BEM-3801 - BATTERY CONTROLLER

Main features:

- Small dimensions
- Wide supply voltage range from 15V to 135V DC
- 3 analog inputs for 120V
- Measurement of current, voltage, temperature, electrolyte, etc.
- Simple and quick installation
- No current shunt required
- Recording of battery operating parameters for up to 5 years
- IP67 protection class
- Protection against incorrect connection
- Internal battery to back up the RTC clock

Intended use:

- Recording battery operating conditions
- Monitoring the operation of forklifts, sweepers, lifts and other electrical equipment

Description

The BEM-3801 battery controller is used to record operating parameters of lead acid, gel, AGM and lithium batteries. The internal FLASH memory allows you to store 250,000 measurement samples and 10,000 collective information about charge/discharge cycles.

Bem-3801 allows to register irregularities in the operation of the battery and in the operation of the electric vehicle.

Radio communication in the 868MHz band in combination with the CHBASE-16 control panel enables remote online monitoring of the battery.
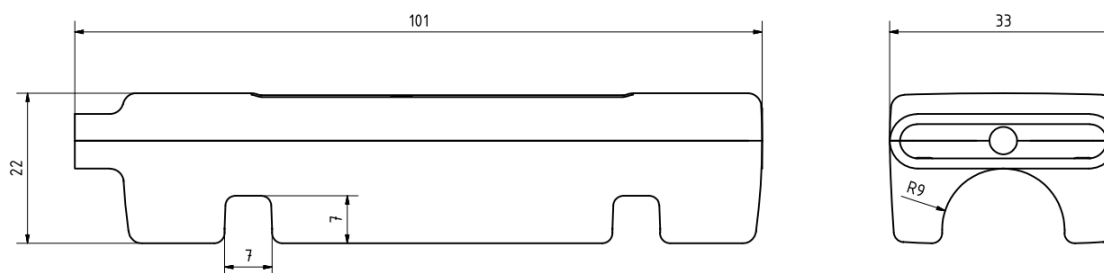
1. Parameters.

1.1 Electrical parameters.

Symbol	Parameter	Min.	Max.	Unit
Vin_ran	Supply voltage	15	135	V
Vin_acc	Supply voltage measurment accurancy	-	1	%
Vin_res	Supply voltage measurment resolution	-	0.01	V
Vin_ran	IN1, IN2, IN3 probe voltage range	0	120	V
Vin_acc	IN1, IN2, IN3 measurment accuracy	-	1	%
Vin_res	IN1, IN2, IN3 measurment resolution	-	0.01	V
Vin_inp	IN1, IN2, IN3 impedance	0.99	1.01	MΩ
Iin_ran	Current measure range	-1200	1200	A
Iin_acc	Current measure accuracy	-	3	%
Iin_res	Current measure resolution	-	0.3	A
Tint_ran	Device temperature measure range	-30	50	°C
Tint_acc	Device temperature measure accuracy	-	+/- 1	°C
Tint_res	Device temperature measure resolution	-	0.1	°C
Text_ran	External temperature measure range	-30	100	°C
Text_acc	External temperature measure accuracy	-	+/- 2	°C
Text_res	External temperature measure resolution	-	0.1	°C

1.2 Operating conditions.

Symbol	Parameter	Conditions	Min.	Max.	Unit
V_sup	Supply voltage	-	13	135	V
Isup	Current consumption	Vin = 13V	21	60	mA
Ta	Working temperature	13V > Vin > 135V	-20	65	°C

2. Mechanical parameters.

Dimensions (without connection wires)	101 x 33 x 22 [mm] (length / width / height)
Weight (without connection wires)	80[g]
Length of connection wires	1 [m]
Method of terminating power cables	Needle connector
The maximum external diameter of the power cable on which the controller is mounted	18[mm]

3. Basic functions of the recorder

3.1 Measured values.

a) Non-contact measurement of battery charging/discharging current
b) Battery voltage measurement
c) 3 analog inputs 0-135V for electrolyte level or balance measurement
d) External temperature sensor (battery temperature)
e) Optional external temperature sensor integrated with the battery compartment flood sensor

3.2 Communication.

a) Radio communication in the ISM band at 869 MHz
b) RGB signaling diode

3.3 Additional features and functions.

a) Installing the controller does not require disconnecting the power cable from the battery terminals
b) Recording of 10,000 charge/discharge cycles, recording type: circular buffer, the oldest records will be replaced with new ones
c) Recording of 250,000 measurement samples (with a measurement interval of 10 minutes, accurate data from the last 5 years of battery operation will be saved)
d) The measurement interval can be configured by the user
e) Integrated RTC clock with battery backup for time-stamping measurement samples.
f) The operating time of the integrated RTC clock without a connected battery is approximately 5 years
g) Marking measurement samples with flags informing about exceeded permissible values
h) Possibility to remotely update the controller software
i) Complete airtightness of the recorder by filling it with epoxy resin
j) Radio transmission encrypted with the AES128 algorithm

4. Description.

BEM-3801 is a battery recorder enabling monitoring and recording operating parameters of liquid electrolyte, AGM, gel, LIFEPO4 batteries. Thanks to three configurable analog inputs, it is possible to monitor the electrolyte level and balance at two points of the battery, or in the case of gel or LFP batteries, the balance at three points.

5. Operation.

5.1 Controller installation.
5.1.1 Mechanical installation.

The controller installation location should be selected in such a way that:
- it is as far away from the metal walls of the battery box as possible
- it is mounted on a section of cable that will not move during battery operation

The controller should be placed on the cable with its concave bottom part and then secured with self-locking straps.

5.1.2 Power connection.

The controller power cables marked with + and – symbols should be connected to the extreme terminals of the battery cell for measurement. As standard, the controller is equipped with needle connectors instead of ring connectors. Tgus, there is no need to unscrew the battery current cables, which minimizes the risk of increasing the contact resistance when re-screwing the cables.

Installation of ring connectors should be carried out as follows:
- Choose a convenient place to insert the ring connector
- Thoroughly clean the cable insulation approximately 10 cm from the planned insertion point
- Apply a small amount of silicone where the needle is inserted
- Insert the needle by hand, then press harder with pliers
- Secure the needle with self-locking straps

After connecting the power supply, the controller will begin to indicate its operation using an LED diode

5.1.3 Connecting measurement leads.

The BEM3801 controller is equipped with three analog inputs marked with the symbols ❶ ❷ ❸. The function of each input is configurable from the application level. By default, all three inputs are equipped with needle connectors and are used to measure the battery balance at three points.

The mechanical installation of measurement connectors is similar to that of power connectors. The difference lies in the place where the connectors are installed.

Balance measurement in 3 points (24V battery / 12 cells, cell #1 closest to -, cell #12 closest to +)

Connect input ❶ to the + connector of cell 3 (6V)
Connect input ❷ to the + connector of cell 6 (12V)
Connect input ❸ to the + connector of cell 9 (18V)

Balance measurement in 2 points (24V battery / 12 cells)

Connect input ❶ to the + connector of cell 4 (8V)
Connect input ❷ to the + connector of cell 8 (16V)

Balance measurement in 1 point (24V battery / 12 cells)

Connect input ❶ to the + connector of cell 6 (12V)

If the installation of connectors is difficult, you can move one cell up or down (e.g. when measuring balance at 2 points on a 24V battery, connect ❶ to + cell 5 and ❷ to + cell 7).

Please remember that when configuring the controller using the application, you must specify which cell the measurement inputs are connected to.

5.1.4 Controller configuration.

a) Mount the controller on the battery cable using plastic cable ties. Choose a mounting location so that the controller is not close to the metal casing of the battery box and other power cables.
b) Connect the power cables to the outermost battery terminals. After connecting the power supply, the controller should start signaling the operating status using an LED diode
c) Install the electrolyte level sensor, if required
d) If balance measurement is required, connect the BAL1 and/or BAL2 measurement leads to one of the middle cells of the battery (it is recommended to connect the cable exactly in the middle of the cell, i.e. to the connector + cell 6 in the case of a 24V battery if the BAL1 sensor is used, or in 1/3 and 2/3 – cells 4 and 8 using BAL1 and BAL2). However, this is not required - the place of connection of the BAL1 and BAL2 cables is configured in the application
e) Install the outdoor temperature sensor by inserting it between the battery cells as close to the center of the battery as possible