

## **Brushless Direct Current (BLDC)**

### **Brushless dc motor controller**

### **Single channel multiple control modes**

### **Hall square wave control, encoder positive mystery, wave control**

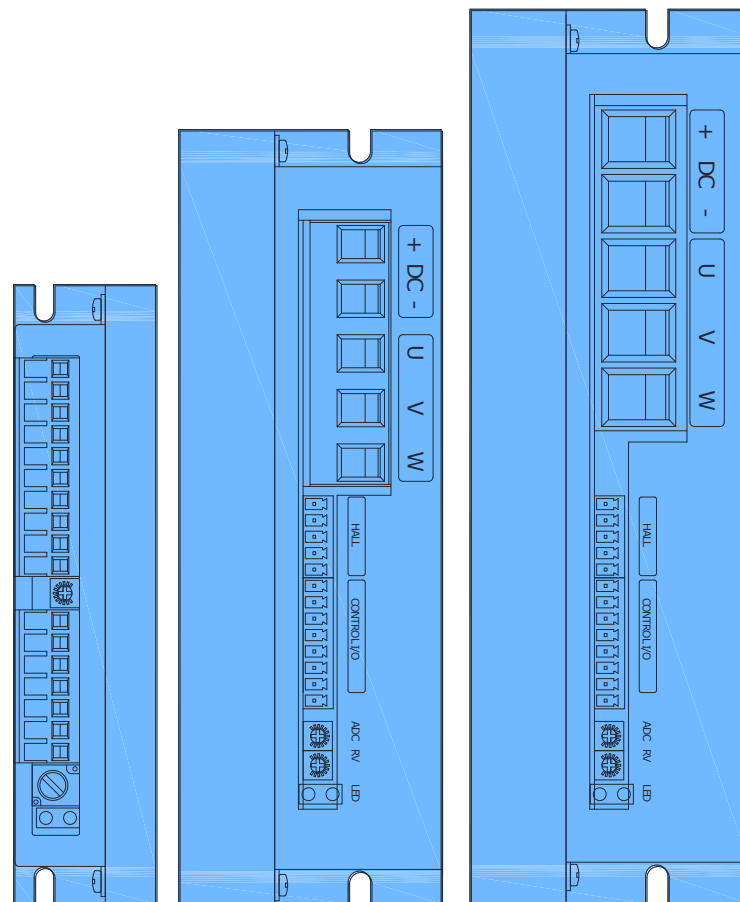
### **RS-485 communication design**

### **APP application Software CloudView**

### **Meet the requirements of national standards**

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- ※ Please install, connect and debug the equipment with industry technicians.
- ※ It is not allowed to install, remove or replace the circuit of the equipment when it is live.
- ※ Be sure to install necessary protective devices between the power input and the power supply (battery) to avoid dangerous accidents or fatal injuries.
- ※ Need to install: overcurrent protector, insurance, emergency switch.
- ※ Please do the isolation and insulation protection between the product and the ground and equipment.
- ※ If there is a real need for live debugging of this product, please choose a non-metallic well insulated screwdriver or special debugging tool.
- ※ This product shall be installed in a well-ventilated environment.
- ※ This product can not be directly used in high humidity, dust, corrosive gas, strong vibration of the abnormal environment.



## Brushless dc motor, Abbreviation:BLDC

Brushless dc motor (BLDC) is an abbreviation of the Brushless Direct Current. The function of the control system corresponding to this motor is to control the precise operation of the motor through software algorithm. Series Bis a single channel low voltage motor controller with display.

The design is based on automotive ARM 32-bit MCU. It can also adapt to brushless motor control based on hall sensor, magnetic coding sensor and photoelectric coding sensor.

The hall sensor motor can be controlled by square wave or positive wave algorithm.

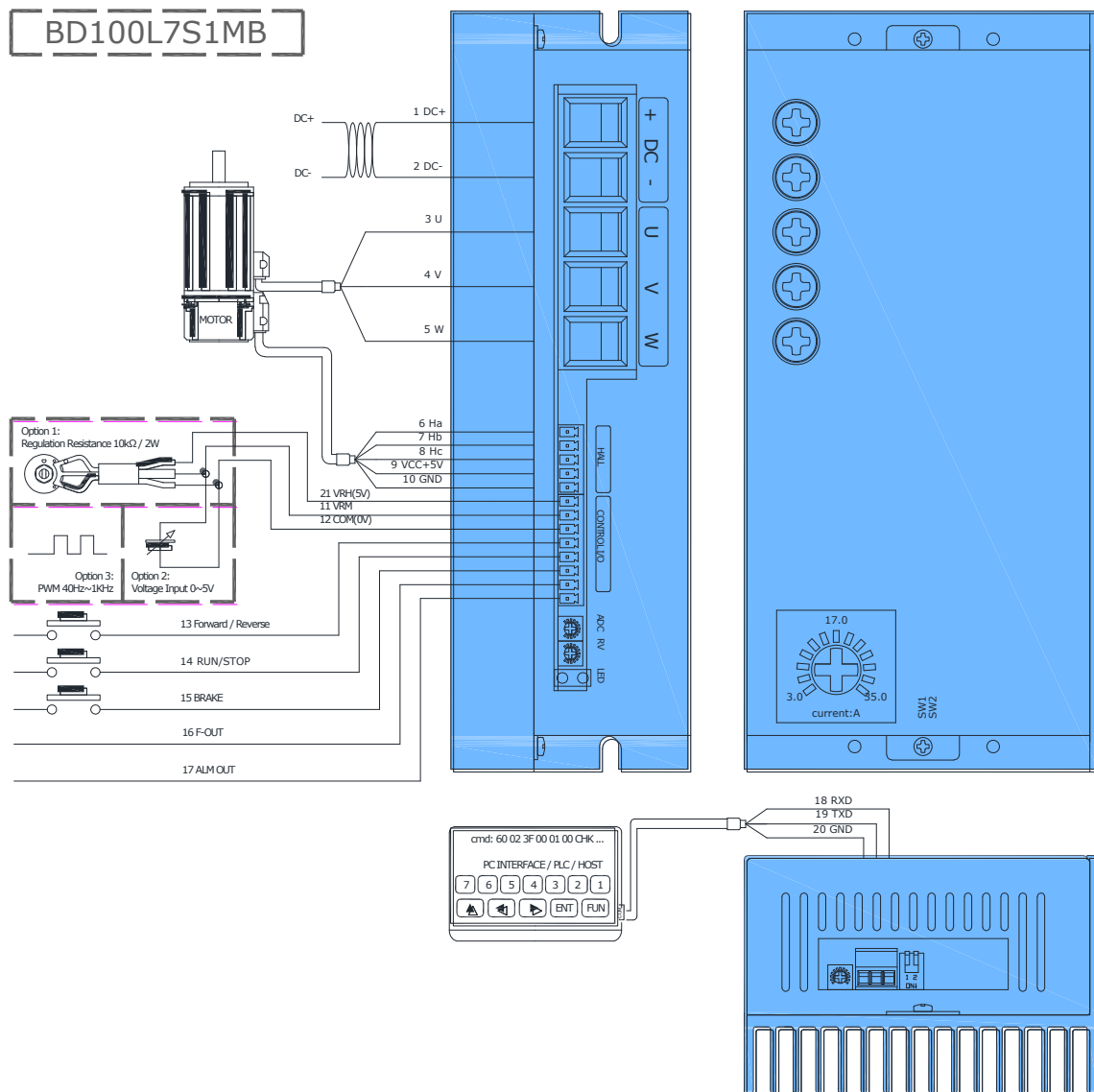
For magnetic hall sensor or optical sensor motor, FOC positive algorithm can be used to achieve low speed, high torque and precise positioning control. Can realize different mode control, PWM open loop, speed closed loop, position loop, torque mode... Custom pattern control can be implemented with algorithm. The controller is equipped with a variety of communication interfaces, and the upper computer can realize various working purposes of the system through communication protocol instructions.

The controller is equipped with the basic control interface, and the upper computer can realize the main functions of the whole system.

The controller has the related failure light indication and special control port output.

The controller is equipped with human-machine interface, through which users can set the parameters of the controller.

## 1. Electrical Diagram



SN	PIN	Function	Color	Note
1	DC+	Power supply positive	R	
2	DC-	Power supply negative	B	
3	U	Motor U	R	
4	V	Motor V	Y	
5	W	Motor W	B	
6	Ha	Hall phase A	B	
7	Hb	Hall phase B	G	

8	Hc	Hall phase C	W	
9	VCC+5V	Hall power supply positive	R	
10	GND	Hall power supply negative GND	B	
11	VRM	Voltage resistance modulation input		
12	COM(0V)	GND for control input		
13	Forward /Reverse	Direction control input		
14	RUN/STOP	Motor run/stop control input		
15	BRK	Motor inner brake control input		
16	F-OUT	Speed output(PP*3 cycles per round, 50% duty cycle signal)		
17	ALM OUT	Alarm output		
18	A	RS-485		
19	B	RS-485 B		
20	GND	RS-485		
21	VRH(5V)	Voltage resistance power supply		

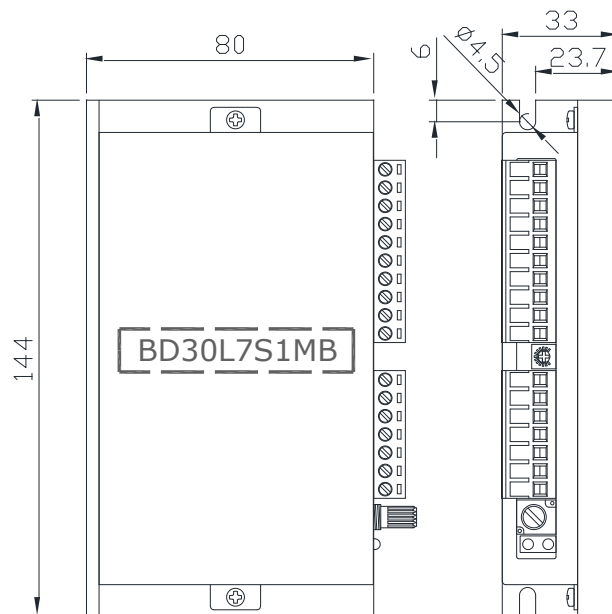
## 1. Characteristics

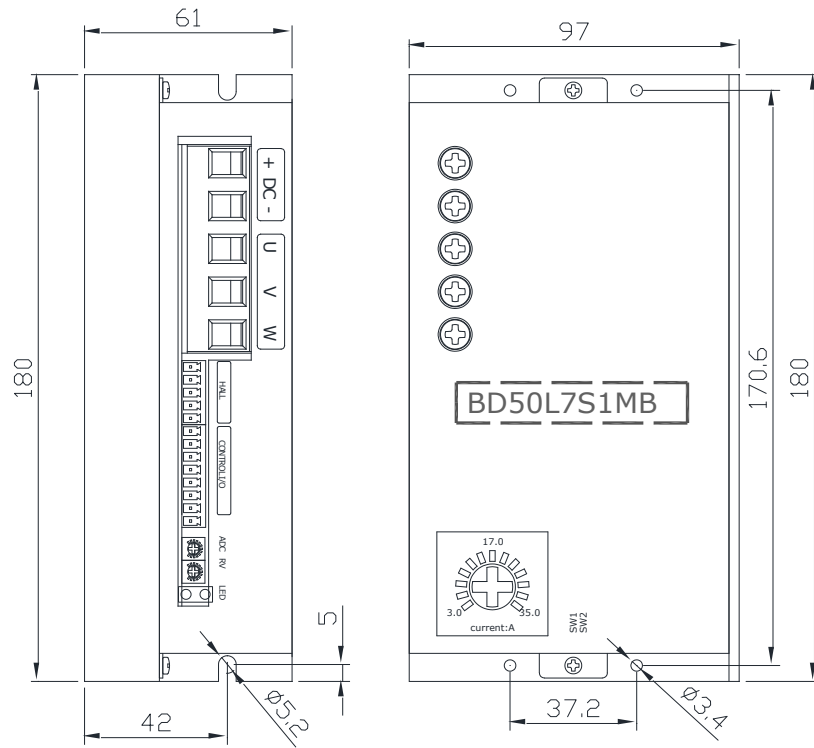
- Smart multi PID control, PID gains for speed changeable by ACC/DEC.
- Control mode: Open loop, Speed closed loop. SW1 ON—Speed closed loop, SW1 OFF—Open loop.
- Polar pairs selection: SW2 ON—4 polar pairs, SW2 OFF—2 polar pairs.
- Speed/Torque modes: inner RV, external 0~5V input, Pulse Width Modulation input.
- Direction control: Forward, Backward.
- Run/Stop control input.
- Digital signal output: Alarm output, external control relay output.
- Work current control: maximum current limited, overcurrent protection. Maximum work current defined by P-SV.
- Protection: over-bus voltage, low-bus voltage, hall sensor signal error, short-cut error.
- LED status indicator.
- RS-485 communication.
- CANOpen communication: Optional.

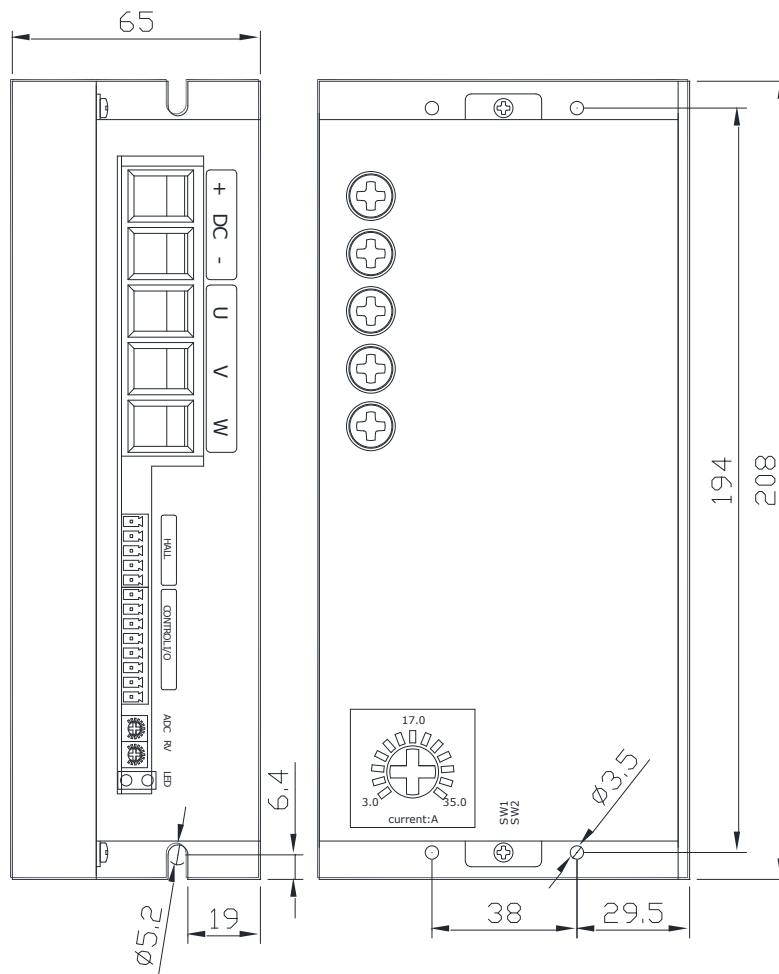
## 2. Parameters

- Power supply range: DC 12~60 V
- Work current range: 6~75A
- Minimum RPM: 50 RPM ( hall sensor motor ) , 1 RPM ( Encoder sensor )
- 5 V DC Power output: 20 mA ability
- VRM Input: 0~5 V DC
- PWM Input: 4Hz~10KHz
- Work temperature: -20~+70°C
- Work Humidity:  $\leq 80$  RH
- Size: See installation drawings
- Weight: BD30L7S1MB—320g, BD50L7S1MB—850g, BD100L7S1MB—1050g

## 3. Installation







## Note :

Multiple controllers are installed at the same time. Please keep the controller > 20mm interval.

Keep the controller away from dust, high humidity environment and avoid accidental contact. Keep enough space around the controller for ventilation and adjustment.

Keep the controller away from heat sources. Ensures that the controller operates within the specified ambient temperature range.

Avoid installing on equipment that vibrates excessively. If installation is required, take good anti-vibration measures.

## 4. Electrical Connection

- ① Donot work with live wires.
- ② Select insulated lead that matches the voltage and current of the controller, please follow the following table to select the specification of the controller power input line and motor connection line.
- ③ Wiring harness specification

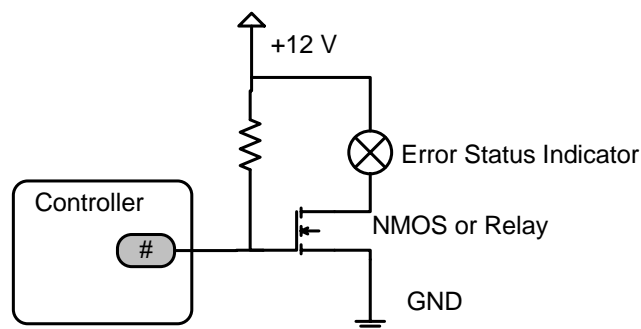
IXD	Interface Name	Specification and definition
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1	Power input	50 A , 6 mm <sup>2</sup> Cross-sectional area , The wire Max longer15 m
2	Motor phase line	50 A , 6 mm <sup>2</sup> Cross-sectional area , The wire Max longer15 m

- ④ In any case, signal lines, logic control line should not be bundled and mixed with the power supply line. output line(motor line)wiring, So that the induced voltage will cause interference to the controller,wrong action or direct damage to the controller.
- ⑤ There is no power reverse protection function inside the Controller, Please must keep that the controller power input is consistent with the positive and negative poles of the external power supply, otherwise the controller will be damaged.

## 5. Output Electrical Diagram

Output is NPN:



## 6. Definition

### 6.1 Indicator

LED	Definition	Description
Green	POWER	Keep after power up
Red	Error	1 : Stall 2 : Overcurrent 3 : Hall sensor error 4 : Low voltage 5 : Over bus voltage 6 : MOS Error 7 : Current sample base Error 8 : Over load 9 : Over speed



## 6.2 Settings

PR\*\* parameter list :

SN	Description	Range	Unit	Default Value	Notes
PR00	ID	1-255	/	1	
PR01	Polar pairs	1~10	P	4	
PR02	Overcurrent	1~30	A	30	
PR03	Limited current	1~17	A	17	
PR04	Maximum PWM duty cycle	10-99	%	99	
PR05	Control modes	0-9	/	2	Mode 0: 485 speed closed loop Mode 1: VRM speed closed loop Mode 2: VRM open loop Mode 3: 485 fixed PWM Mode 4: reserved Mode 6: External open loop Mode 7: External speed closed loop Mode 8: External Pulse Width Modulation open loop Mode 9: External Pulse Width Modulation closed loop
PR06	Inner maximum speed	100-8000	rpm	3000	Mode 1
PR07	Maximum PWM dutycycle for open loop	100~990	0.10%	500	Fixed PWM output
PR08	Input signal direction	0-1	/	0	0--normal , 1--reversed
PR09	Overspeed RPM	100-9999	rpm	3500	
PR10	Overspeed period for	0-9999	mS	0	Disable alarm if 0

	Alarm				
PR11	PID gains ACC	10-100	rpm/mS	60	
PR12	PID gains DEC	10-100	rpm/mS	60	
PR15	Overload period for Alarm	10-9999	mS	3000	
PR16	Inner brake start RPM	1-1000	rpm	100	
PR17	Motor stop style	0-1	/	0	0 : free stop 1 : BRAKE after stop
PR34	485 RUN/STOP	0-1	/	0	0 : STOP 1 : RUN
PR35	485 F/R	0-1	/	0	0 : CW 1 : CCW
PR36	485 Brake	0-1	/	0	0 : Release brake 1 : Brake
PR37	Control command source Sel	0-1	/	0	0 : IO 1 : 485 command

## 7. MODBUS Communication

### 7.1 settings

Para.	Value
Slave ID maximum	16
Baudrate	9600bps
Transfer Style	half-duplex
Protocol	ModBus RTU
Data	8
STOP	1
Checksum bit	None
CRC	ModBus CRC16
Length	8 bytes

### 7.2 Protocol system

Name	ID	W/R	Para Add	Data	CRC
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byte(s)	1	1	2	2	2
Brief	Device ID	0x05:Read 0x06:Write	PR** No. HEX Vlaue	Value	Modbus CRC16
Sample	0x01	0x06	0x00 0x25	0x00 0x01	0x59 0xC1
Set the device control command source as 485 by PR37					

### 7.3 Special instructions

There are two ways to control the operation of the controller, through the controller interface control; Through RS-485 communication control.

Through the control interface control, only through the display to set the required parameters and through the hard wire to control the whole system.

Through RS-485 communication port control, the control instruction source of the system needs to be set as MODBUS instruction of 485 communication according to the following steps, Note that the interface of the controller does not work at this time, if the user needs to re-use interface control, It is also required to set the instruction source as IO port through MODBUS instruction.

#### Form 1 RS-485 Switching steps

Steps	Instruction
1	Set PR05 control mode to 0 from the monitor
2	Send the instruction through RS-485 and set PR37 to 1, and set the instruction source to 485 instruction (HEX data) 01 06 00 25 00 01 59 C1
3	Control (HEX data) with the following command: Start motor PR34: 01 06 00 22 00 01 E8 00 Change speed PR06: 01 06 00 06 0B B8 6E 89 Change veer PR35: 01 06 00 23 00 01 B9 C0 Stop motor PR34: 01 06 00 22 00 00 29 C0

## 8. Cloud point



CloudView V1.01

CloudView V1.01 is an APP for controller parameter setting and monitoring. Users can apply the visual operation controller through this, APP. The APP is connected to the controller through ModBus.

Other

### ① Version of the record

Form 1 Record

SN	Content before modification	Content after modification	Revision of previous	Version	Reviser	Date	Remark
1			V1.0		A		NEW
2							

### ② Naming Rule

BD	30	L2	S1	MB	D	-	F01
Type	Current Grade	Max voltage	Hall	Communication mode	Display	Symbol	Special demands
BD: Brushless	05: 5A	L1: 12VDC	S1: Hall	MB: modbus	D: With display	-	Code
BS: Servo	10: 10A	L2: 24VDC	S2: non-inductive	CN: CAN			none
BT: Double-drive	15: 15A	L3: 36VDC	S3: ABZ encoder	EC: EtherCAT			
	30: 30A	L4: 48VDC	S4: Absolute value encoder				
	50: 50A	L7: 72VDC	S5: Rotation transducer				
	100: 100A	L9: 96VDC					
		H1: 110VACH2: 220VACH3: 380VAC					