

Specification of Lithium-ion Battery for Electric Bicycle

Product designation:	SF-06 36V/11.6Ah (with smart BMS)
General model:	JCEB360-11.6
Factory model:	10ICR18650-4(11.6)-002
Version:	T B D

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1. Introduction

The Lithium-ion battery is composed by li-ion battery pack and battery management system; all components of the battery are mandatory for ensuring its safety and performance.

The specification describes the features of the li-ion battery for electric bicycle application. It's strictly forbidden to modify or disassemble the battery without Phylion's permission.

2. Battery Characteristics

2.1 Key features

Items		Remarks
Cell type	18650	40 cells in 4P10S
Nominal pack capacity	11.6 Ah	
Minimum pack capacity	11Ah	Measurement condition: Charging at 0.2C, discharging at 0.5C
Nominal pack voltage	36V	
AC resistance	$\leq 150\text{m}\Omega$	
Working voltage	28V~42V	
Charge method	CC/CV	With Phylion matched charger
BMS	Smart BMS	
Over-charge protection voltage	4.23V	Any single cell
Over-charge recovery voltage	4.1V	Single cell
Over-discharge protection voltage	2.8V	Any single cell's voltage becomes lower than this value, the discharging stops
Over-discharge recovery voltage	3.4V	Single cell
Discharge over-current protection current	1 st : > 23A \pm 3A @ 2S 2 nd : > 50A @ 96ms	$\leq 19\text{A}$ (持续电流)
Capacity indication	0-100%	
Charge protection under high temp	60°C \pm 5°C	Temperature inside battery
Dimension without controller box	296mm*85mm*93mm	
Dimension with controller box	366mm*85mm*100.5mm	
Weight(Approx.)	< 3.0Kg	Weight without controller
Communication	UART	
Temperature for storage	For 1 month: -10~40°C	
	For 3 months: -10~35°C	
	For 6 months: -10~30°C	
Humidity for storage	5% to 95%	

BMS static power consumption	<150uA	
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2.2 Battery basic characteristics

Initial capacity: after standard charging, use 0.2C discharge until 28V

SOC for delivery: >40% ;

Cycle life: standard charging until 42.3V, then use 300mA to charge in CV method until charging stops, then use 2A to discharge until 28V; in this way, the battery can have more than 60% capacity left no less than 500 cycles.

2.3 Charging conditions

Charging method: CC to CV

Charging voltage limit: 42.3V ;

Charging current limit: use 2A charger to charge; if charging current is lower than 200mA, the charger stops working

Environmental temperature for charging: 0~45°C

High temperature protection during charging: if the internal temperature in battery reaches 60°C, the charging stops

Charging connection: the charger “+” and “-” shall match the battery charge port “+” and “-”, Charge port has foolproof function.

2.4 Discharging conditions

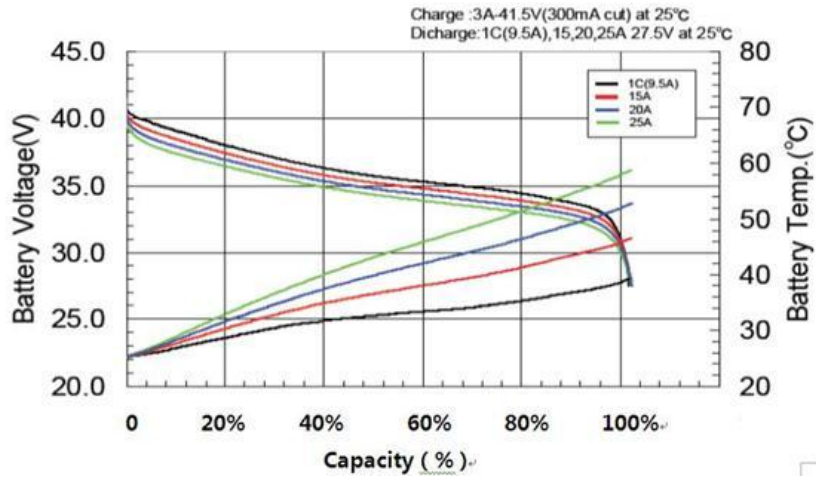
Discharging current limit: maximum 19A, if the current is over 19A, the discharging circuit will be cut off

Environmental temperature for charging: -20°C~45°C

Discharging end voltage: if any single cell's voltage becomes lower than 2.8V, the discharge circuit will be cut off

2.5 Battery charge and discharge curves

** The curves are for reference only.*



2.6 BMS characteristics

- Over-voltage protection
- Under-voltage protection
- Over-current protection
- Low/High temperature protection
- Time-recording
- High-accuracy voltage detection
- High-accuracy current detection
- High-accuracy temperature detection

3. Battery case and appearance

3.1 Pictures

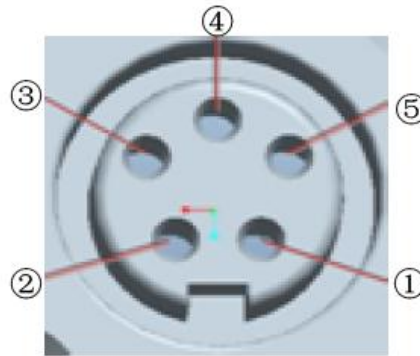


Overall appearance



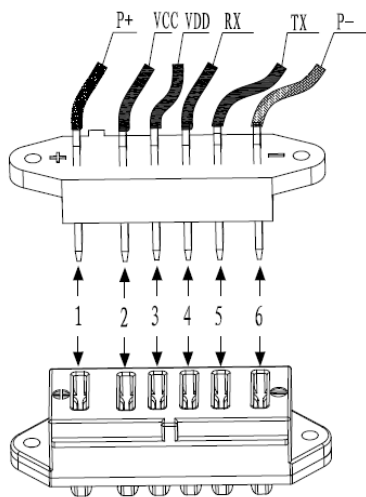
Holder & Controller box

3.2 Instruction of charge port



1pin	Charge “+”
2pin	Charge “-”
3pin	There is a temperature sensor in this PIN, the sensor can allow the charger to detecte the battery temperature; if the temperature is not in the too high or too low, the charging will be stopped
4pin	Communication with BMS: if the overcharge protection of BMS is activated, this charger can identify a signal sent from the BMS, and will cut off charging circuit
5pin	To identify Phylion charger, if the charger is not matched charger from Phylion, the charging will fail

3.3 Instruction of discharge port



Discharge connector in controller

Discharge port in battery

Number	Definition	Description
1	P+	Battery discharge “+”
2	VCC	Connection for positive “+” of tail light * tail light is optional
3	VDD	Power supply for communication circuit, 5V output from controller; if the controller enters sleep mode, the output will stop
4	RX	PIN reception of communication signals UART from BMS, connected (via RX of controller) to PIN “TX” of display
5	TX	PIN transmission of communication signals UART from BMS, connected (via TX of controller) to PIN “RX” of display
6	P-	Battery discharger “-”

4. Charger

4.1 Key features

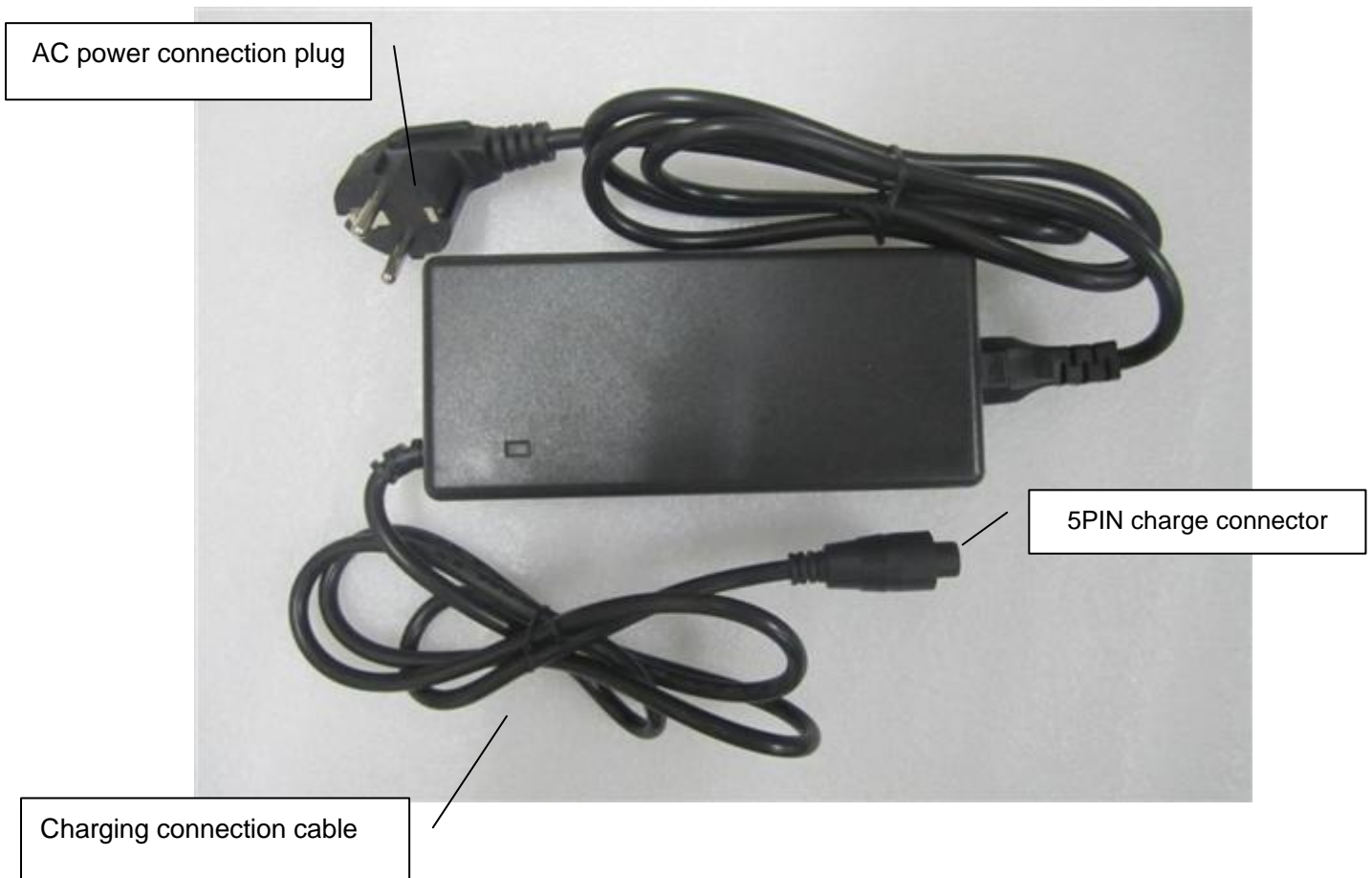
Rated input voltage: AC100V-240V

Grid frequency: 47Hz-63Hz

DC output voltage: 42.0V

DC output current: 2.0±0.2A

4.2 Charger pictures for reference





4.3 To proceed charging

Firstly connect the charge connector with battery charge port, and then connect AC power supply; the LED light of the charger display red color during charging, it will turns green when battery is fully charged.

5. Battery LED indication

5.1 Instruction of button

No.	Action	Battery state	Message
1	Button not pressed	During charging and battery is in normal state	/
2		Start charging and battery is in abnormal state	Battery error
3	Press the button shortly	In normal state	Battery state of charge (SOC)
4		In abnormal state	Battery error
5	Press the button for 10 seconds then release the button	In normal state	Battery state of health (SOH)
6	Press the button for 30S	In normal state	LED1 and LED2 will Flickering, then 60S later the BMS will enter in Power Off mode

5.2 Instruction of battery SOC indication



See picture, from top to bottom: LED5, LED4, LED3, LED2, LED1

Press the button shortly, the LED will display the SOC of battery.

No.	Capacity(SOC)	LED5 (Green)	LED4 (Green)	LED3 (Green)	LED2 (Green)	LED1 (Green)
1	SOC < 10%	Off	Off	Off	Off	Flickering for 5S
2	10% ≤ SOC < 30%	Off	Off	Off	On for 5S	On for 5S
3	30% ≤ SOC < 50%	Off	Off	On for 5S	On for 5S	On for 5S
4	50% ≤ SOC < 75%	Off	On for 5S	On for 5S	On for 5S	On for 5S
5	SOC ≥ 75%	On for 5S	On for 5S	On for 5S	On for 5S	On for 5S

5.3 Instruction of battery SOH indication

Press the button for 10S, then release the button, the LED will display the SOH of battery

No.	SOH	LED5 (Green)	LED4 (Green)	LED3 (Green)	LED2 (Green)	LED1 (Green)
1	SOH ≥ 90%	Slow flickering for 10S	Slow flickering for 10S	Slow flickering for 10S	Slow flickering for 10S	Slow flickering for 10S
2	80% ≤ SOH < 90%	Off	Slow flickering for 10S	Slow flickering for 10S	Slow flickering for 10S	Slow flickering for 10S
3	70% ≤ SOH < 80%	Off	Off	Slow flickering for 10S	Slow flickering for 10S	Slow flickering for 10S
4	60% ≤ SOH < 70%	Off	Off	Off	Slow flickering for 10S	Slow flickering for 10S
5	SOH < 60%	Off	Off	Off	Off	Slow flickering

						for 10S
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* SOH (%) = (Current Full Charge Capacity ÷ **Initial Full Charge Capacity**) × 100%

5.4 Instruction of Battery Error State

Press the button shortly, if the battery is in abnormal state, the LED will display as follows,

No.	Error state	LED5 (Green)	LED4 (Green)	LED3 (Green)	LED2 (Green)	LED1 (Green)
1	Over temperature	On	Off	Off	Off	Flickering for 5S
2	Over Voltage of Cell	On	Off	Off	Flickering for 5S	Off
3	Bad cell	On	Off	Flickering for 5S	Off	Off
4	Charge MOSFET defective or Charging by Discharge port	On	Flickering for 5S	Off	Off	Off

6. Suggested load

No.	Item	Required parameters	Remark
1	Input voltage	36V	
2	Motor rated power	250W	
3	Controller rated working current	10A	
4	Controller current limit	≤15A	Shall consider the tolerance
5	Controller under-voltage protection value	≤31.5V and ≥25V	
6	Communication	With UART or Without	
7	Controller, Display power consumption	Automatic sleep mode function, power consumption lower than 10uA	

Note:

- This specification is to describe the key features of the product; it cannot be used as user manual.*
- Suzhou Phylion Battery Co., Ltd. reserves right to interpret all contents above.*

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