Contents

1. Description

The Energy System EBL 99 C contains the charging module LAS 1216, the battery monitor module BW 99, the complete 12V distribution, fused 12V circuits and additional control and monitoring devices.

The charging unit is designed as a primary controlled switch-mode power supply.
This modern design ensures high power output with compact dimensions and light weight.

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

Connections for a additional battery charger and a solar regulator are provided.

1.1 Suitable Accessories (not supplied)

control and switch panel	instrument panel IT 991, IT 992 and it's models
solar regulator	LR 1214, for solar modules with a total maximum current of 14A, art.nr. 922.202, with 3-p connector (incl. connecting cable 0.5m)
additional charger	Schaudt battery charger, type LAS... with 18A max. charging current. Eg. battery charger LAS 1216, art.nr. 910.517. It increases the charging current by 16A.

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	2.0 kg
cabinet	PA (Polyamid), gentian blue RAL 5010
frontpanel	aluminium, powder painted, light grey RAL 7035

1.2.2 Electrical Data

mains supply	* 230V (+ 10 / - 15%), 47 to 63 Hz, safety class 1
power consumption	* 280 W
suitable batteries	* 6 cell lead-acid or lead-gel batteries, more than 55Ah
steady load off camping battery	* without mains supply, battery alarm 'OFF', battery cut-off switch 'On' and battery voltage = 12.6V with IT 991: approx. 5.5mA with IT 992: approx. 4.1mA

load current of alternator's D+ output by EBL * approx. 0,48A (without load at D+ terminal, see schematic diagram)

permissable load...

...on 12V outputs * maximum current draw up to the fuse rating of each output. See enclosed schematic diagram.

...heater valve * max. 0.1A

...D+ terminal * 1A, with D+ input fused by 2A.

1.2.2.1 Battery charging ...

... on mains supply

camping battery:

charging characteristic * IUoU

maximum charging voltage * 14.3V

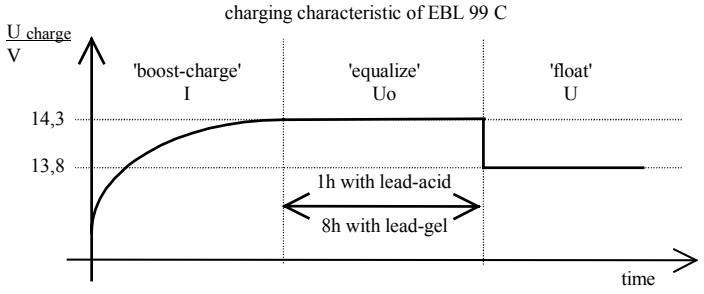
charging current * 16A within mains supply range, electronically limited

floating voltage * 13.8V (automatic change-over)

new charging cycle (change-over to boost-charge) * if battery voltage < approx. 13.8V (approx. 5 sec delay)

3-phase characteristic:

* boost-charge at 16A (arithmetic mean, electronically limited) up to maximum charging voltage,
* then equalize-charge at constant 14.3V (selectable: 1h duration for lead-acid, 8h 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 after a delay of approx. 5 sec.

safety circuits * overheat protected

* overload protection by electronic current limiting
* short-circuit protected by automotive fuse (FK2)

starter battery:

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

...by solar regulator

max. allowed charging current (camping battery) * 10A

... while driving

charging current * simultaneous charging of starter and camping battery by alternator, batteries in parallel by cut-off relay, maximum charging current by alternator must not exceed: 50A (see block diagram)

1.2.2.2 battery monitor module

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

2. Safety Information

* The electrical installation of the motorhome has to be in accordance with current DIN-, VDE- and ISO-regulations. Manipulations will endanger the safety of persons and the vehicle. Due to the above mentioned regulations and safety rules, manipulations are therefore prohibited.
* The connection of the EBL to the mains supply has to be in accordance to national installation rules.
* The EBL 99 C must not be modified.
* The connection of the EBL has to be done by qualified personel 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 99 C

* 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 safety fuses (FK2 type)
battery-type selector switch	The mains plug of the EBL has to be taken off **prior** actuating battery-type selector switch. Before power-up of the EBL this switch has to be selected according to the types of batteries used (lead-acid or lead-gel). The switch ensures a 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 a **explosion-hazard** caused by detonating gas.

battery cut-off switch	the battery cut-off switch seperates **all** 12V load (incl. heater valve) from camping battery to inhibit stand-by currents while vehicle is non-operative. See detail 6.2 'Shut-Down'

Attention !

Please note if heater valve is deactivated the freeze-guard valve of the boiler opens.

note: To reactivate heater, base light/automatic step and reserve output 4 after cut-off by battery cut-off switch or after a battery change, please actuate 12V main switch on the instrument panel.

12V main switch (on instrument panel only)	With push-button switch '12V on/off' all load is being switched on and off. Except heater, base light/automatic step and reserve output 4. Please refer to user's manual of the instrument panel.

3.2 Relay Functions

battery cut-off relay	This relay seperates the starter and camping battery while 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 1 bistable	This relay switches all 12V load off. Except the heater, base light/automatic step and the reserve 4 circuits.
main-switch relay 2 bistable	Additionally to main-switch relay 1 this relay switches the heater (except the freeze-guard valve),base light/automatic step and the reserve 4 circuits off.
refrigerator cut-off relay absorption type refrigerator	This relay controls the power supply of the absorption type 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+'.
refrigerator cut-off relay AES/compr. type refrigerator	This relay controls the power supply of the AES or compressor refrigerator. The refrigerator gets it's power from the starter battery if the engine is running and if there is a voltage on terminal 'D+'. Otherwise power will be provided from the camping battery.
charging relay battery 1 (starter battery)	This relay automatically provides a 2A trickle-charge of the starter battery if mains supply is on.

3.3 Battery Monitor Module

The battery monitor compares the voltage of the camping battery with a reference voltage.

As soon as the battery voltage is lower than 10.5V all 12V load will be switched off.
Merely the freeze-guard valve is still provided with power to keep it shut. Short falls (< 2 sec) below the threshold voltage, due to high inrush currents of connected load do not affect the automatic cut-off.
If the automatic shut-down has been triggered due to overload or a insufficiently charged battery all unrequired 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 camping battery should be fully recharged as soon as possible.

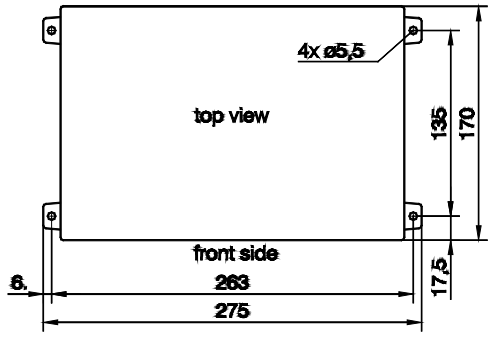
4. Transport, Storage, Installation

4.1 Transport, Storage

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

4.2 Installation

* The EBL is designed for use in dry and sufficiently ventilated environment within a temperature range of - 10°C to + 45°C.
* 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. +45°C in a distance of 2.5 cm to the sides has to be maintained.



Caution !

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

* The EBL has been designed for wall- and floormounting.
* It has to be fitted onto a stout and level surface by use of the four provided mounting sockets.

5. Electrical Installation

* Electrical installation has to be executed by qualified personel only.
* The device must be used only with a camping battery.

Caution !

The EBL must not be used without a connected camping battery, otherwise connected appliances might be damaged in unfavorable conditions.

* Electrical connection is made on the front- and backside according to enlosured block diagram.
* For connection the mains plug or mains supply of the vehicle has to 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 of EBL
  2. battery cables at EBL (screwed terminals on backside)
  3. battery cables at battery terminals
  4. 230V mains supply plug
* Disconnection has to be executed vice versa.

5.1 230V Mains Supply

* Mains supply has to be connected to a earthing-contact socket outlet.
* The power supply line must be a H05VV-F 3x1.5 cable.

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

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

Maximum allowed fuse ratings:			
batteries	battery 1 for refrigerator	sensor cable battery 2	D+ (alternator)
50A	20A	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 camping battery has to be connected to the negative pole of the starter battery externally.

Caution !

Danger of burning because of unqualified connection and fusing.

* The EBL 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 EBL or at too high battery temperature (>30°C).

* The refrigerator input cables 'battery 1 for refrigerator' and 'negative battery 1 for refrigerator' to the EBL have to be wired seperately from other battery cables to the battery terminals.

Attention !

Without separately wired refrigerator and battery cables a optimum charge of the camping battery can not be reached.

5.3 12V-Load

* The choice of battery cable size dimensions has to comply with EN 1648-1 or –2.
Maximum current drain of 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. Camping Battery connected ?
2. Correctly selected battery-type switch. See section 3.1 'Controls'.

* Power-up procedure:

1. Switch battery cut-off switch into 'EIN' position. See user's manual section 3.1 'Controls'.
2. To reactivate heater, base light/automatic step and reserve output 4 after a cut-off by battery cut-off switch 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 camping battery should be disconnected from the 12V system. Disconnect cables at the battery terminals.

1. Switch off 12V main-switch on instrument panel
2. Battery cut-off switch on EBL into 'AUS' position. See section 3.1 'Controls'.

Caution !

Please note, freeze-guard valve of boiler opens 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 houres (80Ah battery) or 16 houres (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 a additional charger, by solar regulator or by alternator is possible if battery cut-off switch is off.

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

6.3 Maintenance

* The EBL 99 C is maintenance-free.
* For cleaning use a soft moisturized cloth with a mild detergent (no methylated spirit, paint thinner, etc.). Liquids must not be allowed to get into the cabinet.

7. Malfunctions

* If due to high surrounding temperature or bad ventilation the EBL get's too hot the charging current will automatically be decreased, however overheating should in any case be prevented.
* The camping battery has to be fully recharged if the automatic cut-off by the battery monitor unit has been triggered.
* 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 enclosured the schematic diagram and the drawings of the front and back side of the EBL 99 C, art.nr. 911.413.

This operating instruction manual with all it's enclosures must be delivered together with the EBL 99 C, art.nr. 911.413. 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 99 C corresponds accordingly to approbiate 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 EN 60335-1:1994 +A11+A1+A12+A13+A14

DIN EN 60335-2-29:1996 + A11

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

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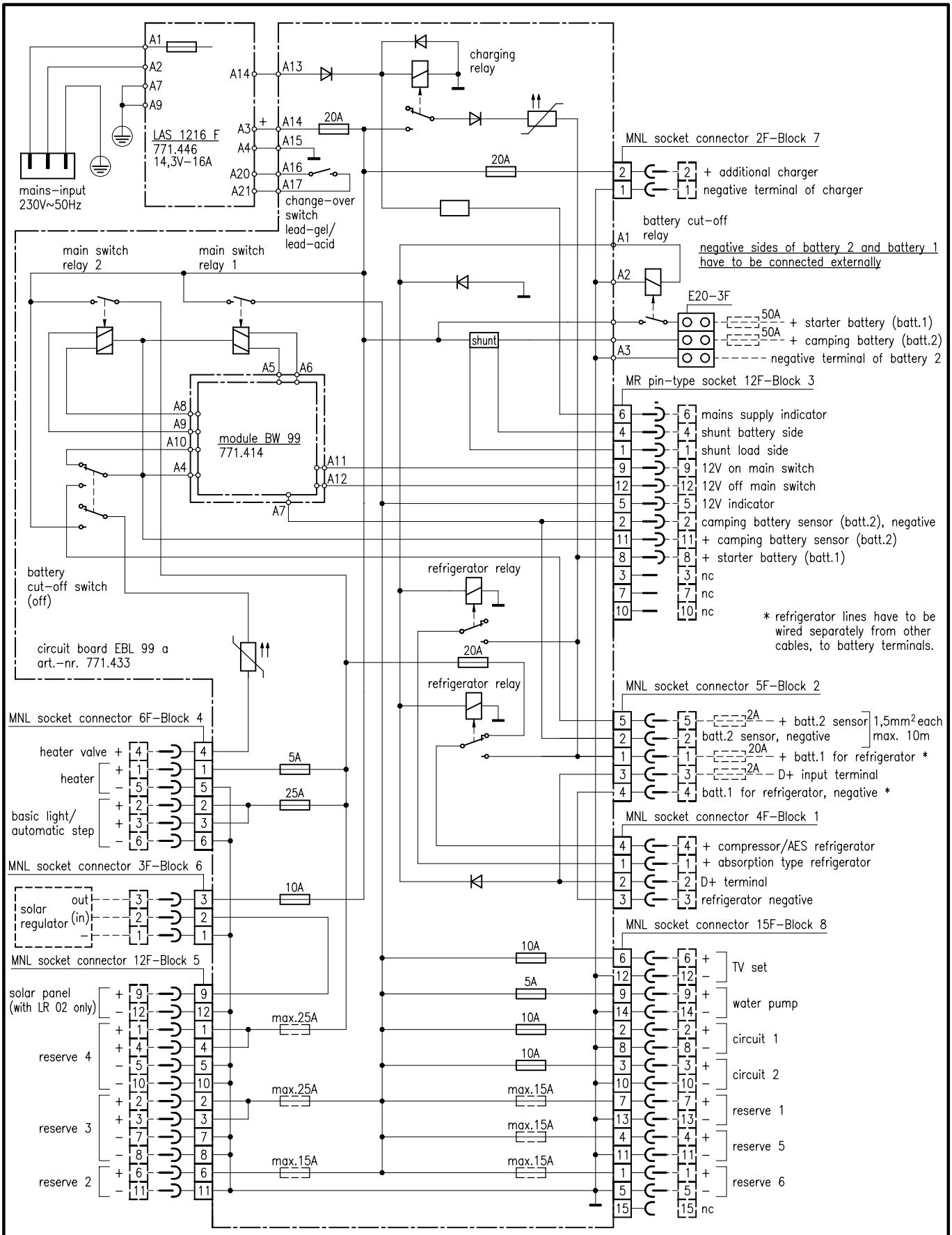


Änderungen nur über A–CAD!

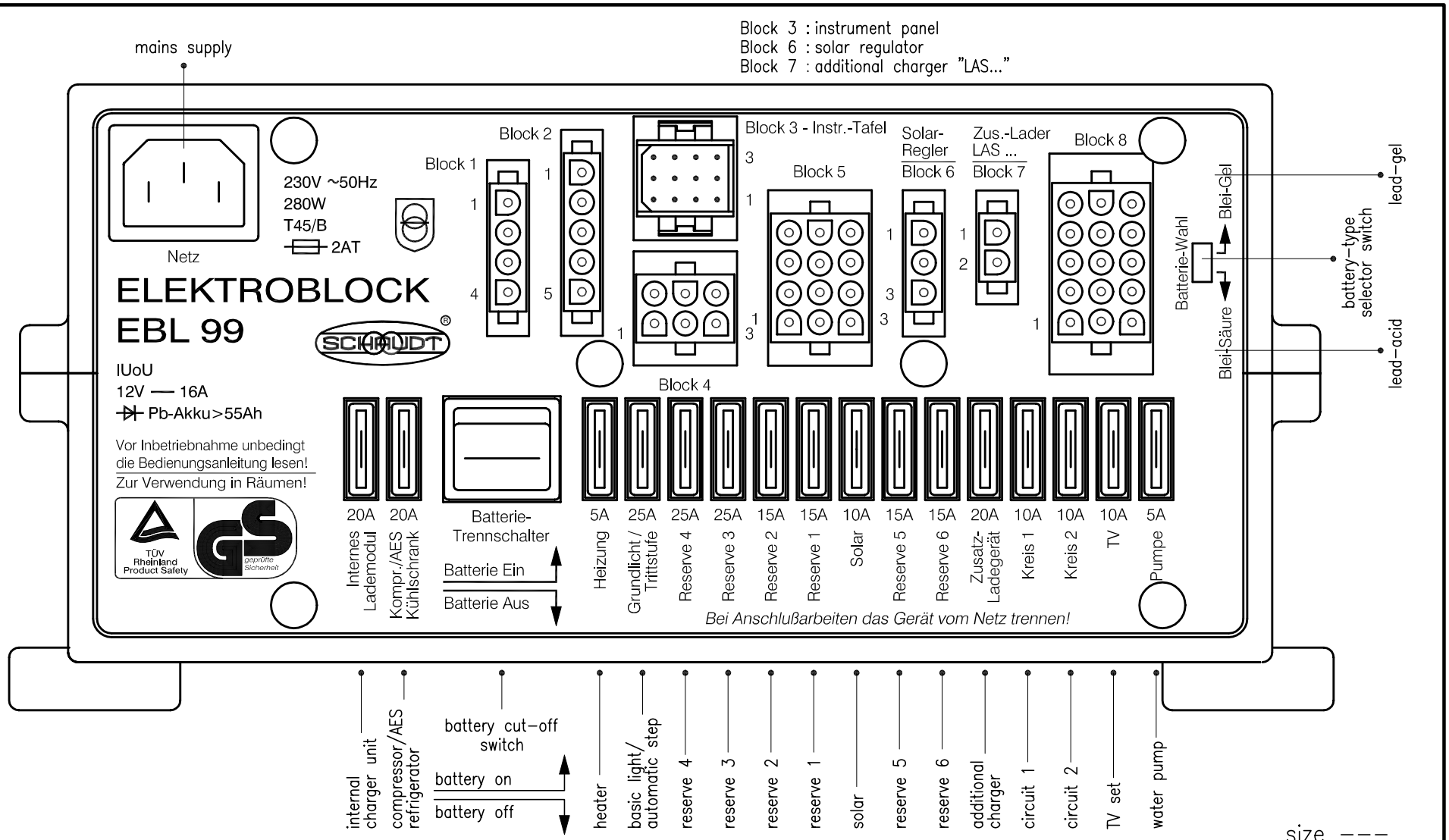
Zust.	Aenderung	Datum	Name

	Datum	Name
Gez.	07.03.2001	Schliecker
Gepr.	08.03.2001	Hüttner
Gepr.		

Schaudt GmbH
Daimlerstraße 5
88677 Markdorf/Bodensee
Postfach 1150
Telefon (07544) 9577–0

Energy Management System EBL 99 C

Art–Nr	911.413	Blatt 1
Ablage	911413A1 En.	von 1



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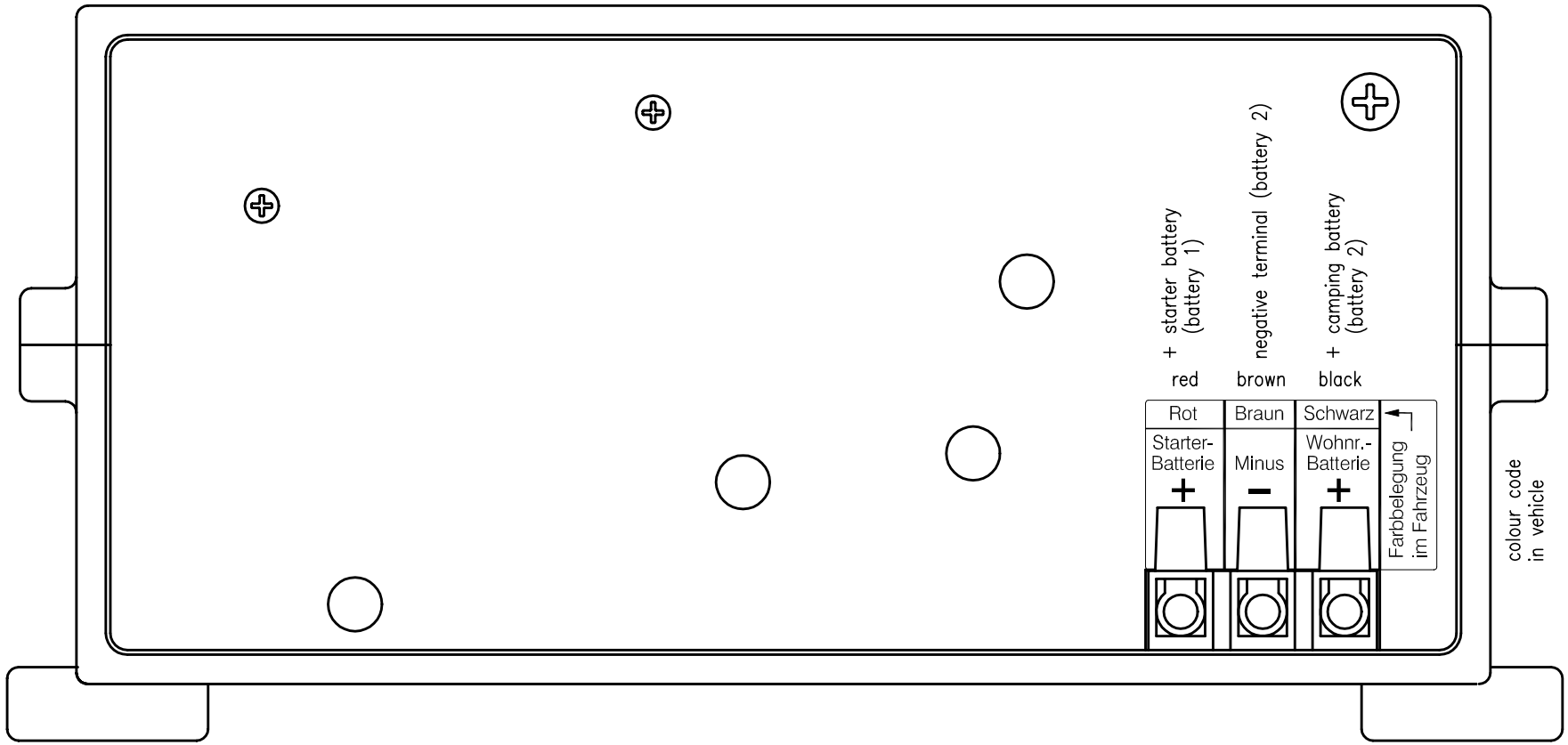
Energy Management System
EBL 99 C – front view

Art-Nr	911.413	Blatt 1
Ablage	911413V1 En.	von 2



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Gepr.	06.03.2001	Hüttner
Gepr.		

Energy Management System
EBL 99 C – rear view

Art-Nr	911.413	Blatt	2
Ablage	911413V2 En.	von	2