



**E&J TECHNOLOGY GROUP CO., LTD**

# **LiFePO4 Battery Specification**

**Model Number: EJ12110Fe-M**

**Doc No:           SPE-LFE-013**

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## 1. Scope

This specification is applied to the IFM battery pack with communication and with MOSFET manufactured by E&J technology group co., ltd.

## 2. Product Specification

Table 1

No.	Item	General Parameter	Remark
1	Rated Capacity	110.0Ah	Standard discharge ( 0.2 C <sub>5</sub> ) after standard charge ( 0.2 C <sub>5</sub> )
2	Minimal Rated Capacity	100.0Ah	
3	Nominal Voltage	12.8V	
4	Cycle Life	Higher than 60% of the Initial Capacity of the Cells	<ul style="list-style-type: none"> <li>◆ Charge: CC@0.2C to 14.6V, then CV till current to 0.05C</li> <li>◆ Rest: 30min.</li> <li>◆ Discharge: 0.2C to 10.0V</li> <li>◆ Temperature: 20±5°C</li> <li>◆ Carry out 2000cycles</li> </ul>
5	Discharge cut-off voltage	9.2V	10.0V( recommended)
6	Charging cut-off voltage	14.8V	14.6V (recommended)
7	Cell and assembly method	IFR26650EC-3.3AH	4S34P
		IFR18650EC-1.5AH	4S79P
8	Housing material	ABS+PC housing/	

Continuous the table 1

No.	Item	General Parameter	Remark
9	Standard charge	0.2C constant current(CC) charge to 14.6V,then constant voltage (CV)14.6V charge till charge current decline to $\leq 0.05C$	Charge time : Approx 7h
10	Standard discharge	Constant current 0.2C Cut-off voltage 9.2V	
11	Maximum Charge Current	55A	
12	Continuous Discharge Current	100A	
13	Operation Temperature Range	Charge: 0~45°C	60±25%R.H.
		Discharge: -10~60°C	
14	Storage Temperature Range	Less than 1 year : 0~25°C	60±25%R.H. at the shipment state
		Less than 3 months:-5~35°C	
15	Weight	Approx: 15.1Kg	
16	Max.Dimension	High:246mm	
		Width: 158mm	
		Length: 260mm	

Continuous the table 1

17	Charge protection	When any cell voltage is more than the protected Voltage and continued time is more than the delay time, PCM will be over charged. It prohibits charging to battery and charge MOSFET is off. After the over Voltage protection, when the highest Voltage is low than the recoverable voltage, PCM will remove from the over charge state. Charge MOSFET is on and the charger can charge the battery. At the case of over charge, the battery can be load.
18	Discharge protection	When any cell voltage is less than the protected Voltage and continued time is more than the delay time, PCM will be over discharged. The battery will be prohibit discharging and discharge MOSFET is off. The output voltage of P+ and P- is 0. After the over Voltage protection, when the lowest Voltage is more than the recoverable voltage, PCM will remove from the over charge state. Discharge MOSFET is on and the battery can be discharged. At the case of over discharge, the battery can be charged.
19	Over current protection	When charge or discharge current exceeds the over current and continued time is more than the delay time, PCM will be the over current state. At the state, it prohibits charge and discharge. PCM will be locked. After 30S, software will recover the PCM.
20	Short protection	When the output of discharge P+ and P- will be short, PCM will be in the short circuit state. At the state, it prohibits charge and discharge. PCM will be locked. After 1min, software will recover the PCM. The short current is 400A and the delay time is 100mA.
21	Balancing	The intra-module balancing circuit is used to compensate slight capacity imbalance among the four cell blocks within a battery module.
22	State of Charge(SOC) Measurement	Individual cell block voltage and charge/discharge current will be used to monitor the state of charge (SOC) of the battery module. The estimated capacity used for the calculations will be adjusted to meet the capacity of the lowest capacity cell block when the battery system is fully cycled. The state of charge will be adjusted for normal self discharge of the battery system when the unit is not on charge.
23	RS-485 Communication Uplink	RS-485 Communications will be used to communicate with the Battery Management Unit (BMU) or connection to other battery Modules.
24	RS-485 Communication Downlink	RS-485 Communication connection from Downstream battery module.
25	RS-485 insulation voltage rating	1414V , 5000V rms for 1 minute
26	Status LED	A Dual LED on module to indicate working status. One is green and the other one is red. Blinking of the green LED indicates that the module is working properly. Blinking of the red LED indicates that the module has failure and needs service.

### 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  $15\sim 30^{\circ}\text{C}$  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  $10\text{k}\Omega/\text{V}$

##### 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 shall consist of charging at a 0.2C constant current rate until the battery reaches 15.6V. The battery shall then be charged at constant voltage of 15.6V volts while tapering the charge current. Charging shall be terminated when the charging current has tapered to  $0.05\text{C}_5\text{A}$ . Charge time: Approx 7.0h, The battery shall demonstrate no permanent degradation when charged between  $5^{\circ}\text{C}$  and  $45^{\circ}\text{C}$ .

##### 3.3.2 Standard Discharge : 0.2C

Battery shall be discharged at a constant current of 0.2C to 9.2V @  $20^{\circ}\pm 5\text{C}$

##### 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.

### 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 poles 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.

An appropriate circuitry with PCM shall be employed to protect accidental short circuit of the battery pack.

#### 4.2. Mechanical shock

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

### 5. Others

Prevention of short circuit within a battery pack

Enough insulation layers between wiring and the cells shall be used to maintain extra safety protection.

The battery pack shall be structured with no short circuit internally, which may cause generation of smoke or firing.

### 6. Period of Warranty

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

### 7. Storing the Batteries

The batteries should be stored at room temperature, charged to about 30% to 50% of capacity.

We recommend that batteries be charged about once per three months to prevent over-discharge.

### 8. Other Chemical Reaction

Because batteries utilize a chemical reaction, battery performance will deteriorate over time even if stored for a long period of time without being used. In addition, if the various usage conditions such as charge, discharge, ambient temperature, etc. are not maintained within the specified ranges the life expectancy of the battery may be shortened or the device in which the battery is used may be damaged by electrolyte leakage. If the batteries cannot maintain a charge for long periods of time, even when they are charged correctly, this may indicate it is time to change the battery.

### 9. Photo:



**10.** Any other items which are not covered in this specification shall be agreed by both parties.