C2	—	BDR	—	A
①	②		③		④	⑤		⑥		⑦

①	Company Abbreiation	Z: ZD Leader
②	Product Type	DRV: Drivers and related products
③	Product Series	C30: C30 Sensored Series
④	Power Rating	400：400W
⑤	Power Supply Type	C2: Single-phase/Three-phase AC220V (50~60Hz)
⑥	Function	B: With braking function
		D: With digital display
		R: With RS485 communication function
⑦	Mounting Method	A: Panel mount type

1.3 Component Description



No.	Description	No.	Description
①	Digital Display Module.	⑥	Power Input Terminal
②	Run Enable Switch	⑦	Brake Unit Connection
③	Encoder Knob	⑧	Motor Power Cable
④	Direction Enable Switch	⑨	Motor Hall Sensor Cable
⑤	I/O Extension Module	⑩	System Grounding Point

1.3.1 Digital Display Module

6-digit LED display; used to monitor driver status, read fault alarms,

1.3.2 Run Enable Switch

This switch forcibly controls whether the drive is in an operating state. When the switch is set to the "RUN" position, the motor will operate; when switched back to the "STAND-BY" position, the motor will stop.

When a resettable fault occurs, toggle the switch once in the sequence "STAND-BY → RUN → STAND-BY" to reset the drive.

1.3.3 Encoder Knob

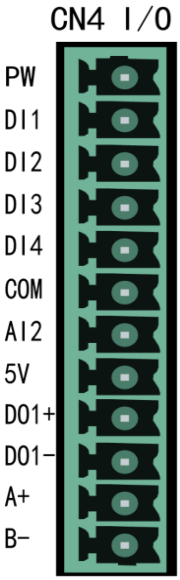
Operating Mode	Default State	Menu Mode
Rotate	Speed Adjustment	Modify Value
Jog Operation	View Other Parameters	Move the digit position left or right

Slowly rotate the knob to the right to increase the speed in increments of 1 r/min; rotate it to the left to decrease the speed in increments of 1 r/min. When the knob is rotated quickly, the speed change rate increases. For parameter adjustment, refer to Section 4: Operation Panel Debugging.

1.3.4 Direction Enable Switch

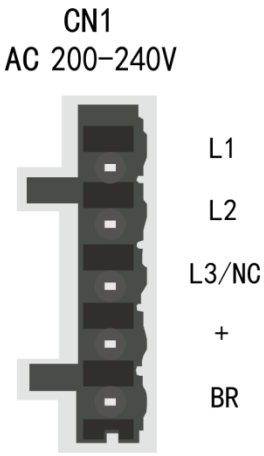
When the direction switch is set to the "FWD" position, the motor rotates forward. When the switch is set to the "REV" position, the motor rotates in reverse.

1.3.5 I/O Expansion Module



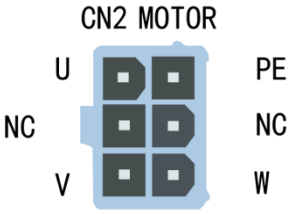
Port	Description
PW	1. Optocoupler isolation, bipolar input; supports NPN/PNP devices. 2. Input voltage: 18V–30V (Limit range: 10V–30V).
DI1	Digital input: Forward (FWD) run. (Input frequency < 10KHz, Input impedance: 1.39KΩ)
DI2	Digital input: Reverse (REV) run. (Input frequency < 10KHz, Input impedance: 1.39KΩ)
DI3	Digital input: Fault Reset. (Input frequency < 10KHz, Input impedance: 1.39KΩ)
DI4	Digital input: Emergency Stop (E-Stop). (Input frequency < 10KHz, Input impedance: 1.39KΩ)
COM	0V Common terminal
AI2	1. Voltage range: 0–10VDC 2. Input impedance: 100KΩ 3. PWM frequency: 3KHz–10KHz
5V	Provides external +5V power supply; Max output current 100mA. Typically used for external potentiometer.
DO1+	1. Optocoupler isolation, bipolar output; supports NPN/PNP devices. 2. Max terminal operating voltage: 30V; Output current < 50mA. 3. Output frequency < 10KHz
DO1-	
A+	Supports RS485 MODBUS RTU communication
B-	

1.3.6 Power Input Terminal and Brake Unit Connection



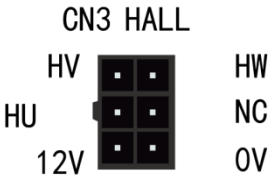
Port	Description
L1	Single-phase AC input terminal, connect to grid / Reserved for 3-phase 220V L1
L2	Single-phase AC input terminal, connect to grid / Reserved for 3-phase 220V L2
L3/NC	NC (No Connection) / Reserved for 3-phase 220V L3
+	Braking Resistor Connection
BR	

1.3.7 Motor Power Cable



Port	Description
U	Motor Power Cable - Phase U
V	Motor Power Cable - Phase V
W	Motor Power Cable - Phase W
PE	Power Supply PE and Motor PE
NC	Not Connected

1.3.8 Motor Signal Cable



Port	Description
HU	Motor Power Phase U
HV	Motor Power Phase V
HW	Motor Power Phase W
12V	12V Power Output
0V	
NC	No Connection

1.3.9 System Grounding Point

Secure using an M5 screw with a washer.It is recommended to install it on a metal mounting surface with good heat dissipation and ensure proper grounding; otherwise, there is a risk of fire.

1.4 Specifications

Functional Parameters		ZDRV.C30-400C2-BDR-A
Power Input	Rated Input Voltage	Single-phase/Three-phase AC220V (±10%)
	Rated Input Current	4.6A (Single-phase)
		2.5A (Three-phase)
	Rated Input Frequency	50Hz/60Hz (±5%)
Power Output	Rated Output Voltage	Three-phase 0V to Input Voltage
	Rated Output Current	2A
	Rated Output Power	400W
	Motor Power Cable Interface	Pluggable Terminal
	Motor Signal Cable Interface	Pluggable Terminal
	Motor Grounding Wire	Screw Fastening
Operation Control Performance	Control Mode	Sensorless Vector Control (SVC)
	Max.Output Frequency	500Hz (Adjustable via parameters)
	Speed Control Accuracy	±0.5%
	Speed Fluctuation	±0.5%
	Position Control	/
	Torque Control	/
	Overload Capability	150% rated current for 1 minute, 180% rated current for 10 seconds, 200% rated current for 1 second
	Key Functions	Speed Tracking, Stop Mode, Acceleration/Deceleration, Under Voltage, Four-quadrant Operation
	Current Limiting Function	Software Current Loop Limiting
	Terminal Functions	Forward/Reverse Operation, Forward/Reverse Jogging Fault Reset, Electronic Stop, Multi-step Speed
General Functions	Analog Input	1 Channel, 0-5V/10V
	Analog Output	/
	Modbus/RS485	Default Baud Rate: 115200, Modbus RTU protocol supported
	Host Computer	RS485 communication for host software connection Parameter setting and data reading
	CAN Communication	/
	Control Panel	Configure parameters and read data via panel keys
	Built-in Speed Control Knob	Encoder knob for speed adjustment
	Braking Resistor	External 100Ω 100W braking resistor support
Protection Mechanism	Protection Items	Output Phase Loss, Overload/Overcurrent, Under/Overvoltage, Overheat Protection
Application Environment	Operating Temperature	Operation at rated current requires ambient temperature between -10 and 40℃.,For ambient temp above 40℃ derate current by 2.5% per 1℃ increase Max ambient temp is 50℃.
	Storage Temperature	30~65℃
	Humidity	Below 90% RH, Non-condensing
	Cooling Method	Natural Cooling (Full power operation requires auxiliary heat dissipation)
	Protection Rating	IP20
	Installation Type	Wall-mounted

2. Installation Instructions

2.1 Operating, Storage, and Handling Environmental Characteristics

<table>
<tr><td colspan="6">The drive must never be exposed to harsh environments such as dust, direct sunlight, corrosive or flammable gases, oil, humidity, water droplets, or vibration.

The salt content in the air must be maintained below 0.01 mg/cm³ per year.</td></tr>
<tr><td colspan="2">Protection Rating</td><td colspan="4">IP20:Protection against the ingress of solid foreign objects with a diameter greater than 12 mm; no moisture protection.</td></tr>
<tr><td rowspan="10">Environmental Characteristics</td><td rowspan="5">Ambient Temperature</td><td rowspan="2">Operation</td><td>Standalone Installation</td><td colspan="2">-10 to 40°C
-20 to -10°C or 40 to 50°C
(derating required)</td></tr>
<tr><td>Side-by-Side Installation</td><td colspan="2">-10 to 30°C
-20 to -10°C or 30 to 40°C
(derating required)</td></tr>
<tr><td>Storage</td><td colspan="3">-33~65℃</td></tr>
<tr><td>Transportation</td><td colspan="3">-20~50℃</td></tr>
<tr><td colspan="4">Non-condensing, non-freezing</td></tr>
<tr><td rowspan="3">Rated Humidity</td><td>Operation</td><td colspan="3">Max.85%</td></tr>
<tr><td>Storage/ Transportation</td><td colspan="3">Max.90%</td></tr>
<tr><td colspan="4">Condensation is not allowed</td></tr>
<tr><td rowspan="2">Atmospheric Pressure</td><td>Operation</td><td colspan="3">86~106kPa</td></tr>
<tr><td>Storage/ Transportation</td><td colspan="3">70~106kPa</td></tr>
<tr><td>Altitude</td><td colspan="4">Operable at altitudes below 1000 m
(derating is required above 1000 m; see Section 2.2.2)</td></tr>
<tr><td>Package Drop</td><td>Storage/ Transportation</td><td colspan="4">Dropping from a height is prohibited; there is a risk of damage.</td></tr>
<tr><td>Vibration</td><td>Operation/Storage/ Transportation</td><td colspan="4">Continuous vibration is prohibited.</td></tr>
<tr><td>Shock</td><td>Operation/Storage/ Transportation</td><td colspan="4">Excessive shock is prohibited.</td></tr>
</table>

2.1.1 Storage Environment Conditions

Before installation, this product must be kept in its original packaging. If the unit is not used temporarily, in order to ensure that it remains within the scope of the company’s warranty and for future maintenance, the following precautions must be observed during storage:

1、Store in a clean,dust-free,and dry location;

2、The ambient temperature and relative humidity at the storage location must be within the specified limits;

3、Avoid storage in environments containing corrosive gases or liquids;

4、It is recommended to keep the product properly packaged and stored on shelves or flat surfaces.

2.1.2 Operating Environment Conditions

Operating Conditions	Ambient Temperature Limits
Operation Under Abnormal Ambient Temperature	When operating at the rated current, the ambient temperature must be within －10 to 40°C. If the ambient temperature exceeds 40°C, the rated current must be reduced by 2.5% for every 1°C increase. The maximum allowable ambient temperature is 50°C.
High-Altitude Operation	When the drive is used at an altitude of 0－1000 m, it shall be applied under normal operating limits. When used at an altitude of 1000－2000 m, the rated current must be reduced by 1% or the operating ambient temperature must be lowered by 0.5°C for every 100 m increase in altitude. For operation above 2000 m, please contact the manufacturer.

For long-term operation, an ambient temperature below 40°C is recommended, and the product should be installed in a well-ventilated location to ensure reliable performance.

In areas with an altitude exceeding 1000 m, due to reduced air density resulting in decreased insulation strength and poorer heat dissipation, derating is required. Operation in high-altitude areas is not recommended.

In addition, the operating conditions shall also include:

1、Locations without a large number of heat-generating devices;

2、Locations free from water droplets, steam, dust, and oil mist;

3、Locations free from corrosive or flammable gases and liquids;

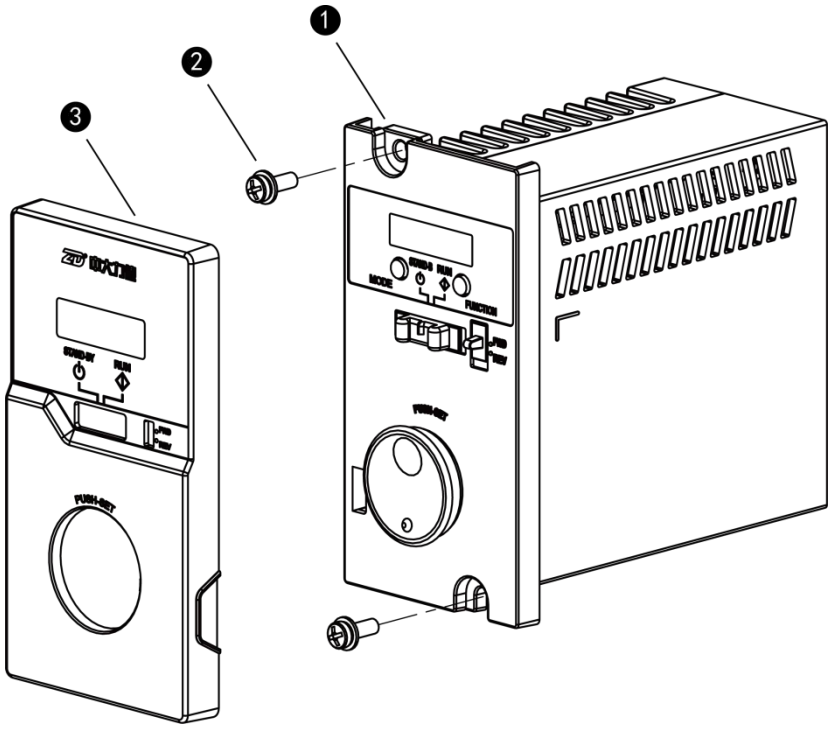
4、Locations free from airborne dust and metal particles;

5、Solid locations without vibration;

6、Locations free from electromagnetic noise interference.

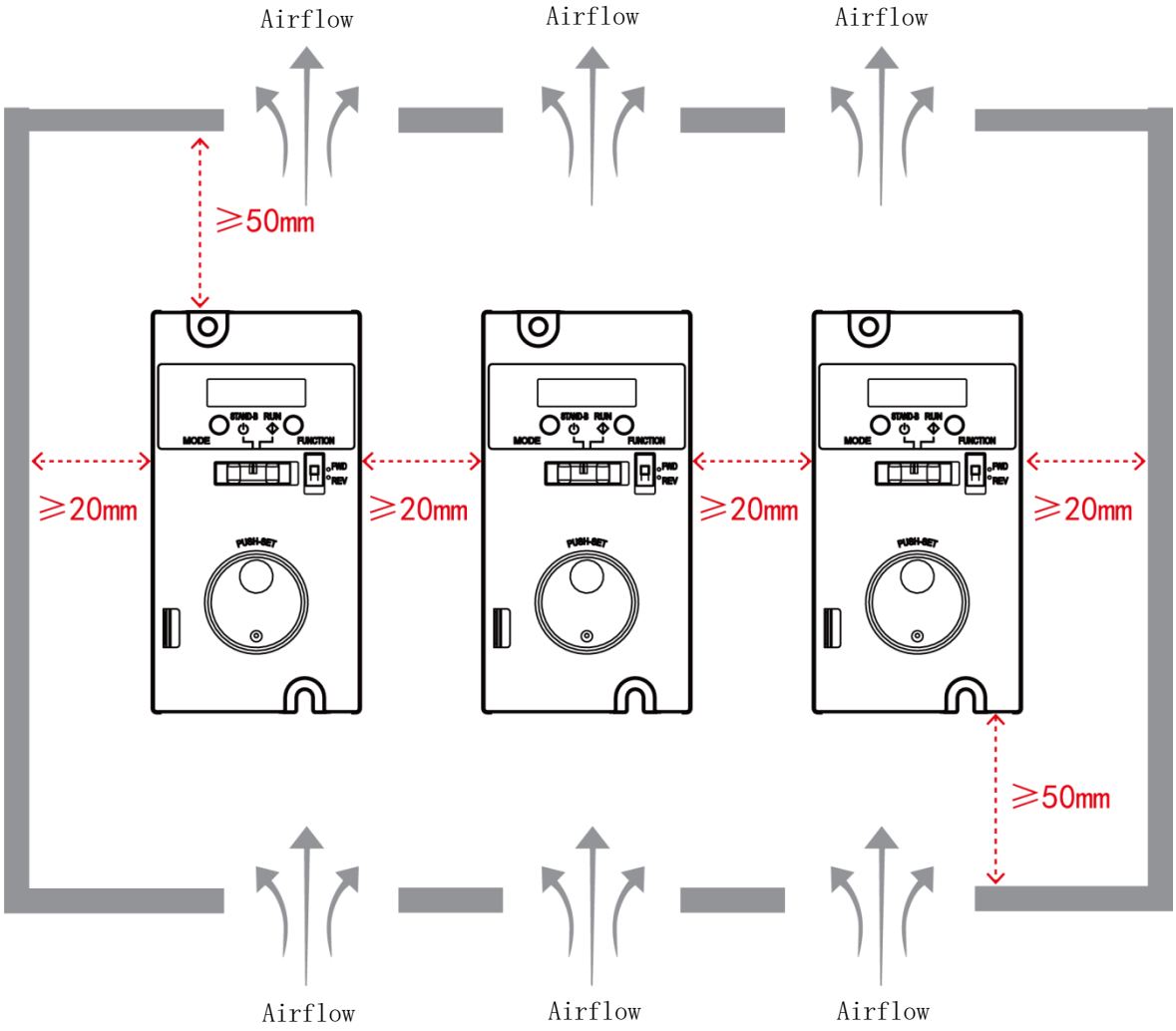
2.2 Installation Method

This product is designed for embedded installation. Before installation, remove the front housing. It is recommended to install on a metal surface with good heat dissipation. Ensure proper grounding via the grounding screw on the metal mounting surface; otherwise, there is a risk of electric shock.Refer to the panel cutout diagram and secure the unit using M4 combination screws.



- Installation Steps

1. Open the front cover ③;
2. Insert the drive unit body：① into the mounting position;
3. Secure the installation using combination screws ②
   (M4 × 12 is recommended, GB 9074.8-1988);
4. Press the front cover ③ into place until it is properly seated.



*In the installation diagram, the spacing between drives and the text annotations are not to scale. Please refer to the text annotations for accurate dimensions.

Please pay special attention to the following:

1、 Do not pull the connection cables between the drive and the motor too tightly to prevent loosening or detachment;

2、 When securing the drive, ensure that all mounting screws are fully tightened;

3、 Use M4 combination screws to fix the unit at the two mounting holes.

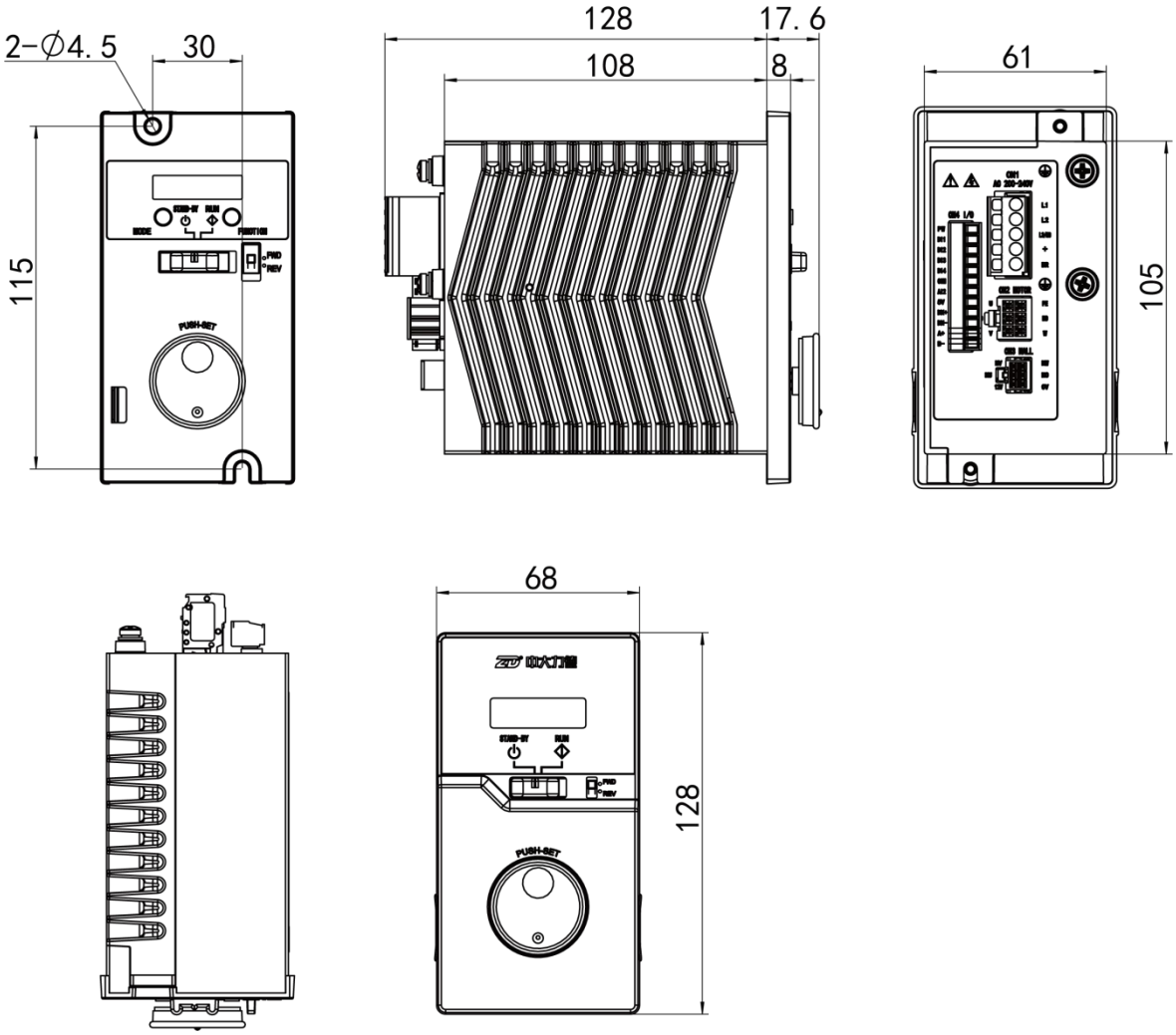
4、 Tightening torque: 1.2－1.5 N•m;

5、 The motor shaft center must be well aligned (concentric) with the equipment shaft center;

6、 The screws securing the motor must be fully tightened.

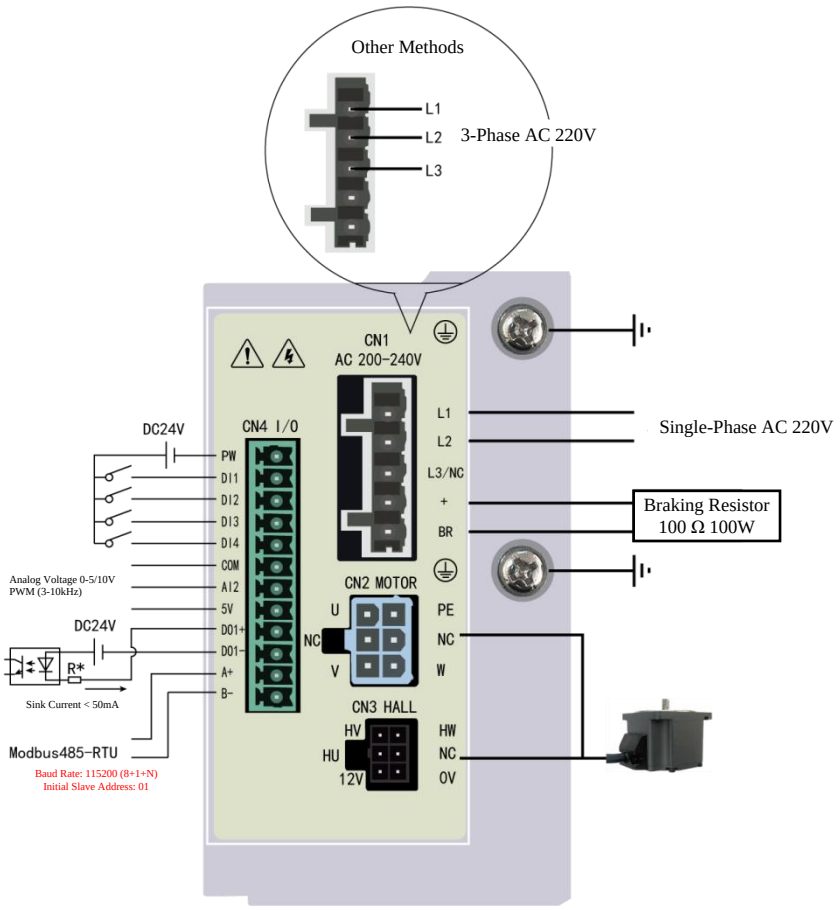
2.3 Installation Dimensions

Unit : mm



2.4 Electrical Wiring

The following figur e shows the wir ing d iagr am of the C30-400C2-BDR-A:



Precautions:

1、Before wiring, be sure to switch off the power supply. Wiring work must be carried out by qualified personnel to ensure personal safety;

2、Do not connect the power cable to any terminals other than the power input terminals, otherwise damage to the drive may occur;

3、The grounding terminal must be properly grounded;

4、Ensure that the screws between each terminal and the conductors are securely tightened to prevent loosening due to vibration;

5、When wiring, select the conductor size in accordance with applicable electrical regulations.

6、Ensure that the power supply capacity is at least twice the rated power of the motor;

7、The factory default length of the motor-to-drive connection cable is less than 1 m. If an extension is required, please contact sales;

8、After completing the wiring, recheck the following items:

(1) Are all connections correct (pay special attention to whether the power cables are connected correctly)?

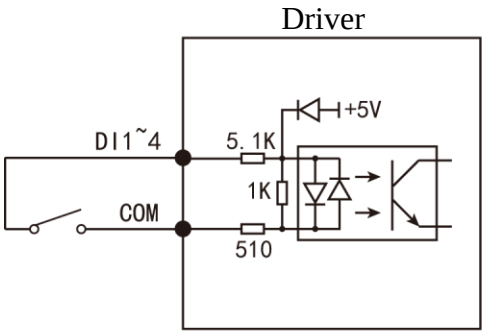
(2) Are there any missing connections?

(3) Are there any short circuits between terminals or short circuits to ground?

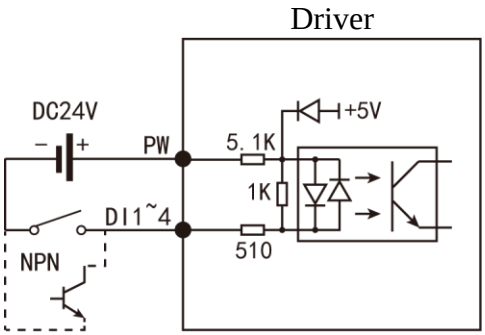
3. I/O Module

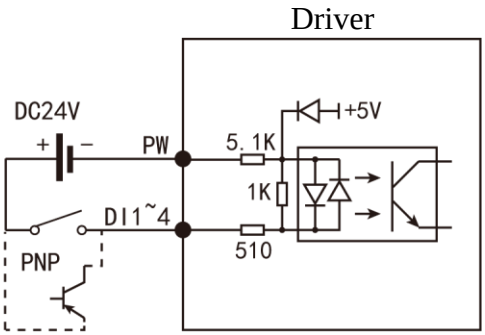
3.1 I/O Control Circuit

3.1.1 DI Terminal Wiring



Note:
1. The digital input wiring method is by short-circuiting the DI and COM ports.
2. Avoid switching the motor direction at high speeds; it is recommended to switch only when the motor is stopped.

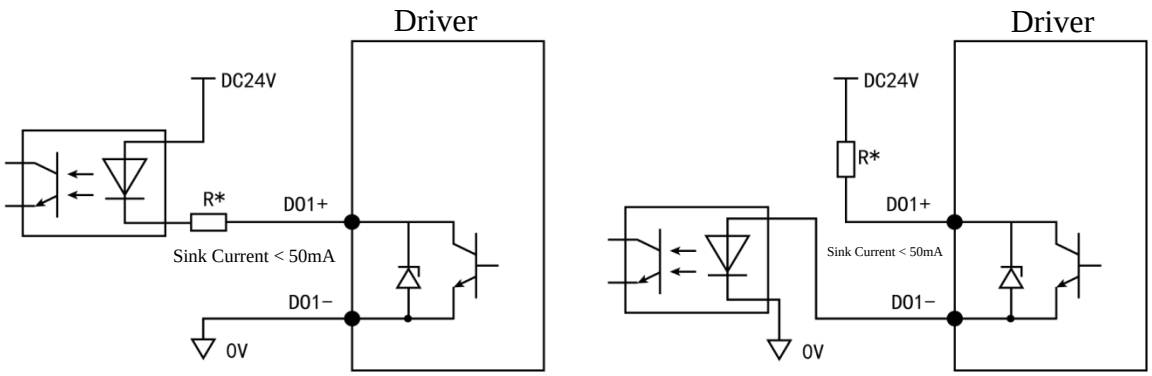




Note:
1. Triggered by a 24V loop formed between the DI port and PW;
2. DI port high level: 18V-30V.
3. Avoid switching the motor direction at high speeds; it is recommended to switch only when the motor is stopped.

3.1.2 DO Terminal Wiring

- The drive’s signal output is an open-drain output. The signal state does not indicate the voltage level, but the ON/OFF state of the internal transistor;
- External power supply: DC 5－30 V, ≤ 50 mA.



*Recommended resistance values when connecting current-limiting resistor R
At DC 24V: 2.7kΩ－5.1kΩ (1W)
At DC 5V: 510Ω－1kΩ (0.25W)

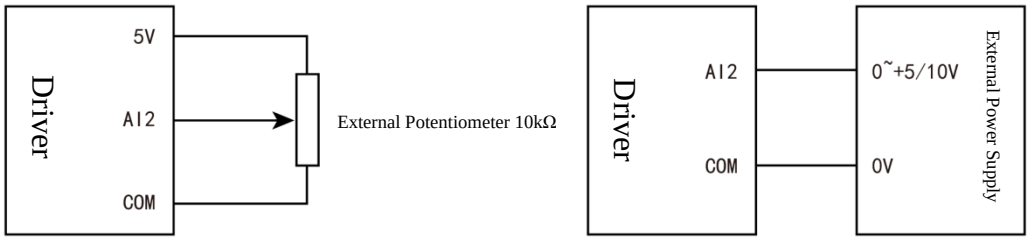
3.2 Analog Signal Circuit

- Analog input AI1 (encoder knob) speed reference:

  This is the product's default speed reference method. The speed is adjusted by turning the drive's knob. Rotating the potentiometer clockwise increases the speed, while rotating it counterclockwise decreases the speed.

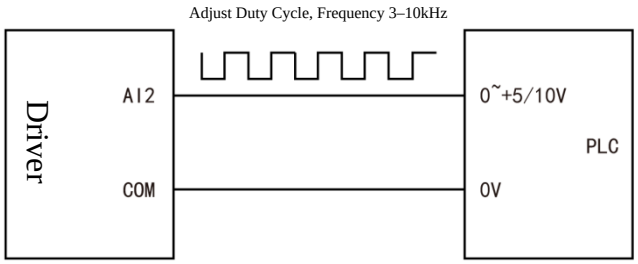
- Analog input AI2 (external voltage / PWM) speed reference:

  1、The speed is adjusted by changing the external input voltage (default 0－10 V; the voltage range can be modified via function parameters, with an upper limit of 10 V) An external potentiometer must be connected by the user (recommended resistance: 10 kΩ).
  The following figure shows two wiring diagrams:



Method 1　　Method 2

  2、Speed control is achieved by adjusting the PWM signal. Send a 3kHz－10kHz PWM signal to modulate the duty cycle, achieving a voltage adjustment of 0.2－4.8V, corresponding to a speed range of 0－3000 rpm.



3.3 Communication Control

To control this product via RS485 communication, it must first be set to communication control through the panel or host computer software, and the corresponding communication protocol must be selected.

3.3.1 Host Computer Software

DriverStudio is a universal host computer software for Zhongda Leader drive products. It supports online debugging for C30 series brushless drives with RS485 communication and can connect without using a keypad.

Combined with the company's series of brushless drives, DriverStudio provides the following functions to meet most motion control application requirements:

1、Parameter configuration and management

2、Motor parameter monitoring

3、Motor motion control

4、User-defined simple PLC and multi-speed control

5、Current and historical fault display and monitoring

6、Advanced user operation functions,

Host computer software download:

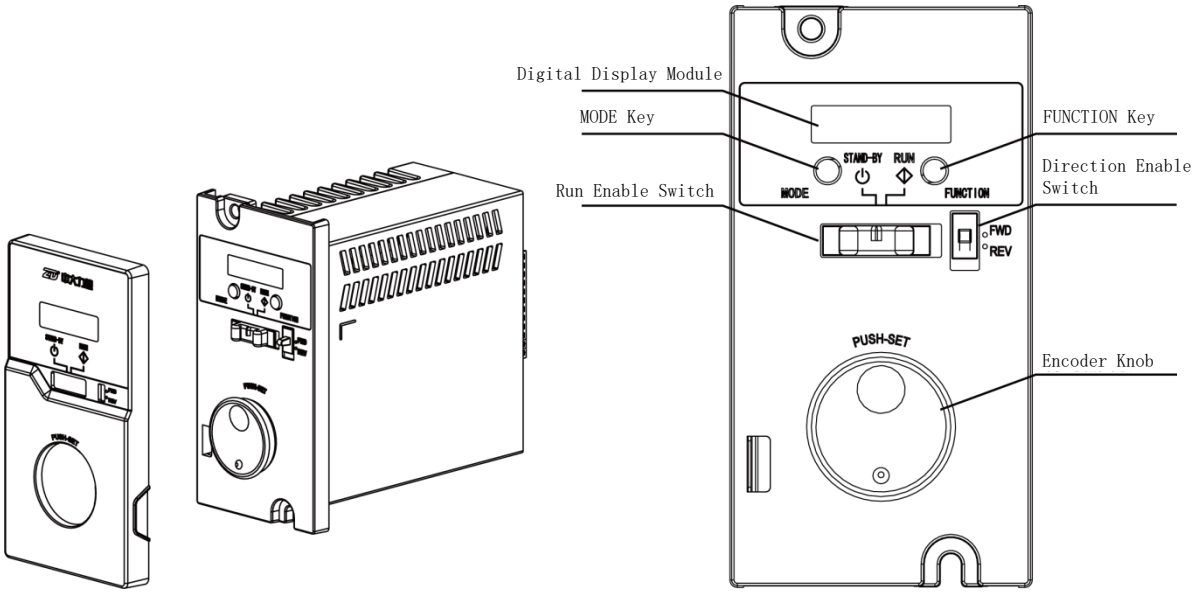
https://drive-api.zd-motor.com/api/download.php

3.3.2 Communication Method

Communication control supports the RS485 Modbus (RTU) communication protocol. The device must be set to the corresponding communication mode via the keypad or host computer software before connection. For communication details,
please refer to Chapter 5: RS485 Communication.

4. Operation Panel Debugging

4.1 Panel Functions



4.2 Panel Configuration

There are three levels of operation menus, as follows:

(1) Function code group number (Level 1 menu): e.g. F00;

(2) Function code number (Level 2 menu): F00.00;

(3) Function code value (Level 3 menu): 50.00 Hz.

Operating Steps:

1. In the stopped state, remove the drive front cover, press the “MODE” key to enter the Level 1 menu, and rotate the encoder knob to select the function code group, such as F00;

2. Press the “FUNCTION” key to enter the Level 2 menu, and rotate the encoder knob to select the function code number, such as F00.10;

3. Press the “FUNCTION” key again to enter the Level 3 menu, rotate the encoder knob to select the function code value, such as 3.0 krpm/s. After modification, press the “FUNCTION” key to confirm and return to the Level 2 menu;

4. After all function codes have been modified, press the “MODE” key to exit the menu level by level.

4.3 Function Codes

The parameters of the C30 drive are grouped by function into a total of 11 groups, from F00 to F10. Other groups that are not displayed are reserved. Each function group contains multiple function codes.

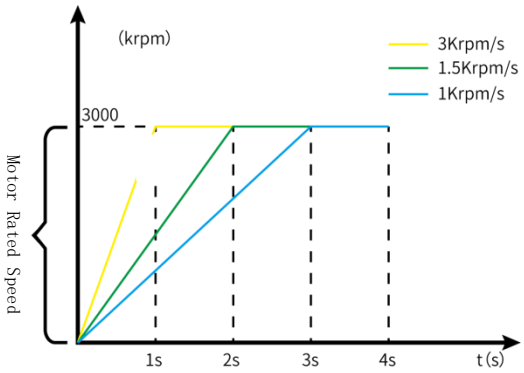
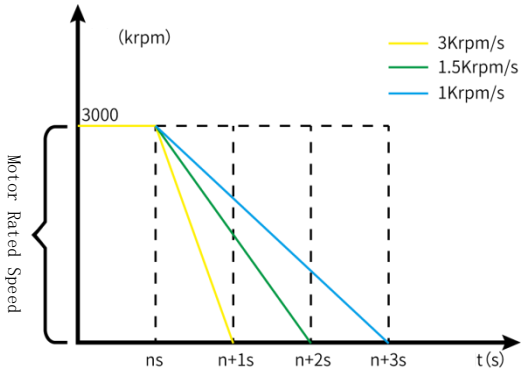
Attribute description: “RWS” = Read/Write/Save, “RWN” = Read/Write/Not saved, “RON” = Read-only/Not saved.

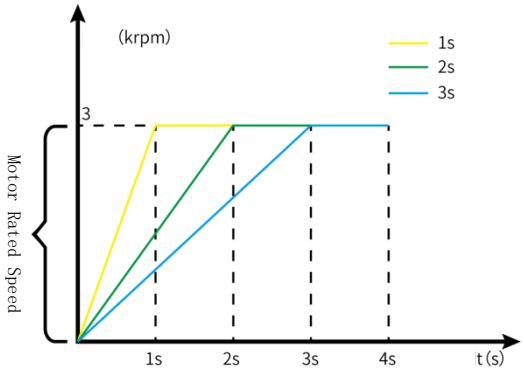
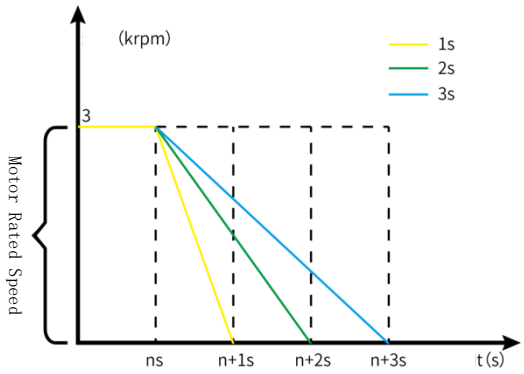
4.3.1 Factory Information

485 Address	Keypad Code	Name	Setting Range	Default Value	Attribute
2000H	F00.00	Version Number	0~30000 The current value of this function code is jointly determined by the software version at the time of programming and the hardware version of the drive. For example, in version 1102, “1” represents the hardware version, and “102” represents the software version.	/	RON
2001H	F00.01	Sub-version Number	0~30000 The current software version date; for example, 10079 indicates October 7th at 09:00.	/	RON
2002H	F00.02	Drive Rated Voltage	0~3000.0 V Displays the AC input voltage (peak value) required for the current drive.	/	RON
2003H	F00.03	Drive Rated Power	0~30000 W Displays the current drive power.	/	RON
2004H	F00.04	Default Motor Model	Reserved	0	RON
200EH	F00.14	Enable Motor Parameter Auto-Tuning	0: No operation 1: Start auto-tuning	0	RWN
200FH	F00.15	Motor Parameter Identification Completed	0: No operation 1: Completed Associated with enabling motor parameter auto-tuning F00.14 (200EH).	0	RWN
2015H	F00.21	Motor Model Selection (Reserved)	0~30000	/	RWS

4.3.2 Control Parameters

485 Address	Keypad Code	Name	Setting Range	Default Value	Attribute
2005H	F00.05	Speed Source	0: Knob Encoder knob enabled (default) 1: Analog AI2 External analog voltage input enabled 2: Host computer or knob Motor speed command written via F00.09 (2009H) is effective; the speed can be changed via RS485 communication (the encoder knob is also effective) 3: Multi-speed Used in conjunction with Enable Source F00.06 (2006H) = 0; the speed is set by multi-speed selection	0	RWS
2006H	F00.06	Enable Source	0: IO Control IO contact functions (F03 group) are enabled 1: Host computer or keypad control Run command F00.08 (2008H) is enabled	0	RWS
2007H	F00.07	Fault reset	0: No function No operation 1: Clear Clears the current drive alarm status and restores normal operating condition.	0	RWN
2008H	F00.08	Run Command	0: Stop 1: Run Enable Run command. When F00.06 (2006H) Speed Source = 1, the run command F00.08 (2008H) is effective and can be used to control drive start/stop.	0	RWN
2009H	F00.09	Motor Speed Command	-9999~9999 rpm Speed command. When the speed source F00.05 (2005H) = 2, the motor speed command F00.09 (2009H) is effective and can be used to adjust the drive speed. Note: Drive operation requires both run enable and speed command.	0	RWS
200AH	F00.10	Motor Acceleration Command	0.1~30.0 krpm/s Speed change from startup to the motor rated speed.	3.0	RWS

					
200BH	F00.11	Motor Deceleration Command	0.1~30.0 krpm/s Speed change from the motor rated speed to stop. 	3.0	RWS
200CH	F00.12	Torque Control Iq Command (Reserved)	-150~150	0	RWS
200DH	F00.13	Torque Control Iq Command (Reserved)	-150~150	0	RWS
2016H	F00.22	Control Mode Selection	0: Speed Control Reach the rated speed via the motor speed command, and achieve it through the closed-loop speed control loop. Reach the rated speed. 1: Torque Control (Reserved)	0	RWS
2017H	F00.23	External Communication Selection	0：485 Communication parameters can be configured via RS-485. 1: Reserved	0	RWS
2018H	F00.24	Speed Display Error	0~10000 rpm When |actual speed − set speed| < speed display error, the motor actual speed F02.04 (2084H) = set speed.	10	RWS

2019H	F00.25	Acceleration/ Deceleration Source	0: Acceleration/Deceleration Command 1: Acceleration/Deceleration Time	0	RWS
201AH	F00.26	Acceleration Time	0.1~30.0 s Time required to accelerate from startup to the motor rated speed. 	1.0	RWS
201BH	F00.27	Deceleration Time	0.1~30.0 s Time required to accelerate from startup to the motor rated speed. 	1.0	RWS

4.3.3 Stop Mode

485 Address	Keypad Code	Name	Setting Range	Default Value	Attribute
2010H	F00.16	Stop Mode	0: Coast Stop When the stop command is triggered, the drive immediately stops outputting frequency, and the motor coasts to a stop by inertia. 1: Deceleration Stop When the stop command is triggered, the drive first reduces the output frequency according to the deceleration rate (F00.25 = 0) or the deceleration time (F00.25 = 1). After the frequency decreases to the deceleration stop threshold F00.17 (2011H), the drive then stops.	1	RWS
2011H	F00.17	Deceleration Stop Threshold	0~9999 rpm Minimum speed during deceleration stop.	30	RWS
2012H	F00.18	Whether to maintain torque at stop.	0: Disabled 1: Enabled	0	RWS
2013H	F00.19	Torque Hold Percentage	0~30 % Outputs the field-weakening current as a percentage of the maximum current limit for torque holding.	0	RWS
2014H	F00.20	Torque Hold Time	0~600.0 s Torque holding time after torque stop. After stopping, the torque is maintained for a certain period and then released. 0: Continuously maintain torque after the run stops, and release the torque only after a run command is given again.	0	RWS

4.3.4 Motor Parameters

485 Address	Keypad Code	Name	Setting Range	Default Value	Attribute
2040H	F01.00	Rated Motor Current	0.01~300.00 A The rated motor current refers to the current value required by the motor under rated operating conditions. In practical applications, an appropriate operating current should be selected based on the motor's rated operating conditions and load requirements, and sufficient safety margin should be ensured. If the motor load current exceeds the rated current,it may cause motor overheating, damage, or even pose safety hazards.	4.00	RWS
2041H	F01.01	Maximum Motor Current	0.01~300.00 A The maximum motor current refers to the maximum current value that the motor can withstand under rated voltage. It should be noted that the maximum motor current only indicates the maximum load the motor can tolerate, and does not represent the ideal operating current for long-term operation. In practical applications, an appropriate operating current should be selected based on the motor' s rated operating conditions and load requirements.	8.00	RWS
2042H	F01.02	Rated Motor Speed	0~6000 rpm Determined based on the motor parameters provided by the motor manufacturer	3000	RWS
2043H	F01.03	Number of Motor Pole Pairs	1~100 Determined based on the motor parameters provided by the motor manufacturer	5	RWS
2048H	F01.08	Motor Parameters Self-Learning Maximum Frequency	1~500 The maximum rotational speed corresponding to dynamic learning when parameter self-learning is enabled	100	RWS

4.3.5 Motor Parameters

485 Address	Keypad Code	Name	Setting Range	Default Value	Attribute
2044H	F01.04	Motor Stator Resistance	0.001~30.000 Ω The stator winding, namely the resistance of the copper windings wound on the stator, is measured based on the matched motor before leaving the factory.	0.933	RWS
2045H	F01.05	Motor d-axis Inductance	0.01~300.00 mH d-axis inductance, measured based on the matched motor before leaving the factory	5.65	RWS
2046H	F01.06	Motor q-axis Inductance	0.01~300.00 mH q-axis inductance, measured based on the matched motor before leaving the factory	5.65	RWS
2047H	F01.07	Motor Back EMF Constant	0.001~10.000 V/Hz When the motor rotor rotates, a back electromotive force (back EMF) is induced in the windings; BackEMF = Back EMF constant × motor angular speed. The value is measured based on the matched motor before leaving the factory.	0.433	RWS
2049H	F01.09	Motor External Connection Cable Resistance (Reserved)	0~30.000	0.001	RWS

4.3.6 Status Parameters

485 Address	Keypad Code	Name	Setting Range	Default Value	Attribute
2080H	F02.00	Current Fault Code	-32768~32768 The current fault indicates the fault status of the drive. If the drive is in an alarm state, the current fault code is displayed. If the drive is operating normally, "0" is displayed, indicating that there is no fault at present. For alarm information, please refer to Faults and Maintenance.	/	RON
2081H	F02.01	Control Status	0~100 When not running: 1 When running: 3	/	RON
2082H	F02.02	Estimation Status	0~100 When not running:1 When running:13	/	RON
2083H	F02.03	Motor Command Speed	-9999~9999 rpm Set Speed	/	RON
2084H	F02.04	Actual Motor Speed	-9999~9999 rpm The current actual speed calculated by the drive.	/	RON
2085H	F02.05	Actual Motor Frequency	-999.9~999.9 Hz Calculated from the electrical frequency converted from the actual speed of the drive.	/	RON
2086H	F02.06	Drive DC Bus Voltage	0.1~1000.0 V The current DC bus voltage calculated by the drive.	/	RON
2087H	F02.07	Motor Is Current	0~300.00 A The current effective (RMS) value of the phase current calculated by the drive.	/	RON
2088H	F02.08	Motor Id Current Command	-99.99~99.99 A The current motor D-axis current target value set by the drive program.	/	RON
2089H	F02.09	Motor Id Current Feedback	-99.99~99.99 A The actual motor D-axis current value of the drive.	/	RON
208AH	F02.10	Motor Iq Current Command	-99.99~99.99 A The current Iq target value set by the drive program.	/	RON
208BH	F02.11	Motor Iq Current Feedback	-99.99~99.99 A The actual Iq value of the drive.	/	RON
208CH	F02.12	AI2 Voltage Value	0.001~30.000 V The analog voltage input level measured by the drive.	/	RON
208DH	F02.13	Drive Temperature	-300.00~300.00 ℃	/	RON

208EH	F02.14	Motor Overload Percentage	0~100 % The overload alarm is determined jointly by the overload factor and the overload time. When operating under 2×overload condition for the specified overload time, an overload alarm will be triggered. The current overload alarm percentage indicates the percentage remaining before the drive reaches the overload alarm triggering condition. When the overload alarm percentage reaches 100, the overload alarm is activated.	/	RON
208FH	F02.15	Drive Overload Percentage		/	RON
2090H	F02.16	Command Speed from Keypad or RS-485	-30000~30000 rpm	/	RON
2091H	F02.17	AI1 Command Speed	-30000~30000 rpm The current set speed of the drive knob.	/	RON
2092H	F02.18	AI2 Command Speed	-30000~30000 rpm The set speed converted from the analog voltage recognized by the drive.	/	RON
2093H	F02.19	Multi-step Speed Command	-30000~30000 rpm	/	RON
2094H	F02.20	Motor Resistance (Self-calibration)	0.000~30.000 Ω The motor resistance self-calibrated during motor operation.	/	RON
2095H	F02.21	Motor Temperature (Self-calibration)	-300.00~300.00 ℃ The motor temperature self-calibrated during motor operation.	/	RON

4.3.7 I/O Control

485 Address	Keypad Code	Name	Setting Range	Default Value	Attribute
2100H	F03.00	**DI1** Terminal Function	0: No function 1: Forward run 2: Reverse run 3: Forward jog 4: Reverse jog 5: Fault reset 6: Free stop 7: External fault input 8: Electronic brake 9: Forward limit 10: Reverse limit 11: Emergency stop 12: Multi-step speed 1 13: Multi-step speed 2 14: Multi-step speed 3 1xx: Above functions (logic level inverted)	1	RWS
2101H	F03.01	**DI2** Terminal Function		2	RWS
2102H	F03.02	**DI3** Terminal Function		5	RWS
2103H	F03.03	**DI4** Terminal Function		11	RWS
2104H	F03.04	**DI5** Terminal Function (Virtual Terminal)		7	RWS
2105H	F03.05	Emergency Stop Deceleration	0.1~60.0 krpm/s Effective when the DI terminal is configured as Emergency Stop.	30.0	RWS
2110H	F03.10	**DO1** Terminal Function	0: Disabled 1: Running 2: Forward running 3: Reverse running 4: Jog running 5: Drive fault 1xx: Above functions (logic level inverted)	1	RWS
2111H	F03.11	**DO2** Terminal Function		5	RWS

4.3.8 I/O Status

485 Address	Keypad Code	Name	Setting Range	Default Value	Attribute
2140H	F04.00	Digital Input Status	00000~11111	0	RON
2141H	F04.01	DI1 Terminal Status	0~1 When the DI terminal is triggered, it is set to 1; when not triggered, it is set to 0.	0	RON
2142H	F04.02	DI2 Terminal Status		0	RON
2143H	F04.03	DI3 Terminal Status		0	RON
2144H	F04.04	DI4 Terminal Status		0	RON
2145H	F04.05	DI5 Terminal Status		0	RON
2150H	F04.06	Digital Output Status	00~11	0	RON
2151H	F04.07	DO1 Terminal Status	0~1 When the DI terminal is triggered, it is set to 1; when not triggered, it is set to 0.	0	RON
2152H	F04.08	DO2 Terminal Status		0	RON

4.3.9 Analog Parameters

485 Address	Keypad Code	Name	Setting Range	Default Value	Attribute
2180H	F05.00	AI2 Lower Limit Value	0~10.00 V Represents the minimum detectable voltage of the AI2 terminal. If the actual voltage input to the AI2 terminal is lower than this parameter, this parameter value will be used as the analog speed command voltage of the AI2 terminal.	0.10	RWS
2181H	F05.01	AI2 Lower-limit Corresponding Setting	-200.0~200.0 % Represents the speed command value corresponding to the AI2 lower limit value F05.00 (2180H). The positive and negative signs indicate the motor's forward and reverse speeds.	0.0	RWS
2182H	F05.02	AI2 Upper Limit Value	0~10.00 V Represents the maximum detectable voltage of the AI2 terminal. If the actual voltage input to the AI2 terminal is higher than this parameter, this parameter value will be used as the analog speed command voltage of the AI2 terminal.	9.90	RWS
2183H	F05.03	AI2 Upper-limit Corresponding Setting	-200.0~200.0 % Represents the speed command value corresponding to the AI2 upper limit value (F05.02). The positive and negative signs indicate the motor's forward and reverse speeds.	100.0	RWS
2184H	F05.04	AI2 Filter Coefficient	0~100.00 % The AI2 filter coefficient determines the filter' s response speed and smoothness to the AI2 input voltage signal.	1.00	RWS

4.3.10 Motor Control

485 Address	Keypad Code	Name	Setting Range	Default Value	Attribute
2200H	F06.00	D-axis Current Controller Kp	0.001~30.000 The proportional gain of the D-axis current PI controller, which proportionally reflects the deviation of the Id signal.	6.000	RWS
2201H	F06.01	D-axis Current Controller Ki	0.0001~3.0000 The integral gain of the D-axis current PI controller.	0.01	RWS
2202H	F06.02	Q-axis Current Controller Kp	0.001~30.000 The proportional gain of the Q-axis current PI controller, which proportionally reflects the deviation of the Iq signal.	6.000	RWS
2203H	F06.03	Q-axis Current Controller Ki	0.0001~3.0000 The integral gain of the Q-axis current PI controller.	0.01	RWS
2204H	F06.04	Speed Controller Kp (High-speed)	0.001~30.000 The proportional gain of the speed PI controller at high speed.	0.800	RWS
2205H	F06.05	Speed Controller Ki (High-speed)	0.0001~3.0000 The integral gain of the speed PI controller at high speed.	0.0060	RWS
2206H	F06.06	Speed Controller Kp (Low-speed)	0.001~30.000 The proportional gain of the speed PI controller at low speed.	0.800	RWS
2207H	F06.07	Speed Controller Ki (Low-speed)	0.0001~3.0000 The integral gain of the speed PI controller at low speed.	0.0060	RWS
2208H	F06.08	High/Low Speed Threshold	0~30000 rpm The switching speed that ensures a smooth transition between the high-speed and low-speed PI parameter sets.	1500	RWS
2209H	F06.09	Speed Limit during Torque Control	0~3000 When the control mode selection F00.22 (2016H) = 1 Effective, limits the maximum speed during torque control.	500	RWS
220AH	F06.10	Enable Motor Resistance Online Self-calibration	0: No function 1: Enabled	0	RWS
220BH	F06.11	Motor Material Temperature Coefficient	1.0~1000.0 ℃/%	261.5	RWS
220CH	F06.12	Temperature Corresponding to Rated Motor Resistance	-99.99~99.99 ℃	25.00	RWS

4.3.11 Multi-step Speed Settings

485 Address	Keypad Code	Name	Setting Range	Default Value	Attribute
2240H	F07.00	Multi-step Speed 0	-9999~9999 rpm When the DI terminals (F03.00 - F03.03) are configured for multi-step speed, different multi-step speeds (F07.00 - F07.07) can be triggered according to different trigger logics. Note: It is generally not recommended to modify Multi-step Speed 0. Please select with caution, otherwise it may cause serious consequences.	0	RWS
2241H	F07.01	Multi-step Speed 1		300	RWS
2242H	F07.02	Multi-step Speed 2		600	RWS
2243H	F07.03	Multi-step Speed 3		900	RWS
2244H	F07.04	Multi-step Speed 4		1200	RWS
2245H	F07.05	Multi-step Speed 5		1500	RWS
2246H	F07.06	Multi-step Speed 6		1800	RWS
2247H	F07.07	Multi-step Speed 7		2100	RWS

4.3.12 RS-485 Communication Parameters

485 Address	Keypad Code	Name	Setting Range	Default Value	Attribute
2280H	F08.00	Baud Rate	0:1200 1:2400 2:4800 3:9600 4:19200 5:38400 6:57600 7:115200 Sets the baud rate of the drive.	7	RWS
2281H	F08.01	Slave Address	1~128 Local Slave Address	1	RWS
2282H	F08.02	Restore Factory Settings	0: No function No operation 1: Restore factory settings Parameter reset function activated	0	RWN
2283H	F08.03	Parity Check	0: No parity (None), 1 Stop bit 1: Even parity (Even), 1 Stop bit 2: Odd parity (Odd), 1 Stop bit	0	RWS
2284H	F08.04	Parameter Save	0: No function No operation 1: Save Save all parameters modified during this power-on cycle.	0	RWN

4.3.13 Fault History

485 Address	Keypad Code	Name	Setting Range	Default	Property
2300H	F09.00	Clear Fault History	0: No Function 1: Clear Records	0	RWN
2301H	F09.01	Current Alarm/Fault Count	-32768~32767	/	RON
2302H	F09.02	Fault History 1	-32768~32767	/	RON
2303H	F09.03	Fault History 2	-32768~32767	/	RON
2304H	F09.04	Fault History 3	-32768~32767	/	RON
2305H	F09.05	Fault History 4	-32768~32767	/	RON
2306H	F09.06	Fault History 5	-32768~32767	/	RON
2307H	F09.07	Fault History 6	-32768~32767	/	RON
2308H	F09.08	Fault History 7	-32768~32767	/	RON
2309H	F09.09	Fault History 8	-32768~32767	/	RON

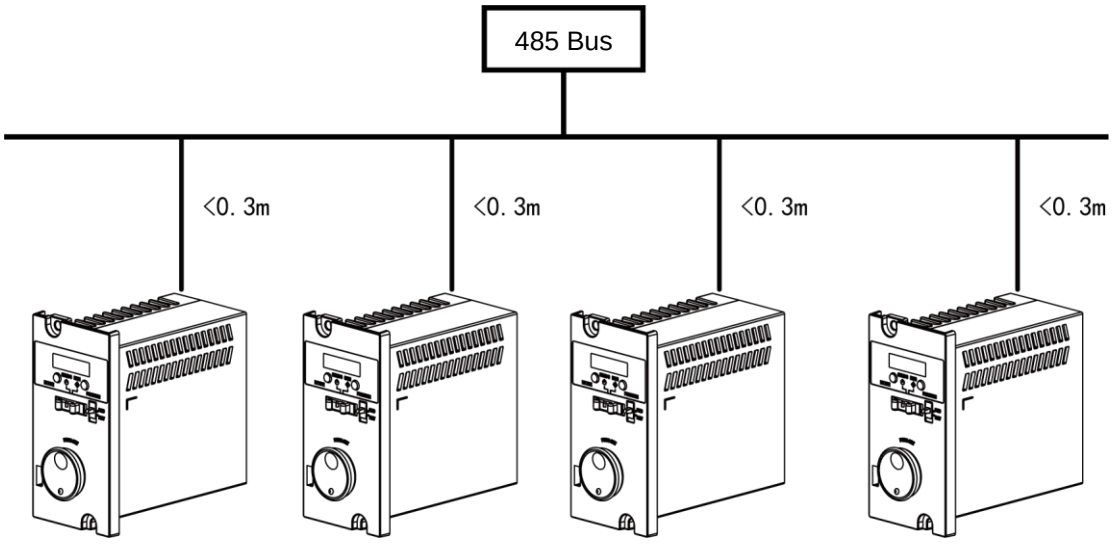
4.3.14 Fault Protection Parameters

485 Address	Keypad Code	Name	Setting Range	Default	Property
2340H	F10.00	Motor Overload Time	0.1~200.0 s	6.0	RWS
2341H	F10.01	Motor Overload Alarm Function	0: Off 1: On	1	RWS
2342H	F10.02	Drive Overload Alarm Function	0: Off 1: On	1	RWS
2343H	F10.03	Drive Overvoltage Alarm Auto-reset	0: Off 1: On	1	RWS
2344H	F10.04	Drive Undervoltage Alarm Auto-reset	0: Off 1: On	1	RWS
2345H	F10.05	Drive Overtemperature Auto-reset	0: Off 1: On	1	RWS
2346H	F10.06	Phase Loss Threshold	0~100 %	30	RWS
2347H	F10.07	Min. Motor Current for Phase Loss Detection	0~10.00 A	0.04	RWS
2348H	F10.08	Excessive Speed Deviation Criteria	100~3000 rpm	500	RWS

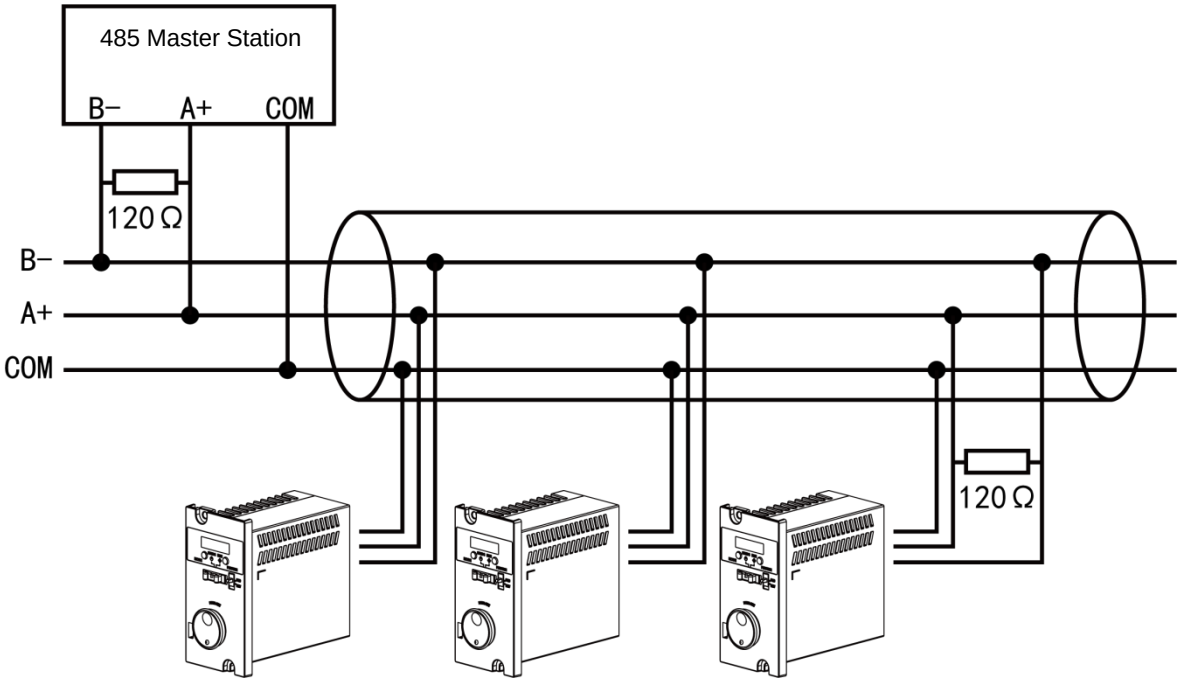
5. 485 Communication

5.1 485 Communication Network

The connection method for the 485 communication network is a bus topology, as shown in the figure below:



Each 485 transceiver device is connected to the bus. The length of each branch (stub) should not exceed 10m; otherwise, reflections may occur, causing communication issues. Below is the wiring diagram:



1. It is recommended to use shielded twisted pair (STP) for connection. Two 120Ω termination matching resistors should be connected at both ends of the bus to prevent signal reflection. The shield layer should generally be reliably grounded at a single point.

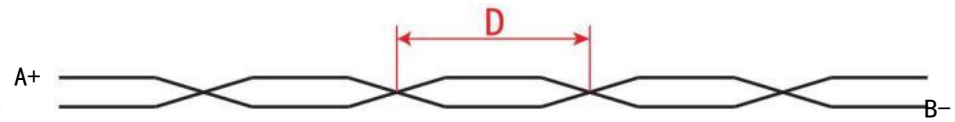
2、Use a multimeter to measure the resistance between A+ and B- to verify if the termination resistors are correct; the normal resistance should be approximately 60Ω (two resistors in parallel).

3、The maximum number of devices connected to a single bus is 32.

4、For long-distance 485 communication, the common ground (COM) of different 485 circuits must be interconnected.

5.2 485 Communication Cable

It is recommended to use twisted-pair cables for 485 communication networks. Twisted-pair cables provide excellent resistance to high-frequency magnetic field noise interference and reduce outward radiation from the cable. The figure below shows a schematic of a twisted-pair cable:



The twist pitch (D) of the twisted pair should be less than 2cm; a smaller pitch results in better anti-interference performance.

For short-distance, low-speed communication, shielded twisted-pair (STP) cables can be used to enhance anti-inter ference capability, with the shield grounded to PE at both ends.

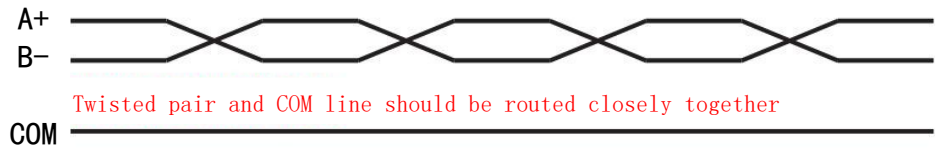
For long-distance, high-speed communication, using shielded cables is not recommended. The significant distributed capacitance between the shield and signal lines can cause signal transmission delays

Bus Cabling Recommend ations:

Wiring Distance	Signal Cable
Within 200 meters	0.3mm^2 Twisted Pair, Sheathed Cable
200 - 500 meters	0.5mm^2 Twisted Pair, Sheathed Cable
500 - 1,200 meters	0.75mm^2 Shielded Twisted Pair (STP), Sheathed Cable
Over 1,200 meters	1.0mm^2 Shielded Twisted Pair, Sheathed Cable, with Repeater at 1,200m

5.2.1 Recommended Wiring Methods for 485 Communication

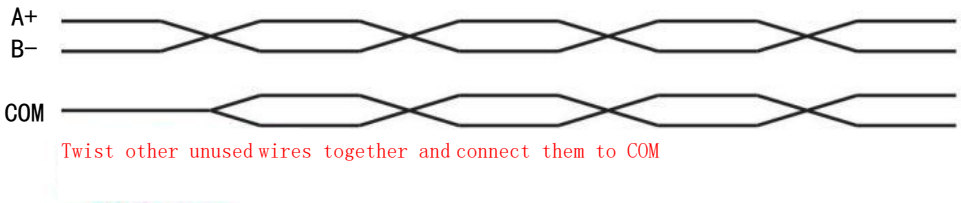
Recommended Option 1



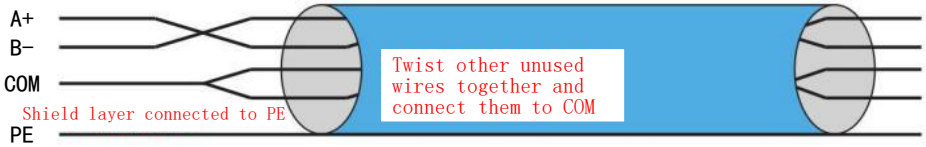
Recommended Option 2



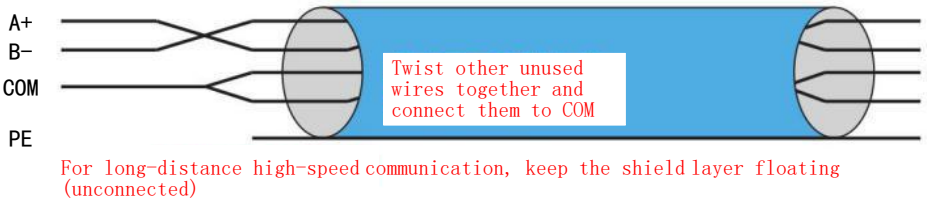
Recommended Option 3



Recommended Option 4



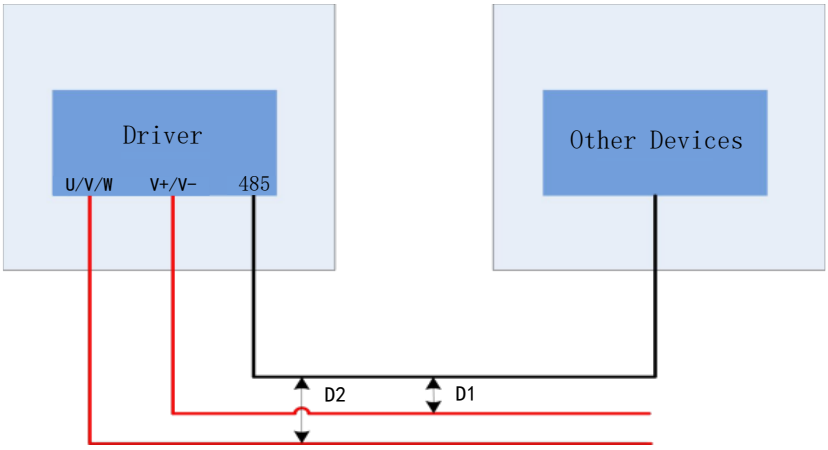
Recommended Option 5



5.2.2 Recommended Layout for 485 Communication Cabling

485 communication is susceptible to interference; problems can easily occur if the layout is close to interference sources.

Recommended wiring method:



Interference sources and RS-485 lines should be routed perpendicularly whenever possible. For parallel routing, the distance (D1) between power cables and 485 signal lines must be > 10cm, and the distance (D2) between U/V/W motor lines and 485 signal lines must be > 20cm. After exiting the cabinet, power cables, U/V/W motor power lines, and 485 communication lines must be routed separately. If interference sources and 485 communication lines are routed within the same cable duct, the spacing must follow the same principles mentioned above.

5.3 System Settings

The factory default configuration for the C30 series drives is shown below:

Address	Name	Setting Range	Default	Property
0x2281	485 Slave Address	1~128, 0 is Broadcast Address	1	RW*
0x2280	485 Communication Baud Rate	0:1200BPS 1:2400BPS 2:4800BPS 3:9600BPS 4:19200BPS 5:38400BPS 6:57600BPS 7:115200BPS(Default)	7	RW*

Note: Regardless of whether the value in address 0x2181 of the current C30 drive matches the ADDR value in the data frame sent by the Master, the Modbus Master can read/write to the C30 drive's address 0x2281 to retrieve the current 485 slave address setting. This is a special feature designed to facilitate debugging for electrical engineers. This implies that when the Master reads/writes to address 0x2281 via Modbus, only one C30 drive should be connected to the 485 bus.

5.4 Data Frame Format

<table>
<tr><th colspan="5">MODBUS--RTU Mode</th></tr>
<tr><th>Address Code</th><th>Function Code</th><th>Data</th><th colspan="2">Checksum</th></tr>
<tr><td>ADDR</td><td>CMD</td><td>DATA</td><td>CRC16_L</td><td>CRC16_H</td></tr>
<tr><td>1Byte</td><td>1Byte</td><td>nBytes</td><td>1Byte</td><td>1Byte</td></tr>
<tr><td colspan="5">Baud Rate: 115200 (Default), Start Bit: 1 bit, Data Bits: 8 bits, Parity: None, Stop Bit: 1 bit</td></tr>
<tr><td colspan="5">In MODBUS RTU mode, if the interval between two characters exceeds 1.5 times the character time, the data is invalid. If the interval exceeds 3.5 times the character time, the current frame is considered completed, and a new frame can begin transmission.</td></tr>
</table>

Note:

a. Address Code: 1 Byte

0x00(0)----Broadcast Address; no response from slaves during broadcast; suitable for group control of multiple units.

0x01(1)-0x7F(127)----Slave Address.

0x80(128)-0xff(255)----Reserved by system; do not use.

b. Function Code: 1 Byte

0x03(3)---------- Read Holding Registers operation.

0x06(6)---------- Write Single Register operation.

0x10(16)---------- Write Multiple Registers operation.

c. Data: n Byte

Different commands have different data formats!

d. Checksum Code: 2 Byte

CRC16 Checksum Target: Address Code + Function Code + Data.

CRC16 Checksum Algorithm: MODBUS(x16+x15+x2+1);

CRC16 Checksum: transmit Low Byte first, followed by High Byte.

5.4.1 485 Communication Wiring Recommended Methods

1.0x03 (Read Holding Registers) Data Frame Format

Master Requesta			
Frame Data	Data Length	Data Content	Description
Slave Address	1Byte	0x01-0xf7	
Function Code	1Byte	0x03	
Register Address	2Byte	0x2000-0x30ff	High Byte + Low Byte
Quantity of Registers	2Byte	0x0001	High Byte + Low Byte
Checksum (CRC)	2Byte	CRC16L+CRC16H	Low Byte + High Byte
Normal Response			
Frame Data	Data Length	Data Content	Description
Slave Address	1Byte	0x01-0xf7	
Function Code	1Byte	0x03	
Byte Count	1Byte	0x02	Total Bytes in Data Area
Data	2Byte	Read Data Content	High Byte + Low Byte
Checksum	2Byte	CRC16L+CRC16H	Low Byte + High Byte
Exception Response			
Frame Data	Data Length	Data Content	Description
Slave Address	1Byte	0x01-0xf7	
Function Code	1Byte	0x83	Msb=1
Error Code	1Byte	0x00-0xff	See 5.4.4 Exception Code
Checksum	2Byte	CRC16L+CRC16H	Low Byte + High Byte

Note: All register addresses are 2 Bytes; High Byte is leading, Low Byte is trailing.

2.0x03(Read Holding Registers) Example

A) Read data from register 0x2001 of slave ID 0x01

Master	Address	Function Code	Register Address		Quantity of Registers		Checksum	
			High Byte	Low Byte	High Byte	Low Byte	Low Order	High Order
	0x01	0x03	0x20	0x01	0x00	0X01	CRCL	CRCH
Slave	Address	Function Code	Byte Count		Data		Checksum	
					High Byte	Low Byte		
	0x01	0x03	0x02		0x00	0X01	CRCL	CRCH

B) Abnormal data read from register 0x2001 of slave ID 0x01

Master	Address	Function Code	Register Address		Quantity of Registers		Checksum	
			High Byte	Low Byte	High Byte	Low Byte	Low Order	High Byte
	0x01	0x03	0x20	0x01	0x00	0X01	CRCL	CRCH
Slave	Address	Function Code	Error Code				Checksum	
	0x01	0x83	See section 5.4.4 Exception Code				CRCL	CRCH

5.4.2 0x06 Write Single Register Operation

1.0x06 (Write Single Register) Data Frame Format

Master Requesta			
Frame Data	Data Length	Data Content	Description
Slave Address	1Byte	0x01-0xf7	
Function Code	1Byte	0x06	
Register Address	2Byte	0x2000-0x30ff	High Byte + Low Byte
Data	2Byte	Write Data Content	High Byte + Low Byte
Error Check	2Byte	CRC16L+CRC16H	Low Byte + High Byte
Normal Response			
Frame Data	Data Length	Data Content	Description
Slave Address	1Byte	0x01-0xf7	
Function Code	1Byte	0x06	
Register Address	2Byte	0x2000-0x30ff	High Byte + Low Byte
Register Value	2Byte	Write Data Content	High Byte + Low Byte
Error Check	2Byte	CRC16L+CRC16H	Low Byte + High Byte
Exception Response			
Frame Data	Data Length	Data Content	Description
Slave Address	1Byte	0x01-0xf7	
Error Code	1Byte	0x86	Msb=1
Exception Code	1Byte	0x00-0xff	Refer to 5.4.4 Exception Codes
Error Check	2Byte	CRC16L+CRC16H	Low Byte + High Byte

Note: All register addresses are 2 bytes, with the High Byte first and the Low Byte second (Big-Endian). This operation is only applicable to registers of type RW (Read/Write) or RW*.

2.0x06 (Write Single Register) Example

A) Writing data to register 0x2001 of Slave No. 0x01.

Master	Address	Function Code	Register Address		Data		Checksum	
			High Byte	Low Byte	High Byte	Low Byte	Low Byte	High Byte
	0x01	0x06	0x20	0x01	0x00	0X01	CRCL	CRCH
Slave	Address	Function Code	Register Address		Data		Checksum	
			High Byte	Low Byte	High Byte	Low Byte		
	0x01	0x06	0x20	0x01	0x00	0X01	CRCL	CRCH

B) Data exception when wr iting to re gister 0x2001 of Slave No. 0x01.

Master	Address	Function Code	Register Address		Data		Checksum	
			High Byte	Low Byte	High Byte	Low Byte	Low Byte	High Byte
	0x01	0x06	0x20	0x01	0x00	0X01	CRCL	CRCH
Slave	Address	Function Code	Error Code				Checksum	
	0x01	0x86	Refer to 5.4.4 Exception Codes				CRCL	CRCH

5.4.3 0x10 Write Multiple Registers Operation

1.0x10 (Write Multiple Registers) Data Frame Format

Master Request			
Frame Data	Data Length	Data Content	Description
Slave Address	1Byte	0x00-0xf7	
Function Code	1Byte	0x10	
Register Address	2Byte	0x2000-0x30ff	High Byte + Low Byte
Quantity of Registers	2Byte	N	High Byte + Low Byte
Byte Count	1Byte	2*N	
Register Value(s)	2*NByte		High Byte + Low Byte
Error Check (CRC)	2Byte	CRC16L+CRC16H	Low Byte + High Byte
Normal Response			
Frame Data	Data Length	Data Content	Description
Slave Address	1Byte	0x01-0xf7	
Function Code	1Byte	0x10	
Starting Register Address	2Byte	0x2000-0x30ff	High Byte + Low Byte
Quantity of Registers	2Byte	N	High Byte + Low Byte
Error Check	2Byte	CRC16L+CRC16H	Low Byte + High Byte
Exception Response			
Frame Data	Data Length	Data Content	Description
Slave Address	1Byte	0x01-0xf7	
Function Code	1Byte	0x90	Msb=1
Exception Code	1Byte	0x00-0xff	Refer to 5.4.4 Exception Codes
Error Check	2Byte	CRC16L+CRC16H	Low Byte + High Byte

Note: All register addresses are 2 bytes, with the High Byte first and the Low Byte second (Big-Endian). This operation is only applicable to registers of type RW (Read/Write) or RW*.

2.0x10 (Write Multiple Registers) Example

Writing data to registers 0x2000 and 0x2001 of Slave No. 0x01

<table>
<tr><td rowspan="5">Master</td><td rowspan="2">Address</td><td rowspan="2">Function Code</td><td colspan="2">Starting Address</td><td colspan="2">Quantity of Registers</td><td colspan="2" rowspan="2">Byte Count</td></tr>
<tr><td>High Byte</td><td>Low Byte</td><td>High Byte</td><td>Low Byte</td></tr>
<tr><td>0x01</td><td>0x10</td><td>0x20</td><td>0x01</td><td>0x00</td><td>0x02</td><td colspan="2">0x04</td></tr>
<tr><td colspan="2">Register 1 Data</td><td colspan="2">Register 2 Data</td><td colspan="2" rowspan="2">Checksum</td><td colspan="2" rowspan="2"></td></tr>
<tr><td>High Byte</td><td>Low Byte</td><td>High Byte</td><td>Low Byte</td></tr>
<tr><td colspan="2">Data 1</td><td colspan="2">Data 2</td><td>CRCL</td><td>CRCH</td><td colspan="2"></td></tr>
<tr><td rowspan="3">Slave Normal Response</td><td rowspan="2">Address</td><td rowspan="2">Function Code</td><td colspan="2">Starting Address</td><td colspan="2">Quantity of Registers</td><td colspan="2" rowspan="2">Checksum</td></tr>
<tr><td>High Byte</td><td>Low Byte</td><td>High Byte</td><td>Low Byte</td></tr>
<tr><td>0x01</td><td>0x10</td><td>0x20</td><td>0x01</td><td>0x00</td><td>0x02</td><td>CRCL</td><td>CRCH</td></tr>
<tr><td rowspan="2">Slave Exception Response</td><td>Address</td><td>Function Code</td><td colspan="4">Exception Code</td><td colspan="2">Checksum</td></tr>
<tr><td>0x01</td><td>0x90</td><td colspan="4">See details in 5.4.4 Error Codes</td><td>CRCL</td><td>CRCH</td></tr>
</table>

5.4.4 Exception Codes

MODBUS Exception Codes		
Exception Code	Meaning	Example
0x01	Data Format Error	TX: 01 10 20 01 00 01 03 00 00 00 00 01 02 48 0D RX: 01 90 01 8D C0
0x02	Value Out of Range or Quantity Out of Range (Max 10)	TX: 01 03 20 01 00 89 DE 6C RX: 01 83 02 C0 F1
0x03	Address Not Found / Invalid Data Address	TX: 01 03 88 88 00 01 2F 80 RX: 01 83 03 01 31
0x04	Invalid Function Code (Only 03, 06, 10 supported)	TX: 01 05 20 01 00 00 97 CA RX: 01 85 04 43 53
0x07	Data Type is Read-Only / Non-Writable	TX: 01 06 21 07 00 01 F3 F7 RX: 01 86 07 03 A2

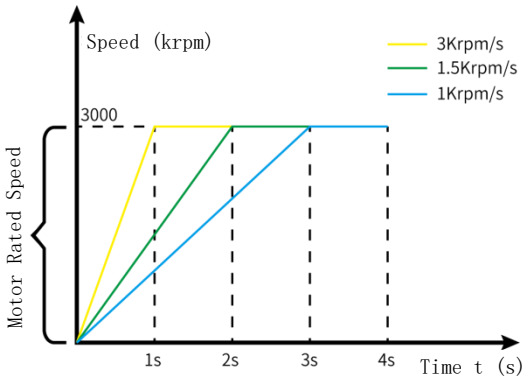
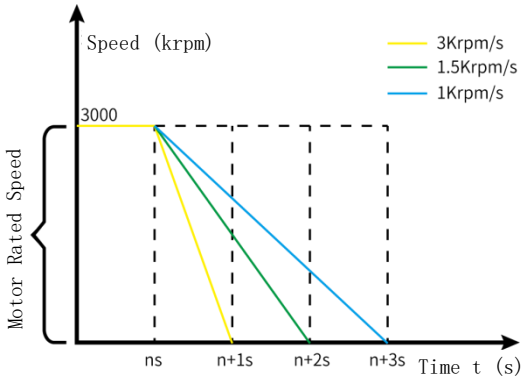
5.5 Register List

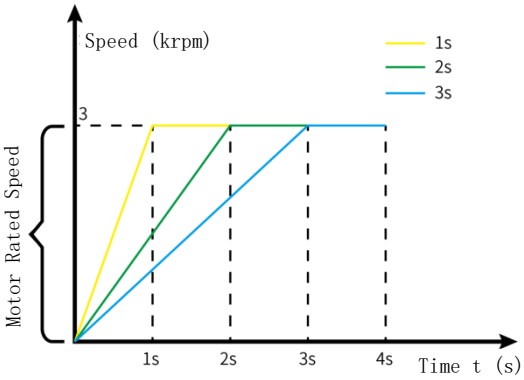
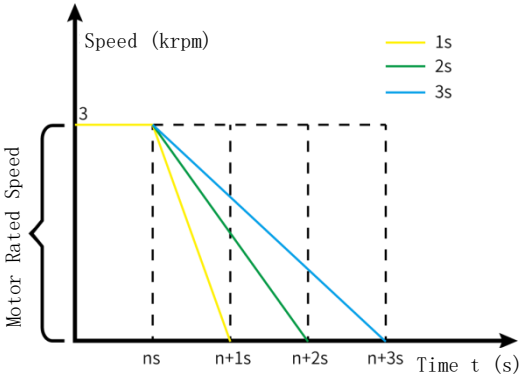
5.5.1 Factory Information

485 Address	Keypad Code	Name	Setting Range	Value	Attribute
2000H	F00.00	Version Number	0~30000 The current function code is determined by the software version during programming and the drive hardware version. For example, in "1102", '1' represents the hardware version and '102' represents the software version.	/	RON
2001H	F00.01	Sub-version Number	0~30000 The current software version date; "10079" represents October 7th at 9:00.	/	RON
2002H	F00.02	Drive Rated Voltage	0~3000.0 V Displays the AC input voltage (peak value) that the drive should receive.	/	RON
2003H	F00.03	Drive Rated Power	0~30000 W Displays the current power rating of the drive.	/	RON
2004H	F00.04	Default Motor Model	Reserved	0	RON
200EH	F00.14	Enable Motor Parameter Self-tuning	0: No operation 1: Start self-tuning	0	RWN
200FH	F00.15	Motor Parameter Identification Completed	0: No operation 1: Completed Related to Enable Motor Parameter Self-tuning F00.14 (200EH)	0	RWN
2015H	F00.21	Motor Model Selection (Reserved)	0~30000	/	RWS

5.5.2 Control Parameters

485 Address	Keypad Code	Name	Setting Range	Value	Attribute
2005H	F00.05	Speed Source	0: Potentiometer Encoder knob is enabled (Default). 1: Analog Input AI2 External analog voltage input is enabled. 2: Upper Computer or Knob Speed is set via communication (RS485/Modbus) using register F00.09 (2009H). The encoder knob remains active. 3: Multi-step Speed Used in conjunction with $F00.06 = 0 Speed is determined by preset multi-step speed settings.	0	RWS
2006H	F00.06	Enable Source	0: I/O Control Terminal control (F03 group) is active. 1: Upper Computer or Keypad Control Run command via register F00.08 (2008H) is active.	0	RWS
2007H	F00.07	Fault Clear / Reset	0: No Function No operation. 1: Clear / Reset Clears the current driver alarm status and restores normal operation.	0	RWN
2008H	F00.08	Run Command	0: Stop 1: Run Enable When speed source F00.06 = 1, the run command via F00.08 is enabled to control the start and stop of the driver.	0	RWN
2009H	F00.09	Motor Speed Command	-9999~9999 rpm Speed Command: When the Speed Source F00.05 (2005H) is set to 2, the Motor Speed Command F00.09 (2009H) becomes active, allowing the drive speed to be adjusted. Note: Drive operation requires both a Run Enable signal and a Speed reference.	0	RWS
200AH	F00.10	Motor Acceleration Command	0.1~30.0 krpm/s Speed variation from startup to motor rated speed	3.0	RWS

					
200BH	F00.11	Motor deceleration command	0.1~30.0 krpm/s The amount of speed change from motor rated speed to standstill. 	3.0	RWS
200CH	F00.12	Torque Control Iq Command (Reserved)	-150~150	0	RWS
200DH	F00.13	Torque Control Id Command (Reserved)	-150~150	0	RWS
2016H	F00.22	Control Mode Selection	0: Speed Control Mode Reach rated speed via motor speed commands; achieve rated speed through a closed-loop speed control system. 1: Torque Control Mode (Reserved)	0	RWS
2017H	F00.23	External Communication Selection	0: 485 Parameter configuration can be performed via RS-485 communication. 1: Reserved	0	RWS
2018H	F00.24	Speed Display Error Tolerance	0~10000 rpm When |Actual Speed - Set Speed| < Speed Display Error, then Motor Actual Speed F02.04 (2084H) = Set Speed.	10	RWS

2019H	F00.25	Accel/Decel Source	0: Accel/Decel Command 1: Accel/Decel Time	0	RWS
201AH	F00.26	Acceleration Time	0.1~30.0 s Time required to accelerate from start to rated motor speed. 	1.0	RWS
201BH	F00.27	Deceleration Time	0.1~30.0 s Time required to decelerate from rated motor speed to stop. 	1.0	RWS

5.5.3 Shutdown Methods

485 Address	Keypad Code	Name	Setting Range	Value	Attribute
2010H	F00.16	Stop Mode	0: Coast to Stop When the stop command is triggered, the drive immediately stops frequency output, and the motor coasts to a stop based on inertia. 1: Deceleration to Stop When the stop command is triggered, the drive first reduces the output frequency according to the deceleration rate (F00.25=0) or deceleration time (F00.25=1). The motor stops completely after the frequency drops to the deceleration stop threshold F00.17 (2011H).	1	RWS
2011H	F00.17	Deceleration Stop Threshold	0~9999 rpm Minimum speed during deceleration to stop.	30	RWS
2012H	F00.18	Torque Holding After Stop	0: Disabled 1: Enabled	0	RWS
2013H	F00.19	Torque Holding Percentage	0~30 % Output flux-weakening current as a percentage of the maximum current limit for torque holding.	0	RWS
2014H	F00.20	Torque Holding Time	0~600.0 s Torque holding time after stopping; torque is maintained for a set period after stop before being released. 0: Continuously maintain torque after operation stops, until a new run signal is given, then torque holding is released.	0	RWS

5.5.4 Motor Parameters

485 Address	Keypad Code	Name	Setting Range	Value	Attribute
2040H	F01.00	Motor Rated Current	0.01~300.00 A In practical applications, the appropriate operating current should be selected based on the motor's rated conditions and load requirements, ensuring an adequate safety margin. If the load current exceeds the rated current, it may cause overheating, damage, or even pose safety hazards.	4.00	RWS
2041H	F01.01	Motor Maximum Current	0.01~300.00 A Motor Maximum Current refers to the peak current value the motor can withstand at rated voltage. Note that the maximum current value only represents the maximum load capacity, not the ideal current for continuous operation. In practical applications, the appropriate operating current should be selected based on the motor's rated conditions and load requirements.	8.00	RWS
2042H	F01.02	Motor Rated Speed	0~6000 rpm Determined based on the parameters provided by the motor manufacturer.	3000	RWS
2043H	F01.03	Motor Pole Pairs	1~100 Determined based on the parameters provided by the motor manufacturer.	5	RWS
2048H	F01.08	Max Frequency for Motor Auto-tuning	1~500 The maximum speed corresponding to dynamic auto-tuning when using parameter self-learning.	100	RWS

5.5.5 Motor Parameters

485 Address	Keypad Code	Name	Setting Range	Value	Attribute
2044H	F01.04	Motor Stator Resistance	0.001~30.000 Ω Stator winding resistance; the resistance of the copper wire wound on the stator, measured based on the matched motor before leaving the factory.	0.933	RWS
2045H	F01.05	Motor d-axis Inductance	0.01~300.00 mH d-axis inductance, measured based on the matched motor before leaving the factory.	5.65	RWS
2046H	F01.06	Motor q-axis Inductance	0.01~300.00 mH q-axis inductance, measured based on the matched motor before leaving the factory.	5.65	RWS
2047H	F01.07	Motor Back-EMF Coefficient	0.001~10.000 V/Hz When the motor rotor rotates, back-EMF is induced in the windings; Back-EMF = Coefficient * Angular Velocity; measured based on the matched motor before factory delivery.	0.433	RWS
2049H	F01.09	External Motor Cable Resistance (Reserved)	0~30.000	0.001	RWS

5.5.6 Status Parameters

485 Address	Keypad Code	Name	Setting Range	Value	Attribute
2080H	F02.00	Current Fault Code	-32768~32768 Current fault indicates the fault status of the drive. If the drive is in an alarm state, the current fault code is displayed. If operating normally, it displays 0, indicating no current fault. See "Faults and Maintenance" for alarm information.	/	RON
2081H	F02.01	Control Status	0~100 Not running: 1 Running: 3	/	RON
2082H	F02.02	Estimation Status	0~100 Not running: 1 Running: 13	/	RON
2083H	F02.03	Motor Command	-9999~9999 rpm Set speed (Reference speed)	/	RON
2084H	F02.04	Motor Actual Speed	-9999~9999 rpm Current actual speed calculated by the drive.	/	RON
2085H	F02.05	Motor Actual Frequency	-999.9~999.9 Hz Calculated from the electrical frequency converted from the actual drive speed.	/	RON
2086H	F02.06	Drive Bus Voltage	0.1~1000.0 V Current drive bus voltage calculated by the drive.	/	RON
2087H	F02.07	Motor Is Current (Stator Current)	0~300.00 A RMS value of the current drive phase current calculated by the drive.	/	RON
2088H	F02.08	Motor Id Current Command	-99.99~99.99 A Target value of the motor D-axis current set by the drive program.	/	RON
2089H	F02.09	Motor Id Current Feedback	-99.99~99.99 A Actual motor D-axis current value in the drive.	/	RON
208AH	F02.10	Motor Iq Current Command	-99.99~99.99 A Target value of the Iq current set by the drive program.	/	RON
208BH	F02.11	Motor Iq Current Feedback	-99.99~99.99 A Actual Iq current value in the drive.	/	RON
208CH	F02.12	AI2 Voltage Value	0.001~30.000 V Drive measures the analog voltage input level.	/	RON
208DH	F02.13	Drive Temperature	-300.00~300.00 ℃	/	RON

208EH	F02.14	Motor Overload Percentage	0~100 % Overload alarm is determined by both overload factor and duration. Under 2x overload, an alarm triggers after the overload time expires. Current percentage shows how close the drive is to the trigger condition; an alarm occurs at 100%.	/	RON
208FH	F02.15	Drive Overload Percentage		/	RON
2090H	F02.16	Keypad or RS485 Command Speed	-30000~30000 rpm	/	RON
2091H	F02.17	AI1 Command Speed	-30000~30000 rpm Current speed setting from the drive's potentiometer (knob).	/	RON
2092H	F02.18	AI2 Command Speed	-30000~30000 rpm Speed setting converted from the analog voltage identified by the drive.	/	RON
2093H	F02.19	Multi-step Command Speed	-30000~30000 rpm	/	RON
2094H	F02.20	Self-calibrated Motor Resistance	0.000~30.000 Ω Motor resistance self-calibrated during motor operation.	/	RON
2095H	F02.21	Self-calibrated Motor Temperature	-300.00~300.00 ℃ Motor temperature self-calibrated during motor operation.	/	RON

5.5.7 IO Control

485 Address	Keypad Code	Name	Setting Range	Value	Attribute
2100H	F03.00	DI1 Terminal Function	0: No Function 1: Reverse Run 2: Forward Jog 3: Reverse Jog 4: Fault Reset 5: Fault Reset 6: Coast to Stop 7: External Fault Input 8: Electronic Brake 9: Forward Limit 10: Reverse Limit 11: Emergency Stop 12: Multi-step Speed 1 13: Multi-step Speed 2 14: Multi-step Speed 3 1xx: Above functions (Level Inversion)	1	RWS
2101H	F03.01	DI2 Terminal Function		2	RWS
2102H	F03.02	DI3 Terminal Function		5	RWS
2103H	F03.03	DI4 Terminal Function		11	RWS
2104H	F03.04	DI5 Terminal Function (Virtual Terminal)		7	RWS
2105H	F03.05	Emergency Stop Deceleration Rate	0.1~60.0 krpm/s Effective when DI port is configured as Emergency Stop	30.0	RWS
2110H	F03.10	DI3 Terminal Function	0: Invalid 1: Running 2: Forward Running 3: Reverse Running 4: Jogging 5: Drive Fault 1xx: Above functions (Level Inversion)	1	RWS
2111H	F03.11	DI3 Terminal Function		5	RWS

5.5.8 IO Status

485 Address	Keypad Code	Name	Setting Range	Value	Attribute
2140H	F04.00	Digital Input (DI) Status	00000~11111	0	RON
2141H	F04.01	DI1 Terminal Status	0~1 Sets to 1 if the DI port is triggered, and 0 if not triggered.	0	RON
2142H	F04.02	DI2 Terminal Status		0	RON
2143H	F04.03	DI3 Terminal Status		0	RON
2144H	F04.04	DI4 Terminal Status		0	RON
2145H	F04.05	DI5 Terminal Status		0	RON
2150H	F04.06	Digital Output (DO) Status	00~11	0	RON
2151H	F04.07	DO1 Terminal Status	0~1 Sets to 1 if the DI port is triggered, and 0 if not triggered.	0	RON
2152H	F04.08	DO2 Terminal Status		0	RON

5.5.9 Analog Parameters

485 Address	Keypad Code	Name	Setting Range	Value	Attribute
2180H	F05.00	AI2 Lower Limit Value	0~10.00 V Represents the minimum detectable voltage of the AI2 port. If the actual input voltage is lower than this parameter, this value will be used as the analog speed command voltage.	0.10	RWS
2181H	F05.01	AI2 Lower Limit Corresponding Setting	-200.0~200.0 % Represents the speed command value corresponding to the AI2 lower limit F05.00 (2180H). The +/- sign indicates forward/reverse motor rotation.	0.0	RWS
2182H	F05.02	AI2 Upper Limit Value	0~10.00 V Represents the maximum detectable voltage of the AI2 port. If the actual input voltage is higher than this parameter, this value will be used as the analog speed command voltage.	9.90	RWS
2183H	F05.03	AI2 Upper Limit Corresponding Setting	-200.0~200.0 % Represents the speed command value corresponding to the AI2 upper limit (F05.02). The +/- sign indicates forward/reverse motor rotation.	100.0	RWS
2184H	F05.04	AI2 Filter Coefficient	0~100.00 % The AI2 filter coefficient determines the response speed and smoothness of the filter for the AI2 input voltage signal.	1.00	RWS

5.5.10 Motor Control

485 Address	Keypad Code	Name	Setting Range	Value	Attribute
2200H	F06.00	d-axis Current Controller Kp	0.001~30.000 Proportional gain of the d-axis current PI controller, proportionally reflecting the id error signal.	6.000	RWS
2201H	F06.01	d-axis Current Controller Ki	0.0001~3.0000 Integral gain of the d-axis current PI controller.	0.01	RWS
2202H	F06.02	q-axis Current Controller Kp	0.001~30.000 Proportional gain of the q-axis current PI controller, proportionally reflecting the iq error signal.	6.000	RWS
2203H	F06.03	q-axis Current Controller Ki	0.0001~3.0000 Integral gain of the q-axis current PI controller.	0.01	RWS
2204H	F06.04	Speed Controller Kp (High Speed)	0.001~30.000 Proportional gain of the speed PI controller at high speed.	0.800	RWS
2205H	F06.05	Speed Controller Ki (High Speed)	0.0001~3.0000 Integral gain of the speed PI controller at high speed.	0.0060	RWS
2206H	F06.06	Speed Controller Kp (Low Speed)	0.001~30.000 Proportional gain of the speed PI controller at low speed.	0.800	RWS
2207H	F06.07	Speed Controller Ki (Low Speed)	0.0001~3.0000 Integral gain of the speed PI controller at low speed.	0.0060	RWS
2208H	F06.08	High/Low Speed Threshold	0~30000 rpm Threshold for switching between high/low speed PI sets to ensure smooth transition.	1500	RWS
2209H	F06.09	Speed Limit during Torque Control	0~3000 When Control Mode Selection F00.22 (2016H) = 1 Effective; limits the maximum speed during torque control.	500	RWS
220AH	F06.10	Enable Motor Resistance Self-Calibration	0: Disabled 1: Enabled	0	RWS
220BH	F06.11	Motor Material Temperature Coefficient	1.0~1000.0 ℃/%	261.5	RWS
220CH	F06.12	Temperature for Rated Motor Resistance	-99.99~99.99 ℃	25.00	RWS

5.5.11 Multi-step Speed Settings

485 Address	Keypad Code	Name	Setting Range	Value	Attribute
2240H	F07.00	Multi-step Speed 0	-9999~9999 rpm When DI ports (F03.00~F03.03) are configured as multi-step speed inputs, different speed steps (F07.00~F07.07) can be triggered based on different input logic. Note: Modifying Multi-step Speed 0 is generally not recommended. Please proceed with caution, otherwise, it may lead to serious consequences.	0	RWS
2241H	F07.01	Multi-step Speed 1		300	RWS
2242H	F07.02	Multi-step Speed 2		600	RWS
2243H	F07.03	Multi-step Speed 3		900	RWS
2244H	F07.04	Multi-step Speed 4		1200	RWS
2245H	F07.05	Multi-step Speed 5		1500	RWS
2246H	F07.06	Multi-step Speed 6		1800	RWS
2247H	F07.07	Multi-step Speed 7		2100	RWS

5.5.12 RS485 Communication Parameters

485 Address	Keypad Code	Name	Setting Range	Value	Attribute
2280H	F08.00	Baud Rate	0:1200 1:2400 2:4800 3:9600 4:19200 5:38400 6:57600 7:115200 Set the corresponding baud rate for the drive	7	RWS
2281H	F08.01	Slave Address	1~128 Local slave address	1	RWS
2282H	F08.02	Restore Factory Settings	0: No Function No Operation 1: Restore Factory Settings Parameter reset function activated	0	RWN
2283H	F08.03	Parity Check	0: No Parity, 1 Stop bit 1: Even Parity, 1 Stop bit 2: Odd Parity, 1 Stop bit	0	RWS
2284H	F08.04	Parameter Save	0: No Function No operation 1: Save Save all parameters modified during this power-on session	0	RWN

5.5.13 History Faults

485 Address	Keypad Code	Name	Setting Range	Value	Attribute
2300H	F09.00	Clear Fault History	0: No Function 1: Clear Records	0	RWN
2301H	F09.01	Current Fault Count	-32768~32767	/	RON
2302H	F09.02	Fault History 1	-32768~32767	/	RON
2303H	F09.03	Fault History 2	-32768~32767	/	RON
2304H	F09.04	Fault History 3	-32768~32767	/	RON
2305H	F09.05	Fault History 4	-32768~32767	/	RON
2306H	F09.06	Fault History 5	-32768~32767	/	RON
2307H	F09.07	Fault History 6	-32768~32767	/	RON
2308H	F09.08	Fault History 7	-32768~32767	/	RON
2309H	F09.09	Fault History 8	-32768~32767	/	RON

5.5.14 Fault Protection Parameters

485 Address	Keypad Code	Name	Setting Range	Default Value	Attribute
2340H	F10.00	Motor Overload Time	0.1~200.0 s	6.0	RWS
2341H	F10.01	Motor Overload Alarm Function	0: Disable 1: Enable	1	RWS
2342H	F10.02	Drive Overload Alarm Function	0: Disable 1: Enable	1	RWS
2343H	F10.03	Drive Overvoltage Alarm Auto-Reset	0: Disable 1: Enable	1	RWS
2344H	F10.04	Drive Undervoltage Alarm Auto-Reset	0: Disable 1: Enable	1	RWS
2345H	F10.05	Drive Overtemperature Auto-Reset	0: Disable 1: Enable	1	RWS
2346H	F10.06	Phase Loss Threshold	0~100 %	30	RWS
2347H	F10.07	Min. Motor Running Current (Phase Loss Detect Pt.)	0~10.00 A	0.04	RWS
2348H	F10.08	Excessive Speed Deviation Detection Condition	100~3000 rpm	500	RWS

Register Parameter Attribute Descriptions:

Attribute	Description
RWS	Indicates that the set value of this parameter can be read and written regardless of the driver's state, and it can be saved (persisted).
RWN	Indicates that the set value of this parameter can be read and written regardless of the driver's state, but it cannot be saved.
RON	Indicates that this parameter is read-only and cannot be written.

5.6 Common Command Examples

Slave Address: 0x01, Baud Rate: 115200, N-8-1

Operation	Data Frame	Description
Run Command	Send Data : 01 06 20 08 00 01 C2 08 Response Data : 01 06 20 08 00 01 C2 08	Write 0x01 to Address 2008H
Motor Speed Command	Send Data : 01 06 20 09 0B B8 55 4A Response Data : 01 06 20 09 0B B8 55 4A	Write 0x0BB8 to Address 2002H Set rotation speed to 3000rpm
Acceleration Command	Send Data : 01 06 20 0A 00 03 E2 09 Response Data : 01 06 20 0A 00 03 E2 09	Write 3 to Address 2003H Value is 0.3Krpm/s
Current Fault Code	Send Data : 01 03 20 80 00 01 8E 22 Response Data : 01 03 02 01 00 B9 D4	Read data from Address 2080H Returns 0x0100 as Phase Loss
Motor Rated Current	Send Data : 01 06 20 40 03 E8 83 60 Response Data : 01 06 20 40 03 E8 83 60	Write 0x03E8 to Address 2040H Set rated current to 10.00A
Parameter Save	Send Data : 01 06 22 84 00 01 02 5B Response Data : 01 06 22 84 00 01 02 5B	Write 1 to Address 2284H Save all modified parameters before this command

Note:

1、After writing data via RS485, a save command is required; otherwise, data will not be retained after power cycle.

2、In practical applications, communication data is represented in hexadecimal, which cannot represent decimal points.For example, 250.00 Hz cannot be shown in hex, so we scale it by 100 to become an integer (25000), which can be represented as 61A8 (H).

3、For writing a value of -100:

100 (Dec) converts to 64 (Hex); subtracting 64 (Hex) from 10000 (Hex) results in FF9C (Hex). Writing FF9C via 485 equals -100.

6. Troubleshooting and Maintenance

The following table shows the fault indications displayed on the screen after the driver detects a fault and shuts down. Users can perform troubleshooting and maintenance based on the fault codes.

Fault No.	Fault Display	Fault Name	Fault Cause	Solution
0x0001	ERR. OV	Overvoltage Fault	1. Input voltage is too high 2. Electronic braking force is too strong 3. Deceleration/Stop speed is too fast	1. Check power supply voltage 2. Modify electronic braking parameters 3. Reduce deceleration, add braking resistor
0x0002	ERR. UV	Undervoltage Fault	1. Power supply voltage is too low 2. Acceleration too fast, external power protection 3. Instantaneous power failure 4. Driver hardware abnormality	1. Check power input 2. Reduce acceleration 3. Fault reset 4. Seek technical support
0x0004	ER. SOP	Excessive Speed Deviation	1. Excessive acceleration 2. Motor stall during operation or sudden load increase 3. Driver hardware abnormality	1. Lower acceleration 2. Check if load is shorted or stalled 3. Replace the driver
0x0008	ERR. OH	Driver Overheat Fault	1. Ambient temperature is too high 2. Thermistor damaged 3. Inverter module damaged	1. Lower the ambient temperature 2. Replace the entire unit 3. Replace the driver
0x0010	ER. OCH	Hardware Overcurrent	1. Accel/Decel too fast 2. Low voltage 3. Drive power rating too small 4. Sudden load increase 5. Ground fault /Phase-to-phase short circuit 6. External strong interference 7. Parameter mismatch with motor	1. Reduce accel rate/max current 2. Check input power voltage 3. Use higher power rated drive 4. Check for short circuit/stall 5. Inspect/Replace cable or motor 6. Check for strong interference 7. Verify parameter matching
0x0040	ER. OCS	Software Overcurrent Fault	1. Acceleration/Deceleration too fast 2. Low input voltage 3. Drive power capacity too small 4. Sudden load application 5. Phase-to-phase short circuit 6. External electromagnetic interference (EMI) 7. Parameter and motor mismatch	1. Reduce Accel rate / Max current 2. Check input power voltage 3. Use a higher power-rated drive 4. Check for load short or rotor lock 5. Inspect/Replace cables or motor 6. Check for strong interference 7. Check parameter compatibility
0x0080	ER. OL2	Drive Overload Fault	1. Acceleration time too short 2. Power supply voltage too low 3. Excessive load 4. Motor and parameter mismatch	1. Reduce acceleration 2. Check power voltage 3. Replace with a higher-tier drive 4. Check if parameters match the motor
0x0100	ER. HLP	Motor Phase Loss Fault	1. Motor lead breakage or poor contact 2. Incorrect phase loss detection threshold	1. Check and redo wiring 2. Select appropriate threshold

Code	Fault Display	Fault Name	Fault Cause	Remedy
0x1000	EER.5C	Modbus communication timeout fault	1. Drive did not receive Modbus data within the specified time 2. Improper Modbus communication timeout setting	1. Check if RS-485 wiring is normal 2. Modify Modbus communication timeout parameters
0x2000	ER.OL1	Motor overload fault	1. Power supply voltage is too low 2. Improper motor rated current setting 3. Motor stall or sudden load change is too large 4. Given Id current command 5. Motor and parameters do not match	1. Check power supply voltage 2. Increase motor rated current 3. Reduce load and check motor/mechanical condition 4. Set Id current command to 0 5. Check if parameters match the motor
0x8000	ERR.EF	External fault	I/O port configured for external fault input and triggered	Check wiring for disconnection signals

Precautions:

1. Except for faults requiring parameter modification via the keypad, all other maintenance must be performed while the power is off.
2. Before use, please confirm that the indicator lights or keypad are functioning normally.
3. Do not perform moving, wiring, or maintenance work while the indicator lights are on.
4. After preliminary troubleshooting, it is recommended to perform a trial run test.
5. Simple maintenance should be carried out by professional personnel who are familiar with the operation of this product.
6. If the fault cannot be resolved, do not disassemble the drive housing for repair without authorization; please contact sales or technical support.

7. Basic Inspection and Maintenance

7.1 Basic Inspection

Inspection Item	Inspection Content
General Inspection	Regularly check for loose screws at the drive mounting site, terminals and wiring, and the connection between the motor shaft and the machinery.
	Conduct regular inspections to prevent foreign objects such as oil, water, or metal dust from falling into the drive.
	If the drive is installed in areas with hazardous gases or high dust levels, measures should be taken to prevent their ingress.
	When changing wiring, ensure the wiring sequence is correct; otherwise, hazardous conditions may occur.
Pre-operation Inspection (Power Off)	Before wiring, ensure the power is disconnected and the motor has completely stopped.
	Apply insulation treatment to the connection points of the wiring terminals.
	Ensure wiring is correct to prevent damage or abnormal operation.
	Check for conductive objects like screws or metal flakes, and flammable materials inside the drive.
	Ensure external control switches are in the OFF position.
	To avoid electromagnetic brake failure, check if the emergency stop and power cut-off circuits are functioning properly.
	If electronic instruments near the drive experience electromagnetic interference (EMI), use suppressors to reduce the interference.
	Verify that the applied external voltage level of the drive is correct.
Pre-run Inspection (Power On)	While the motor is running, ensure connection cables do not rub against mechanical parts or experience excessive tension.
	If the motor exhibits vibration caused by the drive or excessive operating noise, please contact the manufacturer.
	Confirm all parameter settings are correct. Unexpected movements may occur depending on mechanical characteristics. Avoid extreme parameter adjustments.
	When resetting parameters, ensure the drive is in the STOP state; otherwise, it may cause a malfunction.
	Check if the LED indicator lights display any abnormal status.
	Check if the keypad display and command settings exhibit any abnormalities.

7.2 Maintenance and After-Sales Service

Routine Maintenance

■ Please store and operate the equipment under appropriate environmental conditions.

■ Periodically clean the exterior of the drive and motor to prevent the accumulation of dust and dirt.。

■ Do not disassemble any mechanical components during cleaning and maintenance.

■ Periodically clean the gaps in the keypad housing to prevent the ingress of foreign objects.

■ Avoid prolonged use in extreme environments to prevent keypad failure.

■ It is recommended to power down the drive once a month to allow the internal capacitors to undergo a complete charge-discharge cycle.

Component Service Life

■ Electrolytic Capacitor

The lifespan of electrolytic capacitors is primarily affected by ambient temperature and operating conditions. According to supplier specifications, the service life is approximately 3,000 hours under the extreme condition of a maximum operating temperature of 105° C. Ideally, for every 10° C decrease in operating temperature, the service life doubles.

If electrolytic capacitors are stored for long periods without use, the electrolyte inside will gradually lose its activity. It is necessary to periodically apply the rated voltage to "reform" or reactivate the electrolyte.

■ Rotary Potentiometer

According to supplier specifications, the rotary potentiometer has a total rotation angle of: 250° ±10° Rotational life: 100 cycles, ΔR/R≤±（2Ω+3%）。

■ Push Buttons

According to supplier specifications, the operating life is 100,000 cycles.

■ MTBF

Mean Time Between Failures (MTBF) > 200,000 hours.

After -Sales Sevice

■ For operational issues, please contact sales or technical support. Contact information for technical support can be found on the back page of this manual.

■ The warranty period is valid for one year from the date of shipment. Free repair services are provided within the warranty period.

■ If a failure occurs under normal operating conditions as prescribed in this manual, please contact sales to arrange for return and repair.To facilitate troubleshooting and repair, please provide detailed information regarding the cause or symptoms of the fault.

■ The user shall be held responsible in the following cases:

1. Damage caused by improper use, unauthorized repairs, or modifications;
2. Damage caused by dropping or during transportation after delivery;
3. Damage caused by operating outside the specified product specifications;
4. Damage caused by fire, earthquake, lightning, wind, chlorine corrosion, or other natural disasters;
5. Damage caused by the ingress of water, oil, metal fragments, or other foreign objects.

Components with a defined standard service life are excluded from the warranty once their respective lifespan is exceeded.

Synergy Asia Solution Co.,ltd.

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Technical Support Line 1

Technical Support Line 2