

# Lithium iron Phosphate Battery

## Specification

**MODEL:** **IFM12-200E3 (12.8V 20Ah)**

Prepared By/Date	Checked By/Date	Approved By/Date

Customer Approval	<b>Signature/Date</b>
	<b>Company Name</b>
	<b>Company Stamp</b>

### Amendment Records

Edition	Description	Prepared by	Approved by	Date
A	First Edition	Johnson		2012-10-22
B	Current Changed	Che youbao		2013-1-10
C	Add PCM specification	Yu xiaochen		2013-9-24
D	COV Recovery Modify	Yu xiaochen		2013-11-06

## 1. Scope

This specification is applied to the LiFePO4 battery pack with SMBus communication port distributed by Master Instruments Pty Ltd.

## 2. Specification

No.	Item	General Parameter	Remark
1	Rated Capacity	20.0Ah	Standard discharge(0.2C) after standard charge(0.2C)
2	Minimal Capacity	19.0Ah	
3	Nominal Voltage	12.8V	
4	Life Expectation	Residual capacity is more than 60% of the rated capacity	1 ) Charge: <u>CC@0.2C</u> to 14.6V, then CV till current to 0.05C 2 ) Rest: 30min. 3 ) Discharge: 0.2C to 10.0V Temperature: 20±5℃ Carry out 1200 cycles
5	Discharge cut-off voltage	2.4V/cell ( ≥ 9.6V)	10.0V recommended
6	Charging cut-off voltage	3.9V/cell ( ≤ 15.6V)	14.6V recommended
7	Assembly method	IFR26650EC-3.3AH	4S6P
8	Housing material	ABS+PC	Flame Retardant Plastic
9	Standard charge	0.2C constant current (CC) charge to 14.6V, then constant voltage (CV) 14.6V charge till charge current decline to ≤0.05C	Charge time : Approx 7.0h

10	Standard discharge	Constant current 0.2C Cut-off voltage 10.0V	
11	Maximum Continuous Charge Current	10A@20°C	
12	Maximum Continuous Discharge Current	15A@20°C	Over current: 20A (<2S)
13	Operation Temperature Range	Charge: 0~50°C	60±25%R.H.
		Discharge: -10~50°C	
14	Storage Temperature Range	Less than 1 year: 10~25°C	60±25%R.H. at the shipment state
		Less than 3 months:10~40°C	
15	Approx. Weight	2.5Kg	Specific energy: 102Wh/Kg
16	Dimension	L181*W76*H166 mm	Housing color is optional; Terminal is M5 bolt;
17	Fuel Gauge	4 LEDs indicator	
18	Over-temperature protection	70±5°C (Discharge) 60±5°C (Charge)	
19	Short circuit protection	Will recover after removal of short	Replaceable 30A fuse as 2 <sup>nd</sup> protection
20	Pre-charge function	Start@ <2.0V/cell & finish@>2.4V/cell;	Depend on charger
21	Communication protocol	SMbus	

### 3. Performance And Test Conditions

#### 3.1 Standard Test Conditions

Test should be conducted with new batteries within one week after shipment from our factory and the batteries shall not be cycled more than five times before the test. Unless otherwise specified, test and measurement shall be done under temperature of  $20 \pm 5^{\circ}\text{C}$  and relative humidity of 45~85%. If it is judged that the test results are not affected by such conditions, the tests may be conducted at temperature 15~30 $^{\circ}\text{C}$  and humidity 25~85%RH.

#### 3.2 Measuring Instrument or Apparatus

##### 3.2.1 Dimension Measuring Instrument

The dimension measurement shall be implemented by instruments with equal or more precision scale of 0.01mm.

##### 3.2.2 Voltmeter

Standard class specified in the national standard or more sensitive class having inner impedance more than 10k $\Omega$ /V

##### 3.2.3 Ammeter

Standard class specified in the national standard or more sensitive class. Total external resistance including ammeter and wire is less than 0.01 $\Omega$ .

##### 3.2.4 Impedance Meter

Impedance shall be measured by a sinusoidal alternating current method (1kHz LCR meter).

#### 3.3 Standard Charge/Discharge

##### 3.3.1 Standard Charge : 0.2C

Charging at 0.2C constant current until the battery reaches 14.6V. The battery shall then be charged at constant voltage of 14.6V while tapering the charge current. Charging shall be terminated when the current has tapered to 0.05C. Charge time is approx 7.0 hours, The battery shall demonstrate no permanent degradation when charged between 0  $^{\circ}\text{C}$  and 50  $^{\circ}\text{C}$ .

##### 3.3.2 Standard Discharge : 0.2C

Battery shall be discharged at a constant current of 0.2C to 10.0V @  $20 \pm 5^{\circ}\text{C}$

##### 3.3.3 If no otherwise specified, the rest time between charging and discharging is 30min.

#### 3.4 Appearance

There shall be no such defect as crack, rust, leakage, which may adversely affect commercial value of battery.

Prepared Date	2013-11-06
Approved Date	
Part No.	IFM12-200E3
Page No.	6/7
Version	D

## 4. Handling of battery

### 4.1 Prohibition short circuit

Never short circuit battery. It generates very high current which causes heating of the battery and may cause electrolyte leakage, gassing or explosion that is very dangerous.

The terminals may be easily short-circuited by putting them on conductive surface.

Such outer short circuit may lead to heat generation and damage of the battery.

### 4.2. Mechanical shock

Falling, hitting, bending, etc. may cause degradation of battery characteristics.

## 5. Period of Warranty

The period of warranty is 12 months from the date of INVOICE. Master Instruments guarantees to give a replacement in case of battery with defects proven due to manufacturing process instead of the customer abuse and misuse.

## 6. Storing the Batteries

The batteries should be stored at room temperature, charged to about 30% to 50% of capacity. We recommend that battery to be charged once each three months to prevent over-discharge.

## 7. Design sketch (for reference only)



1 PIN:N/A 2 PIN:SMBC 3 PIN:SMBD 4 PIN:GND

## 8. The specification is for reference only and subject to change when we make the samples.

## Specification of PCM

No.	Item		Parameter
1	Voltage	Charging voltage	DC:3.65V/cell
		Balancing voltage	3.60±0.025V/cell
2	Current	Balancing current	110±5mA
		Self-consume current	≤600μA
		Max. continuous charging current	10A
		Max. continuous discharging current	15A
3	Over-charging protection	Over-charging voltage	3.90±0.025V/cell
		Over-charging delay time	≤2S
		Over-charging release voltage	3.6±0.05V/cell
4	Over-discharging protection	Over-discharging voltage	2.40±0.05V/cell
		Over-discharging delay time	≤2S
		Over-discharging release voltage	2.60±0.05V/cell
5	Over-current protection	Software Over-current charge and discharge	20±1A
		Software Over-current delay time	≤2S
		Hardware Over-current discharge	≥30A
		Hardware Over-current delay time	≤11ms
		Release condition	Remove load
6	Short circuit protection	Function condition	External short circuit
		Short Over-current	≥75A
		Delay time	≤61μs
		Release condition	Remove load
7	Fuel Gauge display	1 <sup>st</sup> LED	0%≤RSOC≤10%
		2 <sup>nd</sup> LED	10%<RSOC≤30%
		3 <sup>rd</sup> LED	60%<RSOC≤90%
		4 <sup>th</sup> LED	90%<RSOC≤100%
8	RSOC for 0%/3%/8%	EVD0/EVD1/EVD2	2.5V/2.7V/2.9V
9	RSOC for 100%	Taper voltage or taper current	14.6V/0.05C
10	Impedance	PCBA	≤10mΩ
11	Temperature	Operation temperature	-40~+85℃
		Storage temperature	-40~+125℃
		Over-temperature protection	60±5℃(charge), 70±5℃(discharge)