

Technical specification

BMS EASY







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Product description

The module is determinated for protection of the individual LiFePO4 cells against overcharging and undercharging. The modules can be connected with battery cell to create basic protection for 12, 24, 48V voltage, etc.

- Simple, durable and reliable electrical design (without SW)
- Simple wiring and installation of the module
- Galvanic isolation of outputs from individual cells (bistable relay)
- Galvanically isolated inputs for common reset of modules (optocoupler)

POSSIBILITIES OF USE

- Basic protection for simple systems (backup power, caravans, huts...)
- Duplicate (backup) protection for advanced BMS
- Duplicate warning system for control systems
- Meets the condition of automatic shutdown in the event of a fault without software elements

Modules can be purchased and used individually or in blocks of 4 (can be split by breaking off)

Function description

If the cell voltage is within the allowed range 2.6V to 3.73V (with tolerance \pm 2%), the output relay of the module is in the COM - NO position and the signal LED flashes at an interval of about 3s. If the cell voltage drops or rises outside the allowed interval, the relay switches to the COM - NC position and the LED does not flash. At the same time, the module will disconnect itself from the battery cell, i.e. it does not discharge the battery further by its own consumption.



WARNING

If the indicating wires between the cell and the module are broken, the relay will not switch to the COM - NC position because its coil is not already powered from the cell.







Description of outputs, basic diagram





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Input / output / functions / feature	Value	Note
Range of operation	2.60 V – 3.73V (with tolerance ± 2%)	Satus COM - NO
Self-consumption in operation	cca 1 m A	
Self-consumption out of operation	<10n A	
Switching the relay at Umin	2.60 V	Delay cca 0.5 s
Switching the relay at Umax	3.73V (with tolerance ± 2%)	Delay cca 0.5 s
Max. switching power of relay	DC, AC 30 V/1 A DC, AC 120 V/0.5 A DC, AC 200/0.1 A	
Dielectric strength of the relay	1000Vrms	
Switching ON the module or resetting the equipment Umin, Umax	Pulse min 2 s, max 60 s	Button on the board or voltage to the reset terminals
Status indication - module ON operation	Green LED	Flashes, interval 3 s
Status indication – module OFF operation	Green LED	Do not flashes, does not light
Board dimensions (one module)	35x60x15 mm	
Board weight (one module)	15 g	
Block dimensions (4 modules with edge)	70x138x15 mm	
Block weight (4 modules with edge)	64 g	
Cell input surge resistence	± 16 V ± 100 V	Without any demage Fuse demaged
Input voltage of remote reset/start	9 – 200 V	DC, AC
Relay consumption during start/reset pulse	cca 5 – 50 m A	According to the voltage - there must be no permanent connection



Examples of use:

BASIC BATTERY PROTECTION - CIRCUIT BREAKER WITH VOLTAGE TRIGGER



One of the simplest battery protection systems at the individual cell level with zero self-consumption, which also serves as short-circuit protection and manual disconnection of the battery, e.g. during a long shutdown.

If the voltage on any terminal battery cell drops below 2.60V or will rise above 3.73V (with tolerance \pm 2%), the relay on the corresponding BMS unit will switch to the NC position and the voltage trigger (coupled with the circuit breaker) will trip the battery power output.



WARNING

The peak consumption of the voltage trigger must not cause a greater load on the BMS relay contacts than that specified in the technical specification.

If the battery is disconnected in a mode where both the charger and the load are connected, an unwanted (unstable) circuit may get closed between the charger and the load without the battery.

Related products: <u>GWL/MODULAR Circuit Breaker 2A</u> <u>GWL/MODULAR Circuit Breaker 125A</u> <u>GWL/MODULAR Trigger Switching 60V (Breaker)</u>



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BASIC BATTERY PROTECTION - BISTABLE RELAY



The direct control of the bistable relay from the BMS has the advantage of zero self-consumption and the possibility of remote switching OFF and ON with a button, etc.

If the voltage on any terminal battery cell drops below 2.60V or will rise above 3.73V (with tolerance \pm 2%), the relay on the corresponding BMS unit will switch to the NC position and the bistable relay will be opened via its opening coil. The relay can also be switched ON and OFF via the opening and closing coil by means of pushbuttons.



WARNING

The peak consumption of the relay coil must not cause a greater load on the BMS relay contacts than that specified in the technical specification.

Charging can only be carried out under the condition that the charger is switched off after disconnecting the bistable relay in case of Umax. / cell (if this does not happen, the charger would destroy the bistable relay coil). This must be ensured by the charger logic or by an auxiliary NO contact of the bistable relay.

Related products:

GWL/POWER DC Power Latching Relay 100A, Coil 12V GWL/POWER DC Power Latching Relay 100A, Coil 48V GWL/POWER DC Power Latching Relay 200A, Coil 48V <u>GWL/POWER DC Fuse Mega, 100A, M8</u> VICTRON Fuse 200A / 58V

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BASIC BATTERY PROTECTION AND MONITORING - DC RELAY AND ENERGY MONITOR



Example of a more complex battery management with operational and safety disconnection element and status monitoring.

If the voltage on any terminal battery cell drops below 2.60V or will rise above 3.73V (with tolerance \pm 2%), the relay on the corresponding BMS unit will switch to the NC position and the BMS serial link circuit via COM - NO contacts will be interrupted. The SS relay will lose power and disconnect the power circuit. The safety and service galvanic disconnection of the battery is performed by a central switch. The energy monitor allows you to have an overview of the battery voltage, the direction of current flow and the actual battery capacity (SoC - State of Charge).



WARNING

If the battery is disconnected in a mode where both the charger and the load are connected, an unwanted (unstable) circuit may get closed between the charger and the load without the battery.

When selecting an SS relay, it is necessary to check its bidirectionality (the relay below meets this feature and it can be connected each other up to 3pcs in parallel in order to increase performance. (The Battery Protecs from Victron are only uni-directional).

Related products: <u>123ELECTRIC Powerswitch 48V 100A</u> <u>GWL/POWER DC Switch ZJK125 - 125A, 48V</u> <u>GWL/POWER DC Switch ZJK250 - 250A, 48V</u> <u>GWL/MODULAR LiFePO4 Battery Monitor/Energy Meter + Shunt 350A, 8V-120V</u>



EXTENSION WITH AUXILIARY RELAY FOR POWER CONTACTOR AND SOFT DISCONNECT



An auxiliary relay controlled from the BMS allows switching of several other individual elements, including power contactors with an energy-consuming coil.

If the voltage on any battery cell drops below 2.60V or will rise above 3.73V (with tolerance ± 2%), the relay on the corresponding BMS unit will switch to the NC position, the BMS serial link circuit via COM - NO contacts will be interrupted and the auxiliary relay will be switched off. Through its contacts it is possible to switch and open coils of large contactors, soft outputs of "REMOTE CONTROL" devices (MPPR controllers, inverters...) etc.



WARNING

For controlling more devices via the "REMOTE CONTROL" input, only one relay contact cannot be used, each device must have its own control contact or optocoupler (galvanic isolation).

Related products: <u>GWL/MODULAR DIN Socket For Relay</u> <u>GWL/MODULAR Relay 24V/8A</u> <u>VICTRON Invertor DC-AC 12V/230V 1200W (Phoenix 12 | 1200)</u> <u>VICTRON MPPT Controller 150V/60A, Bluetooth, 12/24/48 V</u>



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CONTROL OF SINGLE COIL BISTABLE CONTACTOR



The AMETEK power contactor works on the principle of switching on and switching off by changing the electromagnetic field of the coil. The green button switches on or resets all BMS Easy modules and at the same time switches on the SRART auxiliary relay. By applying voltage across its COM - NO contacts, the coil pulls the magnetic mechanical part of the contactor and it locks in the closed position. If the voltage on any battery cell drops below 2.60V or rises above 3.73V (with tolerance ± 2%), the relay on the corresponding BMS unit will switch to the NC position and STOP relay is pulsed via the auxiliary contact of the AMETEK. By changing the polarity - the magnetic field of the coil, the the magnetic mechanical part of the contactor via the OPP position. Voltage with the opposite polarity can also be applied to the contactor via the COM - NC contacts of the STOP relay by means of the STOP button and thus the battery power circuit can be switched off.



WARNING

The coil of the AMETEK contactor must not remain permanently under voltage

START/RESET terminals on BMS Easy must not remain permanently under voltage

When both buttons are pressed simultaneously, the control circuit fuse will broken down (additional interlock contacts or auxiliary relays would be required to prevent this from happening)

Related products: Battery Management - DC Contactors



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USE IN COMPLEX CONTROL SYSTEMS



Battery storage facilities in the industry are equipped with advanced BMS that are controlled and monitored by user software and other digital solutions. In these systems, it is advisable to have a basic (backup) BMS that independently signals the limit state of a battery cell or performs a controlled emergency shutdown. In some cases, an emergency BMS without software may be directly required. The BMS Easy analogue signalling circuit is a very suitable solution for these needs, which plays a negligible role in the overall system cost but significantly increases safety and can prevent major damage.

An alternative use of BMS Easy in these systems can be to monitor selected parts, feed their analogue signals to the PLC and process them further, etc.

Related products: <u>SIEMENS LOGO programmable automatic machine (6ED1052-1MD08-0BA1)</u>





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