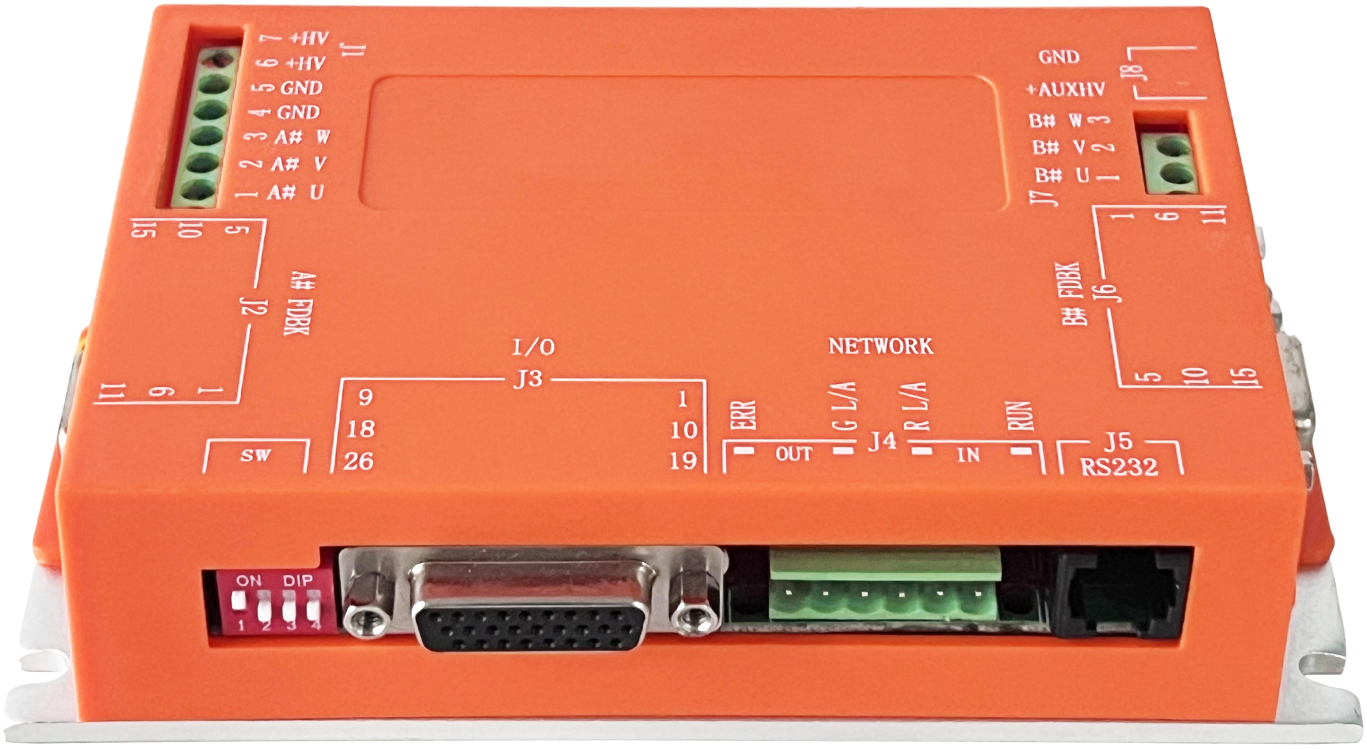
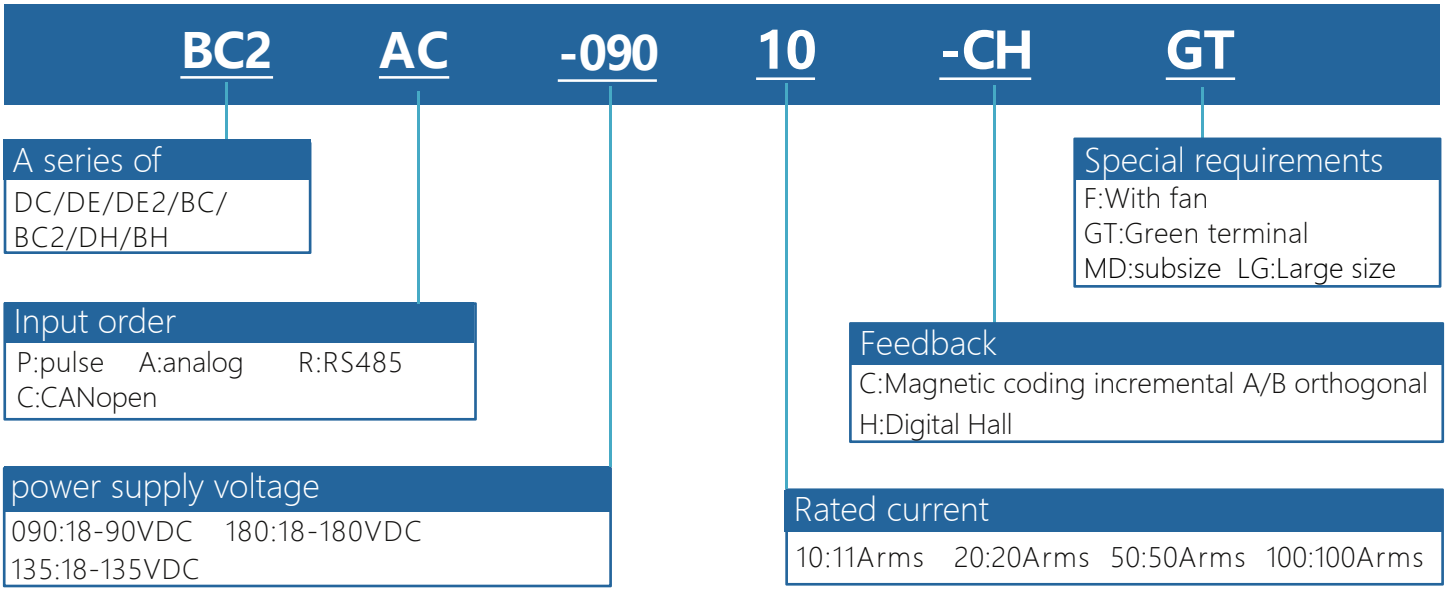
BC2 series brushless actuator instruction manual



BC2 series brushless drive model description



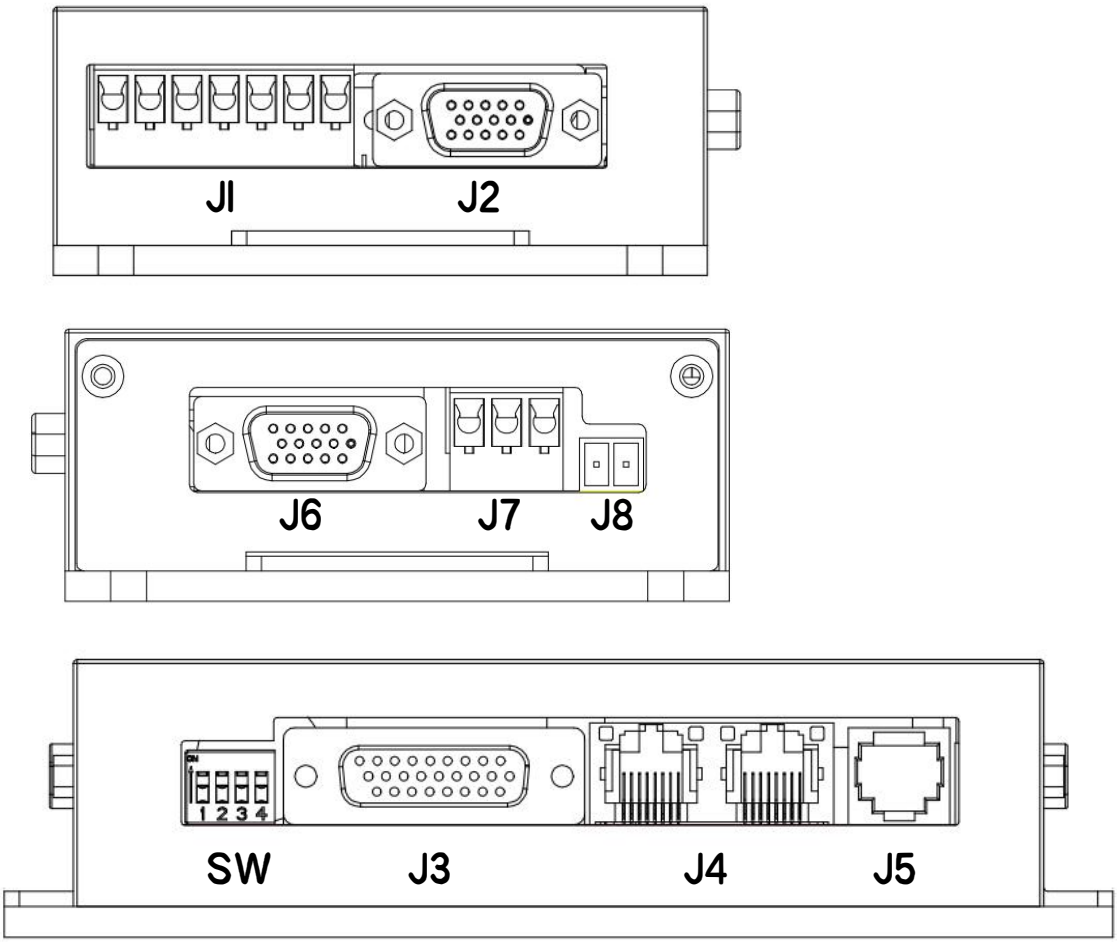
Attention to:
1.The driver supply voltage must be greater than or equal to the rated voltage of the motor

2.The rated current of the driver must be greater than or equal to the rated current of the motor

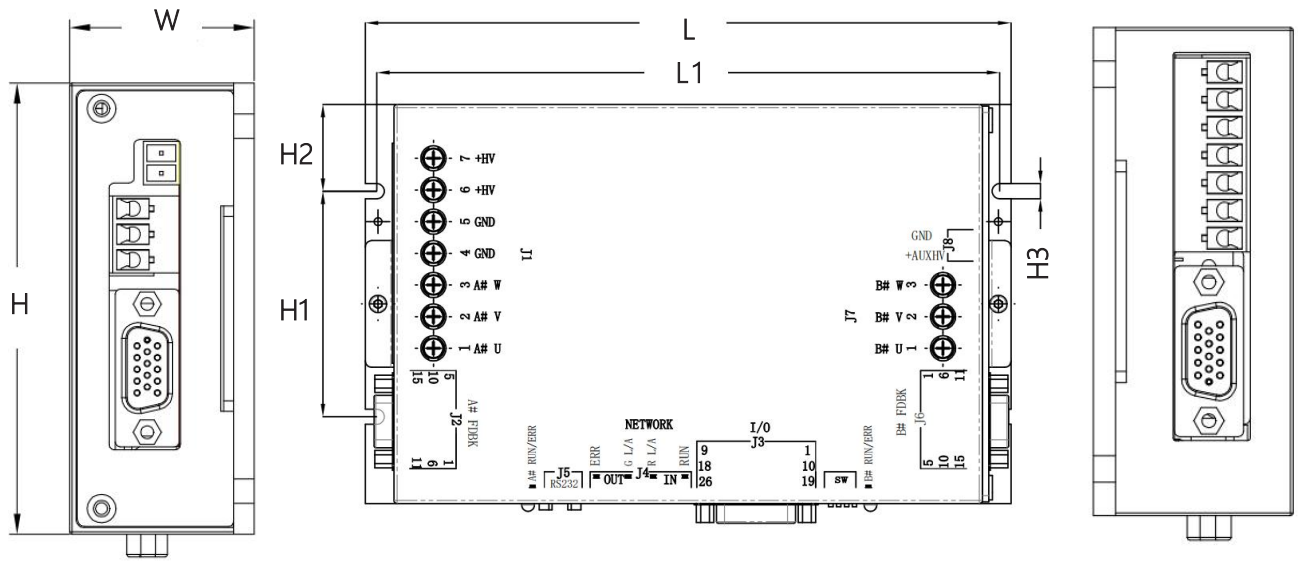
BC2 brushless drive specification summary table

Driver model	service voltage	Rated current Arms	Peak current Apk6S rms	Feedback type	Overall dimensions	weight
BC2AC-09001-CH	18-90VDC	1A	3A	Digital Hall + Encoder ABZ	144*88*36mm	0.35kg
BC2AC-09002-CH		2A	6A			
BC2AC-09005-CH		6A	18A			
BC2AC-09008-CH		8A	24A			
BC2AC-09010-CH		11.5A	34A			
BC2AC-09015-CH		16A	48A			
BC2AC-09020-CH		21A	50A			
BC2AC-09025-CH-MD		25A	50A			
BC2AC-18010-CH	18-180VDC	11A	33A			
BC2AC-09025-CH-LG	18-90VDC	25A	50A		204*126*52mm	0.9kg
BC2AC-09035-CH		35A	70A			
BC2AC-09050-CH		50A	100A			
BC2AC-18015-CH	18-180VDC	16A	48A			
BC2AC-18025-CH		25A	50A			
BC2AC-18035-CH		35A	70A			
BC2AC-13550-CH	18-135VDC	50A	100A			
BC2AC-09050-CHF	18-90VDC	50A	100A		204*130*86mm	1.4kg
BC2AC-09070-CHF-MD		70A	140A			
BC2AC-13550-CHF	18-135VDC	50A	100A			
BC2AC-09070-CH-LG	18-90VDC	70A	140A		310*232*64.5mm	4kg
BC2AC-090100-CH		100A	200A			
BC2AC-090140-CHF		140A	280A		310*232*104.5mm	4.8kg
BC2AC-090200-CHF		200A	300A			
BC2AC-18050-CH	18-180VDC	50A	100A		310*232*64.5mm	4kg
BC2AC-18070-CH		70A	140A			
BC2AC-180100-CHF		100A	200A		310*232*104.5mm	4.8kg
BC2AC-135140-CHF	18-135VDC	140A	280A			
BC2AC-135180-CHF		180A	300A			

BC2 series terminal definition



BC series dimensions drawing



Model number	L	L1	W	H	H1	H2	H3
BC2-01~25A	144	136.8	36	88	71.2	10.8	4.8
BC2-25A~35A	204	196.8	52	126	71.2	27.4	4.8
BC2-50A~70AF	204	196.8	86	130	71.2	29.4	4.8
BC2-70A-100A	310	297	64.5	232	115	58.5	7
BC2-100AF-200AF	310	297	104.5	232	115	58.5	7

1、Product introduction：

1.1 An overview of the

The BC2 series Programmable Intelligent Brushless Drive is a versatile, high-performance, DC-powered, compact, all-digital brushless dual drive controller. It is mainly used in speed and torque control of permanent magnet brushless motor. Can support non-inductive and inductive (incremental encoder, digital hall).

1.2 Technical characteristics

◆•Control mode: speed, torque；

◆•Sampling frequency (time) Current loop: 16KHz(62.5us); Speed/position loop :2KHz(500μs)；

◆•Bandwidth: The current loop is generally 1.5kHz, which varies with parameter adjustment and load inductance；

◆•Programmable protection: over current, over voltage or under voltage, I^2t, output short circuit, overload and other multi-directional protection functions；

◆•Drive motor type: DC brushless motor (inductive and non-inductive)；

◆•Feedback: Digital Hall, incremental encoder (optional)；

◆•Pulse response frequency up to 2MHz, with digital filtering function；

◆•RS232 serial interface, baud rate up to 115KB；

◆•CAN communication, compatible with CANopen DS-402, baud rate up to 1MHz；

◆•RS485 MODBUS RTU serial interface, baud rate up to 115KB

(Only one RS485 or CAN can be selected)；

◆•Power supply voltage：18-90(135/180)VDC.

1.3 Brushless drive standard specification

Speed control	Command control mode			PWM(RC command)、±10V analogue、CANopen、RS485 MODBUS RTU
	input signal	PWM (RC command)	polarity	PWM=0∽100%，polarity=1/0
			nonpolar	PWM=50% +/-50%，
			Frequency range	Minimum 1 kHz，maximum 100 kHz
			Minimum pulse width	220ns
		Analog instruction	Voltage range	Input voltage range ±10V
			impedance	Differential input impedance =5KΩ
Current control	Command control mode			PWM、±10V analogue、CANopen、RS485 MODBUS RTU
	input signal	Analog instruction	Voltage range	Input voltage range ±10V
			impedance	Differential input impedance =5KΩ
I/O signal	Digital input IN		Number of Ports	10 (IN4, IN5, IN9, IN10 are high-speed ports)
			Signal format	NPN，PNP
			Settable function	Servo enable, external reset, forward/reverse limit, motor stop, high-speed pulse input, etc.
	Digital output OUT		Number of Ports	6
			Signal format	NPN (low level active), can withstand maximum current 2A, maximum voltage 30V DC
			Settable function	Fault signal, lock control
Function	LED indicator			Drive status indication, communication indication
	Communi cations functions	RS-232	Baud rate	9600-115200
			agreement	Full duplex mode, ASCII or binary format
		CAN	Baud rate	20kbit/s-1Mbit/s
			agreement	Canopen application layer DS-301V4.02
			equipment	Dsp-402 device driver and motion control
		RS485	Baud rate	9600-115200
			agreement	MODBUS RTU
	Protection function			Over voltage, over current, under voltage, overload, overheating, encoder abnormal protection
Use environment	installation location			Non-corrosive gas, flammable gas, etc
	altitude			Below 1000 m
	temperature			0°C~+50°C
	humidity			5%~95%RH，No condensation of water droplets
	Resistance to vibration/impact			Less than 4.9m/s2/ less than 19.6m/s2

2、Definition of wiring port

2.1 Power input terminal J1 & J7

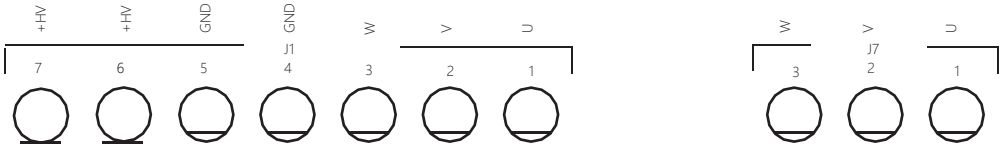


Figure 2.1 Eurogauge screw terminals

J1

serial number	define	terminal	Wiring instructions
1	A#U	Motor power line U phase	Must be connected to the motor one by one according to the label
2	A#V	Motor power line V phase	
3	A#W	Motor power line W phase	
4\5	GND	Input power -	+18~90(135/180)VDC
6\7	+HV	Input power +	

J7

serial number	define	terminal	Wiring instructions
1	B#U	Motor power line U phase	Must be connected to the motor one by one according to the label
2	B#V	Motor power line V phase	
3	B#W	Motor power line W phase	

2.2 Motor encoder input terminal J2 & J6

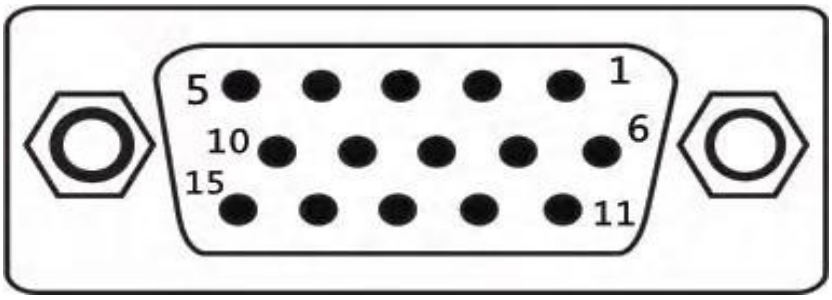


Figure 2.2 three rows of DB15 female seats

J2 A-axis encoder definition

pin	define	function	pin	define	function
1	NTC*	NTC resistance temperature sensor wiring (Analog input function 2 select 1)	9	W+	Motor encoder W+ input
2	NTC*		10		
3	U+	Motor encoder U+ input	11	B-	Motor encoder B input
4	+5V	Motor signal line +5V	12	B+	Motor encoder B+ input
5	0V	Motor signal cable GND	13	A-	Motor encoder A- input
6	V+	Motor encoder V+ input	14	A+	Motor encoder A+ input
7			15	IN3*	Temperature switch sensor wiring
8					

J6 B-axis encoder definition

pin	define	function	pin	define	function
1	NTC*	NTC resistance temperature sensor wiring (Analog input function 2 select 1)	9	W+	Motor encoder W+ input
2	NTC*		10		
3	U+	Motor encoder U+ input	11	B-	Motor encoder B input
4	+5V	Motor signal line +5V	12	B+	Motor encoder B+ input
5	0V	Motor signal cable GND	13	A-	Motor encoder A- input
6	V+	Motor encoder V+ input	14	A+	Motor encoder A+ input
7			15	IN8*	Temperature switch sensor wiring
8					

Note: 1. *If you need Need NTC resistance temperature sensor input function, order please indicate;
2. *If the temperature switch sensor input function is required, connect to pin 1 and pin 15, order please indicate

2.3 Control signal I/O terminal J3

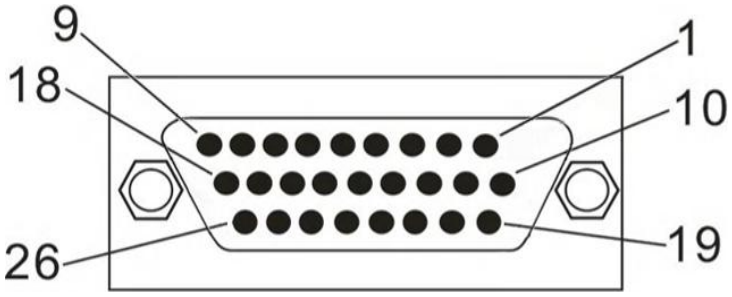


Figure 2.3 Three rows of DB26 female seats

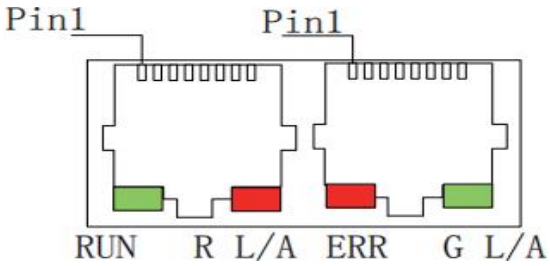
pin	define	function	pin	define	function
19	0V	power ground	20	5V	5V output (100mA)
A axis			B axis		
1	A#AREF+	Analog positive input	10	B#AREF+	Analog positive input
2	A#AREF-	Analog negative input	11	B#AREF-	Analog negative input
3	A#IN1_GP	Hardware enable	12	B#IN6_GP	Hardware enable
4	IN2_GP	custom	13	IN7_GP	custom
5	IN3_GP	custom	14	IN8_GP	custom
6	IN4_HS	custom	15	IN9_HS	custom
7	IN5_HS	custom	16	IN10_HS	custom
8	OUT1	custom	17	OUT4	custom
9	OUT2	custom	18	OUT5	custom
21	A#ENC_A	Motor encoder output signal A	24	B#ENC_A	Motor encoder output signal A
22	A#ENC_B	Motor encoder output signal B	25	B#ENC_B	Motor encoder output signal B
23	OUT3	custom	26	OUT6	custom

Note: Only incremental encoders can output motor encoder signals.

2.4 J4 CAN (RS485)communication terminal

2.4.1 CAN(RS485) communication terminal pin definition

The driver communication port has two kinds, one is the crystal head, the other is the 6p terminal, defined as follows



RJ45 is defined as follows：

pin	definition	function
1	CANH (RS485_A)	CANH signal(RS485_A)
2	CANL(RS485_B)	CANL signal(RS485_B)
3/7	C_GND	Communication power grounding

Note: The two RJ45 ports in J4/J5 are defined in the same way to facilitate bridging during communication.

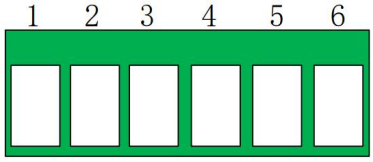
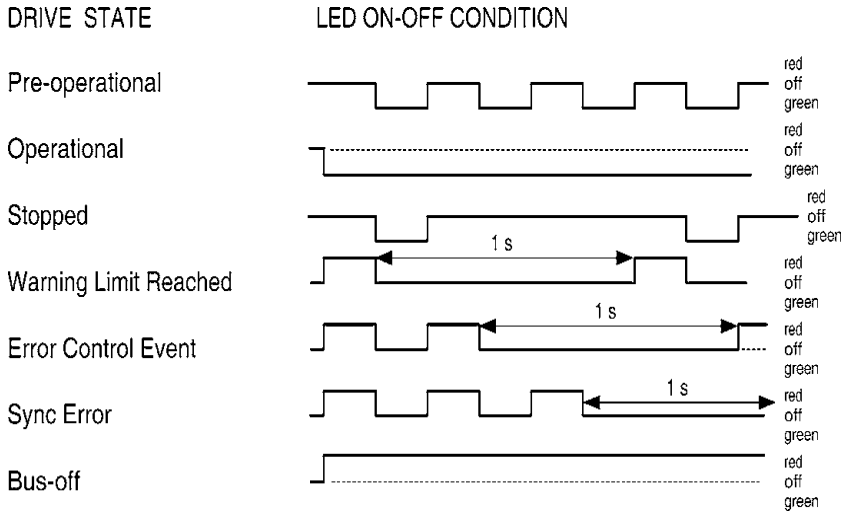


Figure 2.4.2 6P terminal

6P wiring terminals are defined as follows：

pin	definition	function
1	CANH (RS485_A)	CANH signal(RS485_A)
2	CANH (RS485_A)	CANH signal(RS485_A)
3	C_GND	communicatively
4	C_GND	communicatively
5	CANL(RS485_B)	CANL signal(RS485_B)
6	CANL(RS485_B)	CANL signal(RS485_B)

2.4.2 CAN Communication indicator

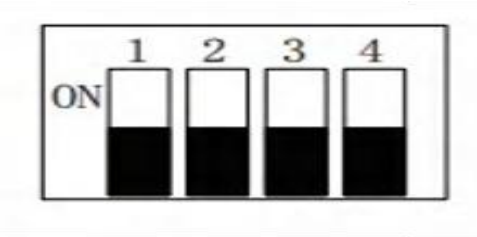


When CAN communicates：

Pilot lamp	status
L/A (Displays link status and link activity)	Off = No link
	On = The port is open and not active
	Blinking on = The port is open and active
RUN （Display CAN communication status）	Off = Initialize
	Blinking = Before operation
	Single blinking = Stopped
	Steady on = Running
ERR(Shows communication errors)	Off = No error, the communication is normal
	Blinking = Invalid configuration
	One blink = number of warning arrivals
	Blinking twice = A protection event or heartbeat event occurs
	Steady on = The CAN controller bus is off

2.4.3 CAN address DIP switch of the SW drive

When the external DIP switch is selected on the software, the DIP switch is valid. The dip is valid for the A-axis drive, and the CAN address of the B-axis is the A-axis address plus 1. The switch codes are based ON the BCD code sequence. The switch codes are valid when the dip switches are switched to ON.

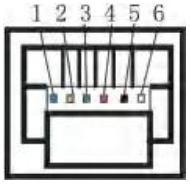


SW DIP switch indicates the station ID

SW switch number	Corresponding station number
1	1
2	2
3	4
4	8

For example, to set the station number to 3, that is, switch 1,2 of the SW switch to ON, 1+2=3; If you want to set the station number to 10, the SW switch 2, 4 to ON, 8+2=10

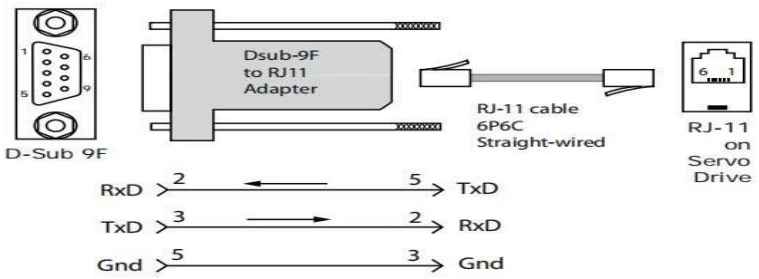
2.5 Serial communication terminal J5



pin	definition	function
2	RXD	RS232 communication receiver
3	GND	Communication power grounding
5	TXD	RS232 communication sender

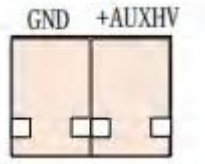
Figure 3.4 RJ11 6-pin crystal holder

The debugging line is shown in the following figure



2.6 Auxiliary power supply J8

The J8 port is the auxiliary power interface of the drive and can be connected if necessary. If connected, communication is maintained when +HV is disconnected from power +AUXHV is powered on, but there is no action when sending commands.



GND	0V
+AUXHV	+24V (or ≤ mains voltage)

2.7 AMP LED

A#AMP and B#AMP are the status indicators for the two axes of the drive, which may have the following states:

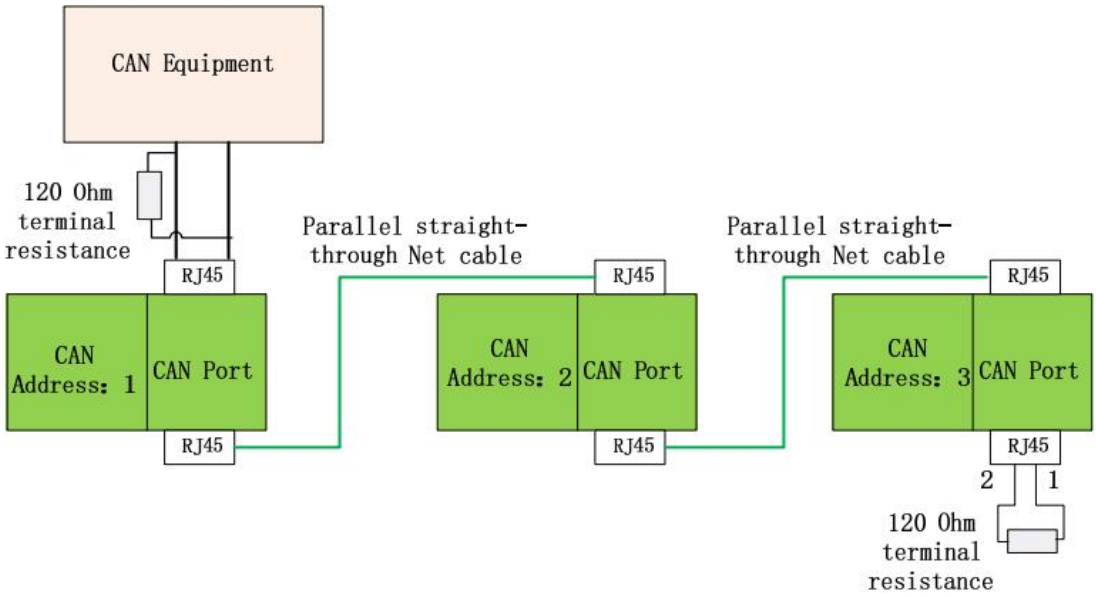
Green/no flash	drive is OK and enabled
Green/Slow blinking	drive is OK but not enabled. After enabled, it can run
Green/Flash	Positive limit switch or negative limit switch is effective, the motor will only move in the direction not prohibited by the limit switch
Red/Fixed	Instantaneous failure, after troubleshooting amplifier restart operation
Red/flashing	Lock the fault and restart the amplifier to resume operation

3 Hardware wiring instructions

3.1 CAN bus(CANH,CANL,GND)

CAN bus is based on CAN V2.0B physical layer, CAN physical layer signals including CANH, CANL and GND, using CANopen protocol for communication. The electrical interface uses TJA1051 high-speed transceiver.The physical address range of CAN communication ranges from 0 to 127， with the default address being 0. Resetting or restarting the drive takes effect with an RS-232 communication port address change or external switch SW selection. Through the CAN communication interface, a very effective combination of high data rate and low cost multi-axis motion control system can be realized.

The CAN network can be connected as shown below：



3.2 Analog signal input(Ref+,Ref-)

±10Vdc differential analog input, maximum input voltage ±10Vdc, input impedance about 5.36k, resolution 12 bits. The analog signal can be used for torque and speed control.

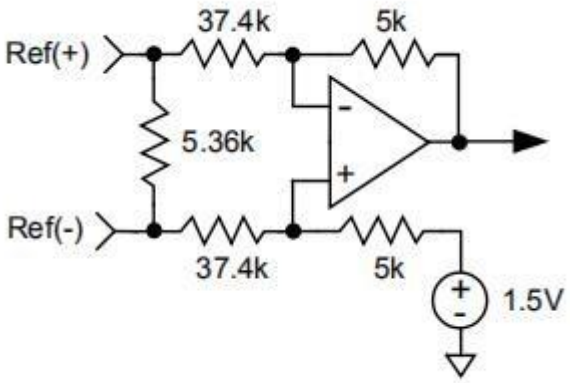


Figure 3.2.1 Analog hardware input circuit

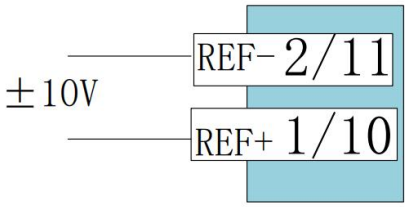


Figure 3.2.2 External power analog input cable

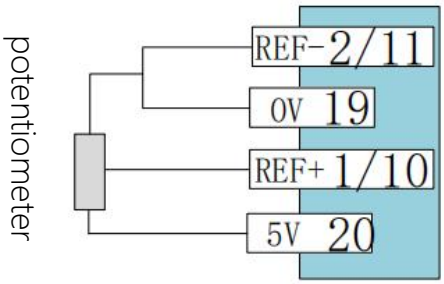


Figure 3.2.3 Internal power analog input wiring

3.3 Digital input signal

BC2 series brushless has 10 digital input ports,8 with programmable functions, drive power PWM output and safety enable fixed by IN1 and IN6 control, through this port can achieve the power circuit hardware off (off enable).

According to the port function of the controller and the hardware RC filtering time, the input signal ports are divided into universal input ports and high-speed input ports, and the function of each port can be changed by programming.

3.4 Universal input signal terminal

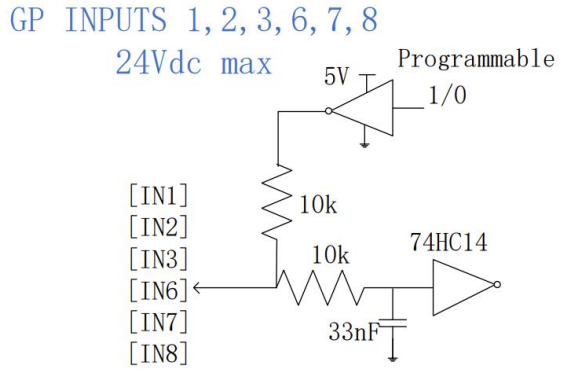


Figure 3.4.1 IN 1-IN 2 hardware input circuit

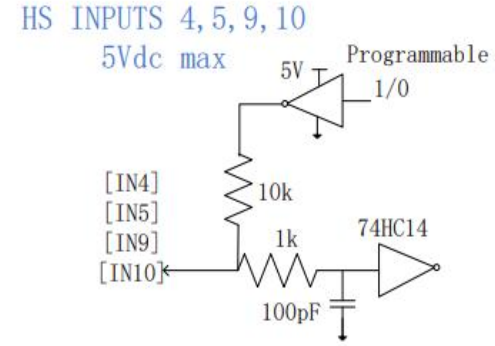


Figure 3.4.2 High speed port hardware input circuit

IN2, IN3, IN7, IN8 are universal input signal terminals, and the control logic and functions can be set by software. IN1,IN6 are fixed for the enable control of the drive, which takes effect through the software parameter setting high/low level.

3.5 High speed input signal terminals（IN4、IN5、IN9、IN10）

IN4, IN5, IN9, and IN10 are high-speed input terminals, which can be used not only as general purpose terminals, but also as high-speed pulse inputs with fixed pulse input ports.

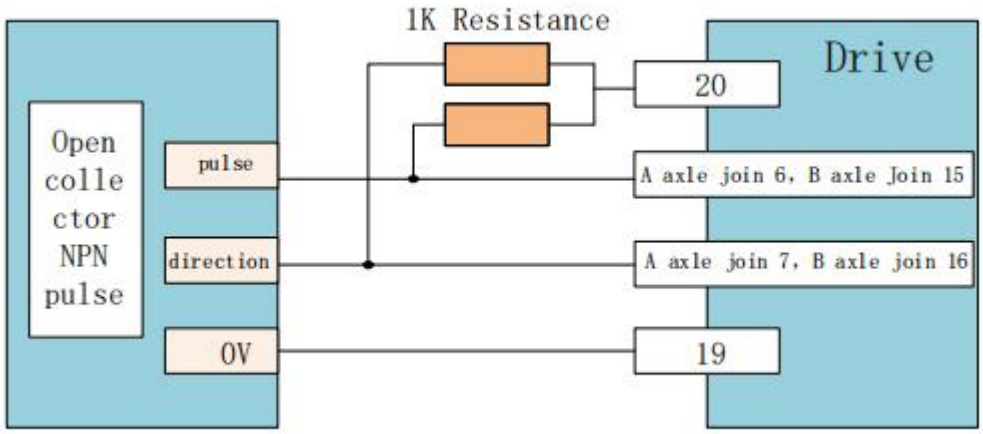


Figure 3.5.1 open-collector NPN pulse input diagram

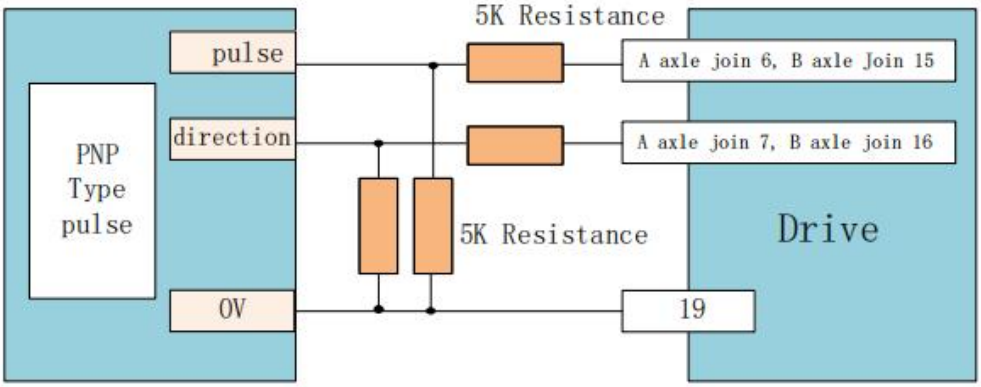
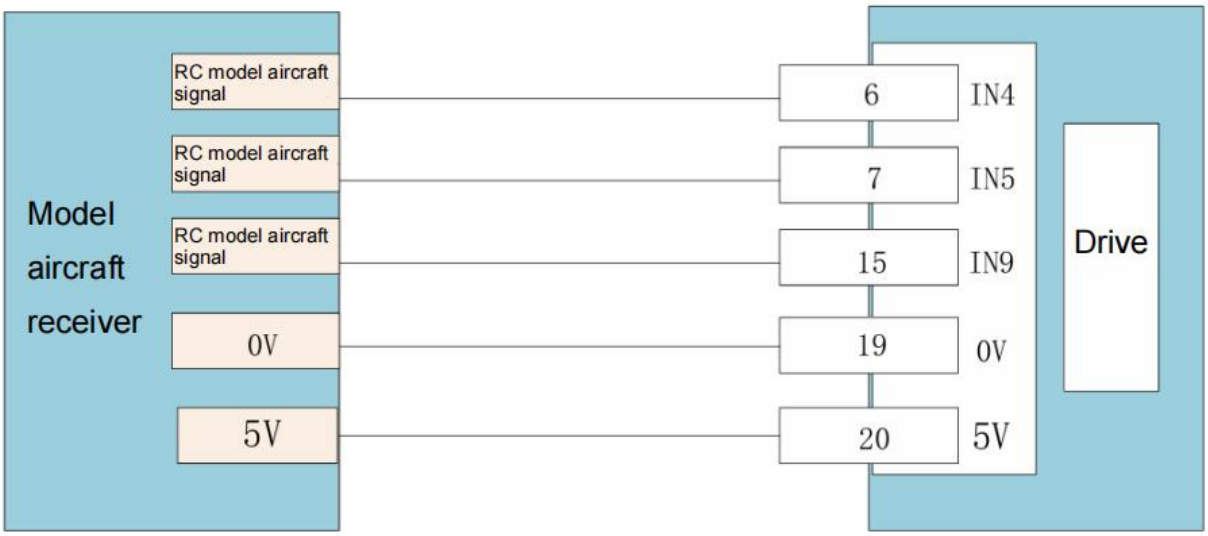


Figure 3.5.2 PNP pulse input diagram



Interlocking	IN4 Walking	IN5 Turning	IN9 Gear Shift
Single-action	IN4 A-axis	IN5 B-axis	IN9 Gear Shift

Figure 3.5.3 RC model signal wiring diagram

3.6 Digital output signal

BC2 series driver has 6 digital output outlets (A,B axis 3 each), digital output IO port using MOSFET open output, internal through the diode series 1k resistor to pull up to 5V, the port can withstand voltage up to 24VDC, current can withstand up to 2A. The output function of the port can be changed according to internal programming.

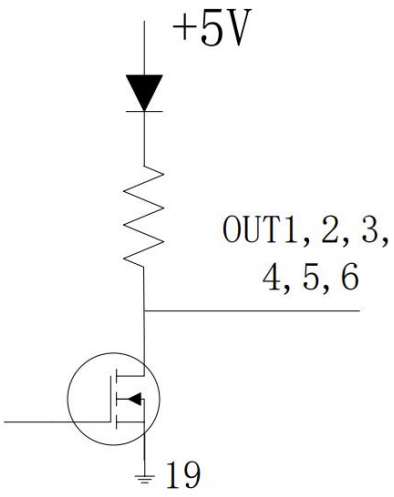


Figure 3.6.1 Digital output hardware circuit

3.6.1 PWM signal input

The motor speed and torque can be controlled by PWM signal, including single-ended PWM duty cycle + direction signal and single-ended PWM duty cycle ±50% modulation.

3.6.2 Single-ended PWM duty cycle =0~100% pulse control

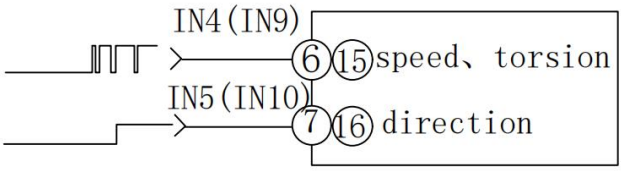


Figure 3.6.2 100% duty cycle + direction control

3.6.3 Single-end PWM duty cycle =50%±50% pulse control

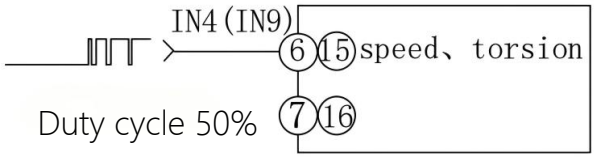


Figure 3.6.3 50%±50% duty cycle control

3.6.4 Motor lock output wiring

The output outlet can be configured as the motor lock output, and the corresponding output outlet is configured as the lock output control on the adjusting software. In the case of no fault and the motor is enabled, the brake is energized to loosen the lock, and the brake power is quickly disconnected in the case of any fault to stop the motor. Since there is no continuous current diode in the circuit, it is necessary to connect the external current diode, if it is through the intermediate relay can not connect the current diode.

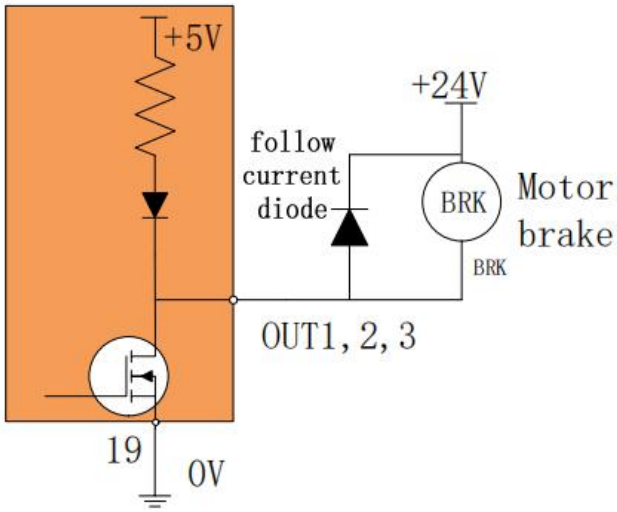


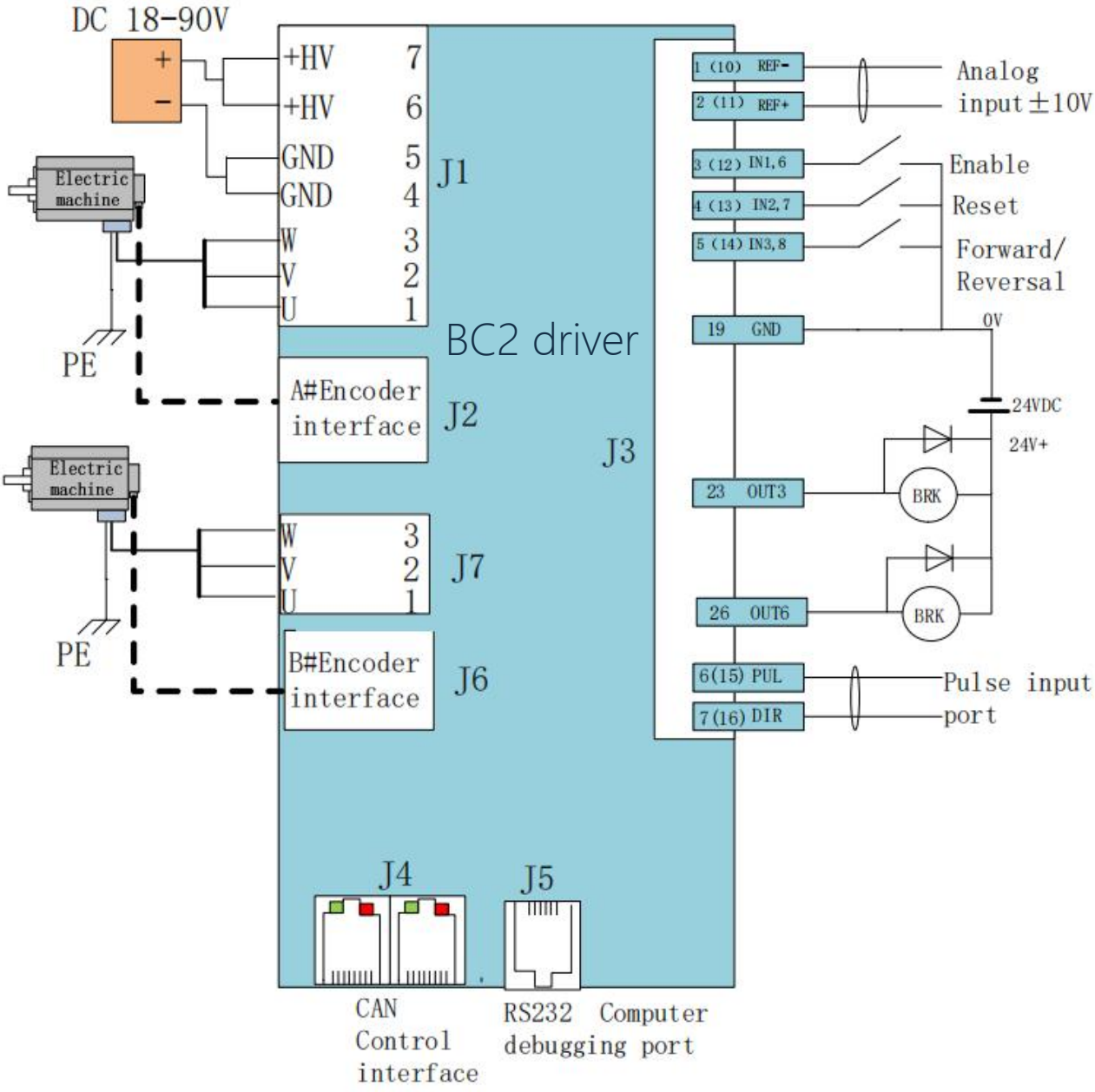
Figure 3.6.4 External circuit of motor lock brake

4 Driver parameter setting

BC2 series drive can be through RS232 serial port, through the tuning software can set parameters, monitor motor status, collect data waveform, etc. Complete system debugging quickly and intuitively. For details, see the debugging software instructions.

5、System wiring diagram

5.1 Typical wiring diagram



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Revision record

Date	Version number	Revised content	
		Modify location	Modify content
20250305	V0.1	/	New edition
20250406	V0.2	P2	New Product Models