BELATRON

Outdoor Charger

Operating Instructions

English original version

5139 en
Version 1.00
16.11.2020

10224171

Pay attention to the operating instructions before connecting

Keep the operating instructions in a safe place. These operating instructions contain important information which must be observed during installation and maintenance.

Masthead

Manufacturer / rights owner

BENNING Elektrotechnik und Elektronik GmbH & Co. KG

Münsterstraße 135 – 137

46397 Bocholt

Germany

Phone: +49 2871 / 93-0

Coesfeld Commercial Register HRA no. 4661

General non-discrimination

The manufacturer is aware of the importance of language with regard to the equality of men and women, and endeavours to take this into account at all times. Nevertheless, for the sake of improving readability, differentiated formulations have not been used.

Copyright

Support / Help Desk

BENNING Helpdesk Team
Phone: +49 2871 93-555
Fax: +49 2871 93-417

E-Mail: info@benning.de
Internet: www.benning.de

Table of contents

List of figures

List of tables

1 Basic information

These instructions must be read in full and understood by all persons who work with the product.

These instructions contain important information, which must be followed during operation.

For safe operation of the product, knowledge is required that is provided in these instructions. The information is shown in a brief, clear format, and the chapters and pages are numbered consecutively.
The products are subject to continuous further development. The manufacturer reserves the right to make changes to the product's design, configuration and technology. The information corresponds to the state of technical knowledge at the time of printing. For this reason, no claims for certain product characteristics can be derived from the contents of this documentation.
The owner, installers, service engineers and users must have access to these instructions at all times. They contain the most important instructions for operating the product described in these instructions in a safe and proper way.

- Special attention must be paid to the safety instructions in particular.
- The safety instructions and warnings on the product must not be tampered with.
- The applicable accident prevention and environmental protection rules and regulations must be observed at the usage location of the product.

1.1 Target group

These instructions are intended for the owner, installers, service engineers and users.

1.2 Applicability

These instructions may only be used for the product described.

1.3 Storing the documents

Please look after this user manual carefully.

This user manual can be archived and distributed as a PDF file. A printout should be kept with the product.

In the event of a change of owner, the instructions must be passed onto the successor.

1.4 Purpose of the instructions

The owner, installers, service engineers and users must be familiar with the installation, operation and maintenance of the product.
Further information which goes beyond the scope of these instructions must be requested from the manufacturer or supplier.

1.5 Special information

This is a product for commercial and industrial use. Restrictions concerning the installation or additional measures may be required to prevent faults from occurring.

1.5.1 Description of the accumulator

The accumulator will be referred to as a 'battery' in these instructions and in the display units. To improve readability, we have refrained from consistently using differentiating formulations.

1.6 Legal information

1.6.1 Warranty

Warranty or guarantee claims and the warranty period depend on the respective contractual relationship, as well as the general terms and conditions of the manufacturer. Details about the manufacturer's warranty can be found in the contractual agreements. Warranty and liability claims are generally excluded if the damage is the result of defective assembly, improper use or force majeure. The information in these instructions was checked carefully. However, no liability can be assumed for errors.

1.6.2 Disclaimer

The manufacturer has checked the contents of the instructions for correspondence with the hardware and software that is described. Nevertheless, errors cannot be ruled out, so the manufacturer cannot guarantee complete correspondence. The contents of these instructions are checked at regular intervals, and any corrections that are needed are contained within the versions that follow.

Any misuse of the product shall lead to termination of the guarantee, the warranty and the manufacturer's general liability.

The manufacturer is not liable for damage resulting from failure to follow these instructions.

Any use other than that described in the manual is considered to be incorrect. The manufacturer is not liable for resulting damage. Modifications to the product or the manual are prohibited.

1.6.3 Software changes

If software changes are made without the manufacturer's knowledge and approval, the right to liability and warranty claims shall be invalidated.

1.6.4 Hardware changes

If changes are made to the housing or other components of the product without the manufacturer's knowledge and approval, the right to liability and warranty claims shall cease.

1.6.5 Figures and drawings

For general illustrative purposes, this user manual includes illustrations and drawings. The functional options and representations may differ from the actual product.

1.6.6 Trademarks

All trademarks that are used are the property of their respective owners, even if they are not separately marked as such.

1.6.7 Legal claims

Any liability on the part of the manufacturer for consequential damage arising from improper use or incorrect installation of the product is expressly excluded.

1.6.8 Declaration of conformity

A corresponding declaration of conformity is kept available for the relevant authority on the manufacturer's premises and can be obtained on request.

2 Safety

2.1 Basic safety information

The product is built according to the state of the art and the recognized safety regulations. In spite of this, the life and limb of the user or third parties may be at risk, and the product or other material assets might be affected.

The manual is an important constituent of the product, and applies exclusively for this product.
The information contained within these instructions is binding, and must be followed at all times.
Failure to follow the handling instructions and safety instructions in these instructions, tampering with the product or using it for an unintended purpose may result in considerable danger.
In addition to the manual and the binding accident prevention regulations which are applicable in the country and place of use, the recognized professional rules for safe and proper working must also be observed.
Additional warnings are provided to guarantee adequate safety for personnel. Adequate safety when handling the product is only guaranteed when these are observed.

2.2 Safety instructions

These instructions contain instructions that must be observed for personal safety and to prevent personal injuries and property damage.
The safety instructions are indicated by warnings. The warnings are shown in descending order depending on the hazard level. The instruction contains details of the nature and source of the danger, the consequences if the danger arises and measures for averting the danger if necessary.
If you see one of the instructions shown below in the manual, extreme caution is required.

2.3 Identifying the safety instructions

Safety instructions and warnings indicate hazard areas and are attached according to DIN ISO 3864 and ANSI Z535.6.
All safety instructions are structured as follows:

SIGNAL WORD

Type and source of the danger
Possible consequences in the event of non-compliance
Measures and prohibition to avoid the danger

2.4 The safety instructions' warning levels

DANGER

Extremely dangerous situation for persons
Failure to pay attention to this note will result in irreversible or fatal injuries..

WARNING

Danger for persons
Failure to pay attention to this note may result in irreversible or fatal injuries.

CAUTION

Slight danger for persons
Failure to pay attention to this note may result in minor or moderate injuries.

NOTE

Slight danger for persons
Failure to pay attention to this note may result in damage to property and environmental damage and affect further operation.

Electrically skilled person

Work that is marked "electrically skilled person" may only be carried out by an electrical expert!

2.5 Safety signs in the operating room

The access area to the operating room must have clearly visible safety signs indicating unauthorised and limited access or for codes of conduct in the operating room according to the local provisions.

If strong electromagnetic fields occur, there must be prohibitions in place for people wearing pacemakers and metal implants.
Additional safety and warning signs can be found near the hazard areas. These provide information about risks and residual risks associated with working on the charger.
The set-up of the charger and safety marking for hazards with fire and rescue drawing, escape route, phone numbers and handling are within the scope of legal provisions IEC 60364-7-729 in the sovereignty of the operator.

2.6 Symbols used

	Warning – non-ionising radiation
	General prohibition
	General warning
	General requirement
	Warning – electrical voltage
	Risk of fire
	Warning – hot surfaces
	Denotes additional information and instructions.
	Recycling symbol
	Symbol used to identify assemblies that are subject to electronic scrapping regulations.
	Symbol used to identify assemblies or parts that must be disposed of in a specific manner. These components may not be thrown in the rubbish bin.
	Symbol used to identify packages / shipped goods that are fragile / sensitive due to their properties.
	Symbol used to identify packages / shipped goods whose correct storage position is indicated by ‘Up’ arrows.
	Protect from cold
	Protect from direct sunlight.
	USB interface
	(DC) direct voltage or current
	(AC) alternating voltage or current
	Earth

Table 2-1: Used symbols – safety

2.7 Personnel qualifications

The product to which these instructions belong must only be handled by **personnel who are qualified** for the respective task.

The owner must ensure that the personnel performing the tasks at hand have the required qualifications.

A clear distinction must be made between personnel responsibilities for the task.

Before using the product, the operator must arrange and successfully carry out the required training courses, further education and instructions that the personnel require.

Inadequately qualified personnel are a risk factor for which the owner of the product is liable.

Specialists / experts in the context of the accident prevention regulations are people who can assess the work that has been assigned to them and recognise potential dangers based on their technical training, knowledge, experience and knowledge of the applicable regulations.

Qualified electrical professionals/ electrically skilled person in the context of these notes are persons who are familiar with setup and installation, commissioning, operation, maintenance and dismantling, and who have the appropriate qualifications.

The maintenance of the charger must only be carried out by qualified and authorised qualified electricians.

Further education or training for personnel is available from the manufacturer or supplier.

Electrically skilled persons in the context of this information are people who are familiar with assembly and installation, commissioning, operation, maintenance and dismantling, and who have the appropriate qualifications. They are responsible for compliance with the applicable standards and regulations.

Electrically skilled person with AuS certification are responsible for compliance with existing standards and regulations, particularly VDE 0105, DGUV Regulation 3 and DGUV Rule 103, or the national rules and regulations. This certification is required so that work on live parts of electrical systems and operating equipment (live-line working) can be performed safely.

2.8 Qualifications for installation and maintenance

The electrical installation and maintenance work may only be carried out by a qualified electrician in accordance with the electro-technical regulations.

In these instructions, these chapters are marked with the following note.

Electrically skilled person

2.9 Intended use

The product may only be used for the use cases described in these instructions and in the technical descriptions, and only using the accessories and components authorised by the manufacturer.

The product may only be used if it is in a technically flawless condition for safe operation.

All instructions and information in these instructions, as well as the technical data sheets, must be observed.

Operation outside the specifications prescribed by the manufacturer is prohibited.

In the event of improper use or use for incorrect purpose, there might be danger to life and limb of the user or third parties, and the unit or other material assets might be affected.

The product is a charger. It may only be used to charge 48 V machines that are compatible with the Volvo requirements. The permissible connected loads in accordance with the technical data may not be exceeded. The prescribed operating position and operating type must be observed.

Among other things, incorrect use and use for incorrect purpose are:

- Mobile use (if the charger is in operation)
- Use in areas at risk of explosion
- Use in areas with humidity that is higher than the humidity specified in the data sheet
- Operation outside of the specifications prescribed by the manufacturer.

Observe protection class IP54

Conversions or modifications that have not been authorised by the manufacturer are not permitted. Only spare and replacement parts that have been approved by the manufacturer may be used.

The persons responsible must ensure that:

- Safety instructions and operating manuals are available and complied with;
- The operating conditions and technical data are observed;
- Safety devices are used;
- Prescribed maintenance work is carried out;
- The maintenance personnel are notified immediately or the product is switched off immediately if abnormal voltages or noises, high temperatures, vibrations or the like occur so that the cause can be determined.

These instructions contain all the information required for use. These instructions do not contain any additional information or notes.

The manufacturer's warranty obligation only applies if these instructions are observed and complied with.

2.10 General residual risk

DANGER

Risk of explosion and ignition

When using unsuitable machines or batteries

- Serious injury to persons and damage to property can occur if the wrong machines/batteries are connected.

DANGER

Danger to life due to electric shock

Using damaged cables.

- Check the cables for potential damage.

DANGER

Danger to life due to electromagnetic fields

The health of people who wear pacemakers, metal implants or hearing aids may be harmed.

- These people must consult their doctor before entering a room that this system is being operated in.

WARNING

Danger to life due to electric shock

Dangerous voltages are present within the charger, even when fuses have blown!

- For this reason, do not use water if and when a fire breaks out.
- The DIN VDE 0132:2001-08 standard or national regulations describe protective measures for firefighting in the area of electrical systems.
- Only use suitable means for extinguishing purposes.

WARNING

Risk of injury due to falling!

There is a risk of tripping over charging cables left lying around.

- Route charging cables so that no-one can trip over them or become caught.
- After completing the charging procedure, wind up the cable or put onto the cable holder (if present).

2.11 Personal protective equipment

Experts

WARNING

Risk of injury!
If personnel are not wearing personal protective equipment, they run a considerable risk of injury.

- ➢ Personal protective equipment must be worn when transporting, setting up, assembling, installing and maintaining the system!

It is strictly prohibited to perform assembly, installation or preventative maintenance work on the unit without the following specified personal protective equipment.
The personnel tasked with carrying out installation or preventative maintenance must not wear bracelets, watches or other conductive parts.
The personal protective equipment to be worn is summarised in the following information signs. The individual equipment must be specified and assessed depending on the type of risk (particularly for electrical hazards) existing for the unit.

	**Safety boots** Use: always		**Protective clothing** Use: always
	**Hard hat** Use: if there are suspended loads		**Work gloves** Use: always
	**Safety goggles** Use: always		

Table 2-2: Personal protective equipment – safety

2.12 Safety rules according to EN 50110 / NFPA 70E / VDE 0105

Electrically skilled person

Safety rules

1. **Disconnect completely**
2. **Secure against re-connection**
3. **Verify that the installation is dead**
4. **Carry out earthing and short-circuiting**
5. **Provide protection against adjacent live parts**

2.13 Fire protection

WARNING

Danger to life due to electric shock

Water or foam may only be used as an extinguishing agent in accordance with DIN VDE 0132 and the country-specific standards.

➢ Use CO2 or an extinguishing agent in **fire class B**.

Fire, open flames and smoking are prohibited in the operating room. Inflammable materials or explosive substances are not to be stored in the operating room.

The operating and maintenance personnel must be demonstrably instructed in how to behave in the event of fire at regular intervals in compliance with NFPA 70 and the national regulations.

Firefighting in electrical systems must be carried out in accordance with VDE 0132, NFPA or national standards such as OSHA 1910 para. E or existing NFPA standards.

- Rescuing people takes precedence over preventing property damage.
- Alert the fire brigade/rescue teams.

Electrical devices must be maintained for fire prevention at regular intervals in accordance with IEC / EN 61557 or country-specific regulations.

Isolate the unit immediately in the event of smell or smoke development or fire in accordance with the regulations!
Notify the person responsible and the maintenance personnel and initiate firefighting measures if necessary.

2.14 Identification

2.14.1 Type plate (example)

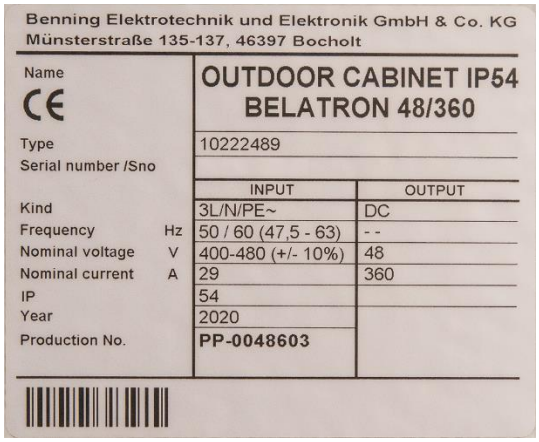


Figure 2-1: Type plate

The exact technical data can be found on the type plate on the charger and the information on the technical data in the appendix.

3 Scope of delivery

The precise item description and item number can be found in the delivery papers. The product is documented in detail in the delivery papers.

The delivery consists of at least the following parts:

- Charger with preset charging programme,
- Mains supply with three-phase 32 A CEE plug
- Machine charging cable with special “MRC 400” charging cable for 48 V Volvo machines
- Operating instructions

The scope of delivery and the type of charger can differ depending on customer requirements. Further technical details are defined in the enclosed delivery papers (and in the order confirmation).

4 Transport

DANGER

Danger to life due to suspended loads!

Use of unsuitable and technically faulty lifting gear and load-carrying equipment with an insufficient load-bearing capacity!

- In the event of transport by crane, suspended assembly or dismantling, the system must be carefully attached to lifting gear and secured. Only use suitable and technically flawless lifting gear and load-carrying equipment with a sufficient load-bearing capacity!
- Never remain or work below suspended loads!
- Only task experienced specialists with attaching loads and instructing crane operators. The banksman must be in the crane operator's line of sight or maintain voice contact with them.
- Failure to observe these warnings may lead to death or severe physical injury.

WARNING

Risk of injury!

Lack of personal protective equipment

- Personal protective equipment must be worn when transporting, setting up, assembling, installing and performing preventative maintenance on the system!

WARNING

Risk of injury!

Due to installation of damaged components!

- Do not accept units with visibly damaged packaging, and do not install under any circumstances.
- Contact your supplier!

CAUTION

Risk of injury due to heavy weight!

The unit is very heavy.

- Observe the weight and use auxiliary equipment.

CAUTION

Risk of injury due to toppling over!

The unit may topple over due to its high centre of gravity

- The unit must be secured to prevent it from tipping over!

⚠ CAUTION

Risk of injury due to toppling over, falling or swinging

The unit can tip over or fall due to careless or excessively fast lifting and transport.

- ➢ Always transport the unit as close as possible to the ground.
- ➢ Use all attachment points for transport.
- ➢ Only use means of transport and lifting gear that is designed for the weight of the unit.
- ➢ Avoid making fast and jerky movements during transport.
- ➢ Always maintain a sufficient safety distance from the unit.

NOTE

Property damage due to transport

The unit can be damaged by careless transport.

- ➢ The unit must be securely packed for transport
- ➢ Do not subject the unit to shocks

Each component is delivered by the manufacturer in electrically and mechanically perfect condition. The transport company is responsible for any transport damage.

The sales/service department of the manufacturer/supplier must be notified of transport damage immediately in writing (within 6 working days of receipt of the goods at the latest)

- The product may only be transported to the intended location in its original packaging. Attention must be paid to securing the load.
- The product may only be transported and stored in an upright position. The transport position must be secured during transport. Attention must be paid to the product's centre of gravity. With this product, slight changes in position can lead to individual components suddenly toppling due to the heavy weight.
- It must also be ensured that the product is securely positioned when in storage.
- Lifting belts must be used when transporting the product in an unpacked state. They must be positioned so that no damage can occur.

4.1 The system's centre of gravity

The centre of gravity is not in the centre. This must be taken into account during transport.
The centre of gravity is marked on the packaging with the centre of gravity symbol.

Figure 4-1: Centre of gravity symbol

4.2 Transport options

4.2.1 Transport with lifting belts

NOTE

Property damage in the event of overload!

- ➢ Only use lifting belts approved for the weight!

Lifting belts must be used when transporting the unit in an unpacked state. They must be positioned so that the instruments and switches on the front door cannot be damaged.

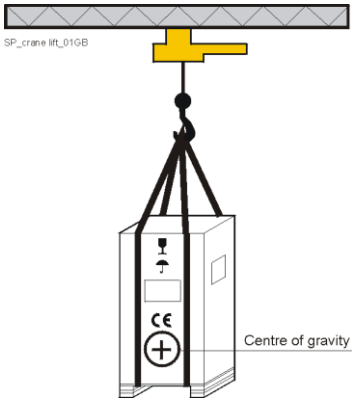


Figure 4-2: Transport with lifting belts

4.2.2 Upright (vertical) transport on crane eyelets

Use only the original crane eyelets or swivel lifting eyes for transporting the system with the crane. The crane eyelets were installed by the manufacturer.

The information shown in Figure 4-3 must be observed when transporting the unit upright using crane eyelets.

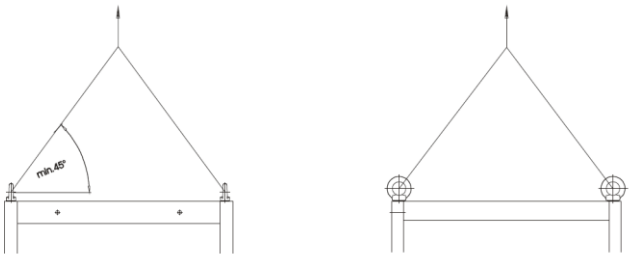


Figure 4-3: Crane eyelets – vertical transport

4.2.3 Transport with a fork lift, lift truck or crane fork

⚠ CAUTION

Risk of injury!
Due to the unit falling or toppling over!

- ➢ The weight of the unit can injure a person and cause severe crushing injuries! For this reason, the unit must be lifted with suitable lifting gear that is designed for the weight of the unit.

The unit may only be transported using a crane fork. Pay attention to symmetrical load distribution, and secure the unit to prevent it from tipping over!
Prerequisites:

- The fork lift is designed for the weight of the unit.
- The fork lift's forks must be inserted fully beneath the transport pallet in suitable locations. Attention must be paid to the centre of gravity when doing this.

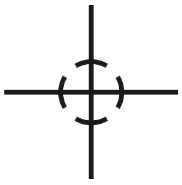
PERMISSIBLE:	IMPERMISSIBLE
Centre of gravity symbol 	**Tipping over** 
Fork lift/lift truck 	

Figure 4-4: Transport

5 Storage

NOTE

Malfunctions can be caused by incorrect storage.

➢ For this reason, please observe the conditions specified.

During storage, please note that 

- The product must be stored in a suitable location, and in particular never left unprotected outdoors. It is advisable to store the product in dry, dust-free rooms and away from chemical substances.
- Because condensation might form, it must be ensured that the product is not subjected to large temperature differences during storage. Temperature fluctuations greater than 20 K per hour are impermissible.
- Please refer to the technical data for the values for a suitable storage temperature. The values in the technical data must not exceed or fall below the given limits.
- Please refer to the technical data for the relative humidity (non-condensing) values. The specified values must not be exceeded.
- If the product is stored at high humidity for an extended period of time, allow it to dry out for more than one day before connecting it to the power supply.

6 Product description

The charger consists of a controllable, high-frequency switched mode power supply with microprocessor-controlled charging electronics. The operating and display unit signals all charger statuses using a status indicator. Charging can be interrupted and continued again using a button. The charger is programmed so that it is compatible with 48 V Volvo machines. The charging process is controlled from the machine. The charger shuts off automatically if there are faults.
The individual modules of the charger are installed in a robust housing.
The charger is low maintenance.

A controlled heater and ventilator is integrated in the outdoor housing. This makes operation possible in a wide range of areas in winter and summer.

6.1 Description of accessories and function

6.1.1 MRC 400 charger

The MRC 400 charging plug supplied with the charger has to be used to charge suitable 48 V Volvo machines.
The charger can be used to charge other machines, batteries and units if the 48 V Volvo requirements are met.
The control contacts are also located in the MRC 400 charger. If a disconnection of the machine from the charger is detected during charging, the charging is stopped immediately.

6.2 Description of safety devices

All live assemblies are equipped with housings and covers that can only be removed using tools. All cables and plugs are properly screened and earthed. The charger is designed in accordance with the protection class; see type plate.
All electrical and electronic components bear the CE symbol; all of the necessary isolating distances have been adhered to. All circuits are protected by primary and secondary fuses with defined current rating and rupturing characteristics.
All metal components are earthed via a protective conductor system.
The charger is equipped with an automatic shut-off function as soon as the preset maximum charging state of the machine has been reached. This prevents overcharging and excessive generation of explosive vapours.

6.3 Views

Figure 6-1: BELATRON Outdoor closed and open

7 Assembly

Electrically skilled person

WARNING

Risk of injury!
If personnel are not wearing personal protective equipment, they run a considerable risk of injury.

- Personal protective equipment must be worn when transporting, setting up, assembling, installing and performing preventative maintenance on the unit!

WARNING

Danger to life due to installation of damaged components
Danger due to installation of damaged components

- Check the components for visible damage.
- Damaged components may not be installed!

WARNING

Danger to life due to improper assembly!
Improper assembly can lead to considerable injuries.

- Carry out assembly correctly.

WARNING

Risk of fire in the event of improper assembly
Improper assembly increases the risk of fire!

- Carry out assembly correctly.

CAUTION

Risk of crushed fingers or hands

Crushing can occur on the hinge side of the door.

- Do not reach into the hinge side of the door!
- Close the door carefully!

CAUTION

Risk of injury due to heavy weight

- The weight of the unit must be considered.
- The assembly site and subsurface must be suitable.

CAUTION

Risk of injury due to faulty or unsuitable tools!
The use of unsuitable tools or incorrect handling can lead to injuries!

- Only use suitable, fault-free tools.
- Use appropriate personal protective equipment.

7.1 Installation location requirements

The charger can be set up outdoors in accordance with IP54.

Before starting with the installation, the scope of delivery should be checked for completeness in accordance with the enclosed delivery documents. Also see chapter 3, Scope of delivery, page 17.

- No liquids must be able to get into the inside of the charger.
- The horizontal distance between the charger and combustible materials must be at least 2.50 m. Both the storage of flammable materials and the use of flammable construction materials above the charger is not permitted. The clearance from areas that are at risk of fire or explosion must be at least 5 m.
- The charger must be protected from impermissible stress. It is particularly important for components not to be damaged during transportation and handling. Contact with electronic components must be avoided. The charger corresponds to the protection class; see type plate.
- Space must be available to place the machine next to the charger.
- Clearance of at least 30 cm must be maintained in the air supply and exhaust areas.
- The air supply must not be adversely affected by other devices (exhaust from other devices etc.).

7.1.1 Subsurface

- The subsurface must be able to bear the weight.
- The subsurface must be even.
- The subsurface must not be flammable.

7.2 Preparing components

Unpacking	
No.	**Action**
1	Open the packaging with a suitable tool.
2	Remove the accompanying documentation and assembly parts.
3	At least two people should remove the components from the packaging.

8 Installation /commissioning

The charger has been equipped with a three-phase 32 A CEE plug at the factory. A 32 A three-phase CEE mains connection is needed at the intended deployment location for operating the charger. The mains voltage and frequency must match the specifications on the type plate. The mains connection must be properly earthed.

The charger must be protected from excessive contact voltages in accordance with the local energy supply company regulations.

If another plug or a fixed installation is required, the installed plug can be removed or replaced by a plug with the same or higher requirements. The requirements can be found in the technical data sheet.

8.1 Mains connection and mains fuses

A mains fuse according to the following table must be connected upstream:

Rated current	Mains fuse	Comment
23 to 32 A	32 A gL	gL melting fuses or circuit breakers with B or C characteristic in accordance with EN 60898 can be used.

Table 8-1: Mains connection fuse protection

If the line-side use of a residual current device (RCD) is required, only type B is permitted!

If an RCD device is present in the mains distributor, it could in some cases be triggered during activation/plug in due to the high capacity in the EMC filter.

- ➢ If this happens, then the RCD device has to be activated after connection or activation of the charger.

8.2 Unplugging the charger

With mains plug
If the mains plug is used as the isolator, it must be easily accessible.

With fixed installation
For fixed connected chargers, an easily accessible isolator must be installed outside the device.

External isolating devices are not included in the scope of delivery. These must be provided by the operator.

8.3 Initial start-up and function test

The charger may only be used in a technically perfect condition and in accordance with its intended use in a safety-conscious and danger-conscious way, paying attention to these operating instructions. It is particularly important that safety-related faults are remedied immediately.
The information on the type plate concerning the permissible machine voltage must be checked before connecting the charging cable and complied with. It must be ensured that the charging cables and the machine are connected with the correct polarity. (This is determined by the charging plug)
If safety-related modifications are made to the charger or changes in operating behaviour are observed, the charger must be taken out of service immediately and the fault reported to the responsible area.
If problems occur in the electrical power supply, shut off the charger immediately.
Once the charger has been properly set up and installed, it must undergo an initial start-up to perform a function test. Proceed as described in the following chapter.

9 Operation

The individual operating steps are described in more detail in the following sections. These sections must be carefully read before starting to operate the charger.

Action instructions for charging a machine:

- Check whether the charger and the machine are compatible with one another.
- Connect the charger to the power supply.
  - ➢ (Plug in the mains plug (the mains plug must be dry!) /
    Switch on if there is a fixed connection.
- Connect the machine to the charger.
  - ➢ Remove the protective cover from the charging plug.

  - ➢ Plug the charging plug into the machine.
- Activate the charging function on the machine.
  - ➢ See the Volvo operating instructions.
  - ➢ The charging procedure starts automatically.
  - ➢ The charging procedure stops automatically.
- Disconnect the machine.
  - ➢ Unplug the charger from the machine.
  - ➢ Close the charging plug with the protective cover.

9.1 Description of the operating and display unit

There are indicators and a button on the outside of the outdoor housing.

Yellow

Green

Red

Button

Figure 9-1: External operation and signalling

9.1.1 Operating unit in the charger cabinet (only for maintenance)

Electrically skilled person

The following operating and display unit with a charge condition traffic light and a start / stop button can be found on the front of the charger inside the outdoor charger.

Figure 9-2: Charge condition traffic light and stop button

9.1.2 Meaning of the charge condition indicator

Colour	Condition / symbol	Phase / meaning	
red	permanent	Charging aborted by a fault	Fault
yellow	permanent	No active charging	Check condition of charger
	flashes	No active charging	Check machine conditions in order to start
green	permanent	End of charging procedure (no error)	Charging procedure complete, battery fully charged
	flashes	Main charging phase	Charging in progress Battery not completely charged
off	permanent	Charging interrupted	No active charging Removed cable
	permanent	Charging interrupted	Charging procedure has stopped Stop button has been pressed (Transitional status)

Figure 9-3: Meaning of the charge condition indicator

9.1.3 Function of the button

Symbol	Meaning	Colour	Explanation
	On/Off	light grey	Press once to interrupt charging procedure

9-4: Function of the button

9.2 Interrupting the charging procedure

The operation of the charger does not require any interruptions during the charging procedure. However, other influences may make it necessary to interrupt the charging procedure.

However, please note:
The charging procedure is interrupted if the On/Off button is pressed on the front control panel.

- Press the On/Off button once.
  - ➢ All of the charge status lights are permanently on

    If the end of charging has already been reached when the button is pressed, the charge state traffic light illuminates in green.

The charging process is not continued when you press the On / Off button again.

- To continue charging, disconnect the charging plug from the machine and reconnect it.
  - ➢ The charge state traffic light starts blinking green again.

During normal operation the charging procedure should not be stopped before the automatic shut-off occurs. Premature shut-offs lead to insufficient charging. This can reduce the availability of the machine.

Interrupting the mains voltage
A new charging procedure is started automatically after the mains voltage has been interrupted!

9.3 Charging procedure ends automatically

The charging procedure stops automatically if the charging programme is complete, i.e. the machine has been charged. The charge condition traffic light then illuminates in green (*charging complete*).
If the machine is needed, stop the charging.
Unplug the charging cable from the machine.

9.4 Malfunction and fault indicators

Faults and the condition of the charger are indicated by the charge status traffic light. The meaning of the status colours or the flashing pattern that is displayed are described in section 9.1, Description of the operating and display unit, page 30.

9.5 Shutting off the charger

The charger must be disconnected from the power supply if:

- The charger is not constantly required,
- The charging electronics are to be set to the initial state (Reset), e.g. if a malfunction has been indicated.

10 Maintenance

Electrically skilled person

DANGER

Danger to life due to electric shock.

Severe injuries or death due to contact with the cables and terminals on the unit.

- All work on the unit must be carried out in accordance with DGUV Rule 3 or national regulations!

DANGER

Danger to life due to electric shock.

Severe injuries or death due to contact with the cables and terminals on the unit.

- Even if the unit is switched off, there can still be voltages present on the terminals!
- Disconnect the machine from the charger (unplug the charging plug).

DANGER

Risk of explosion

There is a risk of explosion if the batteries short circuit.

- Disconnect the machine from the charger (unplug the charging plug).

Damage caused by short circuit

Never use compressed air to clean. This could allow dust particles to get into the charging electronics and cause faults.

Damage caused by incorrect spare parts

Only spare parts approved by the manufacturer may be used.

10.1 General information about maintenance

Like any other electrical device, this charger requires preventive maintenance. Regular maintenance and tests of your installation guarantee higher reliability.

Maintenance work may only be carried out by the manufacturer's Service department.

It is advisable to conclude a maintenance and service contract with the manufacturer.

If any prescribed preventative maintenance work is not performed regularly or is performed, but not on time, according to the manufacturer's specifications during the warranty period, a decision about a warranty claim can only be made once the findings are available.

10.2 Inspection

Electrically skilled person

DANGER

Danger to life due to electric shock.
Severe injuries or death due to contact with the cables and terminals on the unit.

- Even if the unit is switched off, there can still be voltages present on the terminals!
- Disconnect the machine from the charger (unplug the charging plug).

DANGER

Danger to life due to electric shock
Severe injuries or death due to contact with the cables and terminals on the unit.

- Use appropriate personal protective equipment.
- Use an insulated tool.
- Protective covers may only be removed by electrically skilled person.

The inspection involves checking the entire charger.
The actual status of the charger is determined and documented; in doing so, the functioning as well as the settings and values are inspected. During the inspection, it is determined whether the charger is in a proper, functioning and safe condition.
The inspection is performed by a qualified person. Checks must be performed at regular, predetermined intervals. The inspection intervals depend on the extent of the environmental influences as well as the system load.

It is advisable to have the inspection performed by the manufacturer.

The manufacturer recommends an annual inspection.

10.3 Maintenance

Electrically skilled person

DANGER

Danger to life due to electric shock

Severe injuries or death due to contact with the cables and terminals on the unit.

- ➢ Use appropriate personal protective equipment.
- ➢ Use an insulated tool.
- ➢ Protective covers may only be removed by electrically skilled person.

Work on the charger takes place during maintenance. All measures taken should be recorded in a log.

Regularly performed and documented maintenance retains the warranty.

10.3.1 Maintenance schedule

General visual inspection, comprising:

- Examination of switchgear and accessible PCBs for traces of smoke.
- Removal of foreign bodies.
- Remove heavy soiling from the charger from the outside.
  - ➢ Removal of foreign bodies.
- Checking the terminals.
  - ➢ Checking connections.
  - ➢ Checking that screws are tight.
  - ➢ Re-tightening screws at contact points.
- Checking the charger's functional state.
- Checking and (if necessary) correcting all the parameters within the charger.
- Comprehensive documentation of all maintenance results.

10.3.2 Maintenance interval

If any prescribed preventative maintenance services are not performed regularly or are performed, but not on time, according to the manufacturer's specifications during the warranty period, a decision about a warranty claim can only be made once the findings are available.

Regular maintenance is required for device reliability!

It is advisable to have maintenance work performed by the manufacturer.

The manufacturer recommends to check and, if necessary, replace the following components in accordance with the specified intervals.

Maintenance work / checks	Maintenance interval (Recommendation)
Inspect and clean the air vents if necessary.	12 months
Check the tightness of the cable connections and re-tighten them if required. Watch out for discolouration or changes to the insulation and the terminals. Replace damaged cable connections or corroded contact elements if necessary.	12 months
Check warning labels and replace them if necessary.	12 months
Visually inspect existing fuses, isolators and contacts. Replace damaged parts if necessary.	12 months
Check covers and that locking mechanisms are working.	12 months

10.4 Cleaning

Electrically skilled person

DANGER

Danger to life due to electric shock

Severe injuries or death due to penetration of moisture.

- ➢ The device may only be opened by an electrically skilled person.
- ➢ Only use dry materials for cleaning the device.

WARNING

Risk of fire

Risk of fire when using flammable cleaning agents.

- ➢ Do not use flammable liquids for cleaning purposes.

CAUTION

Property damage

Property damage if the incorrect cleaning products are used.

- ➢ Cleaning products containing hydrocarbons may not be used for electrically stressed insulating parts.

Damage caused by short circuit

Do not use compressed air under any circumstances, since dust particles may get into the inside of the charging electronics and cause faults.

Clean the unit regularly. Remove loose dust using a vacuum cleaner or soft brush.

10.5 Repair

Electrically skilled person

DANGER

Danger to life due to electric shock

High voltages can lead to death.

- Switch off all the feeders and secure them against being switched back on again!
- Check that the system is free of voltage!
- Use appropriate personal protective equipment.
- Remove watches, rings, chains or similar conductive parts from your body or clothing.
- Observe chapter 2.12, Safety rules according to EN 50110 / NFPA 70E / VDE 0105, page 15.

DANGER

Danger to life due to electric shock!

Severe injuries or death due to contact with the cables and terminals on the unit.

- Preventative maintenance work may only be performed by qualified electricians.
- Ensure that the workplace is clean!
- Loose parts can cause accidents!
- All work on the unit must be carried out in accordance with DGUV Rule 3 or national regulations!

WARNING

Risk of injury!

Lack of personal protective equipment

- Personal protective equipment must be worn when transporting, setting up, assembling, installing and performing preventative maintenance on the unit!

WARNING

Risk of injury due to short circuit or spark formation

Severe injuries caused by coming into contact with or connecting live components.

- Use appropriate personal protective equipment.
- Damaged components must not be installed.
- Use an insulated tool.

Damage caused by incorrect spare parts

Only spare parts approved by the manufacturer may be used.

Depending on the type of repair, partial testing of the system in accordance with VDE 0105 Part 100 may be necessary, unless this is pending within the scope of repeated testing.

10.6 Safety checking in accordance with DGUV regulation 3

Contact the manufacturer's service department.

11 Decommissioning and dismantling

Electrically skilled person

DANGER

Danger to life due to electric shock

High voltages can lead to death.

- Switch off all the feeders and secure them against being switched back on again!
- Check that the system is free of voltage!
- Use appropriate personal protective equipment.
- Remove watches, rings, chains or similar conductive parts from your body or clothing.
- Observe chapter 2.12, Safety rules according to EN 50110 / NFPA 70E / VDE 0105, page 15.

11.1 Disconnecting the charger from infeeds

Disconnect the charger from the mains.

Disconnect the charger from the machine.

Observe chapter 2.12, Safety rules according to EN 50110 / NFPA 70E / VDE 0105, page 15.

12 Spare parts list

A spare parts list is contained in the service manual.

13 Disposal

The manufacturer is particularly concerned with the environmental compatibility of its complete product range.
The issue of environmental compatibility plays a key role in its supplier selection process.
Most of the individual components are transported in recyclable packaging.
The charger and the associated transport packaging mainly consist of recyclable raw materials.

13.1 Packaging

Recycled materials are used for the packaging.

The transport packaging must be properly disposed of.

13.2 Recycling components

Components integrated into the unit are subject to the specifications of the German Electrical and Electronic Equipment Act (ElektroG) and must be recycled.

14 Abbreviations used

ADR/GGVSEB	Certificate for the transport of hazardous goods
ANSI	AmericanNationalStandardsInstitute
EMV	Elektromagnetische Verträglichkeit / Electromagnetic Compatibility
EVU	Energieversorgungsunternehmen / Power supply company
VDE	Verband der Elektrotechnik, Elektronik und Informationstechnik e.V. / German Electrical Engineering Association)
BMK	Betriebsmittelkennzeichnung / Operating material identifier

Table 14-1: Abbreviations used

15 Annex

15.1 Troubleshooting

Operating errors are often mistakenly thought to be faults or failures. Sometimes, a fault is caused by an external device. Check the other components and electrical devices that are used. If the fault cannot be remedied, even after checking the points listed below, contact the help desk.

15.2 Dimension and elevation drawings

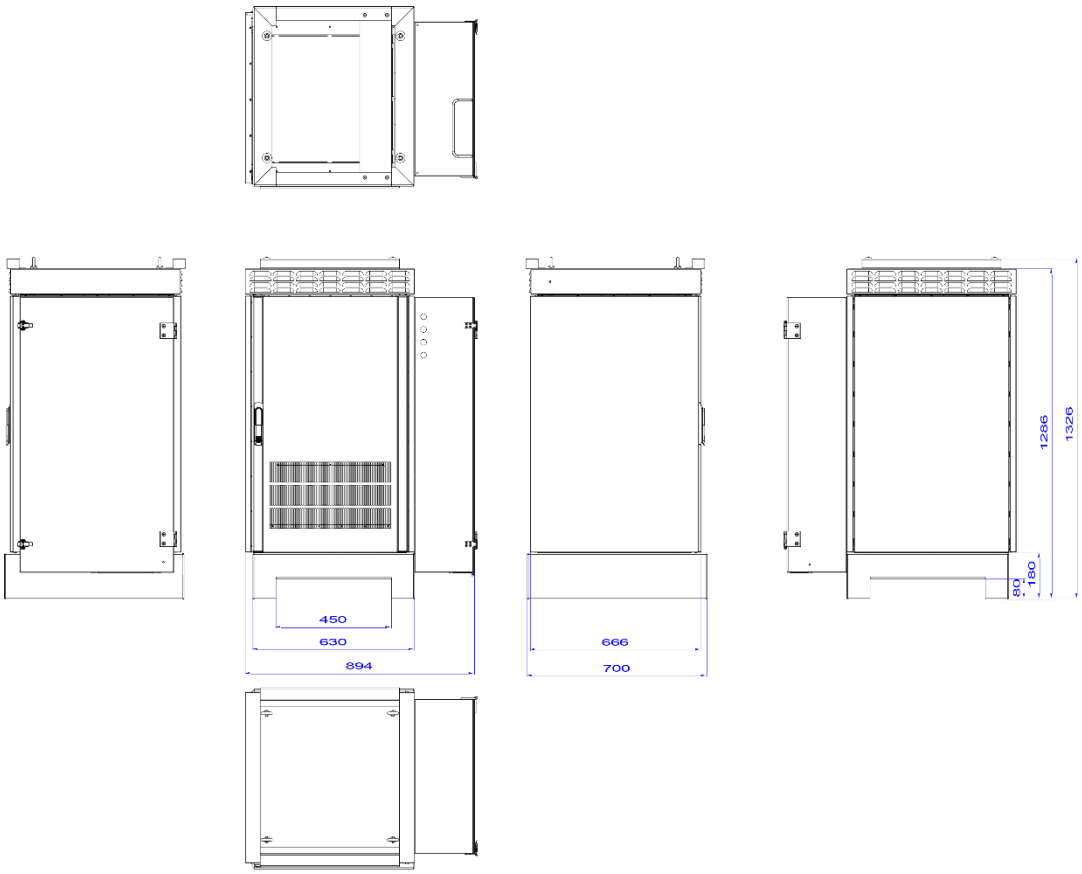


Figure 15-1: Exploded drawing

15.3 Technical data

Device model	**BELATRON**
Device No.	see type plate
Battery type	Customer-specific
Boost charging characteristic	Set by the manufacturer
Temperature range	-15 to 40 °C (>40 °C with derating 2.5%/K to max. 50%)
Nominal input frequency	47.5 to 63 Hz
Protection class	See type plate in accordance with EN 60529
Housing	See Appendix *'Dimensional and exploded drawing'*
Standards	2014/35/EU – Low voltage directive 2014/30/EU – EMC directive EN 60335-2-29 / EN 60950– Safety EN 61558 – Transformers EN 60146 – Semiconductor converters IEC 61000-6-2 – Immunity standard for industrial environments IEC 61000-6-3 – Emission standard for equipment in residential environments and small companies IEC 61000-3-3 – Voltage fluctuations and flicker IEC 61000-3-12 – Limits for harmonic currents produced by equipment connected to public low-voltage systems IEC 61000-4-3 – Immunity to high-frequency electromagnetic fields IEC 61000-4-2 – ESD IEC 61000-4-4 – Burst IEC 61000-4-5 – Surge IEC 61000-4-6 – Immunity to conducted disturbances, induced by radio frequency fields IEC 61000-4-8 – Immunity to low frequency electromagnetic fields IEC 61000-4-11 – Immunity to voltage dips, short interruptions and voltage variations immunity tests EN 60950 – Safety

16 Contact partners in the Service department

Spare parts management
Phone: +49 2871 93-553
Email: spareparts@benning.de

General service queries
Phone: +49 2871 93-556
Email: servicerequests@benning.de

Returns management
Phone: +49 2871 93-554
Email: returns@benning.de

Training management
Phone: +49 2871 93-557
Email: trainingscenter@benning.de

Technical support
Phone: +49 2871 93-555
Email: helpdesk@benning.de

Support / Help Desk

BENNING Help Desk Team
Phone: +49 2871 93-555
Fax: +49 2871 93-417

Email: info@benning.de
Internet: www.benning.de