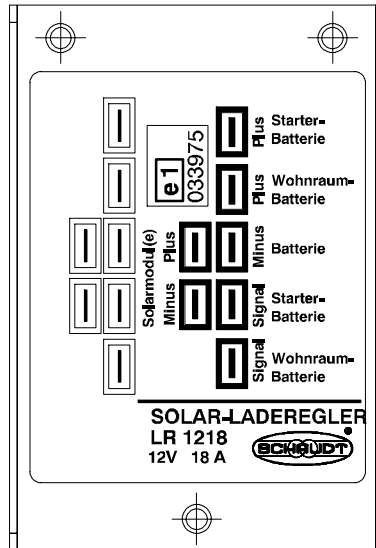


Instruction Manual



LR 1218 Solar Charge Regulator

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1 Safety Information

1.1 Meaning of safety symbols



▲ DANGER!

Failure to heed this warning may result in death or serious injury.



▲ WARNING!

Failure to heed this warning may result in personal injuries.



▲ ATTENTION!

Failure to heed this warning may result in damage to the device or connected consumers.

1.2 General safety information

The device is state-of-the-art and complies with approved safety regulations. Nonetheless, personal injuries or damage to the device may occur if the safety instructions contained herein are not followed.

Ensure that the device is in perfect working order before use.

Any technical faults which may impact personal safety or the safety of the device must be rectified immediately by qualified personnel.



▲ DANGER!

230V mains voltage carrying parts.

Danger of death 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 from the power supply.
- Ensure that no liquids enter the device.



▲ WARNING!

Hot components!

Burns:

- Only change blown fuses when the device is completely de-energised.
- Only replace blown fuses once the cause of the fault has been identified and 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.
- Never store heat sensitive objects close to the device (e.g. temperature sensitive clothes if the device has been installed in a wardrobe).

2 Introduction

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

The instruction manual should be kept in the vehicle at all times. Ensure that other users are made aware of the safety regulations.

Use The LR 1218 solar charge regulator is for charging the batteries of the motorhome by means of the connected solar module. The solar charge regulator limits and controls the charging voltage of the batteries. The solar charge regulator can be connected to:

- two batteries
- a Schaudt Electrobloc with a separate connection for solar current
- a Schaudt Electrobloc with a retrofit adapter for charging the starter battery

For vehicles with digital panel and solar current display, the charging current is picked up by the shunt installed in the solar charge regulator and displayed as solar current on the digital panel.

The solar charge regulator works as a pulse-width modulated series regulator and ensures that the connected batteries are charged without being impaired.



▲ To use the solar charge regulator with an Electrobloc, see the instruction manual for the Electrobloc.

3 Operation

The solar charge regulator does not have any controls.



▲ ATTENTION!

The output voltage of the charge regulator is not suitable for direct supply without battery.

Malfunction of or damage to connected consumers:

- Do not operate the solar charge regulator without a battery.
- Disconnect connector "Plus Solar module(s)" on the solar charge regulator before changing or removing the battery.
- The solar charge regulator may only be used in buffer mode with lead acid or lead gel batteries with a minimum rating of 55 Ah.

4 System faults

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

If this is not possible, e.g. if you are abroad, you can have the electronic bloc repaired at a specialist workshop. Please note that the warranty will become void if incorrect repair work is carried out. Schaudt GmbH shall not accept liability for any damages resulting from such repairs.

Fault	Possible cause	Remedy
No display of the solar current on the digital panel (if available)	Solar charge regulator defective	Contact the customer service department
	Defective electronic block	Contact the customer service department
	Defective wiring	Have the wiring checked

Fault	Possible cause	Remedy
Batteries are not being charged	Defective batteries	Have the batteries checked
	If batteries are in perfect working order: Solar charge regulator defective	Contact the customer service department
	Defective electronic block	Contact the customer service department
	Defective wiring	Have the wiring checked

5 Technical data

Nominal voltage 12 V

Final charge voltage 14.2V for living area and starter battery. Living area battery has priority.

Suitable batteries 6-cell lead acid or lead gel batteries, rated 55 Ah or higher

Suitable solar modules Typ. 36-cell modules with the following properties

- Off-load voltage max. 25 V
- Overall nominal current max. 18 A

Calculation example For example, five solar modules each rated at 55W can be connected in parallel:

Per solar module $U_0 = 22 \text{ V}$
 $I_{\text{nominal}} = 3.2 \text{ A}$
 Overall nominal current $I_{\text{nominal}} = 16 \text{ A}$

Suitable EBL ... electroblocs

- Schaudt GmbH electroblocs with separate solar current connection
- Schaudt GmbH electroblocs with retrofit adapter for charging the starter battery

6 Application and functions in detail

Charging voltage limited If the solar modules have sufficient charging voltage, the solar charge regulator allows the battery to be charged by up to 14.2 V.

As soon as this voltage is reached, the charging current is reduced to fully charge the batteries without impairing them. If the charging voltage of the solar modules is insufficient (e.g. in the dark), an integrated isolation diode prevents the batteries from discharging.

Priority of the living area battery Living area battery and starter battery are charged simultaneously. The living area battery has priority.

7 Maintenance

The device requires no maintenance.

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

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Appendix

A EC Declaration of Conformity

Schaudt GmbH hereby confirms that the design of the device complies with the following relevant regulations:

Directive on electromagnetic compatibility

2004/104/EC dated 14.10.2004

2005/49/EC dated 25.07.2005

2005/83/EC dated 23.11.2005

EU Mark of Approval e1 033975

The original EC Declaration of Conformity is available for reference at any time.

Manufacturer Schaudt GmbH, Elektrotechnik & Apparatebau

Address Planckstraße 8
88677 Markdorf
Germany

B Special fittings/accessories

Instrument panel IT 300 Solar instrument panel for direct connection to the batteries or to electroblocs with retrofit adapter

C Customer service

Customer service address Schaudt GmbH, Elektrotechnik & Apparatebau
Planckstraße 8
D-88677 Markdorf

tel.: +49 7544 9577-16 e-mail: kundendienst@schaudt-gmbh.de

Office hours Mon to Thurs 08.00 - 12.00, 13.00 - 16.00
Fri 08.00 - 12.00

Send in the device Returning a defective device:

- ▶ Fill in and enclose the fault report, see Appendix D.
- ▶ Send it to the addressee (free of charge).

D Fault report

In the event of damage, please return the defective device together with the completed fault report to the manufacturer.

Device type: _____
 Article no.: _____
 Vehicle: _____ Manufacturer: _____
 Model: _____
 Own installation? Yes No
 Upgrade? Yes No

Following fault has occurred (please tick):

- Battery is not charged when solar modules are connected
- Persistent fault
- Intermittent fault/loose contact

Other remarks:

E Design

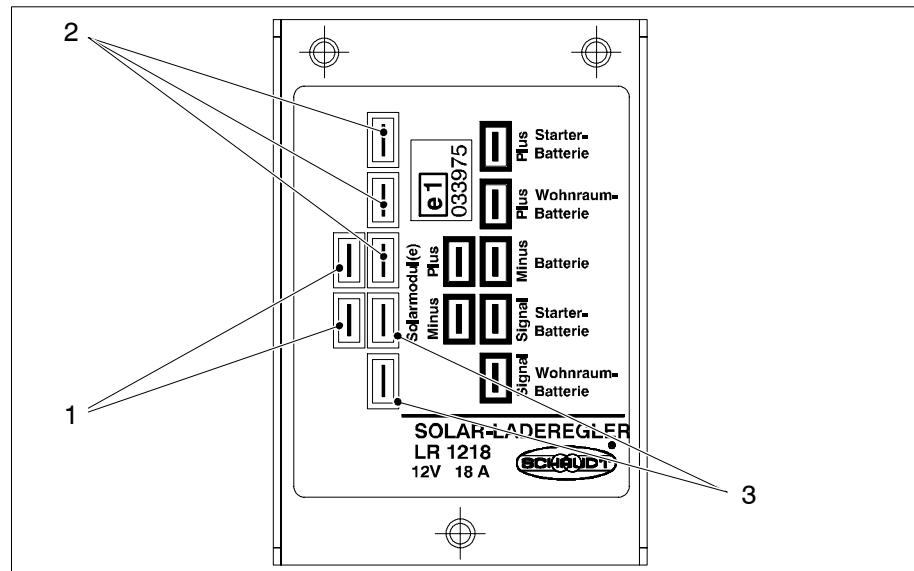
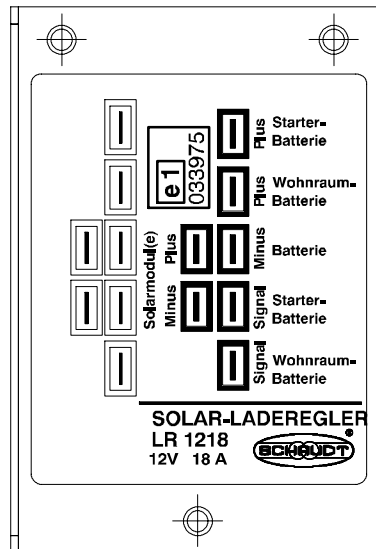


Fig. 1 LR 1218 Solar Charge Regulator

- 1 Solar module connection
- 2 Living area battery and starter battery connections, if required via Electrobloc
- 3 Display panel connection, if required via Electrobloc

Installation instructions



LR 1218 Solar Charge Regulator

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1 Safety Information

1.1 Meaning of safety symbols



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▲ WARNING!

Failure to heed this warning may result in personal injuries.



▲ ATTENTION!

Failure to heed this warning may result in damage to the device or connected consumers.

1.2 General safety information



▲ WARNING!

Hot components!

Burns:

- Blown fuses should only be replaced once the system has been completely disconnected from the power supply.
- Only replace blown fuses once the cause of the fault has been identified and rectified.
- The rear of the device may become hot during operation. Do not touch.



▲ ATTENTION!

Voltage carrying parts

Damage to devices:

- The electrical system of the motorhome or caravan must comply with current DIN, VDE and ISO regulations.
- Never modify the device.
- Never try to start the device using a defective mains cable or with a faulty connection.
- Never carry out maintenance work on live devices.
- Ensure proper electrical connections are made.
- Ensure correct electrical fuses are used.

2 Introduction

These installation instructions are aimed at trained personnel.

They contain important information on the connection and safe operation of the device. The safety information provided must be observed.

Always follow the relevant instruction manual in addition to the installation instructions.

3 Scope of delivery

Delivered as part of the LR 1218 solar charge regulator:

- 1 x LR 1218 solar charge regulator
- Connection set for the different applications
- Instruction Manual
- Installation instructions

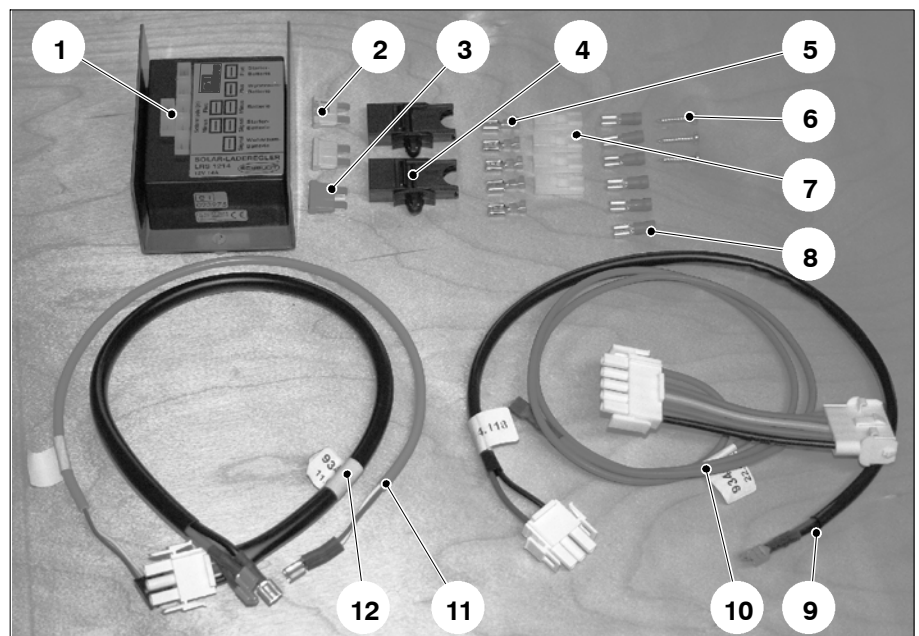


Fig. 1 LR 1218 Solar Charge Regulator Deliverables

Pos.	Qty	Name
1	1	LR 1218 solar charge regulator
2	2	Flat vehicle fuse, 20A
3	1	Flat vehicle fuse, 15 A
4	2	Fuse holder for flat vehicle fuse
5	5	Flat push-on contacts, 6.3 x 0.8 without sleeve
6	3	Screws, 3.5 x 20
7	4	Insulating sleeves for pos. 5
8	6	Flat push-on contacts, 6.3 x 0.8 (blue)
9	1	EBL ... connector cable (caravan battery charge current)
10	1	EBL ... adapter cable (starter battery charge current)
11	1	EBL ... connector cable (signals for display charge currents on DT ... / LT ...)
12	1	EBL ... connector cable (batteries for charge currents)



▲ Not all parts/cables are required for every different application.

4 Mechanical installation



▲ This device is intended for installation into a vehicle.

The device is designed for wall or floor installation. For applications in sections 5.2 and 5.3, it must be installed in the direction vicinity of the EBL ... electrobloc (at a maximum distance of 30cm to the front plate).

Environment

- ▶ For applications in which the cables supplied are used to connect to an Schaudt EBL ... electrobloc, the solar charge regulator must be installed in the direct vicinity of the electrobloc.
- ▶ For other applications, a dry and sufficiently ventilated place in the insulated interior is to be selected for installation. No condensation may be able to form on the device. In order to prevent a build-up of heat, ventilation holes towards the living area must be provided in the upper and lower areas of the place of installation. Its cross-section is based on the size and average temperature of the place of installation.

Minimum clearance

- ▶ Ensure a minimum clearance to the surrounding fixtures and fittings:
 - Maintain a gap of at least 5 cm on all sides (except mounted side).
 - Whilst in operation, the ambient temperature must not exceed +45 °C, measured 2.5 cm away from the sides of the device.

Fitting

- ▶ On a stable and even surface, attach the solar charge regulator to the drillholes with three screws (Fig. 1, Pos. 6).

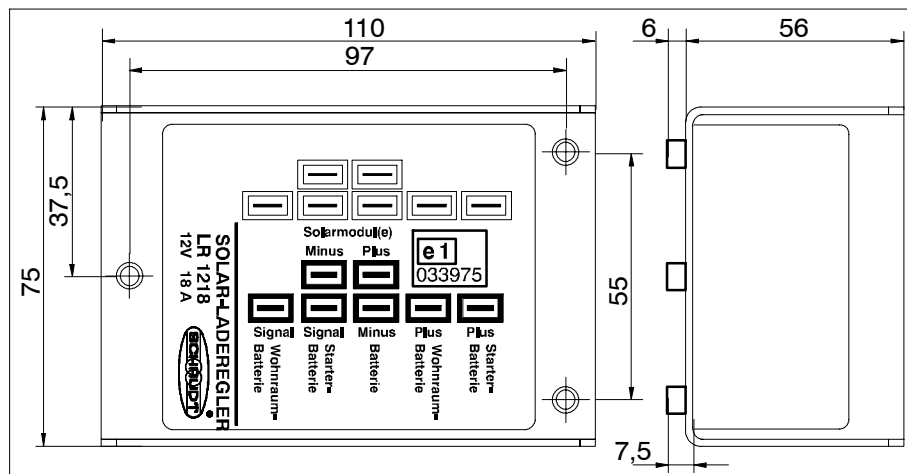


Fig. 1 Dimension Diagram of LR 1218 Solar Charge Regulator (dimensions in mm)

5 Electrical connection



▲ ATTENTION!

The output voltage of the charge regulator is not suitable for direct supply without battery.

Malfunction of or damage to connected consumers:

- Do not operate the solar charge regulator without a battery.
- Disconnect connector "Plus Solar module(s)" on the solar charge regulator before changing or removing the battery.
- The solar charge regulator may only be used in buffer mode with lead acid or lead gel batteries with a minimum rating of 55 Ah.

The electrical connection of the solar charge regulator is ready for the following applications:

- Connections to living area battery and starter battery
- Connection to an EBL ... electrobloc with connected DT ... / LT ... control and display panel .
- Connection to an EBL ... electrobloc with 3-pin MNL connection and adapter for starter battery

5.1 Connections to living area battery and starter battery



▲ ATTENTION!

Short circuits!

Damage to the solar charge regulator or fire damage to cable:

- To protect the supply lines in the event of a short circuit, connect the fuses directly to the positive pole of battery.

Select the cable cross-sections in line with EN 1648-1 or -2. The maximum current load must not exceed 90% of the individual fuse rating.

Recommended cable cross-sections:

Line length (sum of supply and return lines)	Cable cross-section
up to 4m	2,5 mm ²
up to 8m	4,0 mm ²
up to 12m	6,0 mm ²

For this application, the follow parts are required from those delivered:

Pos.	Qty	Name
1	1	LR 1218 solar charge regulator
2	2	Flat vehicle fuse, 20A
4	2	Fuse holder for flat vehicle fuse
5	4	Flat push-on contacts, 6.3 x 0.8 without sleeve
7	4	Insulating sleeves for pos. 5
8	5	Flat push-on contacts, 6.3 x 0.8 (blue)

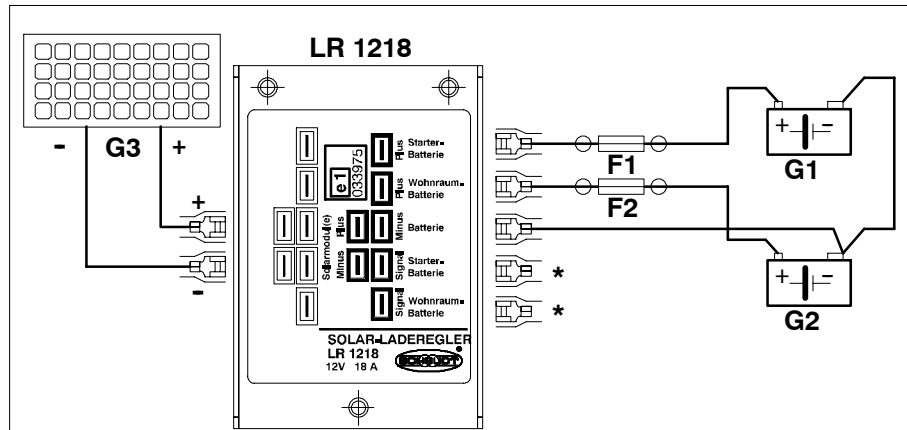


Fig. 2 Circuit diagram of connection LR 1218 to starter battery and living area battery

Pos.	Name
F1	Fuse for starter battery charge current (20A)
F2	Fuse for living area battery charge current (20A)
G1	Starter battery
G2	Living area battery
G3	Solar module(s)
LR 1218	Solar charge regulator
*	for display panel (optional)

Connection sequence

The connection at the front of the solar charge regulator is established in the following sequence:

- ▶ 1. Connect the two fuse holders with fuses to the connection cable in accordance with the circuit diagram in Fig. 2. Use the flat push-on contacts (6.3 x 0.8) without sleeve for this (Fig. 1, Pos. 5). After crimping, attach the insulating sleeves (Fig. 1, Pos. 7). Insert the two fuses.
- ▶ 2. First connect the connection cables for living area battery and starter battery to the solar charge regulator, observing the polarity of the connections. Use the flat push-on contacts (6.3 x 0.8) for this (blue, Fig. 1, Pos. 8).
- ▶ 3. Connect the connection cables for living area battery and starter battery to the batteries.
- ▶ 4. **Finally**, connect solar modules to the solar charge regulator. Use the flat push-on contacts (6.3 x 0.8) for this (blue, Fig. 1, Pos. 8). The connection cables for the solar modules should be positioned as closely as possible to each other to avoid interference of radio reception.

Disconnection

Disconnect in reverse order.

5.2 Connection to an EBL ... electrobloc with connected DT ... / LT ... control and display panel

For this application, the follow parts are required from those delivered:

Pos.	Qty	Name
1	1	LR 1218 solar charge regulator
2/3	1	20A or 15A flat vehicle fuse (depending on EBL ...)
8	2	Flat push-on contacts, 6.3 x 0.8 (blue)
11	1	EBL ... connector cable (batteries for charge currents)
12	1	EBL ... connector cable (signals for display charge currents on DT ... / LT ...)

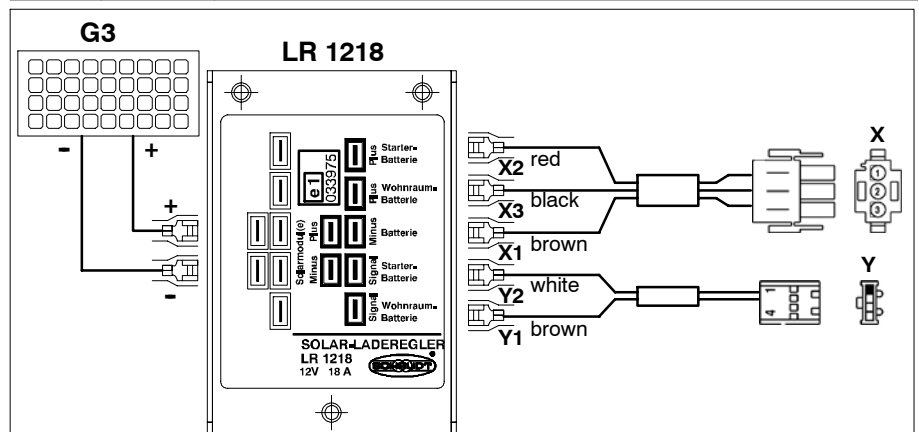


Fig. 3 Circuit diagram of connection LR 1218 to EBL ... with DT ... / LT ...

Pos.	Name
X	Cable with electrobloc connector: - X1 brown negative battery - X2 red + starter battery - X3 black + living area battery
Y	Cable with DT .../LT ... control and display panel connector - Y1 brown living area battery signal - Y2 white starter battery signal
G3	Solar module(s)
LR 1218	Solar charge regulator

Connection sequence

The connection at the front of the solar charge regulator is established in the following sequence:

- ▶ 1. Connect the electrobloc with cable X (connection cable EBL ... (charge currents for batteries), Fig. 1, Pos. 11).
- ▶ 2. Connect the electrobloc with cable Y (signals for display of charge currents on DT ... / LT ..., Fig. 1, Pos. 12).
- ▶ 3. Fit the right flat vehicle fuse (15A or 20 A; Fig. 1, Pos. 2 or 3) into the "Solar" fuse on the EBL ...
- ▶ 4. **Finally**, connect solar modules to the solar charge regulator. Use the flat push-on contacts (6.3 x 0.8) for this (blue, Fig. 1, Pos. 8). The connection cables for the solar modules should be positioned as closely as possible to each other to avoid interference of radio reception.



- ▲ The correct fuse rating is imprinted on the front plate of the EBL ... front plate. See also the block diagram in the instruction manual of the electrobloc.

Disconnection Disconnect in reverse order.

5.3 Connection to an EBL ... electrobloc with 3-pin MNL connection and adapter for starter battery

When using an electrobloc which only has a 3-pin connection for a solar charge regulator, an adapter for charging the starter battery can be retrofitted. It is then possible to charge the living area battery and the starter battery simultaneously.

The following electroblocs (as of April 2008) can be used with the adapter:

- EBL 99
- EBL 100
- EBL 264-9
- EBL 240
- EBL 269

An IT 300 Solar display panel, for the display of the solar charge current, can be used as an optional extra.

For this application, the follow parts are required from those delivered:

Pos.	Qty	Name
1	1	LR 1218 solar charge regulator
2/3	1	20A or 15A flat vehicle fuse (depending on EBL ...)
3	1	Flat vehicle fuses
8	2	Flat push-on contacts, 6.3 x 0.8 (blue)
9	1	EBL ... connector cable (caravan battery charge current)
10	1	EBL ... adapter cable (starter battery charge current)

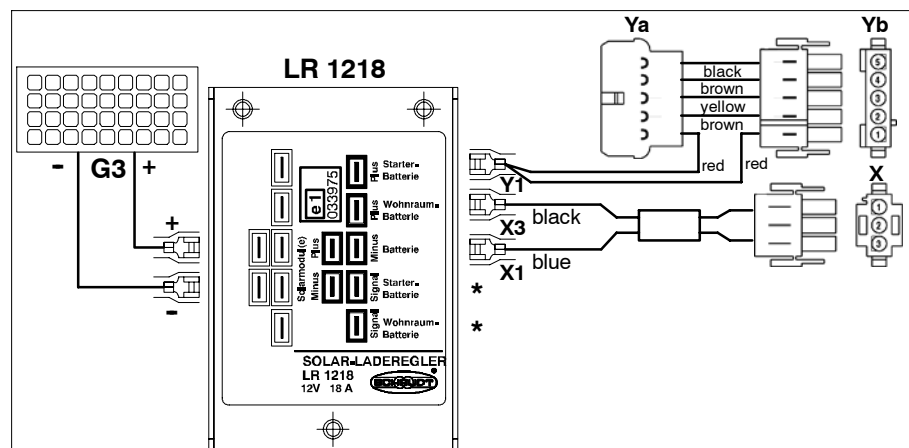


Fig. 4 Circuit diagram of connection LR 1218 to EBL ...

Pos.	Name
X	Cable with electrobloc connector: - X1 blue negative battery - X2 - not assigned - X3 black + living area battery
Y	Electrobloc adapter cable - Ya to available electrobloc cable - Yb to electrobloc - Y1 red + starter battery - Y2 brown negative sensor, living area battery - Y3 yellow D+ input - Y4 brown negative starter battery for refrigerator - Y5 black + living area battery sensor
G3	Solar module(s)
LR 1218	Solar charge regulator
*	for display panel (optional)

Connection sequence

The connection at the front of the solar charge regulator is established in the following sequence:

- ▶ 1. On the electrobloc, disconnect the vehicle-side 5-pin cable carrying the starter battery supply.
- ▶ 2. Connect the electrobloc with cable Y(adapter cable EBL ... (charge current for starter batteries), Fig. 1, Pos. 10).
 - Ya to the vehicle-side cable
 - Connect Yb on the electrobloc
- ▶ 3. Connect the electrobloc with cable X (connection cable EBL ... (charge current for caravan battery), Fig. 1, Pos. 9).
- ▶ 4. Fit the right flat vehicle fuse (15A or 20 A; Fig. 1, Pos. 2 or 3) into the "Solar" fuse on the EBL ...
 - ▲ The correct fuse rating is imprinted on the front plate of the EBL ... front plate. See also the block diagram in the instruction manual of the electrobloc.
- ▶ 5. **Finally**, connect solar modules to the solar charge regulator. Use the flat push-on contacts (6.3 x 0.8) for this (blue, Fig. 1, Pos. 8). The connection cables for the solar modules should be positioned as closely as possible to each other to avoid interference of radio reception.



Disconnection Disconnect in reverse order.

5.4 Block diagram/connection diagram



- ▲ The block diagram and connection diagram are appended to the instruction manual of the solar charge regulator.

6 Initial use

6.1 Checks prior to initial use

- Before starting up**
- ▶ Ensure that all the connections are correct (only for initial use).
 - ▶ Ensure that the batteries or the electrobloc are connected (depending on operating mode).
 - ▶ If the solar charge regulator is connected to an electrobloc, ensure the battery cut-off switch is enabled.

- Starting up the system**
- ▶ Connect the solar module to the solar charge regulator with the correct polarity. The solar charge regulator is ready to use.

7 Technical data

7.1 Mechanical data

Dimensions 56 x 75 x 110 (H x W x D in mm), including attachment feet

Weight 160 g

Housing Plastic, black

Base plate Aluminium, powder coated, gentian blue RAL 5010

7.2 Electrical data

Nominal voltage	12 V						
Regulating principle	pulse-width modulated series regulator charge curve (with solar module) IU						
Final charge voltage	14.2 V living area battery (has priority) 14.2 V starter battery						
Solar charge regulator consumption	approx. 4.5 mA (with solar module in the dark)						
Suitable batteries	6-cell lead acid or lead gel batteries, rated 55 Ah or higher						
Suitable solar modules	Typ. 36-cell modules with the following properties: <ul style="list-style-type: none">● Off-load voltage max. 25 V● Overall nominal current max. 18 A● Overall short circuit current max. 19 A						
Calculation example	For example, five solar modules each rated at 55W can be connected in parallel: <table><tr><td>Per solar module</td><td>$U_0 = 22 \text{ V}$</td></tr><tr><td></td><td>$I_{\text{nominal}} = 3.2 \text{ A}$</td></tr><tr><td>Overall nominal current</td><td>$I_{\text{nominal}} = 16 \text{ A}$</td></tr></table>	Per solar module	$U_0 = 22 \text{ V}$		$I_{\text{nominal}} = 3.2 \text{ A}$	Overall nominal current	$I_{\text{nominal}} = 16 \text{ A}$
Per solar module	$U_0 = 22 \text{ V}$						
	$I_{\text{nominal}} = 3.2 \text{ A}$						
Overall nominal current	$I_{\text{nominal}} = 16 \text{ A}$						

7.3 Environmental parameters

Operational temperature	-20 °C to +40 °C
Storage temperature	-20 °C to +70 °C
Humidity	Operation in dry environment only

8 Storage - Packaging - Transportation

Only transport and store the solar charge regulator if the packing is suitable and ambient conditions are dry.

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