

# 4830 General Purpose Low Voltage DC Brushless Motor Driver Operating Instructions Manual

## Main Features

- ◆ It can be connected to external display operation board to display the speed; it can also be connected to computer for setting drive parameters;
- ◆ Current speed double closed-loop design, low-speed torque, smooth operation;
- ◆ High torque and high speed output, the highest speed up to 8000rpm/min; (according to the user's motor)
- ◆ Speed control mode: external PWM speed control or external potentiometer speed control;
- ◆ There are EN (enable), DIR (direction), X1 (brake) signal control terminal;
- ◆ Can output speed measurement pulse FG, (photoelectric isolation, gate pole output);
- ◆ Can output alarm signal ALM for user detection (opto-isolated, gate output);
- ◆ Over-current, over-voltage, under-voltage, fan control, Hall sensor phase error, motor blocking and other protection functions.



## Product Overview

This DC brushless motor driver is the latest high-tech product launched by our company for the field of medium-power motor drive. This product uses large-scale integrated circuits to replace the original hardware design, with higher anti-interference and fast response performance. This product is suitable for driving any one of the low-voltage three-phase DC brushless motors with or without Hall with an input current below **30A** and a power supply voltage within **DC18V~50V**, and it is characterized by low temperature during high-current operation. The products are used in knitting equipment, medical equipment, food packaging machinery, power tools and a series of electrical automation control field.

## Function Overview

The factory default setting of this product is square wave with Hall closed-loop mode, according to our company to provide handheld debugger to set their own mode of operation, to realize the square wave with Hall speed closed-loop control, square wave with Hall speed open-loop control, square wave speed closed-loop control, square wave speed open-loop control, Hall speed open-loop control, and other control modes.

## Electrical performance index

Electrical performance (at ambient temperature  $T_j=25^{\circ}\text{C}$ )

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Power supply	DC18V~50V DC power supply (capacity selected according to motor power)
Maximum output current	Not more than 30A (depending on the motor and rated load)
Applicable motor	Suitable for motors with an output power of $\leq 1000W$ .
Insulation resistance	At room temperature $> 500M\Omega$
Insulation strength	0.5KV at room temperature and pressure for 1 minute.

### Use of environmental parameters:

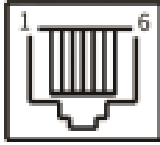
Cooling method		Natural air-cooled & forced air-cooled
Environment	Occasion	Avoid dust, oil mist and corrosive gas as far as possible
	Temp.	$0^{\circ}C \sim +50^{\circ}C$
	Humidity	$< 80\% RH$ , no condensation, no frosting
	Vibration	$< 0.5G (4.9m/s^2)$ 10Hz-60Hz (non-continuous operation)
Storage Temperature		$-20^{\circ}C \sim +65^{\circ}C$
Overall Dimension		185mm× 112.5mm× 80mm
Weight		About 1.0Kg

Note: Due to the drastic change of the storage and transportation environment temperature, it is easy to produce condensation or frost, at this time, the drive should be placed for more than 12 hours, until the drive temperature is the same as the ambient temperature before powering up and running.

## Port Description

Function	Marking	Description
Indicator light	POWER	Green power indicator, power on means power is normal.
	ALARM	Red status indicator (1) Red light is off when normal; (2) When EN is not connected to GND1, the red light is always on; (3) The red light flashes 1 and stops for 1s in case of parameter storage failure; (4) Undervoltage fault when the red light flashes 2 stop 1s; (5) Over-voltage fault when the red light flashes 3 stop 1s; (6) Hall signal failure when the red light flashes 4 stop 1s; (7) motor short-circuit fault when the red light flashes 5 stop 1s; (8) motor blocking when the red light flashes 6 stop 1s; (9) motor overload when the red light flashes 7 stop 1s; (10) motor speed abnormality when the red light flashes 9 stop

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		1s.														
485 communication port	RS485	<p>It can be connected to the handheld debugger to display the rotational speed and can also be used to set the drive parameters.</p> <table border="1"> <thead> <tr> <th>Pin No.</th> <th>Signal</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>NC</td> </tr> <tr> <td>2</td> <td>NC</td> </tr> <tr> <td>3</td> <td>NC 3</td> </tr> <tr> <td>4</td> <td>GND</td> </tr> <tr> <td>5</td> <td>485-</td> </tr> <tr> <td>6</td> <td>GND</td> </tr> </tbody> </table> 	Pin No.	Signal	1	NC	2	NC	3	NC 3	4	GND	5	485-	6	GND
		Pin No.	Signal													
1	NC															
2	NC															
3	NC 3															
4	GND															
5	485-															
6	GND															
Control signal terminal	+5V1	Control signal power supply positive (built-in power supply output)														
	VSP	<p>External speed control signal</p> <p>Control mode:</p> <p>1、 through the external potentiometer to change the VSP terminal voltage to achieve speed regulation, the range of 0 ~ 5.0V</p> <p>2、 To realize speed regulation by changing PWM duty cycle through external PWM signal with frequency 50 Hz -300Hz and amplitude +5V.</p>														
	X1	Brake signal input, low level brake, brake status red light is always off (brake braking strength can be adjusted according to user requirements)														
	FG	Motor speed pulse output, the frequency of this signal can be measured and then converted to the actual speed of the motor;														
	DIR	High and low level control motor forward and reverse, connected to GND1 motor reverse (counterclockwise), not connected to GND1 motor forward (clockwise)														
	EN	Motor enable control, EN connected to GND1, the motor turns (online state), EN is not connected, the motor does not turn (offline state, this state red light is always on)														
	GND1	Control signal power supply ground														
Hall signal terminal	+5V2	Motor Hall power supply positive														
	HU	Hall sensor signal U phase input														
	HV	Hall sensor signal V phase input														
	HW	Hall sensor signal W phase input														
	GND2	Motor Hall power supply ground														
Ground	PE	Driver ground terminal														

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terminal		
Brake signal terminal	P, PR	External brake resistor
Motor and power supply terminals	U, V, W	Motor three-phase output signal, connected to the motor winding
	V+, GND	DC18V~50V power supply input (please do not reverse the polarity of the power supply)

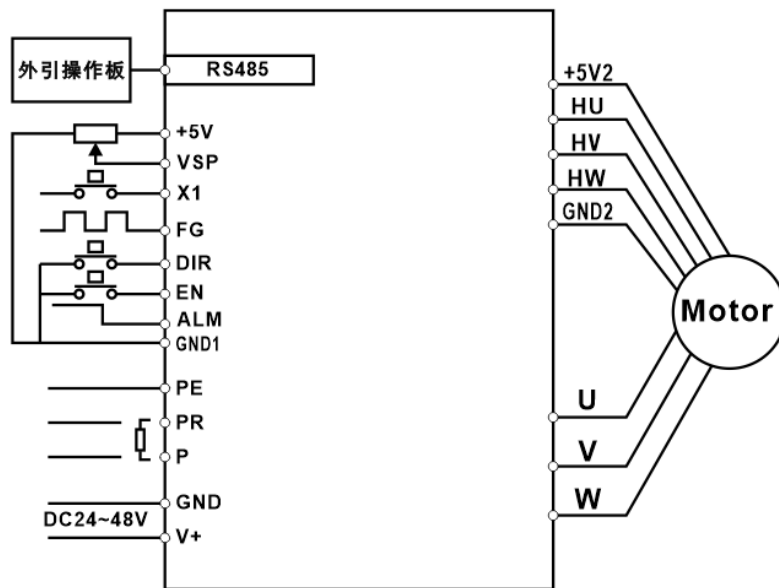
## Function Description

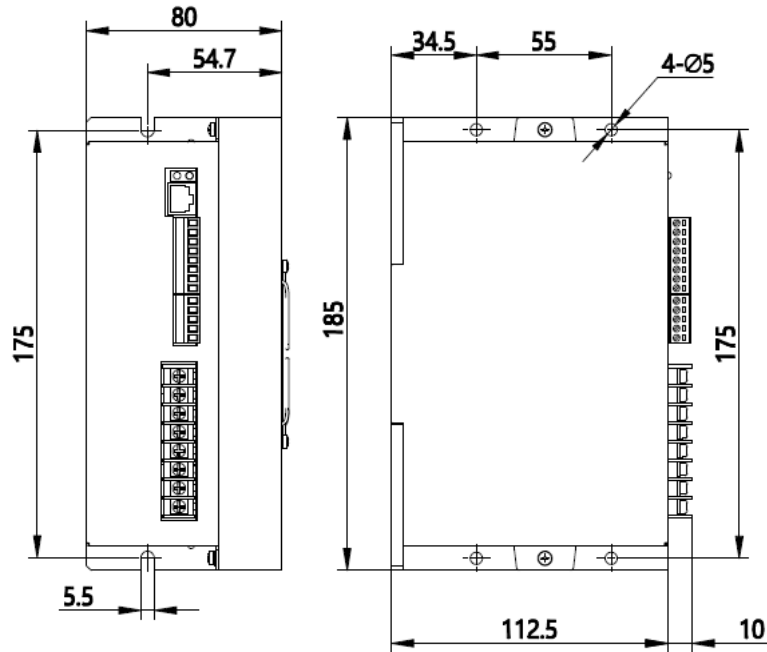
<b>Speed control mode selection (VSP/PWM)</b>	<p>1、 External input speed: the two fixed ends of the external potentiometer were connected to the driver's GND1 and +5V1 end, the regulating end is connected to the VSP end, you can use the external potentiometer (5K ~ 10K) speed regulation, but also through the other control units (such as PLC, microcontroller, etc.) to input analog voltage to the VSP end of the realization of the speed regulation (with respect to the GND1), the acceptance of the VSP port range of DC 0V~+5V, the corresponding motor speed is 0~rated speed.</p> <p>2、 <b>PWM</b> speed regulation: the positive end of the PWM connected to the VSP, the negative end connected to GND1, the input frequency should be greater than 50Hz (recommended 100Hz), change the duty cycle speed regulation.</p>
<b>Brake (X1)</b>	<p>The motor stop and run can be controlled by switching the high and low level of control terminal <b>X1</b>. When X1 is low level, the motor brake stops running and the red light goes out when the brake is braking; when X1 is not connected, the motor is allowed to run. (Brake braking strength can be adjusted separately according to user requirements)</p>
<b>Speed measurement signal output (FG)</b>	<p>The driver provides motor speed measurement pulse signal, which is proportional to the motor speed, and the pulse output mode is optocoupler isolated output.</p> <p>1、 Motor speed (RPM) = <math>F \div N \times 60</math>  <math>F</math>=Frequency measured by frequency meter on the FG foot.  <math>N</math> is the number of motor pole pairs, 8-stage motor is 4 pairs of stages.                  For example, if the user chooses 4 pairs of motors, then: when the output SPEED signal is 200Hz, the motor speed = <math>200 \div 4 \times 60 = 3000</math> rpm.</p> <p>2、 Optoelectronic isolation, gate pole output</p>
<b>Motor forward/reverse signal (DIR)</b>	<p>The forward and reverse rotation of the motor can be controlled through the conversion of the high and low levels of the control terminal DIR.</p> <p><b>Note:</b> In order to avoid a sudden change of direction when the motor is running at high speed, which will cause a huge impact on the motor and mechanical equipment, when the DIR terminal receives the change of direction signal, the driver will first let the motor decelerate until it stops, and after it stops for about 1S, the motor will change the direction of</p>

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	steering, and speed up to the set speed.
<b>Motor start/stop signal (EN)</b>	The motor stop and run can be controlled by switching the high and low level of control terminal EN. When EN is low, the motor runs normally; when EN is not connected, the motor stops working and is in a free state, and the fault lamp is always on. When the motor is stopped by using the run/stop terminal to control the motor, the motor is naturally stopped, and its motion law is related to the inertia of the load.
<b>Alarm indication (ALM)</b>	Output 5V high level (relative to GND1) during normal operation, when there is over-voltage, over-current, Hall signal error, motor blocking when this signal is 0V (relative to GND1), at the same time, the red indicator light.

Wiring diagram
















**Dimensions** (unit: mm)**Safety matters**

- ★ Motor and driver wiring must be carried out in the power-off state, do not wire with electricity.
- ★ Connect the power supply line, motor winding line and Hall signal line correctly according to the method shown in the diagram, and pay attention to the order of U,V,W three-phase and Hall signal HU,HV,HW must be the same.
- ★ Do not disassemble the driver to prevent damage to the device.
- ★ Do not touch all terminals during power-on operation.
- ★ Prohibit the drive to operate without a shell
- ★ Impacting the driver may cause damage.

## Attachment: Low-voltage brushless external lead box operating instructions

### 1、Operation Instructions for the external input box buttons

Power on if the handshake is successful then display P0 area monitoring parameters, if the handshake is not successful then display -Econ-. By adjusting  and  buttons, you can adjust the parameters to be monitored, and press  to enter the specific parameter monitoring interface. Long press  to switch to parameter setting interface to display Px-xx, select the bit to be set through , set the parameter by adjusting  and  buttons, press  to enter the parameter value setting interface, select the bit to be set through , set the parameter by adjusting  and  buttons, after setting the parameter value, press  to save the setting parameter, if you press , you will exit the parameter value setting and return to parameter selecting interface, the parameter will not be saved. Parameters are not saved.

### 2、Parameter table

Function Code	Function code	Parameter range	Default parameter	Parameter Description
P0-00	System version			
P0-01	Restore factory value	0~1	0	
P0-02	Operation panel setting speed	50~10000	50	
P0-03	Acceleration time	1~2000	30	Unit 0.1S
P0-04	Deceleration time	1~2000	30	Unit 0.1S
P0-05	Motor rated speed	100~10000	3000	
P0-06	Motor pole pair number	1~32	2	
P0-07	Brake Ratio	10~100	30	
P0-08	Speed command setting source	0~2	0	0: External potentiometer input 1: Operation panel setting 2:485 communication setting

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P0-09	Potentiometer filter coefficient1	0~1000	5	
P0-10	Potentiometer Filter Coefficient 2	0~100	5	
P0-11	External terminal filtering factor 1	0~1000	10	
P0-12	External Terminal Filter Coefficient 2	0~1000	2	
P0-13	Machine station number	1~250	1	
P0-14	Communication Format	0~1	0	0: 8,N,1 1: 8,N,2
P0-15	Baud rate	0~4	2	0:2400 1:4800 2:9600 3:19200 4:38400
P0-16	Busbar current setting	1~100	20	Unit 0.1A
P0-17	Open loop closed loop selection	0~3	0	0: Sensed closed loop 1: Sensed open loop 2: Non-inductive closed loop 3: Non-inductive open loop
P0-18	Open loop duty cycle	5~96	5	
P0-20	Forward and reverse dead time	0~1000	10	Unit 0.1S
P0-21	Open loop blocking protection disable	0~1	0	0: Blocking protection is effective in open-loop mode. 1: Invalid blocking protection in open loop mode
P0-22	Motor control cycle T	1~1000	20	Unit ms
P0-24	Motor control ratio P	0~1000	11	
P0-25	Motor control integral I	1~10000	3	
P0-28	Motor control integral I (speed prediction)	1~10000	10	Speed prediction integral coefficient
P0-29	Motor control proportional limit	0~1500	180	
P0-30	Sensorless starting torque	0~1000	70	
P0-31	Non-inductive starting speed	1~500	4	

**3、Monitoring display interface**

dP-00	Busbar voltage
dP-01	Busbar current
dP-02	Potentiometer voltage

dP-03	Running speed
dP-04	Error code
dP-05	Drive operating status
dP-06	Bus Current AD Sampling Value

## 4830 Low Voltage DC Brushless Drive Communication Protocol

The communication mode uses the standard Modbus RTU protocol. The communication format can be changed by parameter P0-14, and the communication baud rate can be changed by parameter P0-15. If you need 485 communication to control the driver, you need to change parameter P0-08 to 2.

The addresses of communication parameters are as follows (all expressed in decimal)

Function code	Communication address	Name	Parameter range	Default parameter	Unit
P0-00	0	System Version			
P0-01	1	Restore factory value	0~1	0	
P0-02	2	Operation panel setting speed	50~10000	50	RPM
P0-03	3	Acceleration Time	1~2000	30	0.1S
P0-04	4	Deceleration Time	1~2000	30	0.1S
P0-05	5	Motor Rated Speed	100~10000	3000	RPM
P0-06	6	Motor Pole Pairs	1~32	2	
P0-07	7	Brake Ratio	10~100	30	
P0-08	8	Speed command setting source	0~2	0	
P0-09	9	Potentiometer Filter Factor 1	0~1000	5	
P0-10	10	Potentiometer Filter Coefficient 2	0~100	5	
P0-11	11	External Terminal Filter Coefficient1	0~1000	10	
P0-12	12	External Terminal Filter Coefficient 2	0~1000	2	
P0-13	13	Machine Station No.	1~250	1	
P0-14	14	Communication Format	0~1	0	
P0-15	15	Baud rate	0~4	2	
P0-16	16	Busbar current	1~100	10	0.1A

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		setting			
P0-17	17	Open Loop Closed Loop Selection	0~1	0	
P0-18	18	Open loop duty cycle	5~96	5	
P0-19	19	Fan operation mode	0~1	0	0: Fan operation when system temperature exceeds 40 degrees 1: Fan operation when enable pin is shorted
P0-20	20	Forward and reverse dead time	0~1000	10	Unit 0.1S
P0-21	21	Open loop blocking protection deactivation	0~1	0	0: Blocking protection effective in open loop mode 1: Invalid blocking protection in open loop mode
P0-22	22	Motor control cycle T	1~1000	20	Unit ms
P0-24	24	Motor control ratio P (low speed)	0~1000	11	
P0-25	25	Motor control integral I (low speed 1)	1~10000	3	
P0-28	28	Motor control integral I (low speed 2)	1~10000	10	
P0-29	29	Motor control proportional limit	0~1500	180	
P0-30	30	Sensorless starting torque	0~1000	70	
P0-31	31	Non-inductive	1~500	4	

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		starting speed			
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Operation status addresses are as follows (all in decimal representation)

Communication Address	Name	Unit
200	Bus voltage	V
201	Busbar current	0.1A
203	Running Speed	RPM
204	Fault number	

Operation command addresses are as follows (all in decimal representation)

Communication address	Name	Range
1000	Motor start/stop control	0: Motor stop 1: Motor run
1001	Motor running direction	0: Forward 1: Reverse

Address 0 is read-only, 1~31 are read-write, 200~203 are read-only, and 1000~1001 are write-only.

Example:

Motor start operation: 01 06 03 E8 00 01 C8 7A

Motor stop running: 01 06 03 E8 00 00 09 BA

Motor speed set to 1000 RPM: 01 06 00 02 03 E8 28 B4

Actual motor running speed: 01 03 00 CB 00 01 F5 F4