



LBMC HK5AE

Product Introduction

- The product is a newly developed PMSM (Permanent Magnet Synchronous Motor) controller made by Wuxi Lingbo Electronic Technology Co., Ltd., which can output 800~1500W power. It uses FOC (Field Oriented Control) algorithm in which SVPWM modulation is used to drive the power device so that it injects sinusoidal current to the three-phase motor. Meanwhile, we use a 32-bit microprocessor that integrates the latest ARM core, it exhibits excellent computational 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 braking energy feedback control. Compared with the traditional DC motor (BLDC) controller, it has significant advantages as follows:

Comfortable Driving

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

Smooth & Silent

- Vector control type sine wave current output, motor output torque is smooth, and low frequency noise caused by motor torque fluctuation is fully suppressed.

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.
- Make the function interfaces of different types of products compatible.

Perfect Protection Function

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

Key Features

- Self-checking function after power on.
- Energy feedback braking.
- Brake, cruise, 3-modes speed selection port.
- Integral waterproof terminal port.
- PWM output port.
- Dashboard port.
- LED indication for operation and fault status.
- Ultra-thin shape design, convenient for vehicle installation.

Scope of Application

- Electric motorcycle
- Small electric vehicles
- Electric golf vehicle
- Electric Sightseeing vehicle





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Main Technical Parameters and Working Conditions

Main Parameters	
Rated Input Voltage	48V/60V/72VDC
Rated Input Current	45A
Max Output Current	150A
Rated Output Power	800~1500W
Operating Temperature Range	-20°C~90°C
Storage Temperature Range	-10°C~40°C
Motor Control Mode	Field Oriented Control (FOC)
Standby Power Consumption	20~40mA
Max Motor Speed Limitation	Depend on Motor and Configuration
Driving Method	Torque Loop + Speed Loop Control
Controller Net Weight	(780±30) g

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 or phase wire to ground is short-circuit	3
Blocked protection	Motor blocked time exceeds default value	4
Hall protection	Hall input is abnormal.	5
MOSFET protection	MOSFET self-checking is abnormal	6
Phase winding disconnection protection	One of the motor phase wire is disconnected	7
Stall protection	Motor stall	8
Brake state	Controller is in the braking state	9
Self-checking error protection	Internal self-checking is abnormal when power-on	10
Controller over-temperature protection	Controller operation temperature is higher than default value	11

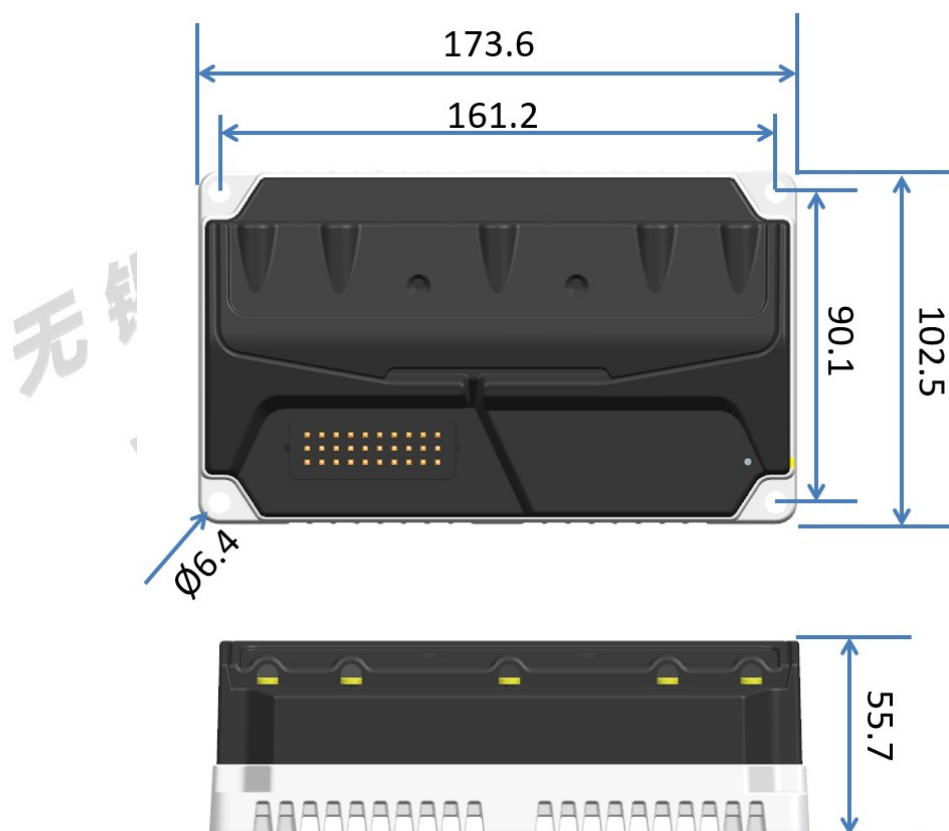


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Throttle protection	Controller input is abnormal	14
GUI parameter failure	GUI parameter setting is incorrect	15
Self-learning failure	Self-learning failure	16
Crystal oscillator	External crystal oscillator setting is incorrect	17

Communication Characteristics	
GUI Tools	RS485 interface: parameter configuration or working status monitoring (optional)
RS485 Communication	RS485 interface (optional)
CAN Communication	CAN interface (optional)
LED Indicator	Indicate current working or fault state

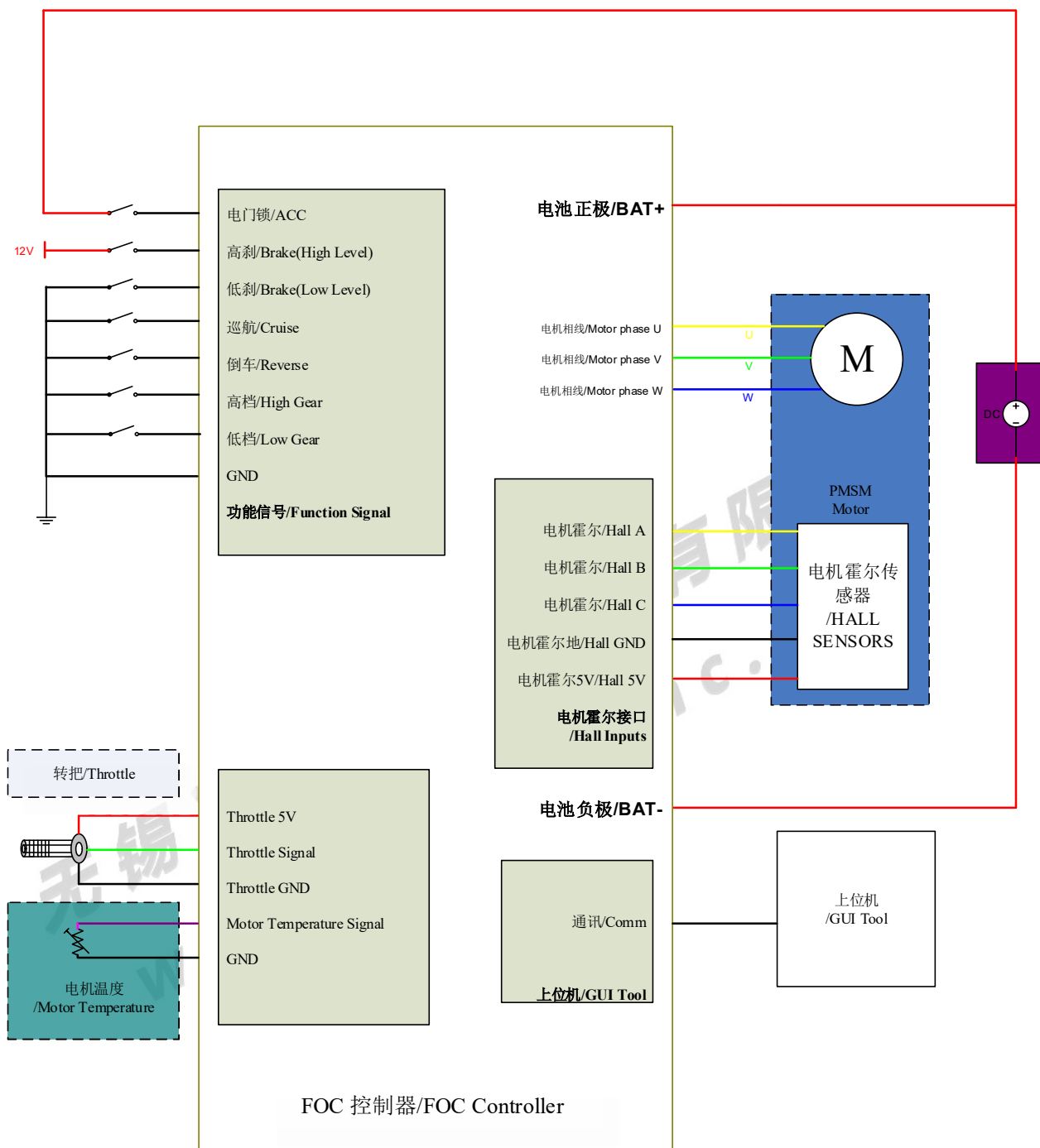
LBMC HK5AE Dimension





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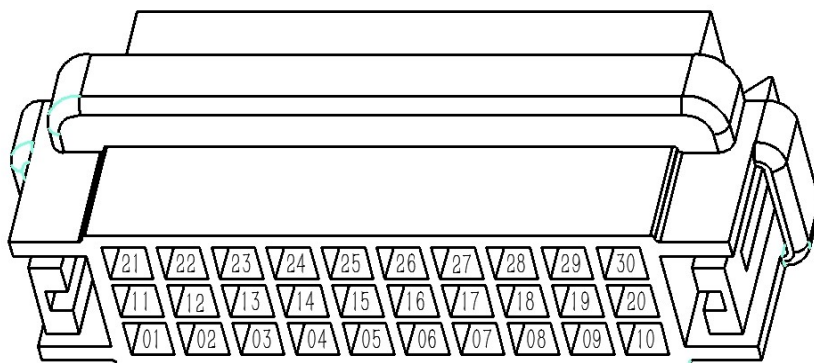
Typical Electrical Wiring





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Connector Wiring



引脚号/PIN	功能定义/Function	电压范围/Voltage range	引脚号/PIN	功能定义/Function	电压范围/Voltage range
1	电机霍尔A/Hall A	0~3.3V	16	地	0V
2	低档/LowSpeed	0~5V	17	功能输入口/Function Input	0~5V
3	高档/HighSpeed	0~5V	18	功能输入口/Function Input	0~5V
4	电机霍尔5V/Hall Power	5V	19	电机滚动报警 /Wheel Sensor Alarm	0~B+
5	CANL 注1/Note1	5V	20	防盗器电门锁 /Anti theft Device ACC	B+
6	电机霍尔地/Hall GND	0V	21	低刹/Brake(Low Active)	0~5V
7	防盗器电源负 /Anti theft Device B-	0V	22	电机霍尔C/Hall C	0~3.3V
8	功能输入口/Function Input	0~5V	23	RX/485B	0~5V
9	相线速度仪表 /Wheel Sensor Output	0~B+	24	功能输入口/Function Input	0~5V
10	电门锁/ACC	B+	25	NC	0~5V
11	高刹/Brake(High Active)	0~12V	26	转把电源地/Throttle GND	0V
12	电机霍尔B/Hall B	0~3.3V	27	转把信号/Throttle Signal	0~5V
13	TX/485A	0~5V	28	转把电源5V/Throttle Power	5V
14	防盗信号/Anti theft Signal	0~5V	29	NC	0~3.3V
15	CANH 注1/Note1	0~5V	30	防盗器电源正 /Anti theft Device B+	B+

注1 / Note1 : 仅限于HK5AEC、HK5APC、HJ5AEC、HJ5APC / Only for HK5AEC、HK5APC、HJ5AEC、HJ5APC