CHARGER
RBC IP66

LEAB
mobile energy

USER MANUAL
VERSION 3
22/06/2021

LEAB Automotive GmbH // Thorshammer 6 // 24866 Busdorf

www.leab.eu

Table of Contents

1 About this Manual

Read this manual carefully and keep it in a safe place. This manual is aimed at Users with prior knowledge of automotive electrics.

Any modifications to the product or its components are prohibited and do not conform to its intended use. Only use original LEAB or LEAB-approved accessories.

Throughout the manual, you will be alerted to warnings and safety notices about potential hazards associated with handling the device. The colours and signal words indicate the severity of the hazard:

Notice

Possibility of material damage

The signal word *Attention* indicates that there is a possibility of material damage. To avoid material damage, follow the instruction.

⚠ CAUTION

Danger that can lead to minor injuries

Safety instructions with the signal word *CAUTION* indicate a hazard which, if not avoided, can result in minor or moderate injury. Read the safety instructions carefully and follow them to avoid the hazard.

⚠ WARNING

Hazards that can lead to severe injuries or death

Safety instructions with the signal word *WARNING* indicate a hazard which, if not avoided, can result in death or severe injury. Read the safety instructions carefully and follow them to avoid the hazard.

⚠ DANGER

Danger that will lead to severe injury or death

Safety instructions with the signal word *Danger* indicate a hazard which, if not avoided, will result in death or severe injury. Read the safety instructions carefully and follow them to avoid the hazard.

You will find useful tips and tricks in certain parts of the manual. These appear as follows:

TIP

Tips provides additional, useful information.

Read the tip carefully and follow the instructions where applicable.

2 Safety

This manual will help you to handle the device safely. Use the device solely in accordance with its intended use. Any modifications to the device or its components are prohibited and do not conform to its intended use. Observe the safety instructions.

Keep this manual is a place where it can be accessed quickly.

2.1 Intended Use

The charger is a robust charger for permanent installation in vehicles, with 12 and 24 V on-board power supply, for charging lead batteries and LION Brix lithium batteries.

The device is designed for a temperature range of -35 °C ... 55 °C. Do not charge batteries with this charger outside the specified temperature range. At higher temperatures, the output power of the charger automatically decreases.

⚠ WARNING

Risk of fire from overheated battery

Flammable gases can escape if the battery overheats.

1. Always charge batteries in well-ventilated rooms and away from ignition sources.

⚠ WARNING

Burns from escaping acid

Acid can leak out when handling batteries.

1. Wear acid-proof clothing when handling batteries.

⚠ WARNING

Risk of injury from damaged, frozen or deformed batteries

Damaged, frozen or deformed batteries can cause injuries.

1. Before using the battery, make sure that the battery is undamaged and the electrolyte is not frozen.

2.2 Foreseeable Misuse

The charger is designed for Interior use in vehicles. Never assemble the charger outside the vehicle. The charger is designed to charge all types of Lead-acid batteries (wet, gel, AGM) and lithium batteries. Charge only the specified battery types with the charger.

To avoid damage, never pinch the leads of the charger. In the event of damage, unplug the charger immediately and contact your dealer or LEAB.

Notice

Device defects from incorrect installation

Incorrect installation can result in device defects.

1. Install the device in a dry and cool location.

3 About this Product

RBC chargers are microprocessor-controlled battery chargers for charging open and closed lead-acid, lead-gel and AGM batteries.

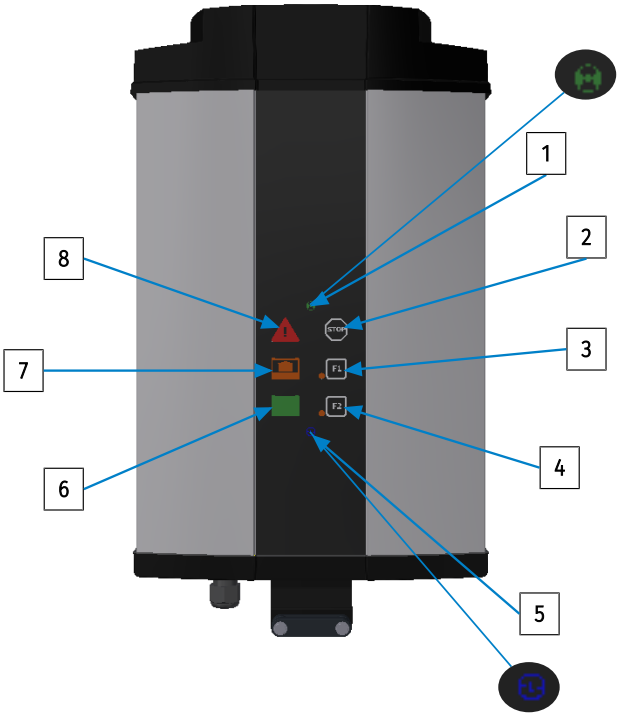

Fig. 1: RBC charger front view

1 'Data connection' LED	2 Stop button
3 F1 button	4 F2 button (no function)
5 'Ready for operation' LED	6 'Charging complete' LED
7 'Charging' LED	8 'Error' LED

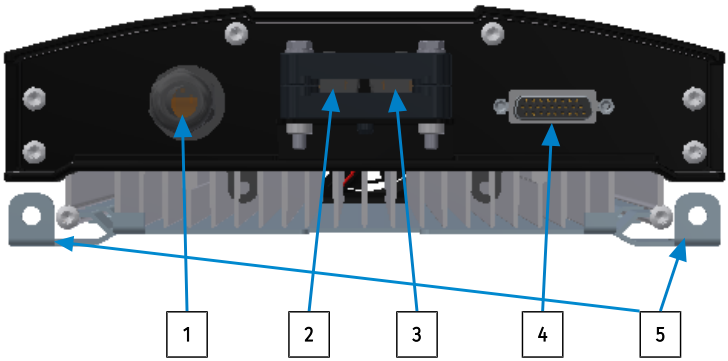

Fig. 2: RBC charger connection side

1	Mains connection cable of the charger	2	Charging cable, red
3	Charging cable, blue	4	Battery data line
5	Mounting bracket		

4 Technical Specifications

	0101036982	0101036991	0101078270
Modell	RBC 1280	RBC 2440	RBC 2480
Battery type	Open and closed lead batteries (wet, gel/AGM)	Open and closed lead batteries (wet, gel/AGM)	Open and closed lead batteries (wet, gel/AGM)
Charging characteristics	30 selectable charging parameters	30 selectable charging parameters	30 selectable charging parameters
Battery capacity	50 Ah ... 800 Ah	50 Ah ... 800 Ah	50 Ah ... 800 Ah
Charging current	80 A	40 A	80 A
Ripple	3 %	3 %	3 %
Main charging	14.1 V - 14.4 V	28.2 V - 28.8 V	28.2 V - 28.8 V
Trickle charging	13.5 V - 13.8 V	27.0 V - 27.6 V	27.0 V - 27.6 V
Input values	230 V/50 Hz	230 V/50 Hz	230 V/50 Hz
Input voltage	195 V ... 264 V	195 V ... 264 V	195 V ... 264 V
Input frequency	47 Hz ... 63 Hz	47 Hz ... 63 Hz	47 Hz ... 63 Hz
Degree of efficiency, max.	> 93%	> 93%	> 93%
International Protection (IP class)	IP66	IP66	IP66
Protection class	I	I	I
Operating temperature	-35 °C ... +55 °C	-35 °C ... +55 °C	-35 °C ... +55 °C
Cooling	Passive	Passive	Active
Dimensions (L x W x H)	410 mm x 235 mm x 78 mm	410 mm x 230 mm x 78 mm	367 mm x 230 mm x 83 mm
Weight	5.5 kg	5.6 kg	6.9 kg
AC cable	1.5 m, two-pin earthed plug	1.5 m, two-pin earthed plug	1.5 m, two-pin earthed plug
DC cable	2 x 2 m, without plug	2 x 2 m, without plug	2 x 2 m, without plug

5 Package Contents

Item	No.
Battery charger	1x
Mounting plate	1x
User manual	1x

6 Assembly

To assemble the device, proceed as follows:

✓ Choose a cool, dry and well-ventilated assembly site.

✓ Do not mount the device directly next to or above batteries.

✓ Guarantee adequate cooling for an unimpeded supply of cooling air.

1. Mount the assembly plate with the side holes (5 mm ∅) on a flat surface.
2. Slide the device into the mounting rails of the assembly plate.

⇨ The device is assembled.

7 Setting the Charging Parameters

The RBC charger contains 30 different charging parameters (charging characteristic, battery capacity and charging mode) which you can select before connecting to the battery. A graphical illustration of the charging characteristics can be found in *Appendix [▷ 18]*.

To set the charging parameters, proceed as follows:

✓ Before setting, select the desired settings using the table below.

✓ The charger is disconnected from the 230 V mains.

✓ The charger is not connected to the battery.

1. Connect the mains plug to a 230 V mains supply.
2. As soon as the 'Ready for operation' LED lights up blue (after approx. 5 s), press the STOP button for 10 s until all LEDs are flashing briefly.

   ⇨ You are in configuration mode.

NOTE! When first used, charging parameters 1 (charging characteristic LK10-06) and 9 (battery capacity 50 Ah) are preset by default.

3. To select a parameter from the list, keep pressing the STOP button until you reach the desired position.

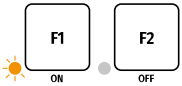

Fig. 3: F1 and F2 buttons

4. Select or deselect a setting by pressing the F1 button.
5. Remove the device from the 230 V mains.

⇨ The charging parameters are set and saved.

Set the following parameters for the different 'Power Supply' charging modes:

NOTE! Depending on the charger, a voltage of 12 V or 24 V is permanently output as standard in the 'Power Supply' charging modes. If you require a higher voltage, please contact LEAB directly.

Charging mode	Settings
Charging mode (default)	25, Charging mode: OFF
	27, CAN mode: OFF
	30: Charging mode: OFF
PDO Power Supply	25, Charging mode: OFF
	27, CAN mode: ON
	30: Charging mode: OFF
SDO Power Supply	25, Charging mode: ON
	27, CAN mode: ON
	30: Charging mode: OFF

	Error	Charging	Charging complete	Ready for operation	Data connection	Charging parameter
1	red	orange	green	blue	green	LK10-06
2	red	orange	green	blue	green	LK10-18
3	red	orange	green	blue	green	LK20-09
4	red	orange	green	blue	green	LK10-05
5	red	orange	green	blue	green	PP100
6	red	orange	green	blue	green	PP101
7	red	orange	green	blue	green	PP102
8	red	orange	green	blue	green	---
9	red	orange	green	blue	green	Capacity 50 Ah
10	red	orange	green	blue	green	Capacity 75 Ah
11	red	orange	green	blue	green	Capacity 100 Ah
12	red	orange	green	blue	green	Capacity 125 Ah
13	red	orange	green	blue	green	Capacity 150 Ah
14	red	orange	green	blue	green	Capacity 200 Ah
15	red	orange	green	blue	green	Capacity 250 Ah
16	red	orange	green	blue	green	Capacity 300 Ah
17	red	orange	green	blue	green	Capacity 350 Ah
18	red	orange	green	blue	green	Capacity 400 Ah
19	red	orange	green	blue	green	Capacity 450 Ah
20	red	orange	green	blue	green	Capacity 500 Ah
21	red	orange	green	blue	green	Capacity 550 Ah
22	red	orange	green	blue	green	Capacity 600 Ah
23	red	orange	green	blue	green	Capacity 700 Ah
24	red	orange	green	blue	green	Capacity 800 Ah
25	red	orange	green	blue	green	Charging mode ● off Power Supply ● on
26	red	orange	green	blue	green	External input ● off ● on
27	red	orange	green	blue	green	CAN mode ● off ● on
28	red	orange	green	blue	green	Parallel operation ● off ● on
29	red	orange	green	blue	green	Not used
30	red	orange	green	blue	green	Charging mode ● off ● on

Fig. 4: Charging parameter settings

8 Checking the Charging Parameter Settings

To check the charging parameter settings, it is necessary to switch back to configuration mode.

Check the Charging Characteristic Setting

To check the charging characteristic setting, proceed as follows:

✓ The desired charging parameters are set and saved.

✓ The charger is disconnected from the 230 V mains.

1. Connect the mains plug to a 230 V mains supply.
2. As soon as the 'Ready for operation' LED lights up blue (after approx. 5 s), press the Stop button for 10 s until all LEDs are flashing.

   ⇨ The device is in configuration mode.
3. Press the Stop button until you are in the desired setting for the charging characteristic.

⇨ The LED next to the F1 button lights up orange. The charging characteristic is set and saved.

Check the battery capacity setting

To check the battery capacity settings, proceed as follows:

4. Keeping pressing the Stop button until you are in the desired battery capacity setting.

⇨ The LED next to the F1 button lights up orange. The battery capacity is set and saved.

Check the charging mode setting

The charging mode setting can be checked using the following features:

- If one of the charging modes 'Charging mode (25), External input On (26), CAN mode Master (27), ON:Parallel operation activated (28) or Charging mode (30)' is set, the LED next to the F1 button is not lit.
- If one of the charging modes 'Power Supply (25), External Input Off (26) or CAN mode Master ext. (27)' is set, the LED next to the F1 button lights up orange.

9 Changing charging parameters

The settings of the charging parameters can be changed at any time. To do this, proceed as follows:

✓ The device is disconnected from the 230 V mains supply.

✓ The device is not connected to a battery.

1. Connect the mains plug to a 230 V mains supply.
2. As soon as the 'Ready for operation' LED lights up blue (after approx. 5 s), press the Stop button for 10 s until all LEDs are flashing.
   ⇨ The device is in configuration mode.
3. Set the desired charging parameters as described in *Setting the Charging Parameters [▸ 9]*.

⇨ The charging parameters are changed.

10 Installation

Battery Connection

To install the device in the vehicle, proceed as follows:

1. Disconnect the battery from the on-board power supply.

⚠ **WARNING!** Disconnect the negative cable first.

2. Secure the positive cable of the device as close as possible to the vehicle battery with a suitable fuse.
3. Connect the positive cable of the device to the positive terminal of the battery.
4. Connect the negative cable of the device to the negative terminal of the battery.
5. Connect the vehicle battery to the on-board power supply.

⇨ The device is installed.

Connection to the 230 V Mains

To install the device to the 230 V mains, proceed as follows:

NOTE! The charger is only suitable for connection to fused, earthed 230 V mains supplies.

1. Connect the mains plug to a 230 V mains supply.

⇨ The charger is connected to the 230 V mains supply.

Connecting the Sensor Cable

The sensor cable measures the battery temperature (sensor cable TS) or the battery temperature and voltage (sensor cable CTS) in order to charge the battery optimally.

To connect the sensor cable, proceed as follows:

NOTE! When connecting, pay attention to the instructions and notes in the sensor cable installation instructions.

1. Connect the sensor cable to the charger.

⇨ The sensor cable is connected.

Connecting the D-Sub Connector

The integrated D-Sub connector allows you to control various signals.

Pin	Description
1	CAN Bus high*
2	Voltage sensor (+)
3	Temperature sensor (+)
4	LED green (+)
5	LEB yellow (+)
7	Insulated ground*
8	Pilot Brix
9	CBL relay contact, normally closed
10	CAN bus low*
11	Remote input (-)*
12	Temperature sensor (-)

Pin	Description
14	LED red (-)
18	CBL relay contact, normally open
19	Remote input (+)*
20	Voltage sensor (-)
22	LED (-)
25	Insulated 5 V (50 mA) output (+)*
26	CBL input

*The CAN bus signals, CBL, the remote input and the insulated 5 V output are galvanically isolated from the DC output.

NOTE! Pins that are not listed are not assigned.

External LED Connection

The LED shows the charge status of the battery.

To connect the external LEDs, proceed as follows:

1. Connect the wire ends of the external LEDs to pin 4, pin 5, pin 14 and pin 22.

⇨ The external LEDs are connected.

EBrix Connection (24 V)

You can connect the RBC 24 V charger to the eBrix system using a suitable adapter.

CBL Control Relay Connection

A potential-free changeover contact is integrated in the RBC chargers, which switches during charging operation. This option can be used, for example, to implement an electrical start interlock with 230 V connection or charge monitoring.

Switching Function of the Changeover Contact

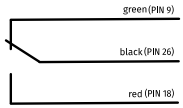

Fig. 5: Switching Function of the Changeover Contact

- When the charger is switched off, pin 9 and pin 26 are connected.
- When the charger is switched on, pin 26 and pin 18 are connected.

Technical Data (insulation)		Capacity (max. values)	
Output to housing:	500 V	Max. 60 V (DC):	0.25 A
Output to ground	120 V		

To install the CBL control relay, proceed as follows:

1. Solder the end of the cable to the D-sub connector.
2. Connect the wire ends to pin 26, pin 9 and pin 18.
3. Plug the D-sub connector into the connector for the CBL control relay on the device.

⇨ The CBL control relay is installed.

11 Operation

11.1 Switching On

To switch on the device, proceed as follows:

1. Connect the mains plug to a 230 V mains supply.

⇨ The device is switched on.

NOTE! After connection to the mains, the LED flashes red for 2 seconds (device test).

NOTE! When the battery is charging, the 'Charging' LED is lit orange.

NOTE! When the battery is fully charged, the 'Charging complete' LED is lit green.

Operating status

			Description
			Battery not connected/No CAN signal
			Charging is interrupted
			Charger in first charging phase
			Charger in second charging phase
			Charger in third charging phase
			Battery fully charged
			Charger waiting for remote

Tab. 1: Display of the operating status LEDs

Charging the Battery

The charger begins to charge the battery as soon as the charger is connected to the 230 V mains.

Interrupting the Charging Process

To interrupt the charging process, proceed as follows:

1. To interrupt charging, press the Stop button.
   ⇨ 'Charging complete' LED flashes green.
2. To continue charging, press the Stop button again.

⇨ The charging process is now interrupted

NOTE! If the Stop button is not pressed again, charging remains interrupted.

11.2 Switching Off

To switch off the charger, proceed as follows:

1. Disconnect the mains plug from the 230 V mains.

⇨ The device is switched off.

12 Maintenance

Check the charger as follows every time before you use it:

- Check the mains cable and mains plug for damage.
- Check charging cables and connections for damage.
- Check the charger for external damage.
- Ensure that the wiring between the charging cable and the charger is secure.

NOTE! For battery maintenance, refer to the battery manufacturer's instructions.

13 Disposal

Dispose of the device in accordance with the Waste Electrical and Electronic Equipment Regulations (WEEE).

The system must not be disposed of with household waste. Take it to a recycling point or return it to your point of sale.

14 EU Declaration of Conformity

The RBC charger complies with the requirements of the following directives:

- 2014/30/EU: EMV
- 2014/35/EU: NRL
- 2011/65/EU: RoHS

15 Appendix

Charging Characteristics

NOTE! To select the correct charging characteristic for your battery, refer to the instructions of your battery manufacturer.

NOTE! The current, compared to the nominal capacity, is given in coulombs (C), e.g. 0.2 C for a 100 Ah battery results in 20 A.

LK10-05 - Freely ventilated lead-acid

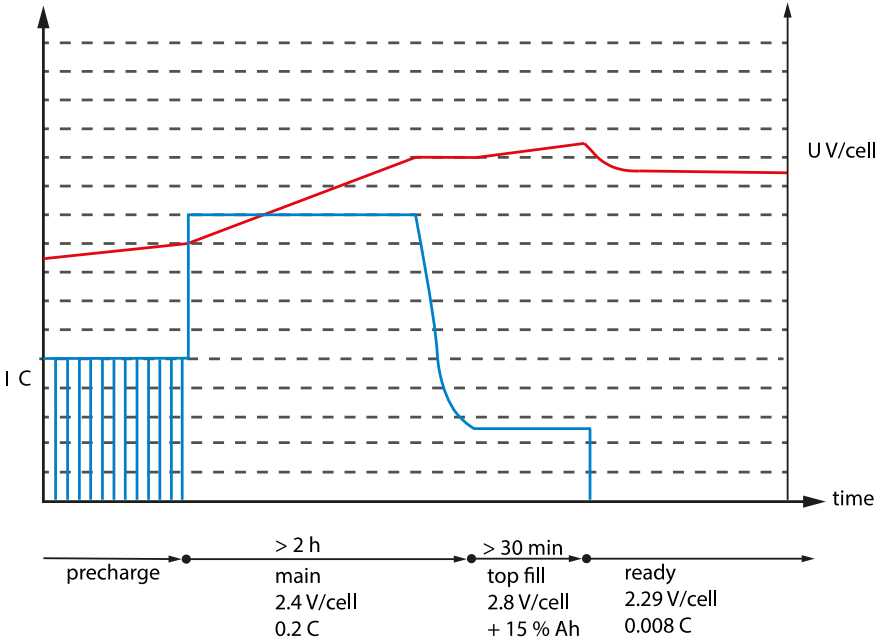

Fig. 6: Charging characteristic LK10-05

In the “Top-Fill” charging phase, the battery is charged with +15% more current compared to the main charging phase.

In the range [-30 °C ... -35 °C] and [+45 °C ... +60 °C] the current is reduced to 0.

Voltage per cell	12 V system	24 V system
2.4 V/ 2.8 V/ 2.29 V	14.4 V/ 16.8 V/ 13.74 V	28.8 V/ 33.6 V/ 27.48 V

LK10-06 - Freely ventilated lead-acid (default)

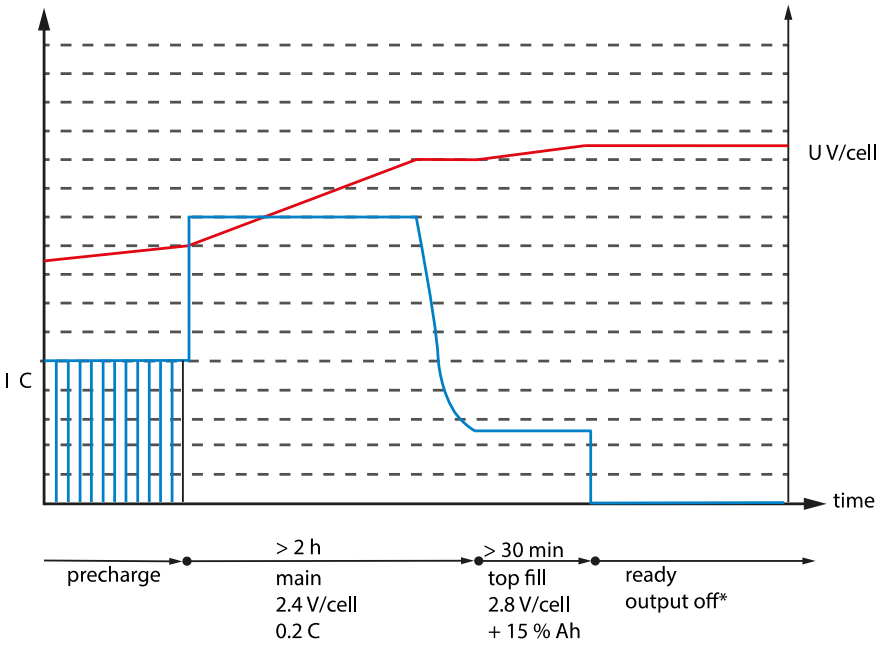

Fig. 7: Charging characteristic LK10-06

In the “Top-Fill” charging phase, the battery is charged with +15% more current compared to the main charging phase.

In the range [-30 °C ... -35 °C] and [+45 °C ... +60 °C] the current is reduced to 0.

In the maintenance phase, the battery voltage is checked periodically; if the battery voltage falls below 2.17 V per cell, the battery is charged for 2 minutes with a pulse charge of 0.05 C.

Voltage per cell	12 V system	24 V system
2.4 V/2.8 V/Off	14.4 V/16.8 V/Off	28.8 V/33.6 V/Off

LK10-18 - Freely ventilated lead-acid

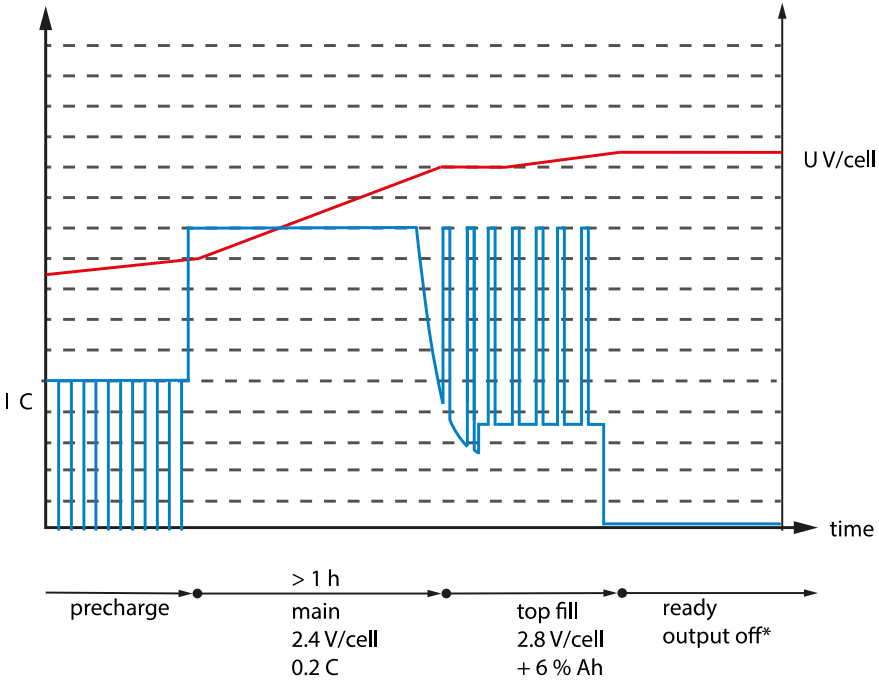

Fig. 8: Charging characteristic LK10-18

In the “Top-Fill” charging phase, the battery is charged with +6 % more current compared to the main charging phase. In addition, the battery is charged with a pulse charge to accelerate the charging process.

In the range [-30 °C ... -35 °C] and [+45 °C ... +60 °C] the current is reduced to 0.

In the maintenance phase, the battery voltage is checked periodically; if the battery voltage falls below 2.17 V per cell, the battery is charged for 2 minutes with a pulse charge of 0.05 C.

Voltage per cell	12 V system	24 V system
2.4 V/2.8 V/Off	14.4 V/16.8 V/Off	28.8 V/33.6 V/Off

LK20-09 - Sealed gel lead-acid

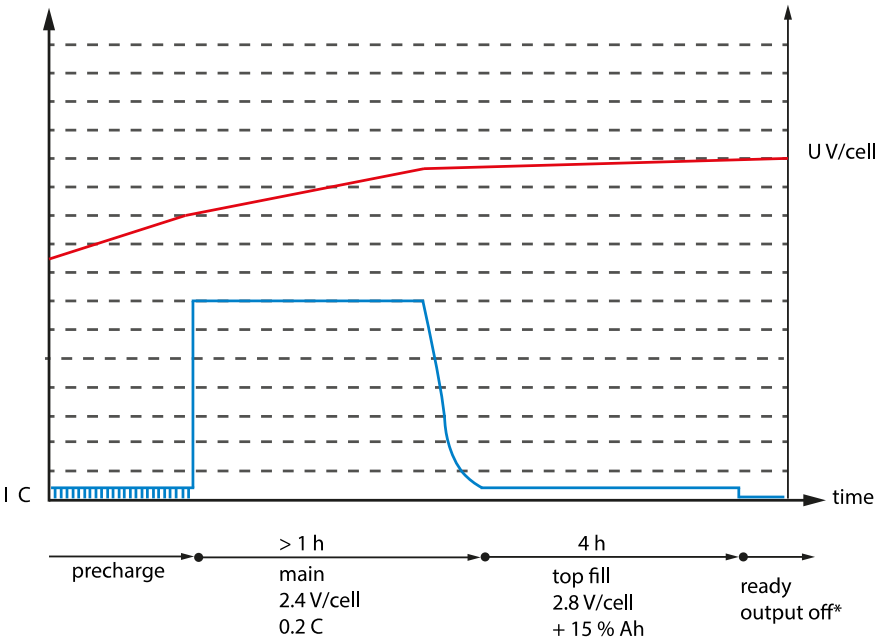

Fig. 9: Charging characteristic LK20-09

The charging characteristic contains an equalisation charge. If the battery is connected to the charger for 16 h, the battery is charged with a 30 hour equalisation charge, a current of 0.006 C and a voltage of 2.8 V per cell.

Voltage per cell	12 V system	24 V system
2.35 V/2.8 V/Off	14.1 V/16.8 V/Off	28.2 V/33.6 V/Off

PP100 - Freely ventilated lead-acid

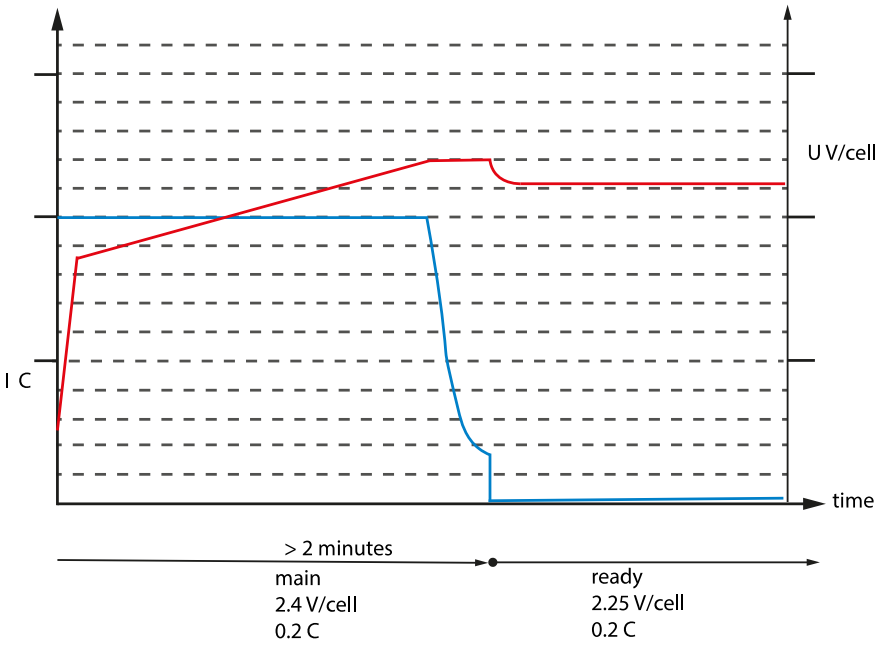

Fig. 10: Charging characteristic PP100

In the range [-30 °C ... -35 °C] and [+45 °C ... +50 °C] the current is reduced to 0.

NOTE! This charging characteristic contains a detection for weak batteries: 0.5 V per cell. Make sure that you do not charge batteries with a smaller number of cells. For example, do not charge a 12 V battery with a 24 V charging characteristic.

Voltage per cell	12 V system	24 V system
2.4 V/2.25 V	14.4 V/13.5 V	28.8 V/27 V

PP101 - Sealed gel lead-acid

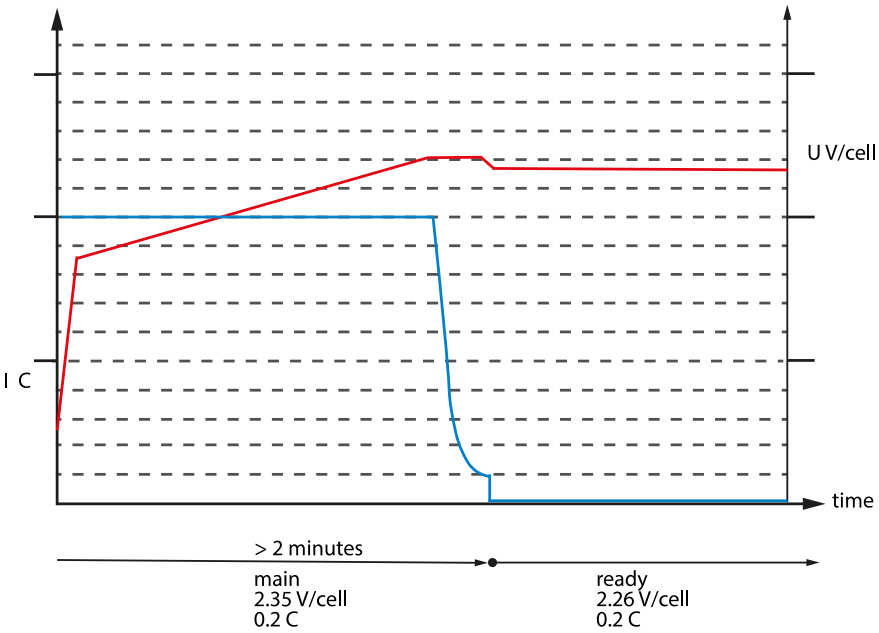

Fig. 11: Charging characteristic PP101

In the range [-30 °C ... -35 °C] and [+45 °C ... +50 °C] the current is reduced to 0.

NOTE! This charging characteristic contains a detection for weak batteries: 0.5 V per cell. Make sure that you do not charge batteries with a smaller number of cells. For example, do not charge a 12 V battery with a 24 V charging characteristic.

Voltage per cell	12 V system	24 V system
2.35 V/2.26 V	14.1 V/13.56 V	28.2 V/27.12 V

PP102 - Sealed gel lead-acid “Sunshine”

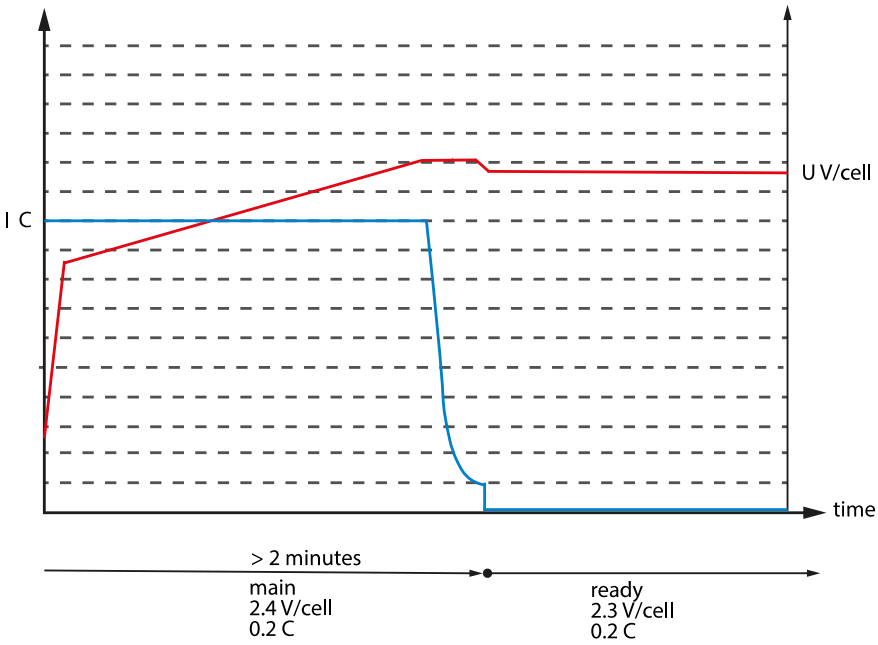

Fig. 12: Charging characteristic PP102

In the range [-30 °C ... -35 °C] and [+45 °C ... +50 °C] the current is reduced to 0.

NOTE! This charging characteristic contains a detection for weak batteries: 0.5 V per cell. Make sure that you do not charge batteries with a smaller number of cells. For example, do not charge a 12 V battery with a 24 V charging characteristic.

Voltage per cell	12 V system	24 V system
2.4 V/2.3 V	14.4 V/13.8 V	28.8 V/27.6 V

We make energy mobile.

LEAB Automotive GmbH
Thorshammer 6
DE-24866 Busdorf
Tel: +49 (0) 4621 9 78 60-0
Fax: +49 (0) 4621 9 78 60-260
info@leab.eu