BATTERY SYMMETRY AND VOLTAGE MONITORING RELAY

BMSA

Features

- Monitors battery symmetry voltage to detect defective cells
- All in one unit from 24 to 512 V
- No current leak through the middle point connection
- Adjustable and programmable settings
- Reset and individual test keys for +B and -B

Benefits

- Early warning for cell deterioration like sulphating or internal short circuit
- Provides continuous overview of power availability from battery packs
- Enhances battery performance preventing overcharging and deep discharging of battery power packs
- Can help reduce maintenance costs
- Monitors a flexible number of cells

Applications

- DC Power distribution
- UPS systems
- Battery banks and charger systems

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DESCRIPTION

The multipurpose Battery Symmetry Relay BMSA is designed to monitor and give an early warning if one or more cells are performing different from an average cell in the battery. The battery must consist of two blocks of cells coupled in series with an accessible middle point used as a reference potential. No current will be drawn from the middle point. The Symmetry Relay monitors that the positive and the negative battery blocks perform equally independent of the actual charge and load level. The two battery blocks do not need to be of equal voltage (same number of cells), but the individual cells must be equal and have the same history.

The BMSA accepts up to twice as many cells in one block as in the other. The nominal voltage range of each block can be set from 12 V to 256 V and the actual voltage must be within the range of 9 to 300 V allowing a battery voltage ranging from 18 V to 600 V. For high battery voltages exceeding 300 V the middle point connection is critical. If it can (even accidentally) be disconnected, the maximum battery voltage must be kept below 300 V.

As an option, the BMSA can be extended to monitor the actual battery voltage for under and overvoltage. The option will include individual relays for under and overvoltage.

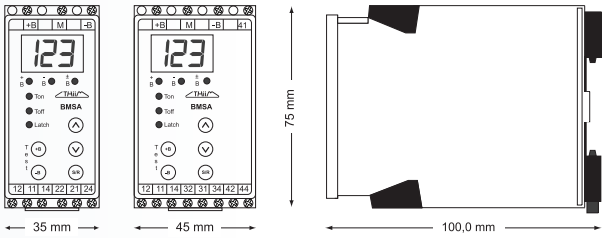
APPLICATION

The BMSA is used on batteries in back up supplies where, by matching two batteries against each other, a warning can be given as soon as a cell in one of the battery blocks starts to deteriorate. As the BMSA is not depending on the actual charge and load status, it is a powerful supervision of only occasionally used batteries in emergency systems.

TEST AND RESET FUNCTION

The two test keys offset the measured voltage from either battery block by 10 %. The display and the function of the BMSA will respond to the change with a new voltage and cell difference information and the relay will operate. The reset key is used for releasing the Latch function and for programming.

DIMENSIONS



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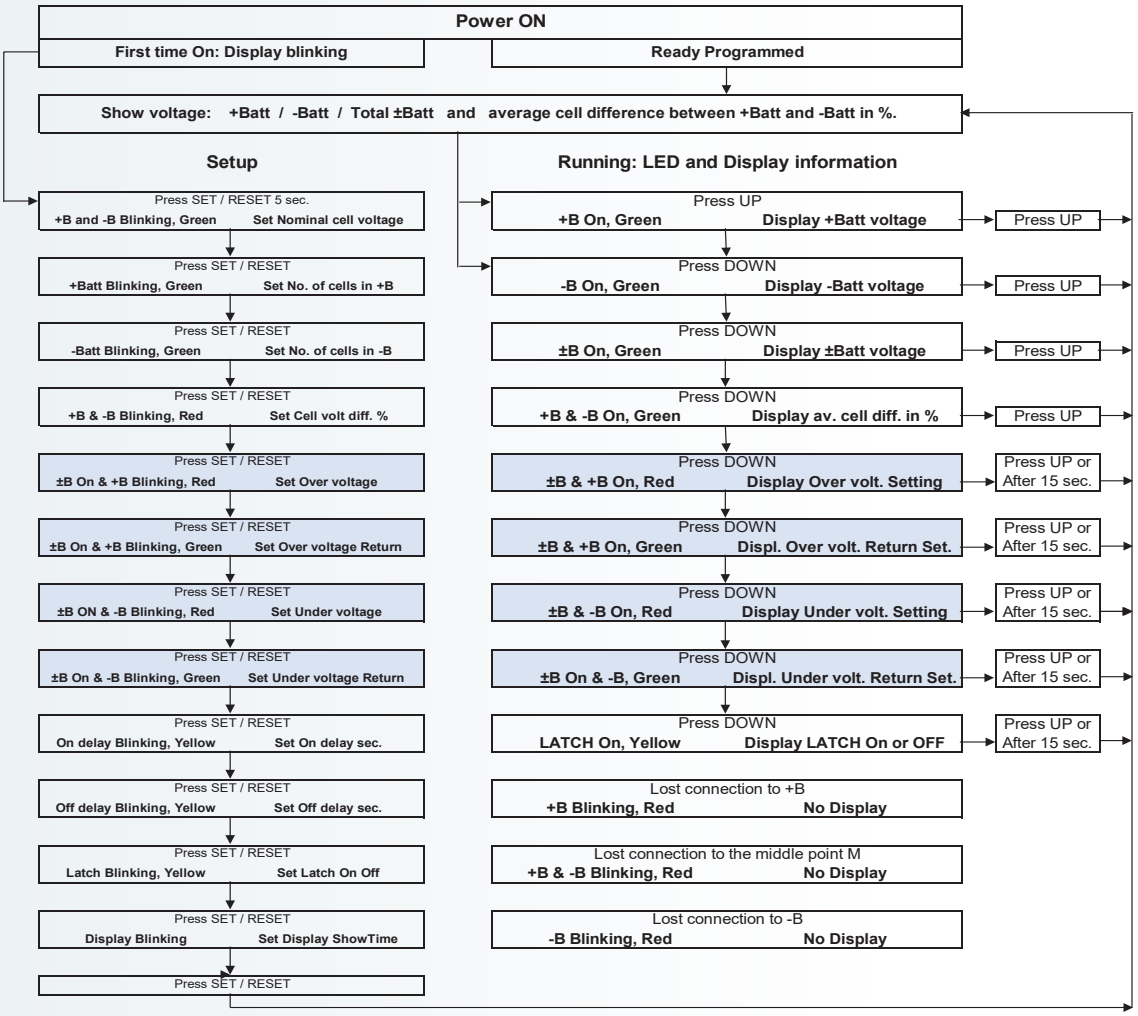
FUNCTIONS

Functional diagram for battery symmetry relay type: BMSA



Definitions and limitations

Nominal cell voltage x.xx is used to calculate the voltage range to be used. The range is set according to the battery with the highest No. of cells.
If the battery has a total nominal voltage up to 48V, it will be measured in the 70V range.
If the battery has a total nominal voltage higher than 48V, it will be measured in the 300V range.

Number of cells times nominal voltage of the cells, must be within the range from 12V to 256V for each of the two Batteries.

The actual voltage of each of the two batteries must be within the range of 9 to 300 volts.
NOTE: If the middle point M is not connected or disconnected, the maximum voltage of ±B must be below 340V.

Cell voltage difference in % is the percentual difference between the average voltage of the cells in the + Battery compared to the cells in the - Battery.
The calculation is (100 * ((Av. Cell + Batt) - (Av. Cell - Batt))) / (0.5 * ((Av. Cell + Batt) + (Av. Cell - Batt))) %.

Cell voltage difference in % can be set from 1% to 20%.
1% is equal to a cell voltage difference of 20mV for two cells of 2.0V and 120mV between two 12V batteries at 12V.
20% is equal to a cell voltage difference of 400mV for two cells of 2.0V and 2,4V between two 12V batteries at 12V.

The resolution of the voltage measurement is calculated up to 70V to be 70/4096 = 17.1mV. In the range up to 300V it is 73.2mV.
The practical resolution over the temperature range is 2 to 3 times the calculated values.

Time delay ON or OFF can be set from 0.1 to 99.9 sec.

Less than 0,1mA will be drawn from the middle point. Total supply will be taken from the +B and -B.

Optional
Over and under voltage measuring with one separate relay for each function.

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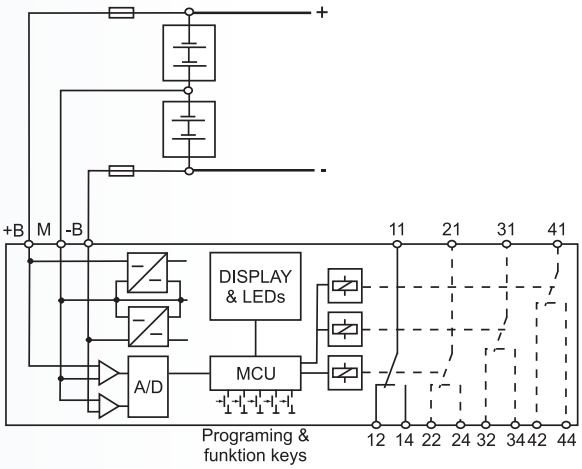
INSTALLATION AND SETUP

When the BMSA is powered up for the first time it will need to be configured to the application. The configuration can be done either by using the keys on the front, or through a RS232 port in the side of the unit. When it is programmed it is ready to monitor the battery or battery pack.

The display will show the two battery block voltages, the total battery voltage and the average cell voltage difference between the two battery blocks in %. For each readout, the LED's on the front will indicate what the display is showing. The display can be set to show one particular measured value, or continuously cycle through the different measurements, one after the other in a specified time sequence. For detailed information of the function of the display and the LED's, please see the function diagram.

When the BMSA is connected to the battery, and the battery is OK, then the internal relay will pull in. When the cell difference exceeds the set maximum, the OFF delay will start to expire and the yellow LED "Toff" will be lit. After the set time delay the relay will drop out. Depending on the latch setting, the relay will remain out or may go in again if the battery returns to a healthy condition. The BMSA is constantly checking the battery connections and blinks with the LED: +B, -B or both LED's if the connection to battery plus, minus or the middle point is disconnected.

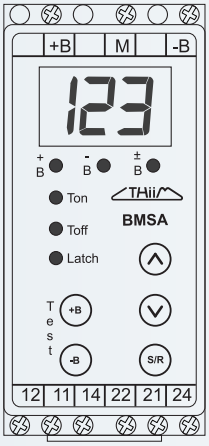
CONNECTIONS

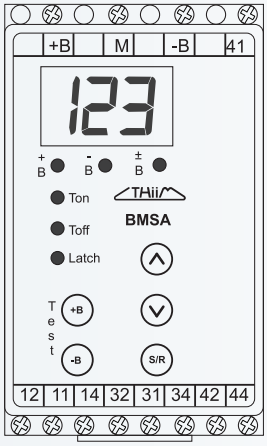


Contact information:
Symmetry relay: 11, 12, 14 and 21, 22, 24
Optional: Undervoltage relay: 31, 32, 34.
Excludes 21, 22, 24
Optional: Overvoltage relay: 41, 42, 44.
Excludes 21, 22, 24

For a healthy battery the following contacts will be closed:
11-14, 31-34 and 41-42

FRONT





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SPECIFICATIONS

INPUT	**DC voltage**
Set Range	2 x 12 VDC to 2 x 256 VDC. (numbers of cells times cell voltage)
Functional Range	2 x 9 VDC to 2 x 300 VDC with the middle point "M" connected. Maximum short time voltage 2 x 350 VDC or 1 x 350 VDC (+B -B) if the middle point "M" is disconnected
Current	120 mA @ 2 x 9 VDC 6 mA @ 2 x 300 VDC

PERFORMANCE PARAMETERS

RESOLUTION	
For Set Range < or = 2 x 48 V	< ±50 mV. Display voltage ±0.1 V
For Set Range 48 V to 256 V	< ±200 mV. Display voltage ±1 V
Average cell diff. in %	< ±0.5 % @ 12 V/70 V and 48 V/300 V range < ±0.1% @ 48 V/70 V and 256 V/300 V range Display average cell diff. ±0.1 %
TIMING	
Response time	Typical < 200 ms
Time range	Separate On and Off delay setting 0.1-99.9 s
ELECTRICAL	
Temp. dependence	A/D converting Typ. ±0.02 %/°C

OUTPUT	
RELAY	2 C/O or 3 x 1 C/O with Optional Over & Undervoltage monitoring
Contact rating	6 A, 250 VAC, 1500 W
Mechanical life	30 million operations
SUPPLY	**Self Supplied, DC voltage**
Range	18-600 V (300 V if the middle point is not connected)
Fuse	Internal 2 x 250 mA in +B and -B Breaking capacity 100 A/250 VDC
Power consumption	Max. 4 W
GENERAL	
Temperature range	-25 °C to +55 °C ambient
Humidity	Up to 90 % RH non-condensing
Dieletric test voltage	Coil to relay contacts 4000 VAC Pole to pole 2500 VAC
TERMINALS	
Tightening torque	0,32 Nm to 0,39 Nm
Screw type	PH1
Cable size	Accepts up to 3,3 mm² or 12 AWG
Weight	0.15 kg standard 0.16 kg with optional over and undervoltage

CE

International standards

Directive 2002/95/EC of 27. January 2003	RoHS
EMC directives 89/336:	
EN 50263:2000	Emission
EN 61000-3-2	
EN 61000-3-3	Immunity
EU directive: Low voltage directive 73/23:	
EN 60255	Electrical Relays

ORDERING INFORMATION

EXAMPLE BMSA 1830 P A 3 C

TYPE
Battery Symmetry Relay — BMSA

SUPPLY VOLTAGE
18 V to 300 VDC — 1830

ADJUSTMENT
Programmed — P

HOUSING
Rail mounting — A

SIZE
35 mm – symmetry relay only 35 mm — 3
45 mm – with optional Under & Overvoltage — 4

CODE END
Code end — C

Company info

Datablad_BMSA_S24_v1

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