User Manual

BLD-AC1000S

BLDC DRIVERS

1000W High Voltage Brushless Driver

Address: 15-4, #799 Hushan Road, Jiangning, Nanjing, China

Tel: 0086-2587156578

Web: www.omc-stepperonline.com

Sales: sales@stepperonline.com

Support: technical@stepperonline.com

Read the operating instructions carefully before putting the driver into operation with power

Summary

BLD-AC1000S BLDC motor driver is designed by OMC Corporation Limited independence which is assorted with the advanced motion control industrial. It is suitable for BLDC motor with the power under 1000W. The driver adopts the latest high performance digital logic chips specialized for brushless motors. It uses a new type of PWM technology that enable the motor running high speed, small vibration, low noise, good stability and high reliability.

1. Product Characteristic

System Characteristic

Input Voltage: 110VAC/220VAC, 50/60Hz,
Continuous Output current: 7A, suitable for ≤1000W motor
Peak Current: 11A
Working temp.: 0~+45°C Storage temp.: -20~+85°C
Working & storage humidity: <85% (no frosting)
Structure: wall-mountable type

Basic Characteristic

Cooling: Radiator
Control terminals: Isolation
Work mode: speed open loop, speed closed loop, external interface control, panel manual control, sense mode, no sense mode, external analog voltage speed regulation, external PWM signal speed regulation, speed display, current effective value display, maintenance mode.
Protection: Over load, over heat, over speed, over voltage, under voltage will cause the power abnormal.

2. Electrical Specification

Parameters	BLD-AC1000S	
Input voltage（VAC）	110	220
Continuous Output Current（A）	7.0	
Rated Output Power（W）	500	1000
Peak Current(A)	10	

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*** Do not measuring or touch any components without housing while operating.**

*** Should check soleplate or change fuse 1minter later after power off.**

*** Operating without housing is forbidden.**

*** Make sure to connect the ground terminal, otherwise the brushless motor will working unsteadily**

*** Sudden damage while drives working, our company only affords the service and replace in the guarantee. Personal injury and motor damage caused by the accident will invalidate the guarantee.**

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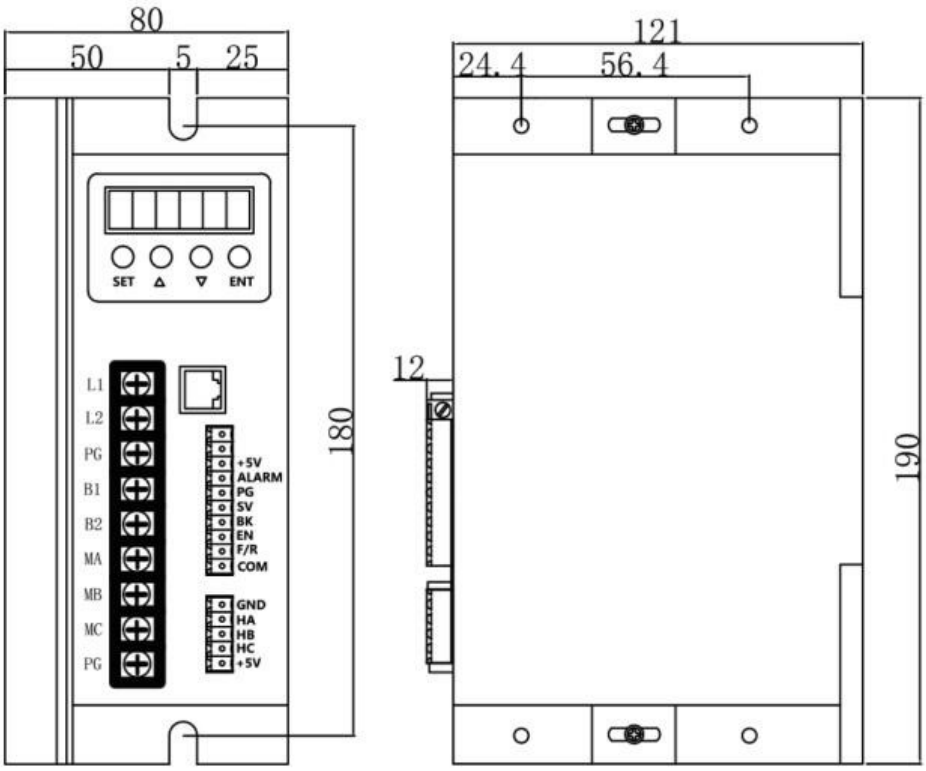
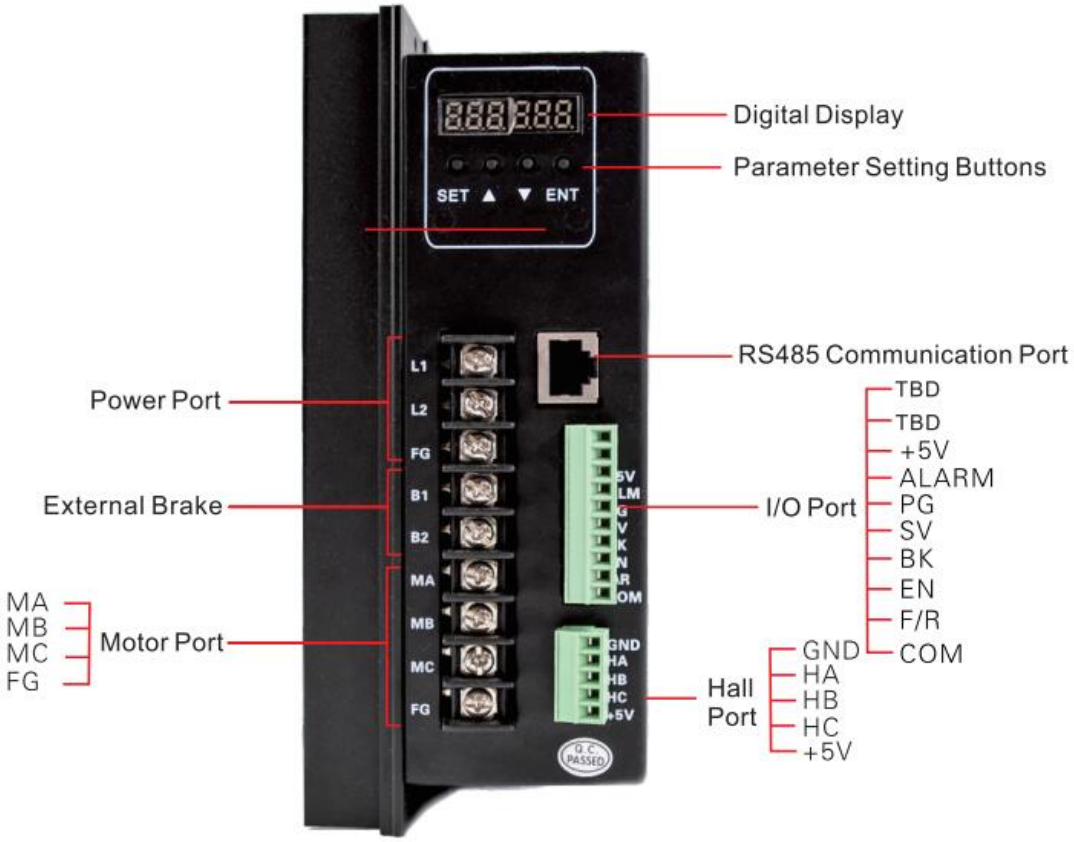
3. Mounting Dimension: 190x80x130mm



4. Terminal and Signal



Power connection

No.	Terminal Name	Description
1	L1	220VAC
2	L2	220VAC
3	FG	Ground line
4	B1	External release resistor(reserve)
5	B2	External release resistor(reserve)
6	MA	Brushless motor winding U phase(A)
7	MB	Brushless motor winding V phase(B)
8	MC	Brushless motor winding W phase(C)
9	FG	For the ground

Hall Signal Terminal

No.	Name	Description
1	GND	Hall sensor Negative
2	HA	Hall sensor A phase
3	HB	Hall sensor B phase
4	HC	Hall sensor C phase
5	+5V	Hall sensor Positive

Motor Connection Terminal

No.	Name	Description
1	U	BLDC winding U phase (A)
2	V	BLDC winding V phase (B)
3	W	BLDC winding W phase (C)
4	FG	GND

Control Terminal

No.	Terminal Name	Description
1	Reserve	
2	Reserve	
3	+5V	**+5V** power output terminal
4	ALARM	Alarm output terminal
5	PG	Speed output terminall
6	SV	Analogy signal input terminal
7	BK	Brake terminal
8	EN	Run/Stop terminal
9	F/R	CW/CCW terminal
10	COM	COM terminal

Attention: If the external potentiometer is not used for speed regulation, the SV and +5V can be connected to the rated speed, and then connect COM and EN to control the start and stop.

5. Function and Usage

Speed adjust method

The drive provides the following three speed regulation modes, the user can choose one of them:

Panel speed regulation: During panel control, acceleration and deceleration can be achieved by pressing +/- buttons.

External input speed regulation: Connect the two fixed terminals of the external potentiometer to the COM and +5v terminals of the drive respectively, and connect the adjustment terminal to the SV terminal to use the external potentiometer (5K~50K) to adjust the speed, or through other The control unit (such as PLC, microcontroller, etc.) inputs the analog voltage to the SV terminal to realize speed regulation (relative to COM). The acceptance range of the SV port is DC OV~+5V, the corresponding motor speed is 0~rated speed.

External digital signal can also be used for speed regulation: a pulse width digital signal (PWM) with an amplitude of 5V and a frequency of 1KHz~2KHz can be applied between SV and COM for speed regulation, and the motor speed is linearly regulated by its duty cycle.

When the speed control voltage is below 0.3V, the motor will stop.

Motor operate/stop control (EN)

The running and stopping of the motor can be controlled by controlling the on and off of the terminal EN relative to COM. When the terminal is disconnected, the motor runs and the motor stops. When using the run/stop terminal to control the motor to stop, the motor stops naturally, and its motion law is related to the inertia of the load. Because braking and stopping have impact on both electrical and mechanical, the body downtime is related to the load inertia of the user's system.

Motor rotation direction control (F/R)

The running direction of the motor can be controlled by controlling the on/off of terminal F/R and terminal COM. When F/R and COM are not connected, the motor runs clockwise (facing the motor shaft), otherwise, the motor runs counterclockwise.

Brake the motor to stop (BK)

The braking and stopping of the motor can be controlled by controlling the on/off of terminal BK and terminal COM. When the control terminal BK is disconnected from the terminal COM, the motor runs. When it is connected, the motor quickly brakes and stops. The braking stop is faster than the natural stop. The specific stop time is related to the load inertia of the user system. Due to the impact of braking and stopping on electrical and mechanical, such as large inertia or fast acceleration and deceleration, it is necessary to connect an external 50 ohm 100W or 200W braking resistor at the B1 and B2 terminals.

Speed signal output(PG)

Speed pulse output, the number of output pulses per motor revolution is 3 x N, where N is the number of pole pairs of the motor. Example: 2 pairs of poles (that is, 4-pole motor) have 6 pulses per revolution, when the motor speed is 500 rpm, the output pulse of terminal PG is 3000.

Alarm output (ALM)

The driver alarm output, the port is low level output when alarm. To get the signal, a 2KΩ~5KΩ pull-up resistor should be connected between the power supply. When an alarm occurs, this terminal is connected to COM (low level), and at the same time, the driver stops working by itself and is in an alarm state.

Drive failure

When overvoltage or overcurrent occurs inside the drive, the drive enters the protection state, the drive will automatically stop working, the motor will stop, and the fault code will be displayed on the drive. Or power off, the drive can release the alarm.

6. Display and Keyboard

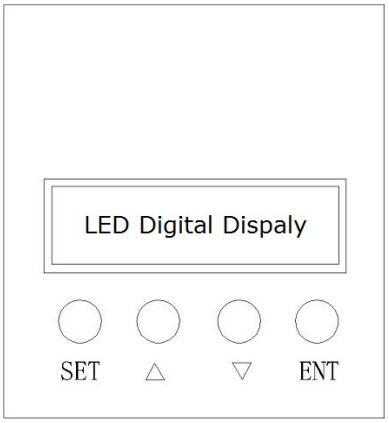
Display and Keyboard Operation

Remark:"SET": Return (backspace)

"△": Plus 1

"▽" : Minus 1

"ENT": ENTER, Confirm key (call out setting parameter)



6.1 Parameter Setting Sequence

Please insure that the motor is under the stop situation when set the parameter. That is, in panel mode, the motor is in the stop state or, the motor is enabled to disconnect in external port mode.

1. In standby condition, press "ENTER" to call out the system parameters, press "ENTER" again, it will call out the parameter value.

2. Press "△"or "▽"to the parameter number you want. Press "SET" to return to standby mode if there is no need to change value.

3. Press "ENTER" to show the parameter setting value. Press "SET" to return to standby mode if there is no need to change value.

4. Press“△”or “▽” to the value demanded.

5. Press “ENTER” to save the changes and press “SET” to return to standby mode.

Note: At setting mode, it will return to speed display interface if there is no press within one minute.

6.2 Working mode

Motor works at two modes. One is the panel mode, another is terminal control. The motor runs as the setting, display shows the speed of motor. Under the panel mode, Press “SET” to start/stop the motor, long press “△”or “▽” to acceleration or deceleration speed, press “ENT” to insure and know the running speed.

6.3 Protect mode

While Motor operates abnormality, display shows ERR×

(1) Err-01: stall

(2) Err-02: over current

(3) Err-04: hall fault

(4) Err-08: input lost- voltage

(5) Err-10: input over-voltage

(6) Err-20: peak current

(7) Err-40: temperature alarm

(8) Err-80: power module temperature alarm

6.4 Drives Parameter Setting:

P00X: Operating Parameter					
Function Code	**Function Name**	**Setting Range**	**Unit**	**Default value**	**Change**
P000	Control mode	00 External port mode 01 Panel mode 02 External port PWM speed ajustment 03 RS485		External port control mode	
P001	Pole	1~99	Pairs	2	○
P002	Rated Speed	100~9999 Valid for external port mode	RPM	3000	○
P003	Max. current setting	0~255	A	25	○

P004	Panel running speed	0~rated speed (only valid for panel mode)	RPM	2000	○
P005	Start time	0~255	0.1s	0	○
P006	Brake force setting	0~950	Decimal	900	○
P007	Open /closed loop control	00 Open loop 01 Closed loop		01 closed-loop	○
P008	Sense/no sense control	00 no sense 01 with sense		01 with sense	○
P009	Display mode	00 display real-time speed 01 display real-time current		00	
P010	Initial speed w/o sensor start	0-FFH	Hexadecimal	04	Immutable
P011	Starting torque	0-FFH	Hexadecimal	10	Immutable
P012	Current adjustment	0-FFH	Hexadecimal	255	Immutable
P013	Control mode	0-FH	Hexadecimal	10	
P014	Site address	1-250H	Decimal	1	
P015	Temperature alarm point	0-FFH	Hexadecimal	6C	Immutable

Mark 1:

P013

00: External control port effective EN: low level active FR: low level active BK: low level active

08: Internal control port effective EN: ineffective FR: low level BK: ineffective

0A: Internal control port effective EN: ineffective FR: high level BK: ineffective

AC current=display real-time DC current/power factor Q

Mark 2: The system working mode is divided into "speed mode" and "control mode".

The speed mode is defined in P000, and the control mode is defined in P013.

Note: After the P007 and P008 parameters are modified and saved, the drive must be powered off and restarted to enter the set control mode state.

7. System Usage

Connect on the wires of the motor and driver (**motor winding wires, Hall sensor**, and power supply) strictly as request. It can not achieve the CW and CCW through changing the wires connection like the asynchronous motor. **The motor will run abnormality with the wrong wires connection, like brushless motor will shake much or heat quickly (the temperature will up to 80 degrees in seconds to 2 min.), and will damage the motor and driver.**

Please run the motor while connecting the power supply, Hall wires and drive power supply. Firstly set the potentiometer to the minimum, press the start switch, increase the motor potentiometer a little, the motor should run. If the motor does not run or shaking, maybe did the wrong wires connection, please recheck the brushless motor wires till the motor running normally.

8. Communication Mode

This communication model is used standard Mod bus protocol, It is using RS485 two-wire serial link communication, Physical interface uses two 3.81mm spacing 3 core Phoenix terminals, the serial connection is very convenient. The transmission mode is RTU, the testing mode is CRC, CRC start word is FFFFH. Data mode is 8-bit asynchronous serial, 2 stops bit, without an invalid bit, Supports multiple communication rates (see the table of parameters)

Parameters function supporting: 03H is for multi-register read, 06H is for single register write

Site address:

00: broadcast address

1-250: user address

251-255: special address, users can not use

No.	address	name	Setting range	Default	Unit
00	$8000	First byte: control bit state Second byte: Hall angle and motor pole(pair)	First byte: Bit0: EN Bit1: FR Bit2: BK Bit3: NW Bit4: null Bit5: SENS Bit6: HR60 Bit7: KH Second byte: Bit0-7: poles 1-255	00H 02H	
01	$8001	Maximum speed in analog adjustment	0-65535	3000	RPM
02	$8002	First byte: start torque second byte: start speed without hall	1-255 1-255	10H 04H	
03	$8003	First byte: accelerate time second byte: decelerate time	1-255	0 0	0.1s
04	$8004	First byte: max. current second byte: temperature alarm point		38H 30H	
05	$8005	External speed setting	0-65535	2000	RPM
06	$8006	Brake force	0-1023	1023	
07	$8007	First byte: site address second byte: reserve	1-250	1 0	
08-0F		$8008-$800F	Segmental speed value(invalid)		
10-17		$8010-$8017	Reserve		
18	$8018	Real speed			
19	$8019	First byte: bus voltage second byte: bus current			
1A	$801A	first byte: control port state Second: TBD	Bit4: SW1 Bit5:: SW2 Bit6:: SW3		
1B	$801B	First byte: fault state Second byte: motor running state	Bit0: stall Bit1: over current Bit2:: hall abnormality Bit3: low bus voltage Bit4: over bus voltage Bit5: peak current alarm Bit6: temperature alarm Bit7: reserve		
1C		$801C above illegal			

8000: first byte:

EN: when NW=0, 0: external EN low level effective 1: external EN high level effective

when NW=1, 0: EN ineffective 1: EN effective

FR: when NW=0, 0: FR low level effective 1: external FR high level effective

when NW=1, 0: FR ineffective 1: FR effective

BK: when NW=0, 0: external BK low level effective 1: external BK high level effective

when NW=1, 0: BK ineffective 1: BK effective

NW: 0: external control effective （EN,FR,BK） 1: internal effective

SENS: when SENS=0, the drive is no hall mode, SENS=1, the drive is hall mode

HR60: 0: 120° hall control 1: 60° hall control temporarily not supported

KH: 0: open loop control 1: closed loop control

Write 02:01 06 80 10 00 02 20 0E to 8010

Among them, terminal address: 01, write command: 06, register address: 80 10, write data: 00 02, CRC16:00 02.

Read the contents of the 2 registers starting from address 8010: 01 03 80 10 00 02 EC 0E

Return content: 01 03 04 00 02 27 10 41 CF

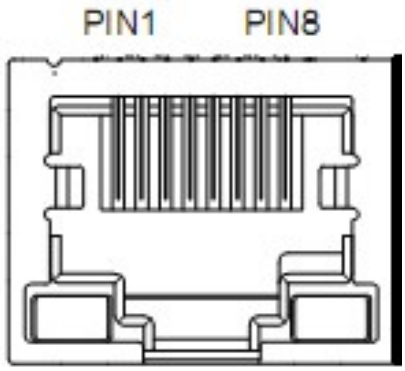
Among them: terminal address: 01, read command: 03, register address: 80 10, read data length: 00 02, CRC16: EC 0E, return byte length: 04, first word: 00 02, second word: 27 10, CRC16:41 CF.

losed loop without hall 2 pair poles Start	01 06 80 00 09 02 27 9B
Write speed 1000	01 06 80 05 E8 03 BE 0A
Write speed 1500	01 06 80 05 DC 05 28 C8
Stop	01 06 80 00 08 02 26 0B
Brake stop	01 06 80 00 0D 02 25 5B
Open loop with hall 2 pair poles Start	01 06 80 00 A9 02 5F 9B
Closed loop with hall 2 pair poles Start	01 06 80 00 29 02 3E 5B

9.Communication Wires Connection

RS-485 communication can be carried out by using the RJ45 cable connector

The RJ45 connector pins are defined as follows:



Pin	Function
8	GND
6	A
3	B