Monitoring Technique

VARIMETER
Battery Symmetry Monitor
BA 9054/331, BA 9054/332

- According to IEC/EN 60255-1
- To monitor for battery systems (emergency power supply)
- Measuring range DC 0.12 ... 1.2 V or 0.2 ... 2 V
- Gold plated contacts to switch low loads
- High overload possible
- With time delay 10 s
- LED indicators for operation and contact position
- Width: 45 mm

BA 9054/331
- For battery voltages up to 300 V
- Without separately auxiliary voltage
- 2 changeover contacts

BA 9054/332
- For battery voltages up to 500 V
- With separately auxiliary voltage
- 1 changeover contact

Approvals and Markings

Applications
Monitoring of battery systems to find voltage inversions of single cells, internal short circuits and sulphating

Function
The middle connection of a Battery system is connected to terminal "M" of the BA 9054/331. If the two parts of the voltage differ more than the adjusted value for 10 s, the output relay trips. It trips also on broken wire on terminal "M". The test button allows a test of the unit. It has to be pressed for at least 10 sec.

Indicators
- Green upper LED: On, when auxiliary supply connected
- Yellow lower LED: On, when output relay activated

Notes
Attention: New batteries are not symmetric in the beginning. The battery monitor has to be readjusted after some time of operation. (See setting). The adjustment has to be verified.

The gold plated contacts of the BA 9054 mean that this module is also suitable for switching small loads of 1 mVA ... 7 VA, 1 mW ... 7 W in the range 0.1 - 60 V, 1 ... 300 mA. The contacts also permit the maximum switching current. However since the gold plating will be burnt off at this current level, the device is no longer suitable for switching small loads after this.
Technical Data

Input

Sensitivity of tripping:
(Measuring range):
DC 0.12 ... 1.2 V absolute scale or,
DC 0.2 ... 2 V absolute scale or
DC 1 ... 10 V absolute scale

Resetting value:
98% of operate value, fixed

Repeat accuracy:
≤ ± 0.5 %

Time delay t:
10 s

Current middle connection (terminal M):
Max 12 µA (at 60 V or 220 V or 500 V)

Principe de mesure:
Arithmetic mean value

Temperature influence:
< 0.05 % / K

Auxiliary Circuit

BA 9054/331:
Battery voltage = auxiliary voltage:
DC 24 ... 60 V / DC 110 ... 220 V
Voltage range:
DC 19 ... 80 V / DC 60 ... 300 V

BA 9054/332:
Battery voltage (Uj):
DC 10 ... 60 V, DC 200 ... 500 V

Auxiliary voltage (A1/A2):
DC 110 ... 220 V, AC 230 V
Voltage range:
0.8 ... 1.1 Uj

Nominal consumption:
Approx. 2.5 VA

Nominal frequency:
50 / 60 Hz

Frequency range:
± 5 %

Output

Contacts:
BA9054/331: 2 changeover contacts
BA9054/332: 1 changeover contacts

Contact material:
AgNi + 5 µm Au

Switching of low loads:
≥ 100 mV

Switching capacity:
To AC 15:
NO contact: 2 A / AC 230 V IEC/EN 60947-5-1
NC contact: 1 A / AC 230 V IEC/EN 60947-5-1
To DC 13:
1 A / DC 24 V IEC/EN 60 947-5-1
To DC:
8 A / DC 24 V or
0.3 A / DC 220 V

Electrical life
To 3 A, AC 230 V cos ϕ = 1:
2 x 10^6 switching cycl.IEC/EN 60947-5-1

Short-circuit strength
max. fuse rating:
6 A gG / gL IEC/EN 60947-5-1

Mechanical life:
50 x 10^6 switching cycles

General Data

Operating mode:
Continuous operation

Temperature range:
Operation: - 40 ... + 60 °C
Storage: - 40 ... + 70 °C
Altitude:
< 2000 m

Clearance and creepage distances
Rated impulse voltage/pollution degree
In/output: 4 kV / 2 IEC 60664-1

EMC
Electrostatic discharge:
8 kV (air) IEC/EN 61000-4-2
HF irradiation:
80 MHz ... 2,7 GHz: 10 V / m IEC/EN 61000-4-3
Fast transients:
4 kV IEC/EN 61000-4-4
Surge voltages
Between wires for power supply: 2 kV IEC/EN 61000-4-5
Between wire and ground: 4 kV IEC/EN 61000-4-5
HF wire guided: 10 V IEC/EN 61000-4-6
Interference suppression: Limit value class B EN 55011

Technical Data

Degree of protection
Housing: IP 40 IEC/EN 60529
Terminals: IP 20 IEC/EN 60529

Housing:
Thermoplastic with V0 behaviour
according to UL subject 94

Vibration resistance:
Amplitude 0.35 mm IEC/EN 60068-2-6
frequency 10 ... 55 Hz

Climate resistance:
40 / 060 / 04 IEC/EN 60068-1

Terminal designation:
EN 50005

Wire connection:
2 x 2.5 mm² solid or
2 x 1.5 mm² stranded wire with sleeve
DIN 46228-1/-2/-3/-4

Wire fixing:
Plus-minus terminal screws M 3.5
with self-lifting clamping piece IEC/EN 60999-1

Insulation of wires or sleeve length:
10 mm

Fixing torque:
0.8 Nm

Mounting:
DIN rail IEC/EN 60715

Weight:
200 g

Dimensions

Width x height x depth:
45 x 75 x 120 mm

CCC-Daten

Thermal current Ith:
5 A

Switching capacity
To AC 15:
2 A / AC 230 V IEC/EN 60947-5-1
To DC 13:
1 A / DC 24 V IEC/EN 60947-5-1

BA 9054/332:
Battery voltage (Uj):
DC 10 ... 60 V

Technical data that is not stated in the CCC-Data, can be found in the technical data section..
### Standard Types

<table>
<thead>
<tr>
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<th>DC 0.12 ... 1.2 V</th>
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<tbody>
<tr>
<td>Article number:</td>
<td>0056172</td>
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### Application Example

![Application Diagram](Image)

#### Application Example

1. **Example 1**
   - Symmetric battery
     - \(U_1 = \frac{1}{2}\) battery voltage
     - Adjust \(U_2\) with tuning and fine tuning potentiometer to 0V

2. **Example 2**
   - 60 V battery set, combination of 12 V Block batteries
     - \(U_1 = 36\) V
     - Adjust \(U_2\) with tuning and fine tuning potentiometer to 0V

3. **Example 3**
   - Non symmetric battery (compensation of battery tolerances)
     - \(U_1 = \frac{1}{2}\) battery voltage + 200 mV
     - Adjust \(U_2\) with tuning and fine tuning potentiometer to 200 mV

### Setting

- Connect the device as shown in application example
- Connect nominal voltage (battery voltage) to A1/A2 (/331) e.g. \(U_B (/332)\)
- Set potentiometer for response value to min setting (0.12 V)
- Connect auxiliary \(U_H (/332)\) to A1, A2
- Find the middle of the battery voltage with the potentiometers for symmetry “groß” and “fein” (tuning and fine tuning). Differences of block batteries can be adjusted up to 12 V. The correct setting is indicated by a green LED.
- Adjust potentiometer for response value to the required value. The device is now ready to use.

### Set-up Procedure

1. **Example 1**
   - **Symmetric battery**
     - \(U_1 = \frac{1}{2}\) battery voltage
     - Adjust \(U_2\) with tuning and fine tuning potentiometer to 0V

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   - **60 V battery set, combination of 12 V Block batteries**
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     - \(U_1 = \frac{1}{2}\) battery voltage + 200 mV
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