iBMS LCD Interface User Manual

The iBMS LCD Interface was designed to display real time data, logged data and to configure all the BMS operating parameters.

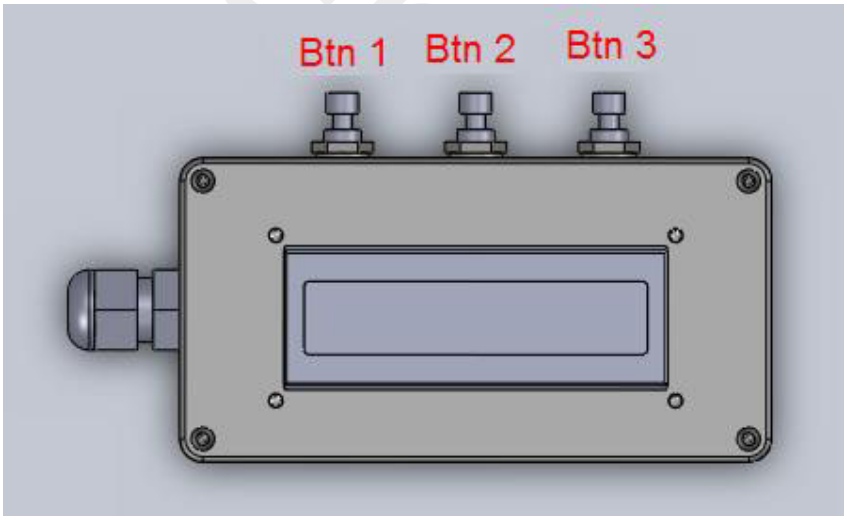
The package contains the following assembled items:

111 x 57 x 22 mm ABS black box
16 x 2 character LCD with blue backlight
3 push buttons
1,2m cable
SUB-D 25 pin male connector

Operation:

Turn BMS off
Connect the SUB-D 25 connector
Turn BMS on
Use the buttons to navigate through the desired pages

Button functions:



Button 1:

Normal mode: Jumps to the next page

Setup mode: Increments the current field

Button 2:

Normal mode: Resets the current page counters (press during 2 seconds)

Setup mode: Moves the cursor to the next field

Button 3:

Normal or Setup modes: Toggles LCD backlighting

During LED turn on also initializes the LCD for hot pluggin.

Button 1 + Button 2:

Enters setup mode (press during 4 seconds)

Each time a button is pressed a short beep will be produced.

Startup screen:

If no events are logged the following pre-charge screen will appear:

```
PRE-CHARG    0.0V
 SN:F1688-11-4
```

[P-] Terminal voltage for dynamic pre-charge

PCB Serial Number
Firmware version number
CPU revision ID

If events are logged a corresponding message will be displayed.

Logged events:

Cell low voltage cut off with offending cell identification:

```
  LOW BATTERY
Cell[15]=2.48V
```

Overcurrent during discharge:

```
      OVER
  CURRENT 129A
```

Current overload I^2t protection:

```
     CURRENT
OVERLOAD  112A
```

Overcharge current (includes regenerative breaking):

```
  OVERCHARGE
  CURRENT 36A
```

Short-circuit:

```
      SHORT
     CIRCUIT
```

Motor controller capacitors pre-charge error:

```
    PRECHARGE
      ERROR
```

MOSFET temperature sensor error (optional):

```
MFET  TEMP  SENSOR
      ERROR
```

High temperature shutdown error:

```
HIGH  TEMP  SHUTDN
      ERROR
```

Normal mode LCD Interface screens:

Page 1:

```
 0.0A 60.0Ah 12C
   0W    0Wh   0%
```

Discharge or charge current (A)
Pack current capacity in (Ah) (Resettable)
PCB temperature (ºC)

Power consumption (W)
Estimated energy consumption (Wh) (Resettable on page 3)
Current overload percentage

Page 2:

```
Max: 17.2A  913W
 15C  Min: 53.0V
```

Maximum current - 333ms average (A)
Maximum power (W)

Maximum PCB temperature (ºC)
Minimum pack voltage - voltage sag (V)

All the counters on this page are resettable.

Page 3:

```
00:07:03   53.1V
Ce04=3.27 3.318V
```

Elapsed time since last BMS switch on (HH:MM:SS) (Resettable)
Pack voltage (V)

Lowest voltage cell number
Lowest cell voltage (V)
Pack average cell voltage (V)

Page 4:

14 segment vertical voltage bar graph for each cell (Cells 1 to 16). Cells 17 to 24 appear on a subpage.

Cells in bleed state are shown with a darker pattern for reference.

A reset performed on this page clears last logged event error.

Page 5:

```
   0 Batt Cycles
 0.00 Ah
```

Battery cycle count
Average cycle depth (Ah)

All the counters on this page are resettable.

Page 6:

```
0Hr Discharge
0Hr Charge
```

Total hours in discharge
Total hours in charge

All the counters on this page are resettable.

Page 7:

```
Sag01=3.21 17APk
Disch 1 Charge 1
```

Largest voltage sag cell number
Largest voltage sag cell voltage (V)
Maximum peak current – 3ms average (A)

Discharge MOSFETs state
Charge MOSFETs state

All the counters on the first line of this page are resettable.

Page 8:

```
Max: 53.3V
Charge:  0.3A
```

Maximum pack voltage (V)
Maximum charge current (A)

All the counters on this page are resettable.

Setup mode LCD Interface screens:

```
[1] 0LiFe 1LiIon
0          [Save]
```

Cell chemistry
0 LiFePO4
1 Li Ion

```
[2]  Cell Number
24         [Save]
```

Number of cells installed: 4 .. 24

```
[3]Pack Capacity
60.0Ah     [Save]
```

Battery pack nominal capacity for fuel gage indicator calculations: 0 .. 999Ah

```
[4]Current Limit
 125A      [Save]
```

Current limit for overcurrent detection: 5A .. 4 x Nominal current

```
[5] LowV Cut OFF
2.50V      [Save]
```

Low voltage cut off setting

```
[6] LowV Turn ON
3.10       [Save]
```

Low voltage cut off release setting

```
[7] VCutTempComp
0          [Save]
```

Charger fine voltage matching

```
[8]Charger Volts
87.6V      [Save]
```

Charger fine voltage matching

```
[9]Charg Current
25.0A      [Save]
```

Charger / Regenerative braking maximum charge current: 1A .. 1.1 x Nominal Current

```
[10]Bleed Rel dV
35mV       [Save]
```

Bleed release delta voltage: 25 .. 99mV

Ex: For a 3,65V bleed voltage
3,650 - 0,035 = 3,615V bleed release voltage

```
[11]PWM High Bat
398        [Save]
```

PWM output for full battery on fuel gage indicator
Max value: 498 (87% duty)

```
[12] PWM Low Bat
118        [Save]
```

PWM output for low battery on fuel gage indicator
Max value: 498 (87% duty)

```
[13]   PreCharge
 0.5s      [Save]
```

Minimum pre-charge time: 0.5 .. 30s

```
[14]PreChargeMod
0          [Save]
```

Pre-charge mode: 0 / 1 / 2

0 – Strict mode

Minimum configured Pre-Charge time is honored. Then it waits for P- voltage to come down to less than 10% full pack voltage. If P- voltage stops decreasing a Pre-Charge error is issued. The circuit remains open.

1 – Relaxed mode

Minimum configured Pre-Charge time is honored. Then it waits for P- voltage to come down to less than 10% full pack voltage. If P- voltage stops decreasing Pre-Charge is terminated and circuit is closed.

2 – Constant mode

No P- voltage evaluation is performed. The circuit is always closed at the end of the configured Pre-Charge time.

```
[15]ShortC Level
 6          [Save]
```

Short-circuit current level detection: 0 .. 10

Short-circuit current trigger levels for 3 x 2mΩ sense resistor:

Level	Trigger current (A)
1	36
2	72
3	108
4	144
5	181
6	217
7	153
8	289
9	325
10	361

Short-circuit current trigger levels for 3 x 1mΩ sense resistor:

Level	Trigger current (A)
1	63
2	126
3	190
4	253
5	316
6	379
7	442
8	505
9	569
10	632

```
[16]ShortC Delay
200us      [Save]
```

Short-circuit detection delay: 50 .. 500µs

```
[17]Dsch Min Cur
 50mA      [Save]
```

Discharge minimum current: 0 .. 100mA

```
[18]LV Cut Delay
500ms      [Save]
```

Low voltage cut off delay detection: 0 … 999ms

```
[19]HV Rel Delay
 0s         [Save]
```

High voltage cut off minimum release time: 0 .. 99s

```
[20]ChFetFullCut
0           [Save]
```

Charge MOSFET bi-directional cut: 0 / 1

```
[21]LED Auto OFF
 3min     [Save]
```

LCD backlight LED auto shut off time: 0 .. 255s

```
[22] MOSFET Diag
0          [Save]
```

MOSFET diagnostic mode enable: 0 / 1

0: Normal mode
1: MOSFET diagnostic mode

Diagnostic mode disables both charge and discharge for MOSFET testing.

```
[23]          OEM
0          [Save]
```

OEM mode enable: 0 / 1

OEM mode disables:
- Configuration changes
- Counters reset
- Event log reset
- Password display

```
[24]    Password
999        [Save]
```

Password for OEM mode access: 0 .. 999