

## PMSM Controller HD2X Family



## Key Features

- On-site parameters setting & provide PC software
- Self-checking function after system power-on
- Energy regenerative braking
- Brake, cruise, and 3-modes speed selection port
- Integrate waterproof terminal port
- PWM output port
- High-current output port, to connect with relay & contactor
- Display port
- LED indication for operation and fault status
- Ultra-thin shape design, to be installed inside the vehicle easily

MODEL	Rated Voltage (DC)	Peak Current
LBMC048502HD2XL	24V/36V/48V	520A
LBMC072402HD2X	48V/60V/72V	420A
LBMC072502HD2X	48V/60V/72V	520A
LBMC096352HD2X	48V/60V/72V/84V/96V	300A
LBMC096502HD2X	48V/60V/72V/84V/96V	400A
LBMC120502HD2X	48V/60V/72V/84V/96V/120V	320A

## Descriptions

• The product is the latest PMSM(Permanent Magnet Synchronous Motor) controller made by Wuxi Lingbo Electronic Technologies Co.,Ltd, which can output 3.5KW/4.0KW/5.0KW power. It's designed with FOC(Field Oriented Control) algorithm in which SVPWM is used to drive the power device so that it injects sinusoidal current to the three-phase of motor. Meanwhile, we use a 32-bit microprocessor which integrates the latest ARM core, it exhibits excellent operational capability and task processing ability. The system can handle several close loops which include torque, flux, speed loop and other high demands of real-time task operations at the same time. Through these control methods, the system can achieve the following performance: maximum torque control, constant power control, speed closed loop control and energy feedback control while braking. Compared with traditional DC motor (BLDC) controller, the PMSM controller has significant advantages as follows:

## Comfortable driving

• Direct torque control, smooth start-up, excellent acceleration performance, especially in medium and high speed stages, which approximates to the performance of fuel motorcycle.

## Smooth & Silent

• Vector control sinusoidal current injection and smooth motor output torque, which fully suppresses the low frequency noise caused by the fluctuations of motor torque.

## Flexible configuration

• Provide PC software(GUI), by which can configure hundreds of parameters, so will improve the flexibility of on-site application.

- Monitor the operating status in real-time.
- Have UART (standard equipment) or CAN BUS, Bluetooth communication interface (user option).
- Make the function interfaces of different types of products compatible.

## Perfect protection

- Have Signal integrity detection (e.g. motor interface signal, control signal, etc.).
- With Over-current protection, over or under voltage protection & over-heat protection.
- Provide motor temperature-control interface.



**Specifications**

Maximum Ratings & Main parameters						
Rated Input Voltage	24V/36V/ 48VDC	48V/60V/72VDC		48V/60V/72V/84V/ 96VDC		48V/60V/72V/84 V/96V/120VDC
Rated Input Current	220A	180A	220A	135A	160A	130A
Max Output Current	520A	420A	520A	300A	400A	320A
Rated Output Power	5KW	4KW	5KW	3.5KW	5KW	5KW
Operating Temperature Range	-20°C~100°C					
Storage Temperature Range	-55°C~85°C					
Motor Control Mode	FOC (Field Oriented Control)					
Standby Power Consumption	20~40mA					
Max. Motor Speed Limitation	Depended on Motor and configuration					
Driving Method	Direct Torque Control					

System Protection Characteristics		LED Blinking Times
Over-voltage protection	Battery voltage is higher than default value	1
Under-voltage protection	Battery voltage is lower than default value	2
Motor over-current protection	Motor phase is short-circuit or phase to ground is short-circuit	3
Stalling protection	Motor stalling time is over default value	4
Hall Sensor protection	Hall input is abnormal	5
MOSFET protection	MOSFET self-checking is abnormal	6
Phase winding disconnection protection	One of the motor phase is disconnected	7
Self-checking error protection	Self-checking is abnormal if internal system power-on	10

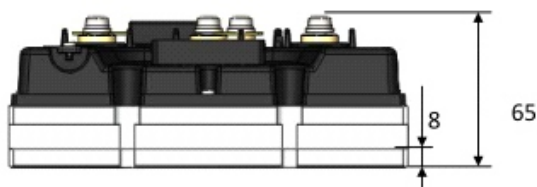
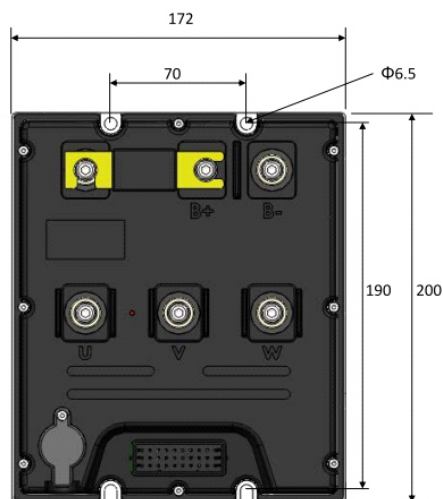


Controller over-heat protection	Controller operation temperature is higher than default value	11
Throttle protection	Throttle input is abnormal	12
Motor over-heat-protection	Motor Temperature is higher than the value of configuration	13
Throttle non-Idle state protection	Throttle is not in the idle state when System Power On	14
Braking indication	Indicating Braking Mode	15

#### Communication Characteristics

UART Communication	UART interface: parameter configuration and working state monitoring
CAN Communication	CAN interface: parameter configuration and working state monitoring
Bluetooth Communication	Bluetooth wireless interface: parameter configuration and working state monitoring
LED Indicator	Indicate current working or fault state

#### Dimension





**Connector Wiring**


Terminal No.	Terminal Descriptions	Remarks
1	NC/CANL	CAN Bus L
2	NC/CANH	CAN Bus H
14	Power Supply for Hall Sensor inside Motor	Connected to Motor Hall Sensor
13	Hall Sensor U	
12	Hall Sensor V	
11	Hall Sensor W	
21	Ground	
9	Power Supply for Digital stage of Controller	Power ON/Off
10	Power Supply for Digital stage of Controller	Power ON/Off
16	Low level braking input	Braking
15	High level braking input (+12V Input)	
26	Throttle Ground	Throttle
27	Throttle Signal	
28	Throttle Power+	
7	Cruising Control (Active Low)	Cruising
5	Ground	

Terminal No.	Terminal Descriptions	Remarks
17	Reverse Control (Active Low)	Reverse Control
5	Ground	
20	High Gear Input (or Button Input)	3-Gear Control
4	Ground	
24	Low Gear Input	
23	HALL Speed Shown On Display	Display Indication
19	Reserved	
6	Reserved Ground	
22	Reserved Input	
25	Reserved Input	
30	NC	
3	Reserved (Motor Temperature Interface)	
8	Reserved OC Output (Max.500mA)	
18	Reserved OC Output (Max.50mA)	
29	Reserved 5V Output (Max.20mA)	