

1 Safety information

1.1 Meaning of safety symbols



▲ DANGER!

Failure to comply with this sign may result in danger to life or physical condition.



▲ WARNING!

Failure to comply with this sign may result in injury.



▲ ATTENTION!

Failure to comply with the sign may result in damage to equipment or other connected consumers.

1.2 General safety instructions

The design of the device is state-of-the-art and complies with approved safety regulations. Failure to observe the safety instructions may nonetheless lead to injury or damage to the device.

Only use the device when it is in perfect technical condition.

Any faults affecting the safety of individuals or the proper functioning of the device must be repaired immediately by specialists.



▲ DANGER!

Parts carry 230V mains voltage.

Risk of fatal injury due to electric shock or fire:

- Do not carry out maintenance or repair work on the device
- If cables or the device housing are damaged, no longer use the device and isolate it from the power supply
- Ensure that no liquids enter the device
- The mains connection line may only be replaced by an authorised customer service department or by those qualified.



▲ WARNING!

Hot components

Burns:

- Only change blown fuses when the device is fully de-energised
- Blown fuses may only be replaced once the cause of the fault is known and has been rectified
- Never bypass or repair fuses
- Only use original fuses rated as specified on the device
- Device parts can become hot during operation. Do not touch them.
- Never store heat sensitive objects close to the device (e.g. temperature sensitive clothes if the device has been installed in a wardrobe)

1.3 Liability limitation

All technical information, data and instructions pertaining to installation, operation and maintenance contained within this operating manual and associated installation guide were up-to-date when the documents were printed, and were compiled in good faith in due consideration of experience and findings gained previously.

No legal claims can be derived from the specifications, illustrations and descriptions in this operating manual or associated installation guide.

The manufacturer assumes no liability for damage due to:

- a failure to comply with this operating manual and associated installation guide
- improper assembly and/or installation
- non-intended use
- improper repairs
- technical modifications
- use of non-approved spare parts

2 Introduction

This instruction manual contains important information for the safe operation of equipment supplied by Schaudt. Make sure you read and follow the safety instructions provided.

The operating instructions should always be kept in the vehicle. All safety information must be passed on to other users.



- ▲ This device is not intended to be used by those (including children) with limited physical, sensory or mental aptitude or lack of experience and/or knowledge unless they are supervised by a person responsible for their safety or have received instruction from this person as to how the device is used.

Children must be supervised to ensure they do not play with the device.

This device is intended for installation into a vehicle.

3 Operation

The electroblock is operated solely from the operator and control panel connected.

Operation of the electroblock is not required for daily use.

Settings only have to be configured when the battery type is changed (lead-gel, lithium or AGM), during initial start-up or when retrofitting accessories (refer to Section 3.2 and the installation instructions EBL 227).

3.1 Switching system on/off



▲ ATTENTION!

Incorrect electroblock settings.

Damage to connected devices. Therefore prior to starting:

- Ensure the leisure area battery is connected.
- Ensure the correct battery type is set.

Battery cut-out

Deactivate the battery cut-out (shutdown) as required (refer to Section 3.5)

12 V main switch (on operator and control panel)

Use the main 12 V switch (see instruction manual of relevant control and switch panel) to switch on/off all the consumers and the control and switch panel.

Exceptions:

- AES refrigerator supply
- Tank heater
- Step
- Awning light
- Refrigerator controller
- Heater

Please refer to the operating instructions for the operator and control panel for further information.

Operation with solar regulator



▲ ATTENTION!

If there is no backup function for the battery, damage to devices connected may result. So therefore:

- Do not operate solar regulator without battery connected.

Use on a 230 V generator or car ferries

If a current generator is used for the 230V motorhome supply, the generator must not exceed the mains connection ratings (see "Technical details", Section 5.2).



▲ ATTENTION!

- To avoid voltage peaks during warm-up, do not connect the generator until it is running in a stable manner. Otherwise the electroblock, the 12 V consumers or other devices connected could be damaged. It is essential the generator conforms to mains supply specifications.

3.2 Changing the battery



▲ ATTENTION!

Use of incorrect battery types or incorrectly rated batteries.

Damage to the battery or devices connected to the electroblock:

- Batteries may only be changed by qualified personnel.
- Follow the battery manufacturer's instructions.
- Only use the electroblock to connect to 12V power supplies with rechargeable 6-cell lead-gel or AGM batteries (and lithium LiFePo4). Never use non-approved battery types such as NiCd batteries.

Changing the battery

- ▶ Electrically isolate the battery from the electroblock. For this, activate the battery cut-out (refer also to Section "Shutdown", 3.5).
- ▶ Remove the "Solar" (Block 3) connector on the EBL 227 (if available).
- ▶ Isolate the electroblock from the mains voltage (230V AC).
- ▶ Replace the battery.
- ▶ After changing the battery, recheck which type of battery has been inserted.



- ▲ Normally only batteries of the same type and rating should be used, i.e. the same as those originally installed by the manufacturer. Switching to other battery types might be possible. Contact the vehicle manufacturer for more information.



▲ DANGER!

Incorrect setting of the battery type.

Risk of explosion due to build up of explosive gases:

- Correctly set the battery type on the operator and control panel.



▲ ATTENTION!

Incorrect setting of the battery type.

Damage to battery.

- Set the correct battery type on the EBL 227.

- ▶ Disconnect the electroblock from the mains before setting the battery type.



- ▲ However, suitability must be checked on a case-by-case basis using the specifications from the battery manufacturer and the charging parameters of the electroblock.
The charging parameters are specified in Section 5.2.

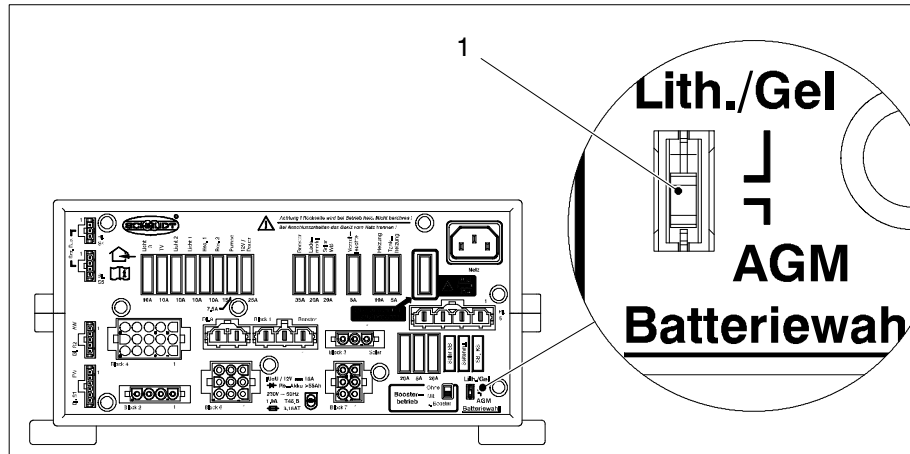


Fig. 1 Battery selector switch

- ▶ Move the battery selector switch (Fig. 1, Pos. 1) to the correct position using a thin object (such as a ballpoint pen):
 - Lead-gel battery: Move the battery selector switch to "Lith./Gel" ("Lead-Gel").
 - AGM battery: Move the battery selector switch to "AGM".
 - Lithium battery: Move the battery selector switch to "Lith./Gel" ("Lead-Gel").



- ▲ Lithium batteries have a separate battery management system. The final charge voltage, applied longer in position "Lith./Gel", enables the BMS for the lithium battery to charge it accordingly (also refer to Section 5.2).

Starting up the system

- ▶ Plug in the "Solar" (Block 3) connector on the EBL 227 (if available).
- ▶ Start up the system as described in section 3.1.

3.3 Operation with booster

Booster connector A booster can be connected on Block 1.

Booster function When a booster is used, the starter battery voltage after a motor start (D+ ON) is no longer applied directly to the leisure area battery and instead only to the "Booster" connector.

The stepped up voltage in the booster is fed in again at the "Booster" connector and applied to the leisure area battery via a 35 A fuse and the shunt.

This means the leisure area battery can also be charged by alternators that regulate down their output voltage in line with the requirements of the base vehicle ("EURO6 alternators").



▲ For vehicles not having a booster fitted as standard, retrofitting is strongly recommended (recommendation: Schaudt WA 121545). Without a booster, full battery charging can not be guaranteed in many cases. Contact your retailer for details.

Retrofitting

- ▶ Connect a booster as follows:
 - Block 1 Pin 3 at the input of the booster (input voltage of booster)
 - Block 1 Pin 2 at the output of the booster (output voltage of booster)
 - Block 1 Pin 1 to the ground connector of the booster
- ▶ Move the "Booster mode" switch (Fig. 2 Pos. 1) on the EBL 227 into position "With .. booster".

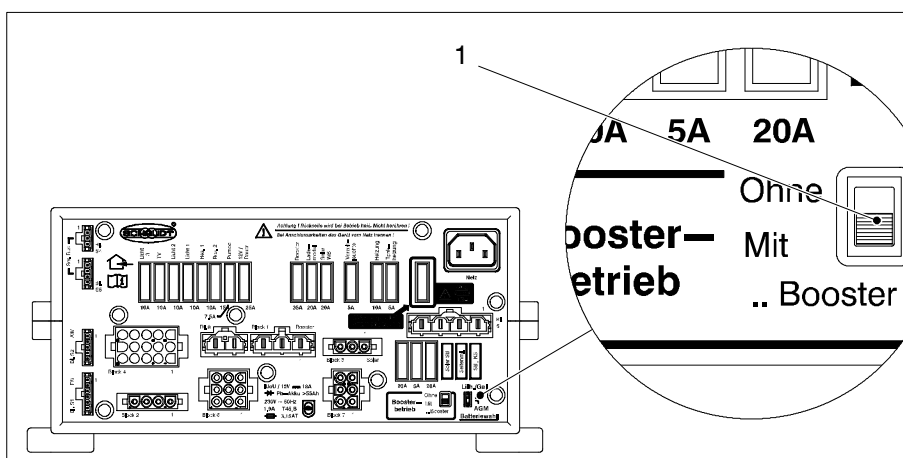


Fig. 2 Battery selector switch

3.4 Faults

Flat vehicle fuses

A fault in the power supply system is usually caused by a blown fuse.

Please contact our customer service address if you cannot rectify the fault using the following table.

If this is not possible, such as when you are abroad, a specialist workshop will be able to repair the device. In this case, you must ensure that the warranty is not invalidated by incorrect repairs being carried out. Schaudt GmbH will not accept any liability for damage resulting from such repairs.

Fault	Possible cause	Remedy
Leisure area battery is not charged during 230 V operation (battery voltage constantly below 13.3 V)	No mains voltage	Switch on the automatic fuse in the vehicle
		Have the mains voltage checked
	Defective electroblock	Contact customer service
Leisure area battery is overcharged during 230 V operation (battery voltage constantly above 14.5 V)	Defective electroblock	Contact customer service
Starter battery is not charged during 230 V operation (battery voltage constantly below 13.0 V)	No mains voltage	Switch on the automatic fuse in the vehicle
		Have the mains voltage checked
	Defective electroblock	Contact customer service
Leisure area battery is not charged during mobile operation (battery voltage below 13.0 V)	Defective alternator	Have the alternator checked
	No voltage on D+ input	Check fuses and wiring
	"Booster" switch on the EBL in the wrong position	Contact customer service
Leisure area battery is not charged during mobile operation (battery voltage below 13.0 V)	Defective electroblock	Contact customer service
The leisure area battery is overcharged during mobile operation (battery voltage permanently above 14.3 V)	Defective alternator	Have the alternator checked
The refrigerator does not work during mobile operation	No power supply to the refrigerator	Have the fuse and cabling checked
	Defective electroblock	Contact customer service
	Defective refrigerator	Have the refrigerator checked
Solar charger does not work (power supply and engine are off)	Solar panel in (partial) shade or covered (snow or dirt)	Move solar panel out of shade or clean it.
	Solar charge regulator not plugged in	Plug in solar charge regulator
	Defective fuse or cabling	Have the fuse and cabling checked
	Solar charge regulator defective	Have solar charge regulator checked

Fault	Possible cause	Remedy
No 12 V supply in the leisure area	Leisure area battery voltage is too low – the battery monitor has activated	Performs a mains charge or start the engine.
	Main 12 V switch for leisure area battery switched off (on the associated operator and control panel)	Switch on the main 12 V switch for the leisure area battery (on the associated operator and control panel)
	Battery cut-out activated	Deactivate the battery cut-out
	Defective fuse or cabling	Have the fuse and cabling checked
	Defective electroblock	Contact customer service
Operation of the electroblock not possible from the control panel.	Defective electroblock	Contact customer service
	Associated operator and control panel defective	Contact customer service
	Bus line faulty/interrupted	Contact customer service



- ▲ The charging current is reduced automatically if the device becomes too hot due to excessive ambient temperature or lack of ventilation. Always prevent the device from overheating nevertheless.
- ▲ If the automatic shutdown mechanism of the battery monitor is triggered, fully charge the leisure area battery.

3.5 Shutting down

3.5.1 Shutting down the system



▲ ATTENTION!

Total discharge results in damage to the leisure area battery. So therefore:

- Fully charge the leisure area battery before and after a shutdown (connect the vehicle to the mains for at least 12 hours and 24 hours for an 80Ah and 160Ah battery respectively)



▲ ATTENTION!

Exceeding permitted input voltages can cause damage to consumers connected. So therefore:

- Do not operate the solar charge regulator without a battery.
- When the battery is changed or removed, first unplug the "Solar" (Block 3) connector on the EBL.

Isolate the leisure area battery from the on-board 12 V supply

Disconnect the leisure area battery from the 12V power supply when the motorhome is not used for a longer period (during the winter for example). For this, the system has a battery cut-out mechanism which isolates electrically the leisure area battery from the vehicle.

- ▶ Disconnect the battery from the operator panel (third party vendor).
- ▶ Refer to the instructions for the operator panel (third party vendor) or vehicle instructions.

The battery cut-out switch isolates all connections from the leisure area battery:

- | | |
|---------------------------|----------------|
| ● AES refrigerator supply | ● Tank heater |
| ● Step | ● Spare 1 |
| ● Refrigerator controller | ● Spare 2 |
| ● Heater | ● Awning light |



- ▲ The leisure area battery is also charged by the internal charger module, an additional battery charger, the solar charger regulator and the alternator **when the battery cut-out is active.**

3.5.2 Cancelling the shutdown

- ▶ Disconnect the battery from the operator panel.
- ▶ Refer to the instructions for the panel.

4 Application and functions in detail

4.1 General



▲ This device is intended solely for installation in a vehicle.

The electroblock is the central power supply unit for all 12V consumers in the motorhome's electrical system. It is usually located in a cupboard or storage area and is accessible from the front in order to change fuses.

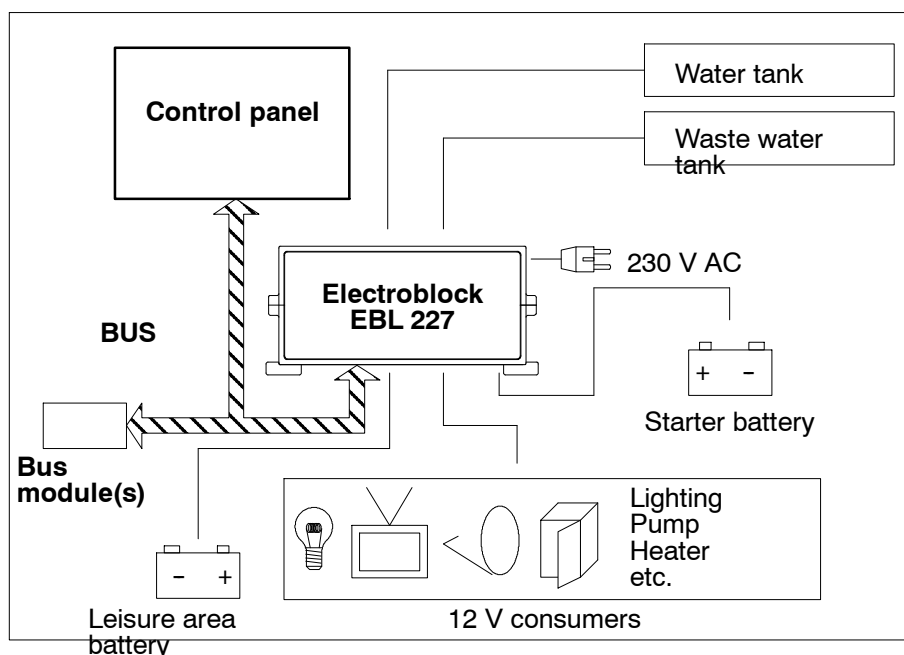


Fig. 3 On-board power supply system

Modules The EBL 227 electroblock comprises:

- a charge module for charging all batteries connected
- the complete 12V distribution unit
- the fuses for the 12V circuits
- a main switch module
- battery monitor
- other control and monitoring functions

System devices A bus-compatible operator panel must be connected for operation. This device controls the electrical functions of the electroblock as well as the accessories connected there.



There is a connection for a solar charge regulator. Probes/sensors for measuring the water and waste water tank levels are also connected to the electroblock.

Flat vehicle fuses protect the various circuits.

Protective circuits

- Excess temperature
- Overload
- Short circuit

4.2 Battery functions


Suitable batteries	Refer to the charging curve; 6-cell AGM or lead-gel batteries (or suitable lithium LiFe-Po4 with own battery management system BMS), from 80 Ah
Battery cut-out	<p>The battery cut-out (activated from the panel, also refer to Section 3.5) isolates the following connectors from the leisure area battery:</p> <ul style="list-style-type: none"> ● all 12 V consumers ● the frost protection valve <p>This prevents the living area battery from slowly discharging due to closed circuit current while the vehicle is not in use.</p> <p>The batteries can still be charged using the electroblock, the alternator, an auxiliary charging unit or the solar charge regulator, even when the battery cut-out switch is switched off.</p>
Battery types	The setting option on the EBL means the best possible charging for different battery types (lead-gel, AGM types and LiFePo4) is guaranteed.
Battery monitor with automatic disconnect	<p>The battery monitor measures the voltage of the leisure area battery. As soon as the battery voltage falls below 11.0 V for longer than 10 seconds (or 10.5 V for longer than 1 second), all 12 V consumers are switched off. Only the consumers not activated from the main "12 V ON OFF " switch continue to be powered.</p> <p>If the voltage falls to a value below 10.5 V for longer than 1 second, ALL consumers are switched off to protect the leisure area battery from total discharge.</p> <p>If an overload or an insufficiently charged leisure area battery causes the voltage to fall so low that the automatic disconnecter is triggered, any non-essential consumers should be switched off.</p> <p>It may be the case that only the 12 V supply is started for a short time. For this, switch on the main "12 V ON OFF " switch from the control panel.</p> <p>However, if the battery voltage remains below 12.0 V, you cannot switch the 12 V power supply back on.</p> <p>Fully charge the leisure area battery as soon as possible. For more information, see the description of "battery voltages".</p>

4.3 Additional functions

**Automatic switch
function for
AES/compressor
refrigerator**

This relay supplies the AES/compressor refrigerator with power from the starter battery when the vehicle engine is running and the D+ connection is live. An AES/compressor refrigerator is powered by the leisure area battery when the vehicle engine is not running.

Step fuse

The "Step" output is protected by a resettable 15 A fuse and is powered continually. This is also the case when the main "12 V ON OFF  switch is OFF.

**Battery charging with
solar charging regulator**

Permitted charge current 18 A, protected with 20 A.
Depending on the solar charge regulator used, either only the leisure area battery is charged or the leisure area battery and the starter battery.

**Mains charging
Starter battery**

This feature provides an automatic float charge for the starter battery at up to 5 A when the 230 V mains is connected to the electroblock.

**Tank probe/sensor
inputs**

The EBL 227 has connectors for 2 tank sensors, one for fresh water (FW) and one for waste water (WW). Each sensor has a base electrode and 4 level electrodes (25%, 50%, 75% and 100%). The water level is determined by the electroblock reading the probes immersing into the water.

If the vehicle engine is running, the level measured last when the vehicle was stationary is displayed. This prevents the value displayed from changing continually due to the water sloshing around.

It is also possible to connect probes with capacitive measuring. These probes enable linear measuring of the tank contents, from 0 to 100%.

Water pump output

The output for supplying the water pump can be activated. The prerequisite for this is control from an operator and display panel that makes such a function available (from a button or softkey ...). It is used to switch on and off the pump supply separately. This means the pump for pressure-controlled systems can be deactivated (e.g. over night).



- ▲ Activating the pump is described in the operating instructions for the associated operator and control panel.

5 Technical details

5.1 Mechanical details

Dimensions	130 x 275 x 170 (H x W x D in mm), including attachment feet
Weight	2.0 kg
Housing	PA (polyamide), gentian blue (RAL 5010)
Front	Aluminium, powder coated, light grey (RAL 7035)

5.2 Electrical details

Mains connection	230V AC $\pm 10\%$, 47 – 63 Hz sinusoidal, protection class I	
Current consumption	1.9 A	
Suitable batteries	6-cell lead-gel, lithium or AGM batteries, 55 Ah and above	
Standby current from Leisure area battery	Dependent on the control panel: approx. 5 – 20 mA, plus consumption of controller electronics of refrigerator	
	Conditions for the measurement:	
	<ul style="list-style-type: none"> • approx. 10 minutes after disconnection from the mains • 12.6V battery voltage • Battery alarm OFF • Battery cut-out switch ON • Lighting for operator and control panel OFF • All consumers switched off • 12V main switch off 	
D+ loading	Loading of D+ output of the alternator by the electroblock approx. 0.5 mA without current consumption on D+ point	
Current-carrying capacity	12V outputs	A maximum of 90% of the nominal current of the relevant fuse may be drawn.
	Frost protection valve output	max. 0.1 A
	D+ point	1 A for fusing D+ input with 2 A

Battery charging via mains connector

Leisure area battery (LAB)

Battery selector switch setting	Lithium/lead-gel	AGM
Charging curve	IUoU	IUoU
Final charge voltage	14,4 V / 16 h	14,7 V / 4 h
Charge current	18 A	18 A
Voltage for float charge	13,7 V with automatic switchover	13,7 V with automatic switchover

Battery charging of the starter battery

Starter battery

	Charging current float charge	max. 6 A
	Charging voltage	typ. $U_{LAB} - 0.2$ V
IUoU curve	New charge cycle, switch over to main charge	when battery voltage below 13.7 V with a delay of approx. 5s

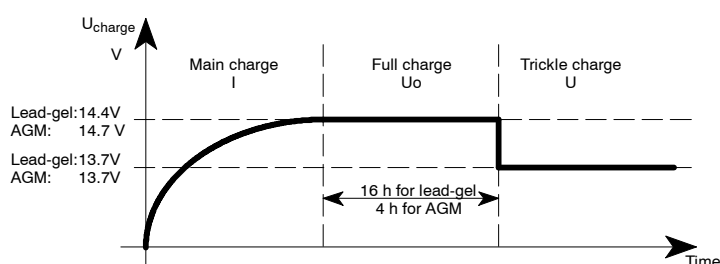


Fig. 4 Charging voltage curve with electroblock EBL 31

- I** Main charge with maximum 18 A charging current, electronically limited, up to final charging voltage. Start of charge also for completely discharged batteries.
- U₀** Automatic switchover to full charge with constant 14.4 V (lead-gel) or 14.7 V (AGM). The duration of the full charge phase is based on the battery type and is set on the device.
- U** Automatic changeover to compensation charge with constant 13.7 V. In the compensation charge phase, the voltage at the output of the charging module is constant.

Start of a new charging cycle by switching over to main charge, if the battery voltage falls below 13.7 V for more than 5 seconds when loaded. Start of charge also for completely discharged batteries. The internal charge module can also be operated without leisure battery.

**Interrupting voltage for
EBL 227 with OVP**

Overvoltage: Approx. 265 V ~ eff.
This values applies for distortion-free sinusoidal voltage.

5.3 Environmental parameters

Operating temperature -20 °C to +45 °C

Storage temperature -20 °C to +70 °C

Humidity Operation in dry environment only

CE CE mark?

6 Maintenance

The electroblock requires no maintenance.

Cleaning Clean the electroblock with a soft, slightly damp cloth and mild detergent. Never use spirit, thinners or similar substances. Do not allow liquids to enter the electroblock.

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Appendix

A Special fittings/accessories

Operator and control panel	Operator and control panel (required for use), e.g. DT 720
Solar charge regulator	Schaudt solar charge regulator, type LR ... , LRS ... or LRM ... for solar modules with a total charge current of 18 A with 3-pin connector (charging of leisure area and starter batteries possible)
Bus modules	Different types of Schaudt bus modules can be connected to control other devices (this is dependent on the vehicle make).

B Upgrades



▲ ATTENTION!

No consumers or chargers should be connected directly to the leisure area battery. They would bypass the current measurement and so could cause erroneous charging of the battery.

All consumers and chargers (solar regulators, audio devices, etc.) must therefore be connected to the connectors on the EBL 227.

C Customer service

Customer service	<p>Schaudt GmbH, Elektrotechnik & Apparatebau Planckstraße 8 88677 Markdorf Germany</p> <p>Phone: +49 7544 9577-16</p> <p>Website: www.schaudt-gmbh.de</p> <p>Email: kundendienst@schaudt-gmbh.de</p>
Send in device	<p>Returning a faulty device:</p> <ul style="list-style-type: none">▶ Complete and enclose the fault report, see Appendix D.▶ Send it to the addressee (free delivery).

D Fault report

In the event of damage, please fill in the fault report and send it with the faulty device to the manufacturer.

Device type: _____

Part no.: _____

Vehicle: _____ Manufacturer: _____

Model: _____

Own installation? Yes ☐ No ☐

Upgrade? Yes ☐ No ☐

Following fault has occurred (please tick):

- ☐ Electrical consumers do not work – which?
(please specify below)
- ☐ Switching on and off not possible
- ☐ Persistent fault
- ☐ Intermittent fault/loose contact

Other comments:

[illegible]

E Layout

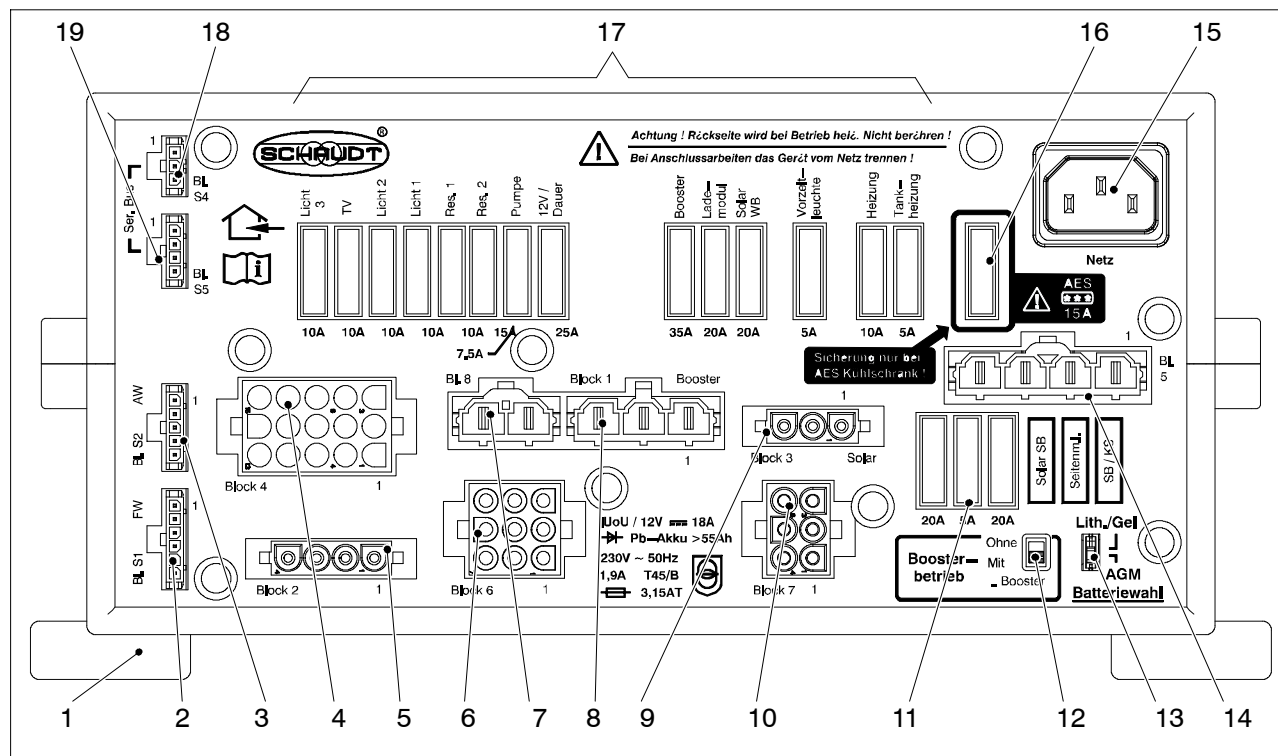


Fig. 5 Layout of the EBL 227 electroblock (front)

Pos.	Name	Meaning	Use
1	Installation feet (4 x)		
2	Bl. S1	Block S1 - Microfit 6F	Sensor for fresh water
3	Bl. S2	Block S2 - Microfit 6F	Probe/sensors for waste water
4	Block 4	Block 4 - MNL 15F	Supply to consumers, D+
5	Block 2	Block 2 - MNL 4F	D+, sensor, leisure area battery
6	Block 6	Block 6 - MNL 9F	Power to consumers, exit and side marking lights
7	Block 8	Block 8 - Minifit SR 2F	12 V permanent - 25A
8	Block 1	Block 1 - Minifit SR 3F	Connection for booster
9	Block 3	Block 3 - MNL 3F	Solar regulator
10	Block 7	Block 7 - MNL 6F	Power for pump and refrigerator (including controller)
11	Flat vehicle fuses	Fuses	Solar regulator starter battery, side marking lights, refrigerator starter battery
12	Booster mode	Switch	Selector switch, connected via booster
13	Battery selection	Switch	Selector switch for battery type (changes characteristic, see Section 5.2)
14	Block 5	Block 5 - Minifit SR 4F	Fridge and step
15	Mains	Socket for non-heating devices	230 V AC mains supply
16	AES 15 A	Fuse	Fuse, only used for AES refrigerator
17	Flat vehicle fuses	Fuses	Protection of 12 V consumers
18	Bl. S4	Block S4 - Microfit 3F	LIN bus (serial)
19	Bl. S5	Block S5 - Microfit 4F	LIN bus (serial) and signal "Charge"

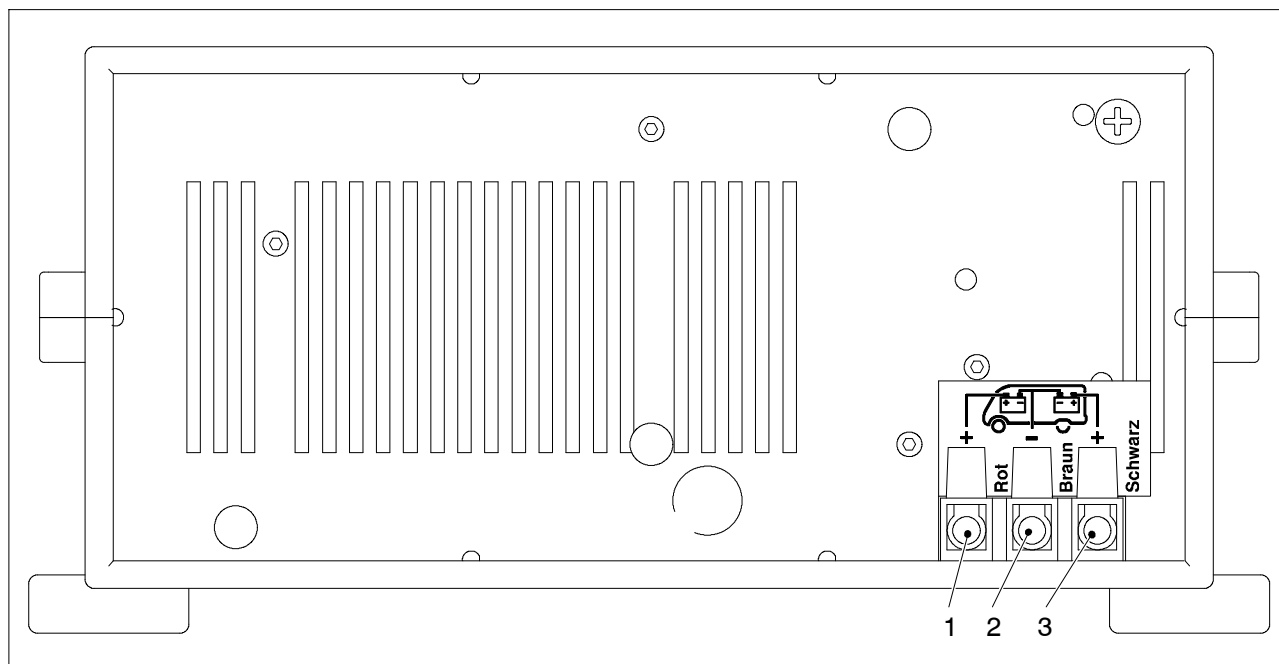
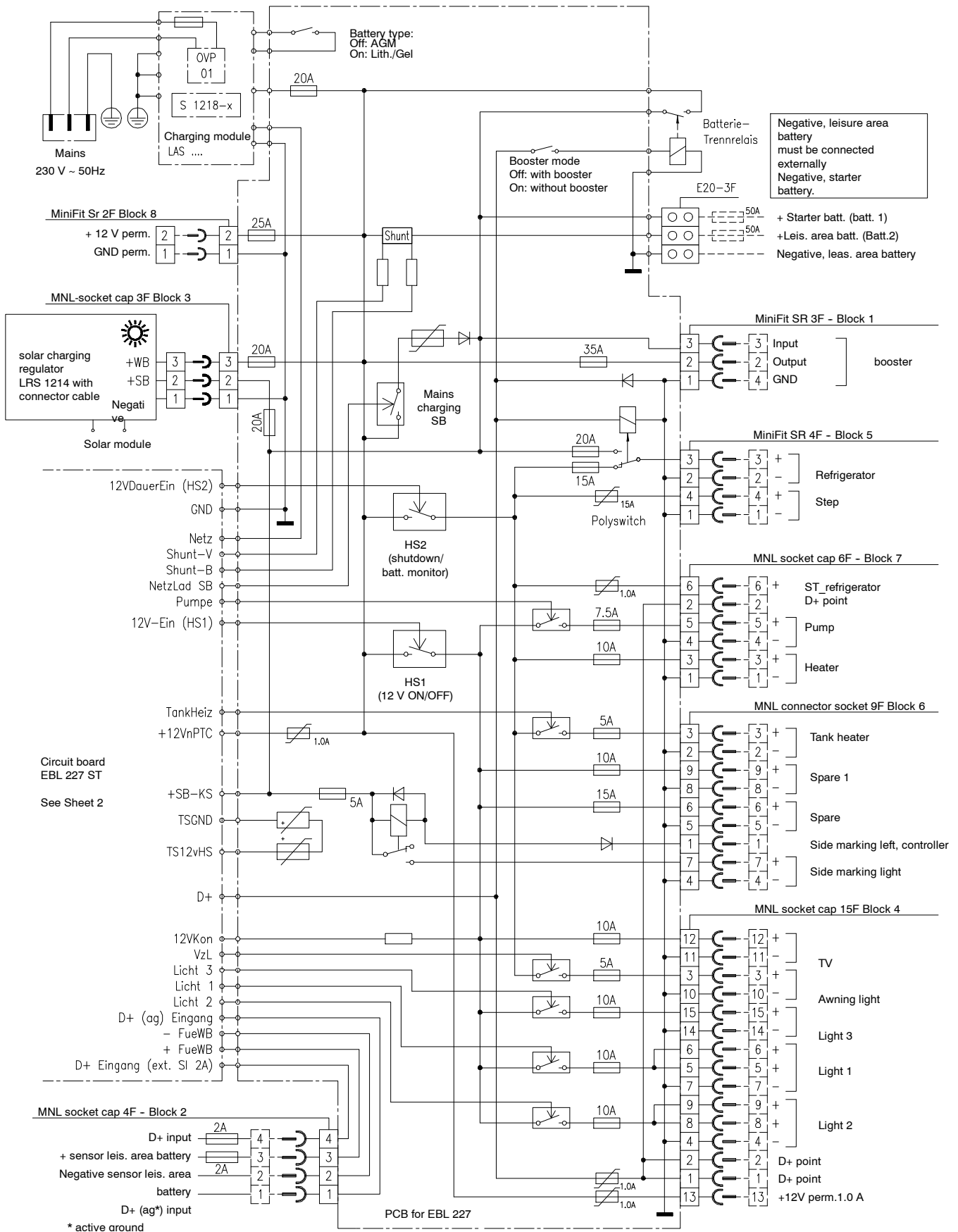


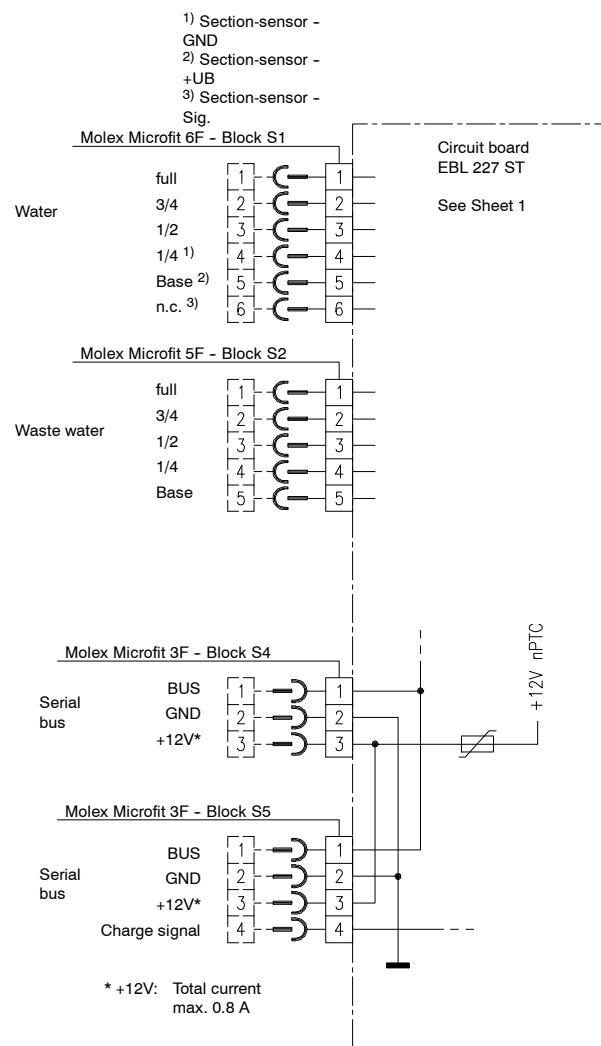
Fig. 6 Layout of EBL 227 electroblock (rear)

Pos.	Name	Meaning	Use
1	+ Red	Terminal	Starter battery connector
2	- Brown	Terminal	Common ground
3	+ Black	Terminal	Leisure area battery connector

F Block/connection diagram (I of II)



Block/connection diagram (II of II)



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