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1. Description

The energy system EBL208 contains the charging module LA 204, the battery monitor module BW 208, the complete 12V distribution, fused 12V circuits, a connector for a solar regulator and additional control and monitoring devices.

To operate the energy system and to control the living-area functions including accessories an instrument panel is compulsory.

1.1 Suitable Accessories (not supplied)

control and switch panel	instrument panel IT 204
solar regulator	LR 1214, art.no 922.202, for solar modules with a total maximum current of 14A, with 3-p connector and a connecting cable 0.5m.

1.2 Technical Data

1.2.1 General Data

sizes (h x w x d in mm)	130 x 275 x 170 incl. mounting sockets
weight	3.9 kg
cabinet	PA (Polyamid), gentian blue RAL 5010
frontpanel	aluminium, powder painted, light grey RAL 7035

1.2.2 Electrical Data

mains supply	* 230V (+ 6 / - 10%), 50Hz, safety class 1
power consumption	* 250VA
suitable batteries	* 6 cell lead-acid or lead-gel batteries, more than 35Ah
steady load off living-area battery	* without mains supply, battery alarm 'OFF', a battery voltage of 12.6V and with IT 204: 0.6mA
load current of alternator's D+ output by EBL	* approx 0.4A without load at D+ terminal, see schematic diagram
permissible load...	
...on 12V outputs	* maximum current draw up to the fuse rating of each output, see enclosed schematic diagram
...anti-freeze valve	* max 0.1A
...D+ terminal	* 1A, with D+ input fused by 2A.

note: operating instruction manual is intended for the owner and has to come with the EBL

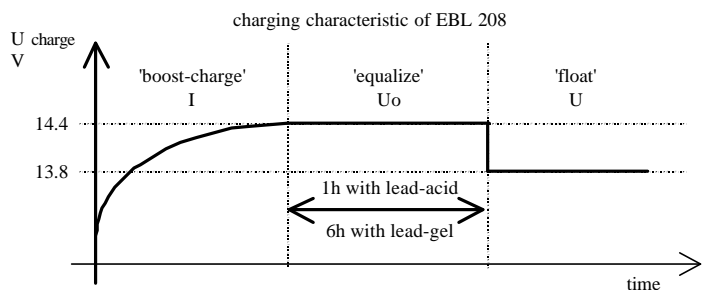
1.2.2.1 Battery charging on mains supply

living-area battery:

- control system * thyristor controller
- charging characteristic * IWUoU
- maximum charging voltage * 14.4V
- charging current * 10A arithmetic mean (= 15A eff) at 230V mains supply and 12.0V charging voltage. The charging current is mains supply dependent.
- floating voltage * 13.8V, automatic change-over
- new charging cycle (change-over to boost-charge) * if battery voltage approx < 13.8V

3-phase characteristic:

- * boost-charge at 10A max (arithmetic mean, electronically limited) up to maximum charging voltage,
- * then equalize-charge at constant 14.4V (selectable: 1h duration for lead-acid; 6h duration for lead-gel batteries),
- * then automatic change-over to float-charge at 13.8V



If due to high loads the 13.8V floating voltage can't be provided, the battery charger switches over from float to boost-charge.

- safety circuits * short-circuit and reverse-polarity protected (charger needs a connected battery with a voltage of > 2.5V)
- * safety fuse in mains supply, 1.6A slow
- * over-temperature switch in transformer
- * 20A automotive safety fuse (FK2) 'Int. Charger' on frontpanel

starter battery:

- charging current * trickle-charge to starter battery with max 2A

...by solar regulator

- max allowed charging current (living-area battery) * 14A

...while driving

- charging current * simultaneous charging of starter and living-area battery by alternator, batteries in parallel by cut-off relay, maximum charging current of living-area battery by alternator must not exceed 30A. See block diagram.

1.2.2.2 Battery Monitor Module

- switch-off voltage * 10.5V \pm 0.1V
- minimum switch-on voltage by 12V main-switch on instrument panel * 11.0V \pm 0.1V

note: operating instruction manual is intended for the owner and has to come with the EBL

2. Safety Information

- * The electrical installation of the motorhome has to be in accordance with current DIN-, VDE- and ISO-regulations. Alterations will endanger the safety of persons and the vehicle.
Due to the above mentioned regulations and safety rules, alterations are therefore prohibited.
- * The connection of the EBL to the mains supply has to be in accordance to national installation rules.
- * The energy system EBL 208 must not be modified.
- * The connection of the energy system has to be done by qualified personnel only and must be conform to specifications mentioned in this operating instruction manual:

see instruction manual section 4.2 'Installation'
 section 5 'Electrical Installation'
and in enclosure schematic diagram of EBL 208

- * In the following text special notice should be paid to the signs shown below:



CAUTION !

Electrical current hazard warning.



CAUTION !

General hazard warning.

3. Operating Instructions

3.1 Controls

12V fuses Pluggable FK2 automotive fuses

battery-type selector switch The mains plug of the energy system has to be taken off **prior** to actuating the battery-type selector switch on the backside of the device. **Before** power-up of the energy system this switch has to be selected according to the type of battery used (lead-acid or lead-gel). The switch ensures an optimum charge of the connected battery type. To actuate use a thin tool (eg a pencil tip).



Caution !

An incorrect selected battery-type switch may **damage the batteries** and there may be an **explosion-hazard** caused by detonating gas.

battery cut-off switch The battery cut-off switch 'Battery' separates the control and switch board and the anti-freeze valve of the heater system from the living-area battery, to inhibit stand-by currents while vehicle is non-operative.
See detail 6.2 'Shut-Down'



Attention !

Please note if anti-freeze valve is deactivated by the battery cut-off switch 'Battery', in position 'off', the safety-valve of the boiler opens automatically.

note: To reactivate all load after being cut-off by battery cut-off switch 'Battery' or after a battery change, please actuate 12V main switch on the instrument panel.

12V main switch With push-button switch '12V EIN/AUS' all load, except automatic step
on instrument panel and AES-refrigerator, is being switched on and off.
Please refer to instruction manual of the instrument panel.

3.2 Relay Functions

battery cut-off relay	This relay separates the starter and living-area battery when the engine is not running and if there is no voltage on terminal 'D+'. Both batteries are connected in parallel and therefore simultaneously charged while engine is running.
main-switch relay bistable	This relay is controlled by the push-button switch on the instrument panel '12V EIN/AUS'. It switches off all 12V load, except the automatic step and the AES-refrigerator.
awning-light relay	The awning-light is operational only with turned on main-switch and if the engine is not running with no voltage on terminal 'D+'.
refrigerator cut-off relay	This relay controls the power supply of the refrigerator. The refrigerator gets it's power from the starter battery only if the engine is running and if there is a voltage on terminal 'D+'. An AES refrigerator is provided from the living-area battery when the engine is not running.
charging relay battery 1 (starter battery)	This relay automatically provides a 2A trickle-charge to the starter battery if mains supply is on.

3.3 Battery Monitor Module

The battery monitor compares the voltage of the living-area battery with a reference voltage.

As soon as the battery voltage is lower than 10.5V all 12V load will be switched off.

Only the automatic step and a AES-refrigerator are still provided with power. Short falls (< 2 sec) below the threshold voltage, due to high inrush currents of connected load do not affect the automatic cut-off function.

If the automatic shut-down has been triggered due to overload or an insufficiently charged battery all non-essential load should be switched off.

By actuating the '12V on/off' push-button switch on the instrument panel it may be possible to reactivate the 12V system for a short period of time.

However, the 12V System can not be switched on if the battery voltage stays under 11.0V.

In any case the living-area battery should be fully recharged as soon as possible.

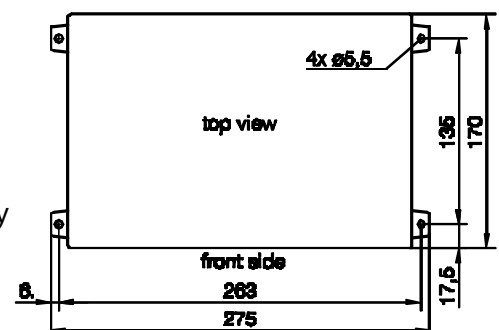
4. Transport, Storage, Installation

4.1 Transport, Storage

- * The energy system should be stored and transported in a suitable packing and in a dry environment only.
- * Storage temperature range : - 10°C to + 50°C.

4.2 Installation

- * The energy system has been designed for wall and floor mounting.
- * It has to be fitted onto a stout and level surface by use of the four provided mounting sockets.
- * The energy system is designed for use in a dry and sufficiently ventilated environment within a temperature range of - 10°C to + 40°C.



note: operating instruction manual is intended for the owner and has to come with the EBL

- * A minimum distance of 5 cm to the surrounding equipment has to be maintained above and to all sides. In operation a temperature of max +40°C at a distance of 2.5 cm to the sides must not be exceeded.



Caution !

Danger of overheating if distances to equipment are too short or if ventilation is blocked.

5. Electrical Installation

- * Electrical installation has to be executed by qualified personnel only.
- * The device must be used only with a living-area battery.



Caution !

The energy system must not be used without a connected living-area battery, otherwise connected appliances might be damaged in unfavorable conditions.

- * Electrical connection is made on the frontside according to enclosed block diagram.
- * For installation purposes, the mains plug or mains supply of the vehicle must be disconnected.



Caution !

Danger of life due to electrical shock or **danger of burning** with a defective mains cable, incorrect connection or service work with mains supply on.

- * Electrical connection has to be in accordance to the following sequence:
 1. all socket connectors on frontpanel
 2. battery cables at battery terminals
 3. 230V mains supply plug
- * Disconnection has to be executed vice versa.
- * AES-refrigerator fuse This fuse must be used only in conjunction with a AES-refrigerator



Caution !

The AES-refrigerator fuse must not be used with other refrigerator types. The battery might get deeply discharged. Battery damage is possible.

5.1 230V Mains Supply

- * Mains supply has to be connected to an earthing-contact socket outlet.
- * The power supply line must be a H05VV-F 3x1.5 cable.
- * For connection, the mains plug or mains supply of the vehicle has to be disconnected.

5.2 Batteries, Battery-Sense Cable, Refrigerator and D+ (Alternator)

- * Leads have to be fused according to their cross-sections.

Maximum allowed fuse ratings:			
batteries	battery 1 for refrigerator	sensor cable battery 2	D+ (alternator)
30A	15A	2A	2A

- * Fuses need to be installed close to the battery terminals or alternator for short circuit protection of the leads.
- * The negative pole of the living-area battery has to be connected to the negative pole of the starter battery externally.



Caution !

Danger of burning because of incorrect connection and fusing.

- * The energy system has to be used exclusively on 12V power systems with rechargeable 6-cell lead-acid or lead-gel batteries.



Caution !

Unsuitable batteries will be damaged.

- * Batteries have to be mounted in sufficiently ventilated areas or must be fitted with vent lines. Please refer to installation instructions of the battery manufacturer.



Caution !

Exploding hazard by detonating gas with defective batteries, defective energy system or at too high battery temperature (>30°C).

- * The refrigerator input cables 'battery 1 for refrigerator' and 'negative battery 1 for refrigerator' to the energy system have to be wired separately from other battery cables to the battery terminals.



Attention !

Without separately wired refrigerator and battery cables an optimum charge of the living-area battery can not be achieved.

5.3 12V-Load

- * The choice of battery cable size dimensions has to comply with EN 1648-1 or -2. Maximum current drain of the load must not exceed the respective fuse rating.

6. To Put Into Operation, Shut-Down, Maintenance

6.1 To Put Into Operation

- * **Prior** to power-up special attention must be paid to:

1. Properly connected living-area battery
2. Correctly selected battery-type switch. See section 3.1 'Controls'.
3. AES-fuse inserted only if a AES-refrigerator is used.

- * Power-up procedure:

1. Turn battery cut-off switch 'Battery' into 'on' position. See user's manual section 3.1 'Controls'.
2. To reactivate the system after a cut-off by battery cut-off switch 'Battery' or after a battery change, please actuate 12V main switch on the instrument panel.

6.2 Shut-Down

- * Before long periods of nonusage of the motorhome (eg during wintertime), the living-area battery should be disconnected from the 12V system. Disconnect cables at the battery terminals.

1. Switch off 12V main-switch on instrument panel
2. Turn battery cut-off switch on energy system into 'off' position. See section 3.1 'Controls'.



Caution !

Please note, the anti-freeze valve of the boiler opens automatically if vehicle is shut down by the battery cut-off switch.

- * Before and after long periods of nonusage (eg. during wintertime), the vehicle should be hooked up to mains supply to fully recharge the batteries for a minimum of 12 hours (80Ah battery) or 16 hours (160Ah battery).



Caution !

To prevent battery damage the battery should be fully charged before shut-down of the vehicle.

Note: A recharge of the batteries by the built-in charging unit, by solar regulator or by alternator is still possible even if battery cut-off switch is off.

6.3 Maintenance

- * The energy system EBL 208 is maintenance-free.
- * For cleaning use a soft moisturized cloth with a mild detergent. Do not use methylated spirit, paint thinner, etc. Liquids must not be allowed to get into the cabinet.

7. Malfunctions

- * If due to overload the device gets too hot, eg charging an empty battery while all load is switched on, battery charging will be stopped automatically. After cooling down the EBL-charger activates itself again. However, overheating should in any case be prevented.
- * Should repairs be necessary, please contact the service department of Schaudt GmbH, ph. 0049-(0)7544-9577-16, eMail: kundendienst@schaudt-gmbh.de
- * If it is not possible to see the manufacturer for service (eg being overseas), necessary repairs can be carried out by a qualified workshop.
- * Unqualified repairs enforce expiration of warranty. The manufacturer Schaudt GmbH disclaims it's liability and is therefore not liable to resulting damages.

8. Enclosures

To this operating instruction manual belongs the enclosed schematic diagram and the drawing of the front view of the energy system EBL 208, art.no 911.430.

This operating instruction manual with all it's enclosures must be delivered together with the energy system EBL 208, art.no 911.430.

It has to be part of the instruction manual if it is part of a system installed in a motorhome.

8.1 EC declaration of conformity

We hereby certify that the type of construction of the energy management system EBL 208 corresponds accordingly to appropriate provisions:

EC low-voltage guide line	73/23/EWG i.d.F. der Änderung vom 22.07.93
Electromagnetic compabitibility guide line	89/336/EWG mit Änderung 92/31/EWG

Employed standards and technical specifications, particularly:

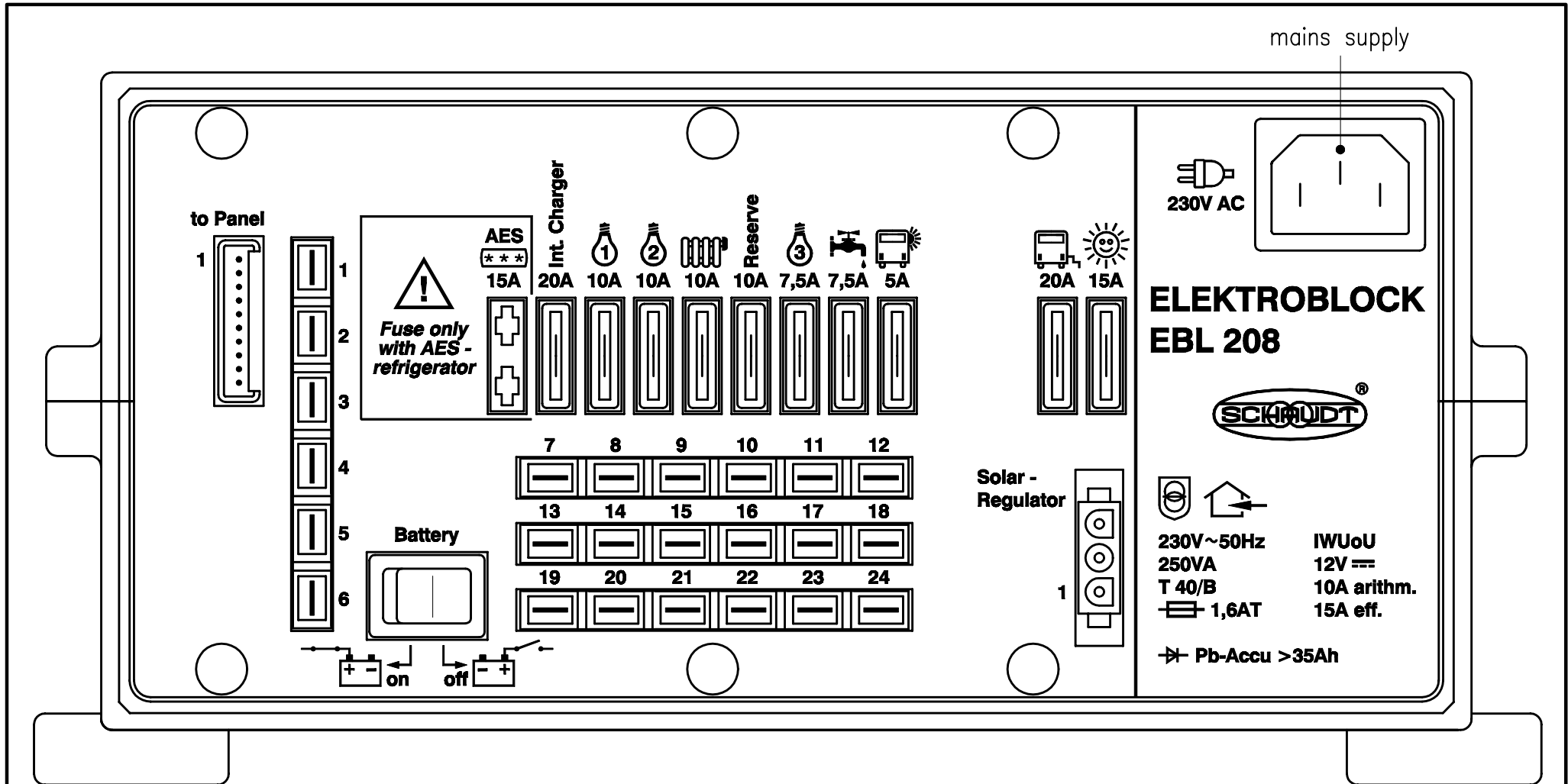
DIN VDE 0700 Teil 1 /11.90 (EN 60335-1:1988)
DIN VDE 0700 Teil 29 /03.92 (EN 60335-2-29:1991)
DIN VDE 0551 T1 /09.89 (EN 60742:1989)
DIN EN 50081-1:3.1993
DIN EN 50082-1:3.1993
DIN EN 61000-3-2:10.1998

The EC declaration of conformity in original is available and can be looked at any time.

Manufacturer: Schaudt GmbH, Elektrotechnik & Apparatebau

Address: Daimlerstraße 5, 88677 Markdorf, Germany

note: operating instruction manual is intended for the owner and has to come with the EBL



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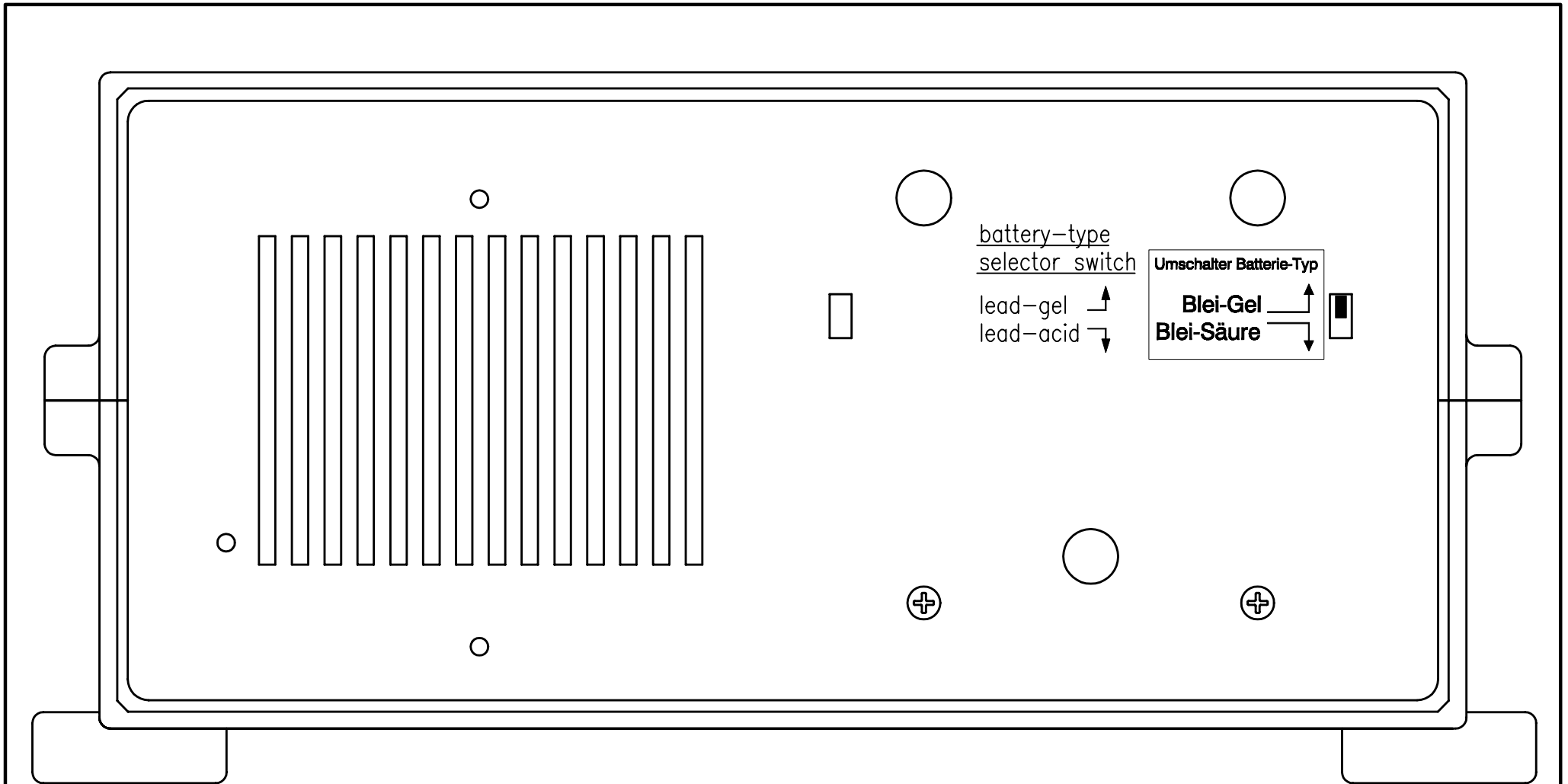
Schaudt GmbH

Daimlerstraße 5
88677 Markdorf/Bodensee
Postfach 1150
Telefon (07544) 9577-0

Datum	13.12.2001	Name	Schliecker
Gez.	13.12.2001	Gepr.	Hüttner
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front view – Energy
Management System EBL 208 a

Art-Nr	911.430	Blatt	1
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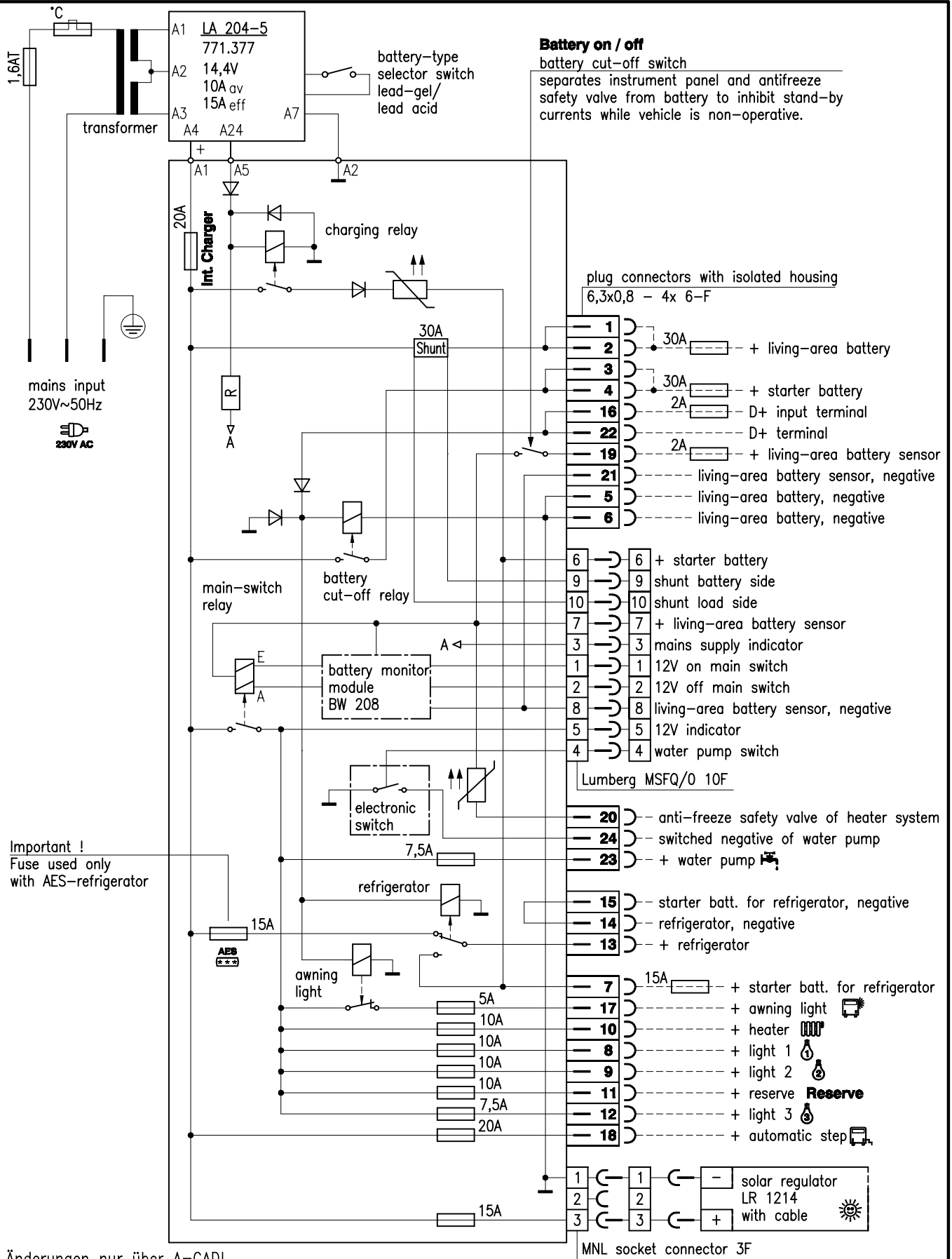


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			Gepr.		
			Schaudt GmbH		
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a	HZ 7,5 in 10A	06.12.01	Schliecker		
Zust.	Aenderung	Datum	Name		

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Art-Nr	911.430	von	1
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