VOTRONIC

Installation and Operating Manual

Battery Protector 100 Switching Capacity 12 V - 24 V / 100 Amperes No. 3078

Please read this operating and installation manual thoroughly prior to connection and start-up.

All-automatic battery protection for special purpose vehicles, campers, boats and industrial application.

The battery protector 100 is connected between supply battery and consumers. It protects the battery from dangerous total discharge and the consumers from low voltage as well as from overvoltage.

Note: The values being indicated in parentheses ( ) apply to 24 V operation.

Functions:

- The unit protects the battery from dangerous total discharge.
- Maximum admissible current 100A; thus, it is also suitable for high-capacity consumers.
- Disconnection of the consumers for protection against dangerous overvoltage.
- The disconnection can be cancelled manually by means of the **"EMERGENCY-ON" function**.
- Applicable as battery main switch.
- Simple remote control with single-pole external switch is possible.
- Preliminary alarm as soon as the preliminary alarm level is reached.
- Recognition and disconnection of hidden current consumers (with switching threshold automatism).
- Immediate emergency shut-down in case of defective battery or extremely discharged battery 7.8 V (12.0 V).
- Visual indication of the operating state.
- Audible indication in case of preliminary alarm and disconnection (can be deactivated).
- Output for external alarm indication (max. 0.2 A short circuit-proof).
- Compensation of voltage loss in the feed line by separate sensor cable is possible.
- Suitable for any type and brand of lead batteries (Acid, Gel, Dryfit, Heavy Duty, Solar, fleece, AGM etc.)
- Least own electricity consumption during operation (acc. to EN13976).
- No own electricity consumption in case of disconnection by external remote control switch.

Installation:

1. Chose an installation place being clean and being protected from humidity and dust.
2. The installation place of the unit should be chosen in such a way, that the cables of battery and consumers can be as short as possible (losses) and that the pushbutton "EMERGENCY" is easily accessible. The unit should never be covered by any objects.
3. The battery protector is fastened solidly with screws in the casing flanges. The unit can be installed in any position.
4. In case of great distance to the battery, we recommend to connect a separate sensor cable.
5. The cable lugs of the connection cables for battery and load should be connected solidly to the terminals "Battery" and "Load" by means of the delivered screws M6. The provided rubber caps must imperatively be used as short-circuit protection for those terminals.
6. Observe to fasten the connection cables in such a way, that neither high tensible force, nor high force of pressure is acting on the terminals.

Connection:

ALWAYS DISCONNECT THE POWER SUPPLY TO THE BATTERY PRIOR TO WORKING ON THE ELECTRIC SYSTEM TO AVOID SHORT-CIRCUITS!

It is recommendable to use connection cables of different colours to avoid malfunctions due to mixed up connections.
Observe: Only use red cables for plus "+" connection and black cables for minus "-" connection.
The unit will not be damaged by eventual wrong polarization, but it will not be operating.

Imperatively observe the cable cross sections and cable length, as well as the polarity. Insert the fuses near the battery.
Please observe the connection plan, page 2!

Start-up:

Option: Operation with sensor cable

Selector switch 6 "Sens. Batt." in position "−" (ON)

Particularly in case of powerful consumers being equipped with long charging cables, it is recommendable to measure the battery voltage via a "sensor cable" directly at the battery. This allows precise observation of the charging voltage rates for connection and disconnection. Use a fuse 3 A for the connection of the sensor cable being located as near as possible to the positive pole (+) of the battery.

Option: Remote Control with Switch

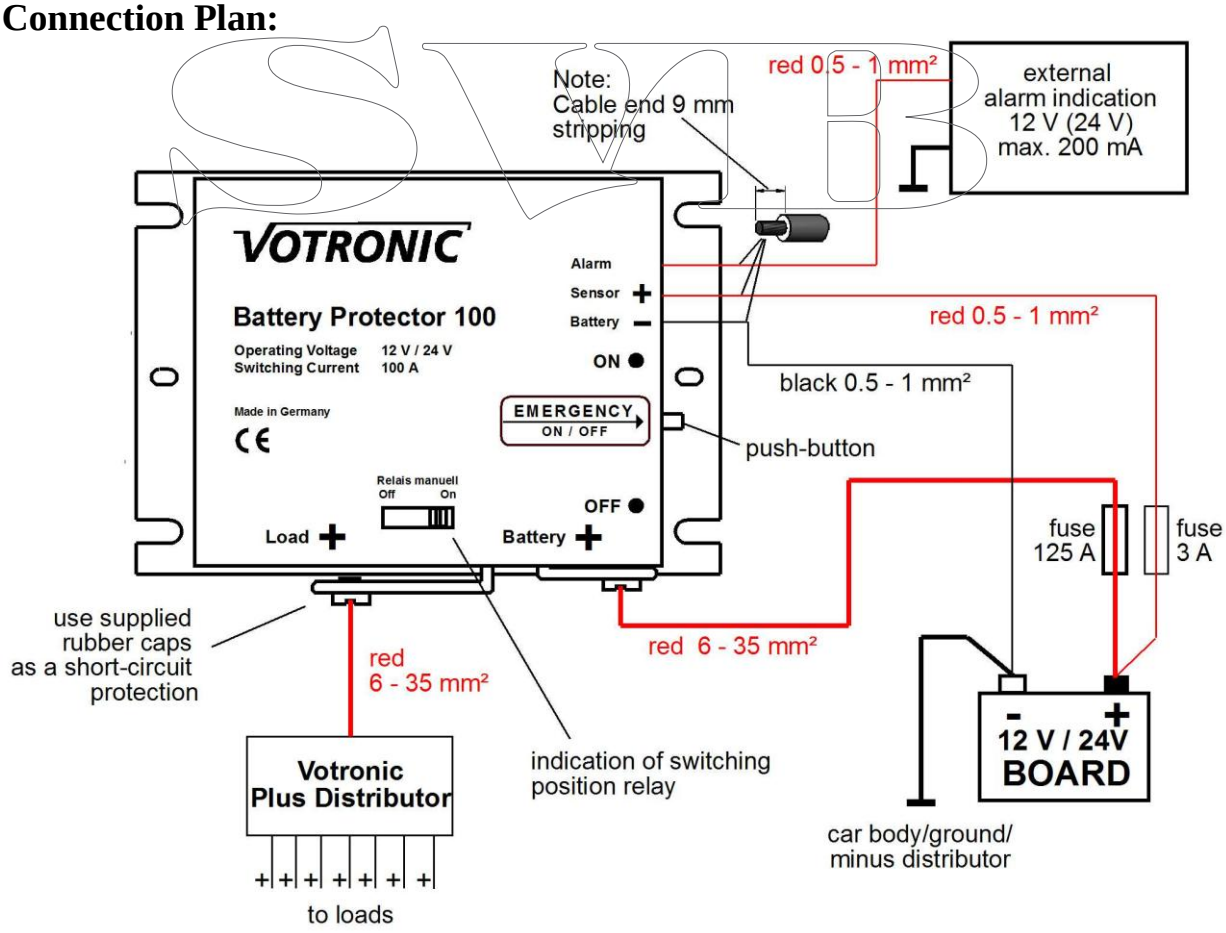
Remote control of the battery protector 100 is possible by insertion of a simple switch into the sensor cable. If the relay is switched-on by the remote control switch, the relay will be closing for at least 30 s, also if U bat.<disconnection voltage. Activation of the (EMERGENCY-ON function) is effected by switching-off the switch for 1 second and switching it on again.

In case of disconnection by the remote control switch, also the alarm output will be switched-off.

Option: External Alarm Indication

It is possible to connect an external alarm indication at the terminal alarm.
(+switching, max. 200 mA, overload-proof and short-circuit-proof).
The output will be active in case of: preliminary alarm, disconnection of the relay by low voltage, overvoltage recognition.

Connection Plan:



HINT:
Fuses should be connected directly at the batteries (cable protection) with e.g. VOTRONIC Power Fuse Holder and Cable Fuse Holder.

Important:
Connect inverter with own low voltage cut off directly to the battery.
The same applies to all charging sources, such as mains charger, solar controller, generator etc.

Push-button EMERGENCY:

The following functions can be controlled by means of the integrated push-button "EMERGENCY ON/OFF":

1. EMERGENCY ON Function

If the unit had been switched-off due to drop below the disconnection voltage, it can be switched-on by means of the push-button ON/OFF. If the disconnection voltage will be reached again, the Battery Protector 100 will automatically be switched-off again with the corresponding preliminary alarm.

If the emergency-on function is activated over the mechanic switch of the relay (relay manually), automatic disconnection **will not be effected after 30 s.** This allows full exploitation of the residual charge of the battery in an absolute emergency situation. It must, however, be observed that the battery might be in harmful low voltage range (<10.5 V), which requires soonest recharging.

2. Main Switch Function

During normal operation, this push-button can be used to disconnect the consumers, which have been connected to the Battery Protector 100 (main switch function). In this case, reconnection of the consumers must also be effected by means of this push-button.

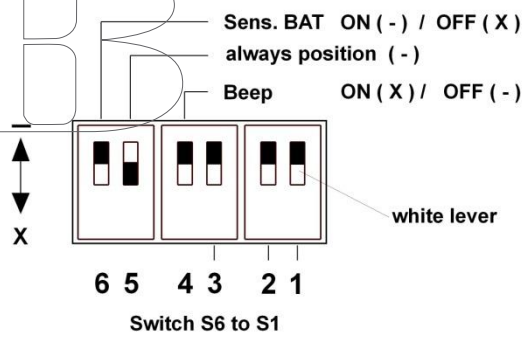
How to set the switching voltages and how to select the operating modes:

The different operating modes and switching voltages can be adjusted by means of the 6 selector switches at the unit rear. Adjustment is made by vertically moving the white levers to the desired position.

Switches S1 and S2: **Switching thresholds for 12 V and 24 V batteries and manual mode or automatic mode**
Switch S3: **Battery voltage 12 V** (x) **or 24 V** (-)
Switch S4: **Audible alarm (beep) ON (x) or OFF (-)**
Switch S5: **Not assigned, always in position (-)**
Switch S6: **Sensor cable active (-) (see page 2: Option: Operation with sensor cable)**

Selector switches at the unit rear
Figure shows the factory-adjustment:

(Figure corresponds to the disposition on the unit)



Operating Voltage: **12 V**
Disconnection Voltage: **(OFF) Switching Threshold Automatism**
Connection Voltage: **(ON) 12.5 V**
Audible Alarm: **ON**
Operation without sensor cable

Table for operation with fixed adjustment of switching-on and switching-off levels:

S3	S2	S1	Disconnection Voltage **24 V** Connection Voltage	
-	-	-	21.2 V / 40 s	24.8 V / 1 s
-	-	X	23.0 V / 40 s	25.0 V / 1 s
-	X	-	23.6 V / 40 s	25.6 V / 1 s
-	X	X	Automatic	25.0 V / 2 s
S3	S2	S1	Disconnection Voltage **12 V** Connection Voltage	
X	-	-	10.6 V / 40 s	12.4 V / 1 s
X	-	X	11.5 V / 40 s	12.5 V / 1 s
X	X	-	11.8 V / 40 s	12.8 / 1 s
X	X	X	Automatic	12.8 V / 2 s

Function Switching Threshold Automatism:

The switching threshold automatism allows maximum use of the battery capacity and ensures optimum battery protection in case of

- very large consumers in the range of minutes, hours.
- average consumers in the range of hours, days.
- small consumers in the range of days, weeks.
- latent smallest consumers in the range of several weeks.

The switching threshold automatism continuously determines the parameters for disconnection voltage and time. If a battery is permanently charged with only small current rates, disconnection must be effected in case of higher voltage levels. By this method, the cells are protected from degenerative changes and long-lasting damages at the electrodes. Example: Disconnection will be effected at 12.1 V in 4 weeks.

Consumers with large current consumption will cause a quick drop of the battery voltage. In this case, full exploitation of the battery capacity requires a comparatively low disconnection voltage. The Battery Protector continuously determines the optimum parameters for the disconnection by means of an integrated lead accumulator pattern. A preliminary alarm of 40 s (LED "OFF", beep and alarm output) will be given prior to disconnection. This allows the user to switch-off redundant consumers to avoid release of the low voltage disconnection. If the battery had been relieved appreciably after that, the preliminary alarm will be reset.

The switching threshold automatism effects **automatic** reconnection, in case of the following voltage levels:

12 V Operation: 12.5 V
24 V Operation: 25.0 V

Or **manually** by means of the push-button EMERGENCY ON / OFF.

Indicator Lamps:

The LEDs of the display are indicating the operating state by different flashing cycles. A window "Relay manually" in the unit front can be used for control of the switching position "On / Off" of the relay.

Operating State	LED ON (green):	LED OFF (red)	Beep	Switching Position of the Relay	Alarm Output
Normal Operation Main Output ON	-			ON	not active
Preliminary alarm voltage is reached		-	-	ON	Output activated
Switched-off by U Bat. < disconnection voltage		-	every 40 s -	OFF	Output activated
Disconnection by Overvoltage U Bat > U Max	-	-	every 40 s -	OFF	Output activated
No operating voltage				OFF	not active
Manual disconnection by ON/OFF key				OFF	not active
Supply of operating voltage		------		OFF	not active

Explanation of the signs: - = LED is flashing

Operating Instructions:

- **Overvoltage Limitation:**
  Sensitive consumers are protected by disconnection of the supply voltage at 15.5 V (31.5 V). Reconnection is effected 30 seconds after a drop below this voltage level. If such high voltage levels will be reached repeatedly, the charging controller, the battery, the charger and the battery terminals should be checked.

- **Lifetime of the battery:**
  The Battery Protector 100 can extend the lifetime of the battery considerably. The following general rules must be observed:

  In contrast to other battery types, batteries on lead basis **do not have any** harmful memory effect. Consequently: In case of doubt, partially discharged batteries are to be **charged fully** as soon as possible.
  Store only fully charged batteries and recharge them periodically, particularly in case of used (older) batteries and higher temperatures. **Sulphation** of the battery plates due to total discharge is to be prevented by **immediate charging**, particularly in case of low and high ambient temperatures.
  Keep batteries as cool as possible; choose an appropriate location for installation and observe the instructions of the manufacturers.

Notes:

Safety Regulations:

Appropriate Application:
The Battery Protector 100 had been designed according to the valid safety regulations.

Appropriate application is restricted to:

1. **Installation of the indicated fuses near the battery to protect the cabling of the unit.**
2. **Technically faultless condition.**
3. **Installation in a well-ventilated room, protected from rain, humidity, dust, aggressive battery gas, as well as in an environment being free from condensation water.**

Never use the unit at locations where the risk of gas or dust explosion exists!

- Open-air operation of the unit is not allowed.
- Cables are always to be laid in such a way that damage is excluded. Observe to fasten them tightly.
- Never lay 12 V (24 V) cables and 230 V mains supply cables into the same cable conduit (empty conduit).
- Check live cables or leads periodically for insulation faults, points of break or loosened connections. Occurring defects must be remedied immediately.
- The unit is to be disconnected from any connection prior to execution of electrically welding or work on the electric system.
- If the non-commercial end-user is not able to recognize the characteristic values being valid for a unit or the regulations to be observed, a specialist is always to be consulted.
- The user/buyer is obliged to observe any construction and safety regulations.
- **The unit is not equipped with parts, which can be replaced by the user.**
- Keep children away from batteries and connections.
- Observe the safety regulations of the battery manufacturer.
- Ventilate the battery room.
- Non-observance may result in injury or material damage.
- The warranty period is 24 months from the purchase date (against presentation of the sales slip or invoice).
- The warranty will be void in case of any inappropriate utilisation of the unit, if it is used beyond the technical specification, in case of improper operation or external intervention. We do not assume any liability for any damage resulting hereof. The liability exclusion is extended to any service being executed by third, which has not been ordered by us in writing. Service is to be effected exclusively by VOTRONIC Lauterbach.

Technical Data:

Nominal Operating Voltage (DC):	12 V or 24 V (switchable)
Operating Voltage Range (DC):	8.5 V – 40 V
Current Consumption ON	3 mA
Current Consumption OFF	3 mA
Current Consumption ON by remote control switch	3 mA
Current Consumption OFF by remote control switch	0 mA

Load Output:

maximum switching current	100 A / 150 A max. 10 sec.
Short-circuit-proof and overload-proof according to	IEC and DIN EN 61036 / 61037
Adjustable Switching Level:	**12 V**
Voltage Level OFF (at choice):	10.6 V / 11.5 V / 11.8 V 30 sec.
Voltage Level ON (at choice):	12.4 V / 12.5 V / 12.8 V 10 sec.
Overvoltage Disconnection (U max)	15.5 V 2 sec.
Adjustable Switching Level:	**24 V**
Voltage Level OFF (at choice):	21.2 V / 23.0 V / 23.6 V 30 sec.
Voltage Level ON (at choice):	24.8 V / 25.0 V / 25.6 V 10 sec.
Overvoltage Disconnection (U max)	31.5 V 2 sec.
Switching level fixed for switching threshold automatism:	**12 V**
Voltage Level OFF	< 12.2 V 4 Weeks
Voltage Level ON	> 12.5 V 2 sec.
Switching level fixed for switching threshold automatism:	**24 V**
Voltage Level OFF	< 24.4 V 4 Weeks
Voltage Level ON	> 25.0 V 2 sec.

Alarm Output:

Execution	Open Collector Hi-Side (+ switching), maximum 200 mA Internal fuse 1 A self-resetting
Output Voltage during Alarm (active)	Voltage at Terminal Battery -0.3 V
Output Voltage without Alarm (not active)	0 V

Battery Types:	any lead battery with nominal voltage 12 V (24 V) (Acid, Gel, Dryfit, Heavy Duty, Solar, fleece, AGM etc.)
Fitting Position of Unit:	any
Working Temperature Range:	-20/+45 °C
Protection Class:	IP21
Dimensions (mm):	105 x 77 x 38 mm
Weight:	180 g

Ambient conditions, humidity of air: max. 95% RH, no condensation

Declaration of Conformity:
According to the stipulations of the regulations 2006/95/EG, 2004/108/EG, 95/54/EG this product corresponds to the following standards or standardized documents:
EN55014; EN55022 B; DIN14685; EN61000-4-2; EN61000-4-3; EN61000-4-4

Disposal of the product in the normal household waste is not allowed.

RoHS 2002/95/EC
The product conforms to RoHS. Thus, it complies with the directives for Reduction of Hazardous Substances in Electrical and Electronic Equipment.

Quality Management System
DIN EN ISO 9001

Delivery Scope:
- Battery Protector 100
- 2 Rubber Caps for Capacity Connection Terminals
- 2 Screws M6 for Capacity Connection Terminals
- Operating Manual

Subject to misprints, errors and technical modification without notice.

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