LINGBO
PMSM FOC CONTROLLER

PMSM Controller HK2 Family

PMSM Controller HK2 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
LBMC060122HK2	48V/60V	140A
LBMC072122HK2	48V/60V/72V	140A

Descriptions

• The product is the latest PMSM(Permanent Magnet Synchronous Motor）controller made by Wuxi Lingbo Electronic Technologies Co.,Ltd, which can output 1.2KW 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.

LINGBO
PMSM FOC CONTROLLER

PMSM Controller HK2 Family

Specifications

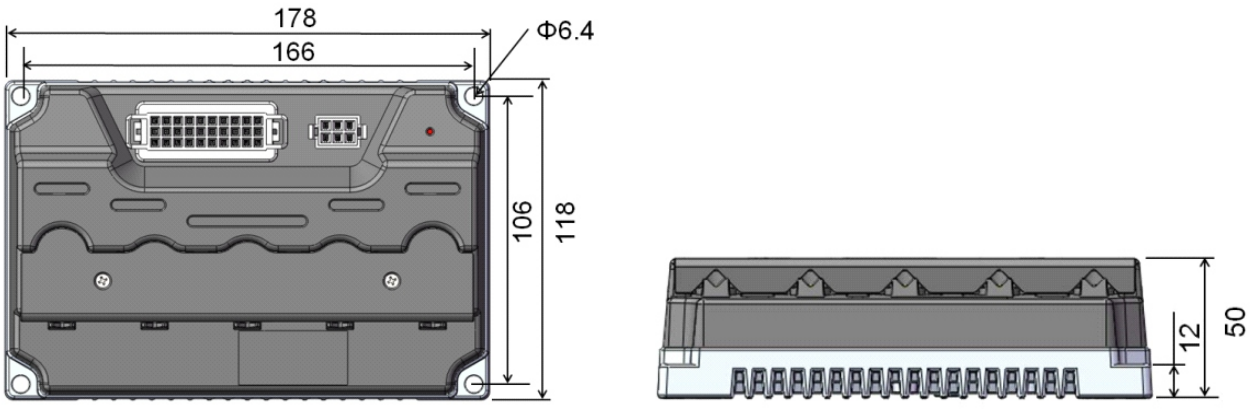
Maximum Ratings & Main parameters		
Rated Input Voltage	48V/60VDC	48V/60V/72VDC
Rated Input Current	45A	45A
Max Output Current	140A	140A
Rated Output Power	1.2KW	
Operating Temperature Range	-20℃~100℃	
Storage Temperature Range	-55℃~85℃	
Motor Control Mode	FOC (Field Oriented Control)	
Standby Power 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	14

Communication Characteristics	
UART Communication	UART 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

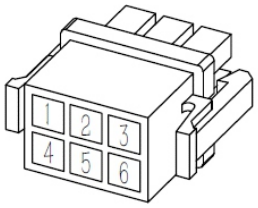


PMSM Controller HK2 Family

Connector Wiring

Terminal No.	Terminal Descriptions	Remarks
29	NC	
23	RX	
13	TX	
10	Power Supply for Digital stage of Controller	Power ON/Off
28	Throttle Power+	Throttle
27	Throttle Signal	
26	Throttle Ground	
21	Low level brake input	Brake
11	High level brake input (+12V Input)	
12	EBS Enable	
30	Power Supply for alarm	Alarm Device
7	GND	
20	Power supply for digital stage from alarm	
19	Motor Phase	
14	Trigger Signal from alarm	
16	Cruising Control (Active Low)	Cruising
1	Reserve	Reserve

Terminal No.	Terminal Descriptions	Remarks
2	Low Gear Input	3-Gear Speed Control
3	High Gear Input(or Button Input)	
15	Battery Choose	Battery Choose
24	Start Gear Choose(or One-Key-Repair)	Start Gear(or One-Key-Repair)
6	GND	Ground
7	GND	
16	GND	
13	HALL Speed Shown On Display(or One-Wire-Display)	Display Indicate
9	Motor-Phase Speed Shown On Display	
4	High-Gear-LED	
22	Mid-Gear-LED	
17	Low-Gear-LED	



Terminal No.	Terminal Descriptions	Remarks
1	Ground	Connected to Motor Hall Sensor
2	NC	
3	Power Supply for Hall Sensor inside Motor	
4	Hall Sensor W	
5	Hall Sensor V	
6	Hall Sensor U	