CHARGE CUBE 12-40

EN Operating manual
Battery Charging System

akkuteam
ENERGIETECHNIK

Contents

EN

Introduction

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Dear reader,

we would like to thank you for the trust you have shown and congratulate you on the purchase of your technical high-quality akkuteam product. The manual you are reading will help you to become familiar with your product. If you read through this manual carefully you will be able to learn about the many possibilities your akkuteam product provides. This is the best way to make the best use of its advantages.
Please also observe all safety information in order to guarantee more safety at your product's installation location. As long as you handle your product carefully, you will ensure its long-term quality and reliability. It is important to follow these requirements for excellent results.

Safety regulations

Safety information explanation

Identifies a possibly hazardous situation.
If it is not avoided, death or serious injuries can result.

Identifies a possibly damaging situation. If it is not avoided, light or minor injuries or material damages can result.

NOTE! Identifies a danger of restricted work outcomes and possible damage to the equipment.

IMPORTANT! Identifies application tips and other particularly useful information. It is not a signal word for a damaging or hazardous situation.

If you see one of the symbols shown in the "Safety regulations" chapter, you should pay particular attention.

General

The device has been manufactured with state-of-the-art technology and according to recognised safety regulations. Despite this, hazards still remain for the following due to incorrect operation or misuse

– life and limbs of the operator or third parties,
– the device and other owner's material assets,
– efficient work output with the device.

All persons who are involved in the commissioning, operation, maintenance and service of the device must

– be appropriately qualified,
– read this operating manual completely through and follow it precisely.

The operating manual must always be kept at the device's installation location. In addition to this operating manual, the generally applicable and local regulations for accident prevention and environmental protection must be observed.

All safety and hazard information on the device should be

– kept in legible condition
– not damaged
– not removed
– not covered, pasted over or painted over.

The safety and hazard information's position on the device can be found in the chapter entitled "General information" in your device's operating manual. Always eliminate any malfunctions which can affect safety before switching the device on.

This affects your safety!

Use in accordance with the regulations

The device is to be used exclusively for operation in the sense of proper intended use. Any other or further usage is considered improper. The manufacturer is not liable for any damages resulting from the above or for inadequate or incorrect working results.

Proper intended use also includes

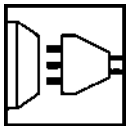
– complete reading and observation of the operating manual and all safety and hazard information.
– observance of inspection and service work.
– observance of all information provided by battery and vehicle manufacturers.

Surrounding conditions

Operation or storage of the device outside the stated range is considered to be improper use. The manufacturer is not liable for any damages resulting from the above.

Please refer to the technical data in the excerpt for precise information about permissible surrounding conditions.

Power connection



Devices with higher performance can influence the grid energy quality based on their current consumption.

This can affect some types of devices in the form of:
- connection restrictions
- requirements with regard to maximum permissible grid impedance *)
- requirements with regard to the minimum required short-circuit performance *)

*) at the interface for the public grid in each case
See technical data.

In this case the owner or operator of the device must verify that the device may be connected and, if necessary, he should consult his energy supply company.

Hazards due to grid and charging current

When working with chargers you are exposed to numerous hazards, for example:
- electrical hazards caused by grid and charging current
- hazardous electromagnetic fields which can be life-threatening for persons fitted with heart pacemakers

An electrical shock can be deadly. In principle, every electric shock is life-threatening. To avoid electrical shocks during operation:
- do not touch any live parts within or outside the device.
- never touch battery terminals under any circumstances.
- never short-circuit the charging cable or charging terminals.

All cables and lines must be fixed, undamaged, insulated and sufficiently dimensioned. Loose connections, scorched, damaged or insufficiently dimensioned cables and lines must be immediately repaired by authorised specialists.

Hazards caused by acids, gases and vapours

Batteries contain acids which are damaging to the eyes and skin. Furthermore, gases and vapours which can cause health risks and which are highly explosive under some circumstances are produced during battery charging.

- only use chargers and well-ventilated rooms in order to prevent the accumulation of explosive gases. Battery rooms are not considered to be explosion-hazardous if a hydrogen concentration of below 4% can be guaranteed by natural or technical ventilation systems.
- Keep a spacing of 0.5 m (19.69 inches) between battery an charger while the batteries charging. Keep possible ignition sources and fire and naked flames away from the battery.
- Never disconnect the connection to the battery (e.g. charging terminals) during the charging process.

- Never inhale any gases or vapours produced.
- Ensure sufficient provision of fresh air.
- Never place any tools or electrically-conductive metals on the battery to avoid short-circuits.

- Battery acids may never contact the eyes, the skin or clothing. Wear protective goggles and suitable protective clothing. Always wash acid splashes immediately and thoroughly with clean water, consult a doctor if necessary.

General information on handling batteries

- Protect batteries against dirt and mechanical loading.
- Store charged batteries in cool rooms. The lowest self-discharge rates occur at approximately +2°C (35,6°F) .
- Ensure that the battery is filled up to the maximum marking with acid (electrolyte)by doing a weekly visual check.
- Do not start or immediately stop operation of the device and have the battery checked by authorised specialists in cases of:
  - uneven acid levels or high water consumption in individual cells, which may be caused by a possible defect or unauthorised warming of the battery to above 55°C (131°F).

Self and personal protection

All people, especially children, must be kept away from the device and the working area during operation. If, however, other persons are in the vicinity

- inform these people about all hazards (health risks caused by acids and gases, hazards caused by grid and charging current etc.),
- provide appropriate protective equipment.

Before leaving the working area, ensure that no personal or material damages can occur while you are away.

Safety measures during normal operation

- Only operate devices with an grounded conductor on a power supply with an grounded conductor and a electrical socket with grounded conductor contact.
  If the device is operated on a grid without a grounded conductor or at an grounded electrical socket without a conductor, this is considered gross negligence. The manufacturer is not liable for any damages resulting from the above.
- Only operate the device in accordance with the Protection Class stated on the nameplate.
- Never operate the device if it shows any signs of damage.
- Have mains and device supply lines regularly checked for proper earth conductor functioning by an electrician.
- Have safety equipment which is not functioning properly and components which are not in a perfect working order repaired by authorised specialists before switching the device on.
- Never bypass or shut down safety equipment.
- A freely accessible mains plug is required after installation.

EMC device classifications

Devices in Emission Class A:

– are only intended for use in industrial environments
– can cause grid-bound and radiated malfunctions in other areas.

Devices in Emission Class B:

– fulfil the emission requirements for residential and industrial environments. This also applies to residential areas in which the energy supplies are provided by the public low voltage grid.

EMC device classification in accordance with rating plate or technical data.

EMC measures

In special cases, impairments to the intended application area can occur despite observance of the standardised emission limit values (for example if sensitive devices are located at the installation location or if the insulation location is in the vicinity of radio or television receivers). In this case, the owner is obliged to take reasonable measures to ensure fault elimination.

Data backup

The user is responsible for data backup for changes made in relation with the work settings. The manufacturer is not responsible for deleted personal settings.

Service and maintenance

The device only requires minimum care and maintenance under normal operating conditions. However, observance of some points is essential in order to keep the device serviceable over many years.

– Check the mains plug and mains cable in addition to charging cables and charging terminals for damage before every start-up.
– If the device housing surface is dirty, clean it using a soft cloth and only using solvent-free cleansing agents.

Repair and maintenance work may only be carried out by authorised specialists. Only use original spare and retail parts (also applies to standard parts). It cannot be guaranteed that parts obtained from outside suppliers have been designed and manufactured correctly in terms of loading and safety.

No changes, additions or modifications of the machine may be carried out without the authorisation of the manufacturer.

Warranty and liability

The warranty period for this device is 2 years starting from the date of invoice. However, the manufacturer provides no warranty if the damages can be traced back to one or more of the following causes:

- improper use of the device.
- improper assembly and operation.
- operation of the device with defective safety equipment.
- non-observance of the information in the operating manual.
- unauthorised modifications to the device.
- catastrophes caused by the effects of foreign bodies and natural disasters.

Technical safety check

The manufacturer recommends that a technical safety check is carried out on the device at least every 12 months.

We recommend that the technical safety check is carried out by an authorised electrician

- after modifications
- after installations or conversions
- after repairs, care and maintenance
- at least every 12 months

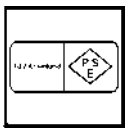
Follow the appropriate national and international standards and directives when carrying out the technical safety check.

You can find out more information about the technical safety checks at your service address. This will provide you with the necessary documents per request.

Safety labelling

Devices with a CE mark fulfil the basic requirements contained in the Low Voltage and Electromagnetic Compatibility Directives.

Devices labelled with this TÜV mark of conformity fulfil the requirements of the relevant standards for Canada and the USA.



Devices labelled with this TÜV mark of conformity fulfil the requirements of the relevant standards for Japan.

Devices labelled with this TÜV mark of conformity and the ID mark stated on the rating plate fulfil the requirements of the relevant standards for Australia.

Disposal

Do not dispose of this device in a domestic setting (e.g. at home)! According to the European Directive 2002/96/EU regarding Used Electrical and Electronic Devices, and its implementation in national law, used Power Tools must be collected separately and returned to a environmentally-compatible recycling system. Ensure that you return your used device to your dealer or obtain information about local, authorised collection and disposal systems. Ignoring this EU Directive can have potentially negative implications for the environment and your health!

Copyright

Text and images correspond to the technical standard at time of printing. Subject to alteration. The contents of this operating manual do not provide any grounds for claims on the side of the purchaser. We would be grateful for any suggestions for improvement and references to errors in the operating manual.

General information

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Device concept

The compact construction of the device reduces its space requirements and considerably facilitates mobile use. In addition to the extensive fittings, the charger is updatable and therefore be fitted out perfectly for the future.

Warning information on device

The charger has been provided with safety symbols on the rating plate and on the front label. These safety symbols may neither be removed nor painted over.

Only use the functions after you have completely read the operating manual.

Connect the battery with the correct polarity: (+) red (-) black

Explosion hazard! Oxyhydrogen gas is created in the battery during charging.

Warning of hazard location or of hazard designation.

Cancel the charging process before disconnecting the battery from the charging cable.

Keep possible ignition sources such as fire, sparks and naked flames away from the battery.

For use indoors or in vehicles (onboard). Do not expose to rain.

Battery acid is corrosive and should never come into contact with the eyes, the skin or clothing.

Ensure that there is a sufficient fresh air supply during charging.

Warning of hazardous electrical voltage.

Initial start-up

Safety

Incorrect operation can result in serious personal or material damages. Only implement the described functions once you have completely read and understood the following documents:

Proper use

The charger is used for charging the batteries listed below. Any other or further usage is considered improper. The manufacturer is not liable for any damages resulting from the above. Proper intended use also includes

- observing all the information contained in this operating manual
- regular checking of the mains and charging cables

The charging of dry batteries (primary elements) and non-rechargeable batteries can cause serious personal and material damages and is therefore forbidden.

Charging of the following batteries is permitted:

- wet-cell batteries: enclosed batteries with liquid electrolyte (can be recognised by the sealing plugs) and low-maintenance / maintenance-free wet-cell batteries (MF)
- AGM batteries: enclosed batteries (VRLA) with specified electrolyte (nonwoven fabric)
- Gel batteries: enclosed batteries(VRLA) with specified electrolyte (gel)
- EFB batteries: enclosed batteries with liquid electrolyte and increased cycle stability for start-stop operation
- Li-Ion batteries with integrated BMS (Battery Management System)

Power connection

You will find the rating plate, which states the permissible mains voltage, attached on casing. The device is only designed for this mains voltage. You can find details about the necessary mains cable fusing in the chapter entitled "Technical data". If your device is not fitted with a mains cable or mains plug, you should fit a mains cable and mains plug in accordance with your national standards.

NOTE! Electrical installations which are not sufficiently dimensioned can result in serious material damages. The mains cable and its fusing is to be designed to match the existing power supply. All technical data on the rating plate applies.

Safety concept - standard safety devices

The following safety devices are included in delivery along with the Battery Charger VAS 622 009:

- zero potential, spark-free terminals for protection against explosion hazards.
- polarity protection that prevents damage or destruction of the charger.
- the charger that is effectively protected by the short-circuit protection system. The fuse that does not need to be replaced if there is a short circuit.
- charging time protection that prevents overcharging and destruction of the battery.
- overtemperature protection using "derating" (reduction of the charging current if the temperature exceeds the limit range).

Operating elements and connections

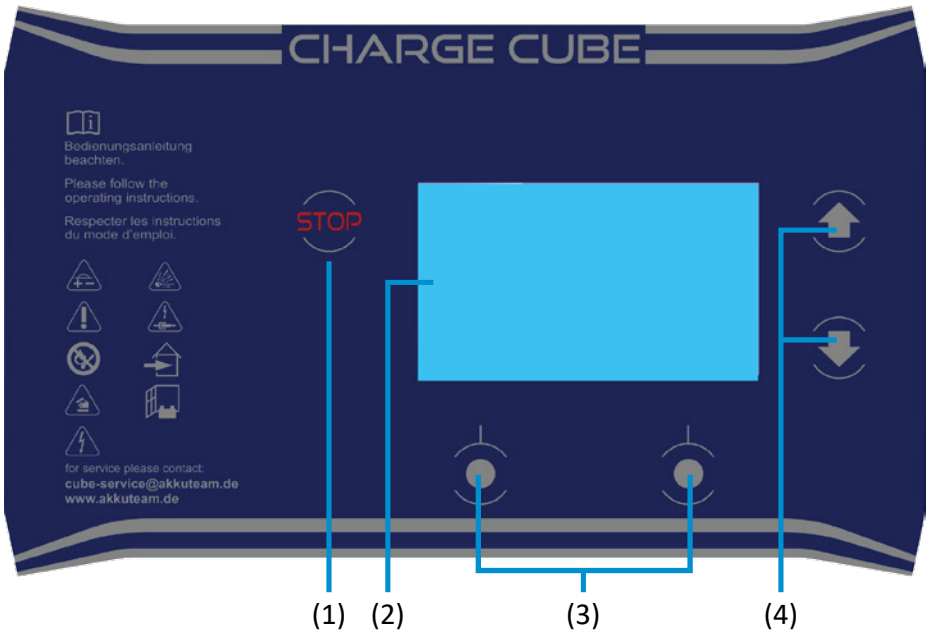
General

It is possible that your device will be provided with functions which are not described in this operating manual, or vice versa, after firmware updates. Furthermore, individual illustrations can be slightly different than the actual operating elements provided on your device. However, the functionality of these operating elements is identical.

Incorrect operation can result in serious personal or material damages. Only implement the described functions once you have completely read and understood the following documents:

- this operating manual
- all operating manuals provided for system components, especially safety regulations

Control panel

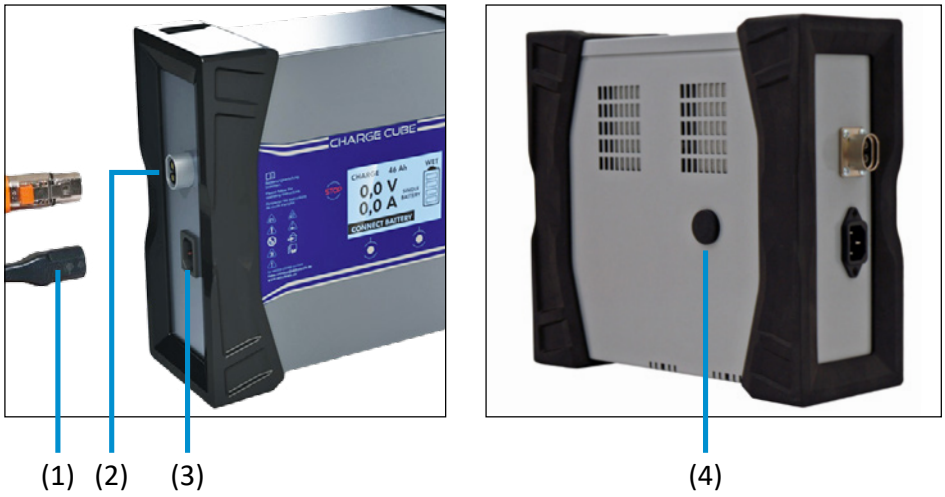


No.:	Function
(1)	STOP button – cancellation of current function mode
(2)	Graphic display
(3)	Selection key – confirmation and selection of selected settings
(4)	Arrow keys – selection of the options shown – changing of the option parameters shown

Connection options

Danger of damage to device and accessories. Only plug in options and system extensions if the mains plug has been removed and the charging cables have been disconnected from the battery.

Connections



No.:	Function
(1)	Mains cable
(2)	Charging cable connection socket - for connecting the charging cable
(3)	AC input power socket
(4)	Connection - USB (remove protective cap first) for connecting to a PC – Software update

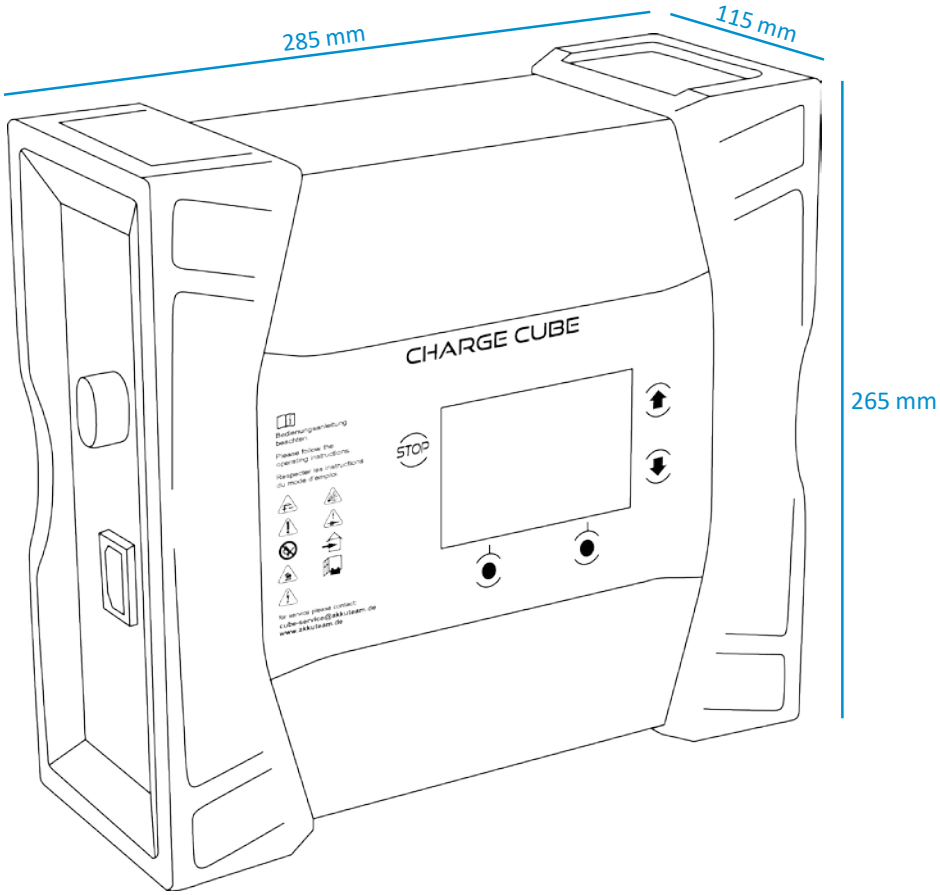
Assembly

If the charger is installed in a switch cabinet (or similar enclosed spaces) ensure that sufficient heat dissipation is provided by induced ventilation. The charger should have 10 cm of space on all four sides.

The charger may never be operated or installed without edge protection. Supply air must be ensured.

Connect the charger to the power supply with the mains cable via the input power socket ②.
To connect the charging cable with the device, first undo the detent ③ by pressing the orange-coloured strap and holding it down. Insert the charging cable into the charger via the connection socket ①.
First connect the positive terminal (red) to the positive terminal on the battery, and then the negative terminal (black) to the negative terminal on the battery.

In order to guarantee that the plug can be accessed, the following space dimensions must be observed:



Operating modes

General information

The charger is suitable for 12V lead-acid batteries (wet-cell, AGM, EFB, GEL) and 12V Li-Ion batteries.

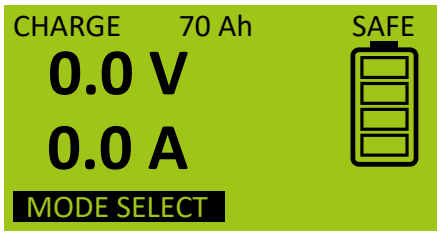
Available operating modes

The following operating modes are available:

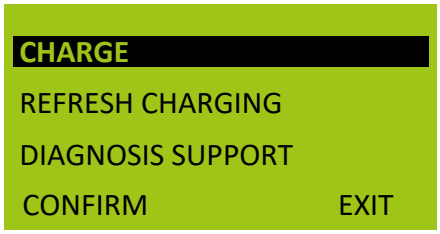
- CHARGING, charging batteries in or outside the vehicle
- REFRESHER CHARGING, refresher-charging of exhausted batteries outside the vehicle
- DIAGNOSIS SUPPORT electrical system support during a diagnosis or software updates to the vehicle,
- POWER SUPPLY OPERATION, power supply mode for electrical systems without fitted batteries or for power supply to disconnected components.
- SETTINGS, device settings
- I-CHECK, power input check for VW Group testing instructions for the purpose of guaranteeing provision for starter batteries

Selecting operating modes

Connect the power cable to the charger and plug into mains socket.

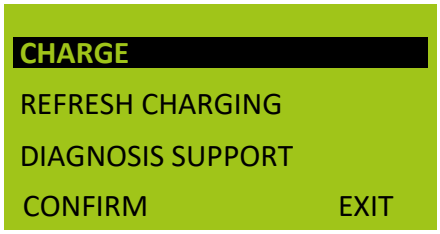


If mode selection is not shown, charging operations start automatically with the SAFE setting and the battery capacity of 70 Ah as soon as the battery terminals are connected.



You can access the selection menu using "MODE SELECT" and then scroll between the operating modes using the arrow keys. You can also simply achieve this by pressing the arrow keys in the menu. Select the operating mode using the arrow keys and confirm your selection with "CONFIRM".

"Charging" OPERATING MODE

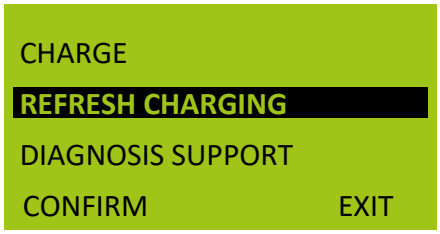


The CHARGING operating mode is used for:

- charging or trickle charging when fitted or removed.
- charging with consumers in the vehicle switched on.

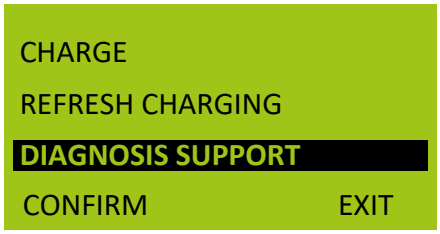
The CHARGING operating mode is available once the charger has been connected to the mains by default in its "SAFE" mode for security.

"Refresh charging" OPERATING MODE



The REFRESHER CHARGING mode is used to reactivate exhausted or sulphated batteries. Refresher charging should only be applied to the battery when the battery has been removed and is located outdoors or in well-ventilated spaces.

"Diagnosis Support" OPERATING MODE



The DIAGNOSIS SUPPORT operating mode unburdens the vehicle battery during a diagnosis or during a vehicle software update.

"Power supply" OPERATING MODE

The POWER SUPPLY operating mode enables the vehicle to be provided with a power supply during repair work if the battery has been removed or is being replaced.

"Settings" OPERATING MODE

The device settings allow you to personalise the charger in the following areas:

- language selection
- setting the charging cable length
- information about the software version
- setting the acoustic signals
- setting the show room mode
- setting continuous standby operation

"I-Check" OPERATING MODE

The I-CHECK

- is used to check the battery's power input capability
- with error checks and assessment

"Charging" operating mode

General information

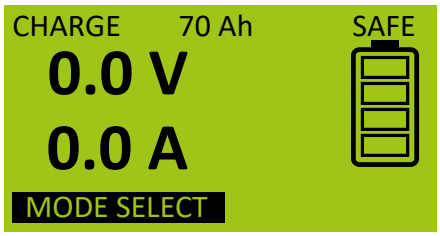
The CHARGING operating mode is used for:

- charging or trickle charging when fitted or removed.
- charging with consumers in the vehicle switched on.

Danger of material damage if battery is defective. Before starting the charging process, ensure that the battery to be charged is fully functioning.

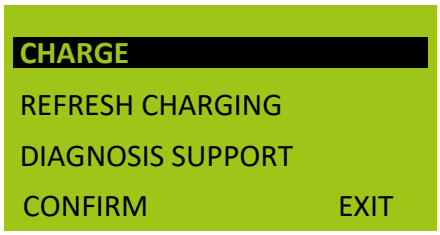
Charging the battery

1. Insert the charger's mains plug



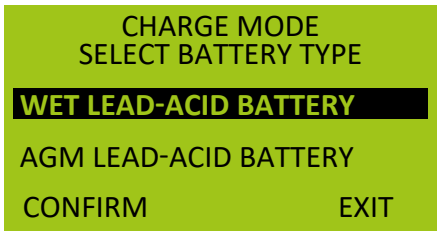
The "CHARGING" operating mode is available once the charger has been connected to the mains as standard.

2. Selecting the operating mode



Select the operating mode using the arrow keys and confirm your selection with "CONFIRM".

3. Selecting the battery type

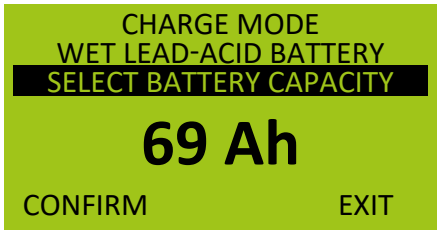


Select the battery type using the arrow keys and confirm your selection with "CONFIRM".

The following selection types are available:

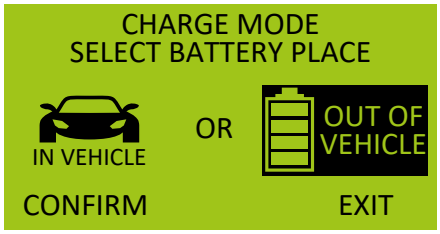
- STANDARD WET-CELL BATTERY
- AGM BATTERY
- EFB/EFB+ BATTERY
- GEL BATTERY
- LITHIUM ION BATTERY

4. Select battery capacity



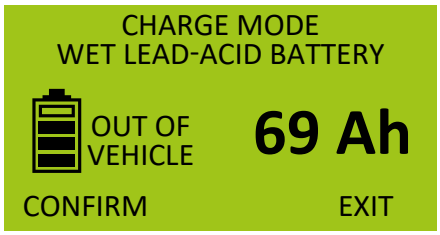
Use the arrow keys to select a battery capacity from between 10 and 300 Ah and confirm your selection with "CONFIRM".

5. Charging location selection

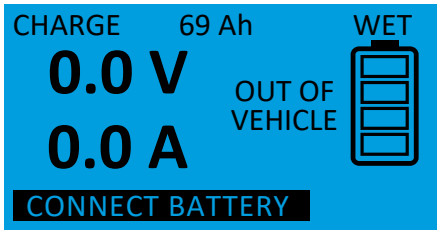


Select the battery's charging location. Use the arrow keys to select between "IN VEHICLE" for charging the battery in the vehicles electrical system or "OUT OF VEHICLE" for charging a single battery outside the vehicle. Confirm your selection with "CONFIRM".

6. Overview of selected settings



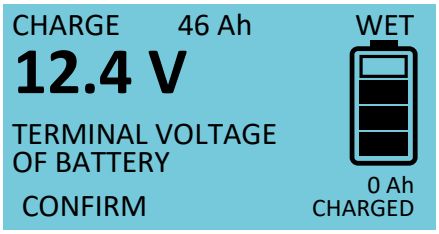
Check your settings, and then confirm these with the "CONFIRM" key.



Once all the settings have been carried out the device is ready to start the selected function once you have connected the terminals to a battery with at least 1.0 V open-circuit voltage.

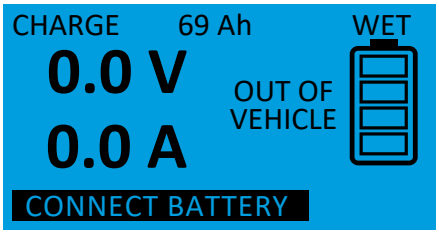
7. Connecting the battery - no sparks will be produced when the battery is connected thanks to the voltage-free charging terminals even if the charger has been connected to the mains.

- Connect the red charging clamps to the positive terminal (+) on the battery.
- Connect the black charging clamps to the negative terminal (-) on the battery.



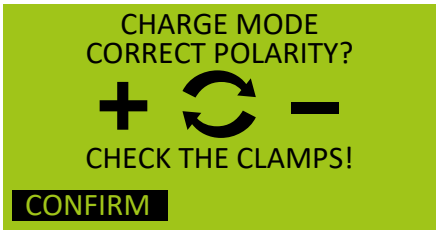
Once the battery has been connected to the charging clamps the charger shows the terminal voltage at the connected battery as a number and as a battery symbol on the bar display for 30 seconds. The charging process starts automatically after this.
You can skip the display of the battery open-circuit voltage using the "CONFIRM" key.

The battery must have an open-circuit voltage of at least 1.0 V for this process. If the information window for the terminal voltage of battery does not appear, the battery is an extremely exhausted battery of below 1.0 V. In this case we recommend using the "REFRESH" operating mode for reactivating exhausted batteries. You can find more information about this in the section on the “REFRESH” operating mode.



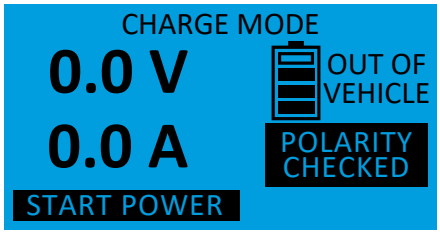
Alternatively, the charging start of a deep discharge battery can also be forced by pressing the left button under the instruction „Connect Battery“ for at least 5 seconds. This leads to the safety query area.

8. Checking polarity when connecting deep-discharged batteries



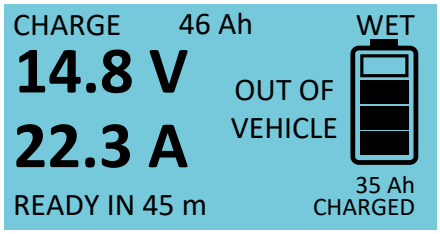
If the battery has an open-circuit voltage of less than 1.0 V, the polarity will be queried for safety reasons. The operator is then requested to check the charging clamp polarity! You then have to confirm the polarity check using the "CONFIRM" key.

Material damage hazard if charging cable has incorrect polarity. Always observe the charging cable polarity at the battery.

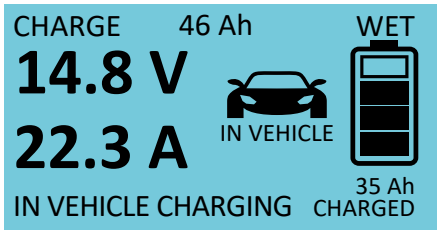


Then confirm the polarity check by pressing the "START POWER" key. The charger is now ready for operation.

9. Starting the charging process



The following text describes charging a wet-cell battery at 46 Ah outside the vehicle. The current voltage and current are displayed and updated every 0.5 seconds.
Rising bars symbolise the battery's charging status (e.g. if 2 bars are displayed and the 3rd bar is blinking this symbolises a charging status of 75%). The charged capacity is displayed underneath the battery symbol. The remaining charging time is shown in minutes between 120 and 0. If this period is longer than 120 minutes, the display shows "READY IN > 2h".



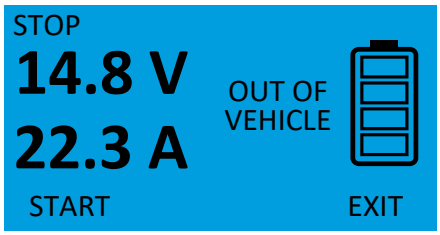
If the battery is connected to a vehicle, the remaining charging time is not displayed. Instead, "IN VEHICLE CHARGING" is displayed together with a car symbol.

10. Cancelling the charging process

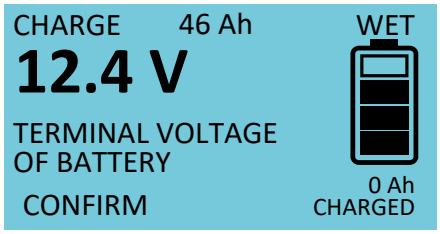
Damage hazard to connecting sockets and connecting plugs. Do not unplug or disconnect the charging cables during charging.

Press the STOP key during the charging process. The charging process will be cancelled.

11. Continuing the charging process



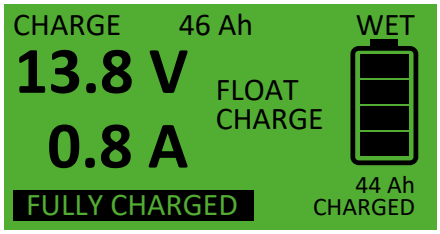
The charging process can be continued by pressing the left-hand “START” selection key.



The current battery open-circuit voltage will again be displayed for 30 seconds. The charging process starts automatically after this.

12. Charging process complete

Danger of spark formation on premature removal of the charging cable. Press the STOP key to stop the charging process before disconnecting the charging cable.



Once the charging process has stopped the charge retention process starts automatically with 13.8 V. In this condition, the 4 charging bars all blink and "FLOAT CHARGE" is displayed.

Press the STOP key. Disconnect the black charging clamp from the negative terminal (-) and the red charging clamp from the positive terminal (+) on the battery.

"Refresh" operating mode

General information

The "REFRESH" operating mode is used to charge the battery if long-term exhaustion is assumed (e.g. the battery is sulphated).

- Battery is charged up to maximum acid density.
- Plates are reactivated (removal of sulphate layer within the scope of electro-physical possibilities).

Personal and material hazard caused by overheated battery. Do not charge the battery requiring reactivation at an surrounding temperature exceeding 30°C. The battery can reach temperatures of up to 45°C during "REFRESH" operating mode. If the battery temperature exceeds 45° you should switch off the battery charger immediately.

Danger of damage to on-board electronics caused by refresh charging. Disconnect the battery from the vehicle electrical system and remove from the vehicle before commencing refresh charging.

Successful refresh charging is dependent on the battery's sulphating level.

Only use the "REFRESH" operating mode with caution since the refresh charging process can result in liquid losses or drying out the battery.

Danger of injuries to personal. Wear protective goggles and suitable protective clothing when handling battery acid. Always wash acid splashes immediately and thoroughly with clean water, consult a doctor if necessary. Never inhale any gases or vapours produced.

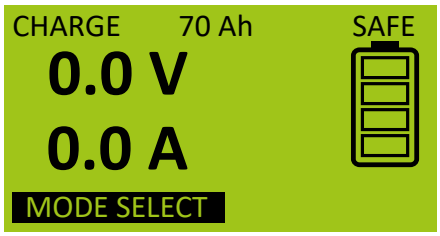
The following batteries are permitted to be put under the "REFRESH" operating mode:

- wet-cell batteries: enclosed batteries with liquid electrolyte (can be recognised by the sealing plugs) and maintenance-free wet-cell batteries (MF). Check the acid level after reactivation and refill with distilled water if necessary.
- AGM batteries: enclosed batteries (VRLA) with specified electrolyte (non-woven fabric)
- Gel batteries: enclosed batteries(VRLA) with specified electrolyte (gel)
- EFB/EFB+ batteries: enclosed batteries with liquid electrolyte and increased cycle stability for start-stop operation

Reactivating a battery

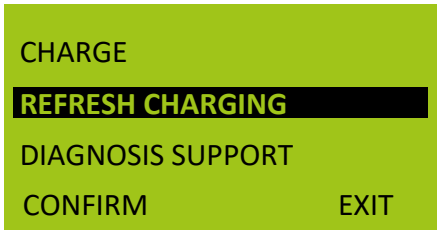
Exhausted batteries can freeze even at temperatures around 0°C. Danger of material damage if battery freezes. Always ensure that the acid in the battery requiring reactivation is not frozen before commencing refresh charging.

1. Insert the charger's mains plug



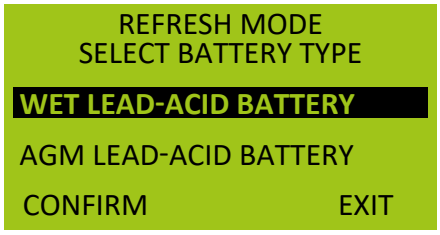
The "CHARGING" operating mode is available once the charger has been connected to the mains as standard.

2. Selecting the operating mode



Select the operating mode using the arrow keys and confirm your selection with "CONFIRM".

3. Selecting the battery type

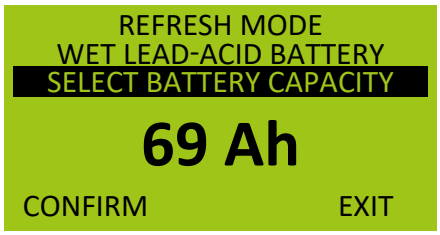


Select the battery type using the arrow keys and confirm your selection with "CONFIRM".

The following types are available the selection:

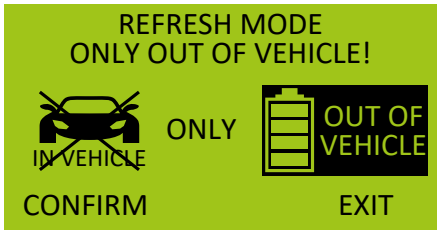
- STANDARD WET-CELL BATTERY
- EFB/EFB+ BATTERY
- AGM BATTERY
- GEL BATTERY

4. Select battery capacity



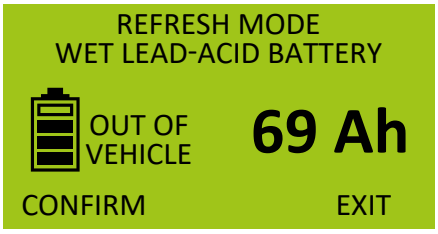
Use the arrow keys to select a battery capacity from between 10 and 300 Ah and confirm your selection with "CONFIRM".

5. Charging location selection

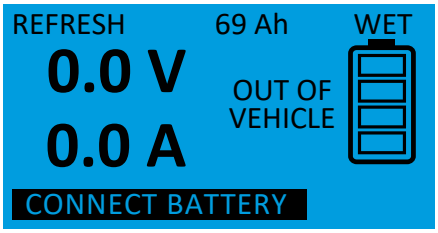


Charging inside the vehicle is not permitted during refresh mode. It is only possible to charge a single battery since the charging voltage reaches more than 16 V, which can damage the vehicle electronics. The information "ONLY OUT OF VEHICLE!" blinks, and you must accept this with the "CONFIRM" key.

6. Overview of selected settings



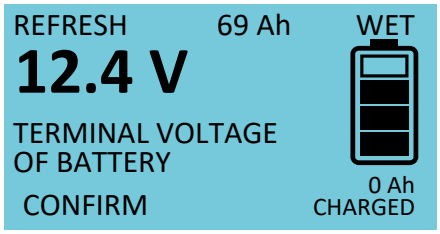
Check your settings, and then confirm these with the "CONFIRM" key.



Once all the settings have been carried out the device is ready to start the selected function once you have connected the terminals to a battery with at least 1.0 V open-circuit voltage.

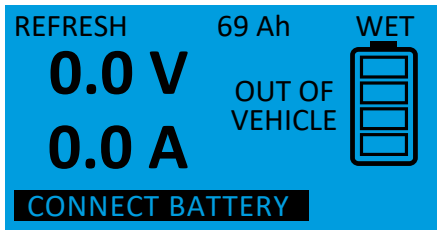
7. Connecting the battery - no sparks will be produced when the battery is connected thanks to the voltage-free charging terminals even if the charger has been connected to the mains.

- Connect the red charging clamps to the positive terminal (+) on the battery.
- Connect the black charging clamps to the negative terminal (-) on the battery.



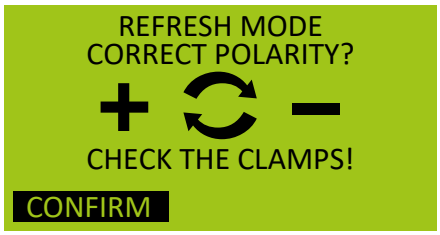
Once the battery has been connected to the charging clamps the charger shows the terminal voltage at the connected battery as a number and as a battery symbol on the bar display for 30 seconds. The charging process starts automatically after this.
You can skip the display of the battery open-circuit voltage using the "CONFIRM" key.

The battery must have an open-circuit voltage of at least 1.0 V for this process. If the information window for the terminal voltage of battery does not appear, the battery is an extremely exhausted battery of below 1.0 V



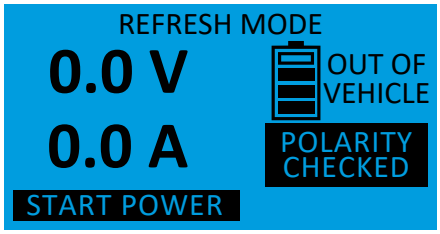
Alternatively, the charging start of a deep discharge battery can also be forced by pressing the left button under the instruction „Connect Battery“ for at least 5 seconds. This leads to the safety query area.

8. Checking polarity when connecting exhausted batteries



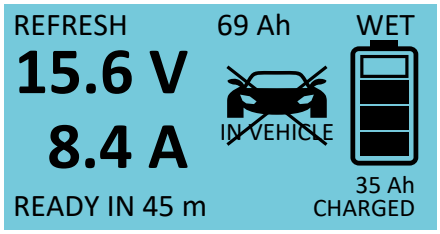
If the battery has an open-circuit voltage of less than 1.0 V, the polarity will be queried for safety reasons. The operator is then requested to check the charging clamp polarity! You then have to confirm the polarity check using the "CONFIRM" key.

Material damage hazard if charging cable has incorrect polarity. Always observe the charging cable polarity at the battery.



Then confirm the polarity check by pressing the "START POWER" key. The charger is now ready for operation.

9. Starting refresh charging



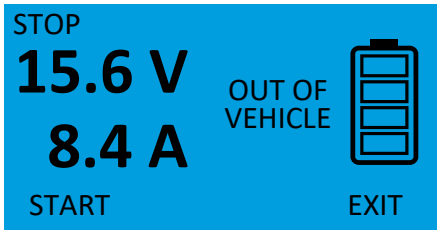
The following text describes refresh-charging a wet-cell battery at 69 Ah outside the vehicle. The current voltage and current are displayed and updated every 0.5 seconds. Rising bars symbolise the battery's charging status (e.g. if 2 bars are displayed and the 3rd bar is blinking this symbolises a charging status of 75%). The charged capacity is displayed underneath the battery symbol. The remaining charging time is shown in minutes between 120 and 0. If this period is longer than 120 minutes, the display shows "READY IN > 2h".

10. Interrupting refresh charging

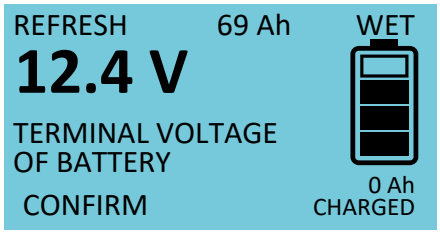
Damage hazard to connecting sockets and connecting plugs. Do not unplug or disconnect the charging cables during refreshing.

Press the STOP key during the refresh process. Refreshing is then cancelled.

11. Continuing refresh charging



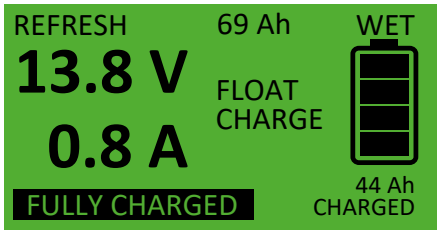
The refresh process can be continued by pressing the left-hand "START" selection key.



The current battery open-circuit voltage will again be displayed for 30 seconds. After this, the refresh process starts.

12. Refresh charging stops

Danger of spark formation on premature removal of the charging cable. Press the STOP key to stop the charging process before disconnecting the charging cable.



Once the refresh process has stopped, the charge retention process starts automatically with 13.8 V. In this condition, the 4 charging bars all blink and "FLOAT CHARGE" is displayed.

Press the STOP key. Disconnect the black charging clamp from the negative terminal (-) and the red charging clamp from the positive terminal (+) on the battery.

"Diagnosis Support" operating mode

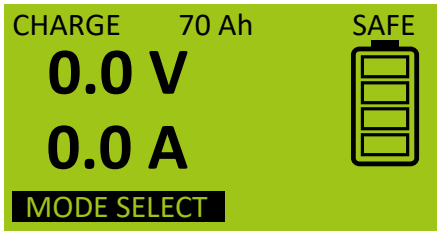
General information

The "DIAGNOSIS SUPPORT" operating mode is exclusively used to unburden the vehicle battery during a diagnosis or during a vehicle software update. Over longer periods of time the discharged current must be less than the maximum charge output current (40 A) otherwise the battery becomes discharged. "STANDBY" operating mode is not suitable for completely charging the battery.

Danger of material damage if battery is defective. Before starting DIAGNOSIS SUPPORT, ensure that the battery to be buffered is fully functioning.

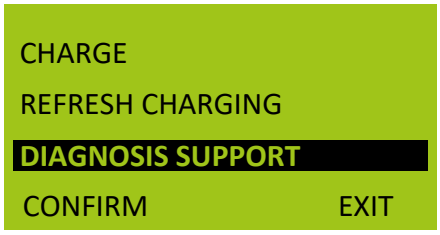
Standby operation

1. Insert the charger's mains plug



The "CHARGING" operating mode is available once the charger has been connected to the mains as standard.

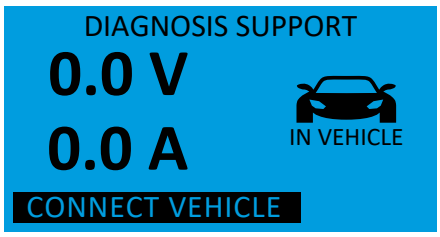
2. Selecting the operating mode



Select the operating mode using the arrow keys and confirm your selection with "CONFIRM".

3. Overview of selected settings

Diagnosis Support is suitable for all battery types. The standby voltage of 13.8 V is supplied at a maximum standby current of 40 A. If the maximum standby current is greater than 40 A, the standby voltage decreases proportionally to the load. Signalling methods for an overload are described in the following items.

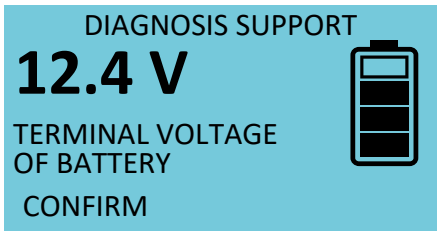


You should accept the additional information about standby operation by pressing the "CONFIRM" key.

The device is now ready for operation.

4. Connecting the battery - no sparks will be produced when the battery is connected thanks to the voltage-free charging terminals even if the charger has been connected to the mains.

- Connect the red charging clamps to the positive terminal (+) on the battery.
- Connect the black charging clamps to the negative terminal (-) on the battery.



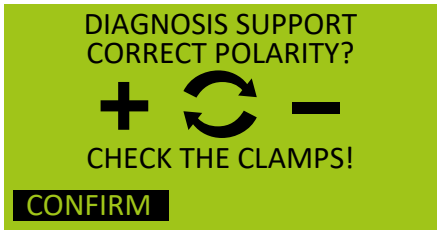
Once the battery has been connected to the charging clamps the charger shows the terminal voltage at the connected battery as a number and as a battery symbol on the bar display for 30 seconds. The charging process starts automatically after this.

You can skip display of the battery open-circuit voltage using the "CONFIRM" key.

The battery must have an open-circuit voltage of at least 1.0 V for this process. If the information window for the terminal voltage of battery does not appear, the battery is an extremely exhausted battery of below 1.0 V. In this case we recommend using the "REFRESH" operating mode for reactivating exhausted batteries. You can find more information about this in the section on the "REFRESH" operating mode.

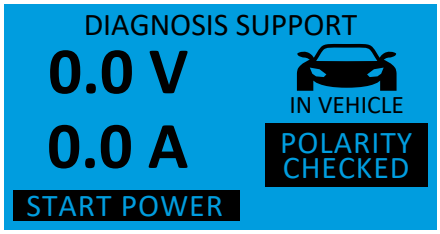
Alternatively, the charging start of a deep discharge battery can also be forced by pressing the left button under the instruction „Connect Battery“ for at least 5 seconds. This leads to the safety query area.

5. Checking polarity when connecting exhausted batteries



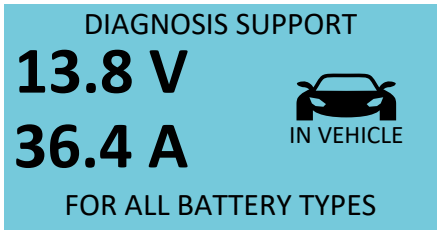
If the battery has an open-circuit voltage of less than 1.0 V, the polarity will be queried for safety reasons. The operator is then requested to check the charging clamp polarity! You then have to confirm the polarity check using the "CONFIRM" key.

Material damage hazard if charging cable has incorrect polarity. Always observe the charging cable polarity at the battery.

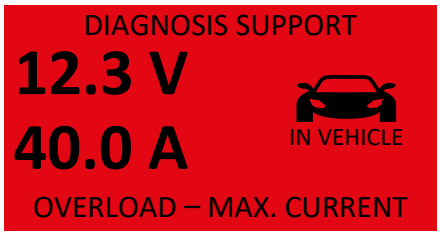


Then confirm the polarity check by pressing the "START POWER" key. The charger is now ready for operation.

6. Starting Diagnosis Support



This operating mode supports a vehicle electrical system with a built-in battery with a constant 13.8 V and maximum 40 A. The current values for voltage and current are displayed and updated every 0.5 seconds.



If the vehicle electrical system uses more than the maximum 40 A which can be supported by the charger, the additional curent must be provided by the battery and the voltage decreases proportionally to the load.

The charger will provide a warning with a red screen colour and the information "OVERLOAD – MAX. CURRENT". The display blinks every 10 seconds, and the "OVERLOAD – MAX. CURRENT" information blinks every second.

If the current to be provided remains at more than 40 A and the voltage drops below 12.3 V, the display colour changes between light blue and red every second. The charger also gives out an acoustic signal which can be activated or deactivated in the device settings.

Caution! The danger exists that the supply voltage continues to decrease due to overloading, and if this is the case the application (e.g. flashing control units) will be automatically stopped by the system if the voltage falls below 12.0 V. This can result in hardware damage to the control units.

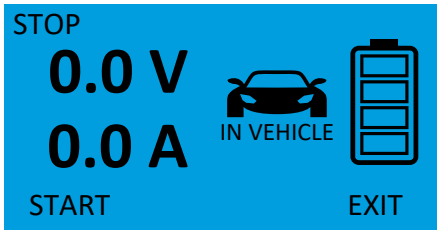
7. Interrupting Diagnosis Support

Danger of spark formation on premature removal of the charging cable. Press the STOP key to stop "DIAGNOSIS SUPPORT" before disconnecting the charging cable.

Press the STOP key during diagnosis support. Standby operation will be cancelled.

Damage hazard to connecting sockets and connecting plugs. Do not unplug or disconnect the charging cables during standby operation.

8. Continue Diagnosis Support



Diagnosis Support can be continued by pressing the left-hand "START" selection key.

The current battery open-circuit voltage will again be displayed for 30 seconds. Standby operation starts automatically after this.

9. Stopping standby operation

Press the STOP key. Disconnect the black charging clamp from the negative terminal (-) and the red charging clamp from the positive terminal (+) on the battery.

"Power supply" operating mode

General information

In "POWER SUPPLY" operating mode the charging cables are connected directly to the battery lines or the vehicle outside starting point. This ensures that the on-board electronics is provided with power while the battery is removed. Since only the vehicle's battery lines are connected to the charger, the battery voltage detection function is not available.

The incorrect vehicle-specific voltage can cause serious damage to the vehicle on-board electronics. It is imperative that you check the correct voltage before connecting the charger to the vehicle battery lines! Only for 12 V applications.

Power supply operation

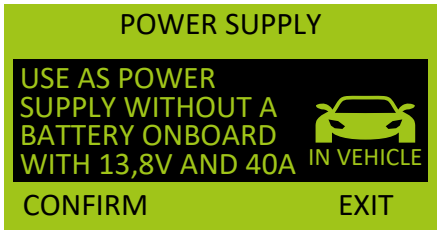
1. Insert the charger's mains plug

The "CHARGING" operating mode is available once the charger has been connected to the mains as standard.

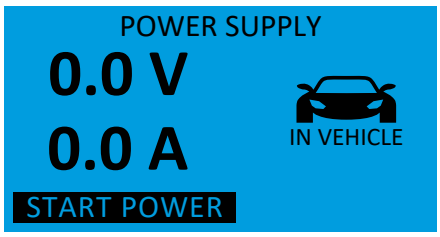
2. Selecting the operating mode

Select the operating mode using the arrow keys and confirm your selection with "CONFIRM".

3. Overview of selected settings



Power supply operation is designed for applications without a battery. The standby voltage of 13.8 V is supplied at a maximum standby current of 40 A.

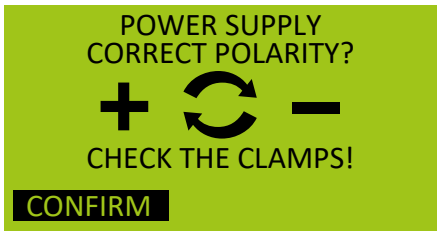


If the maximum standby current is greater than 40 A, the standby voltage decreases proportionally to the load.
Signalling methods for an overload are described in the following items.

You should accept the additional information about standby operation by pressing the "CONFIRM" key.

Once you have pressed "START POWER" the device is ready to start the selected function.

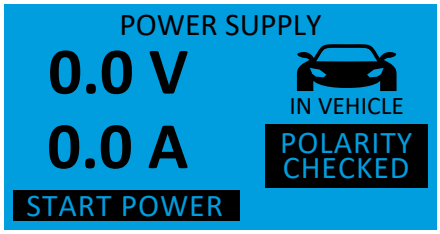
4. Checking polarity



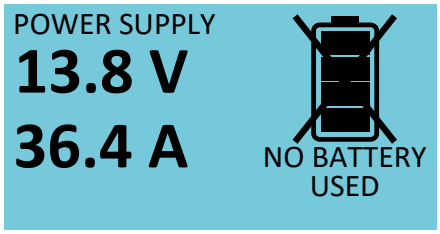
The polarity will be queried the safety reasons. The operator is then requested to check the charging clamp polarity! You then have to confirm the polarity check using the "CONFIRM" key.

Material damage hazard if charging cable has incorrect polarity. Always observe the charging cable polarity at the battery.

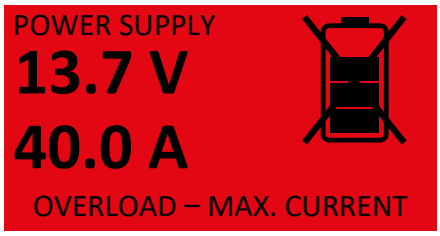
5. Starting power supply operation



Once the polarity check has been confirmed the charger is ready to operate once you have pressed the "START POWER" key. A voltage of 13.8 V will be applied to the terminals.
This mode supports an electrical system without fitted batteries or an electrical load with a constant 13.8 V and max. 40 A.



The current voltage and current values are displayed and updated every 0.5 seconds.
The charger supports the connected consumers with maximum 40 A. If the consumer is taking more than 40 A, the voltage will decrease.



The charger display colour will change from light blue to red every second. On top of this the display shows "OVERLOAD – MAX. CURRENT". The charger also gives out an acoustic signal which can be activated or deactivated in the device settings.

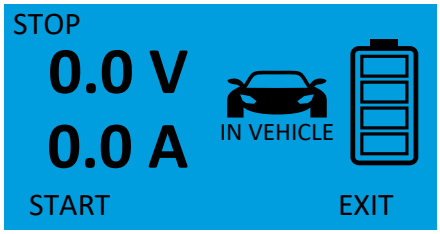
Caution! There exists the danger that the supply voltage continues to decrease due to overloading, and if this is the case the application (e.g. flashing control units) will be automatically stopped by the system if the voltage falls below 12.0 V. This can result in hardware damage to the control units.

6. Cancelling power supply operation

Danger of spark formation on premature removal of the charging cable. Press the STOP key to stop "POWER SUPPLY OPERATION" before disconnecting the charging cable.

Press the STOP key during power supply operation. Power supply operation will be cancelled.

Damage hazard to connecting sockets and connecting plugs. Do not unplug or disconnect the charging cables during power supply operation.



As soon as you press the STOP key you will return to the initial area of the "POWER SUPPLY OPERATION" mode and you will have to confirm all the safety queries again.

"POWER SUPPLY OPERATION" mode can be continued by pressing the left-hand "START" selection key.

Device settings

EN

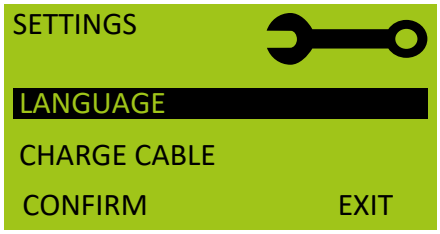
General information

The device settings allow the following personalisation possibilities:

- language selection for display presentation
- configuration of cable lengths (0.1 m – 20 m)
- configuration of cable cross-section (4mm², 6mm², 10mm², 16mm²)
- information on the device's current firmware version
- switch beeper on and off
- switch showroom mode on and off
- switch standby operation continuously on and off

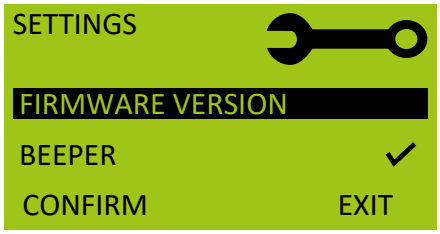
Select the "SETTINGS" operating mode using the arrow keys and confirm your selection with "CONFIRM".

Settings areas

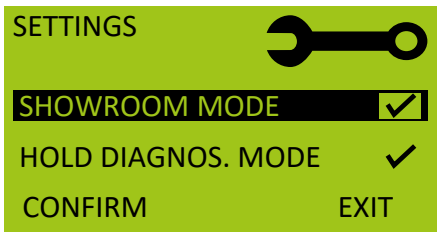


Settings areas

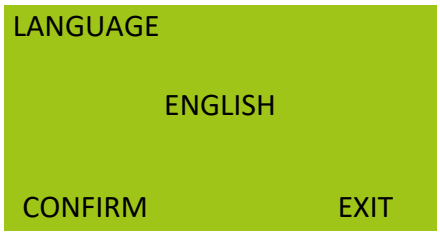
- language
- charging cable version
- firmware version
- acoustic signal
- showroom mode
- continuous standby operation



Select the settings area using the arrow keys and confirm your selection with "CONFIRM".

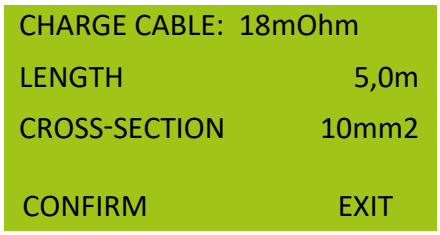


Language selection



Select the appropriate language using the arrow keys and confirm your selection with "CONFIRM".

Charging cable version



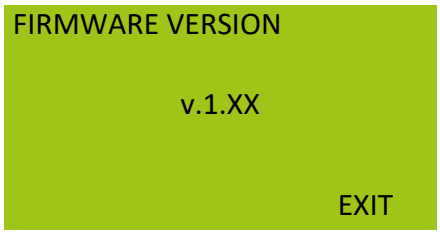
You should use this menu to set the length and cross-section of the charging cables. This setting is used to compensate the voltage loss across the charging cable length.

Select the appropriate menu item using the arrow keys and then confirm your selection with "CONFIRM".

The charging cable length can be set in 0.1 m steps between 0.1 m and 20.0 m using the arrow keys.

The charging cable cross-section can be set at 4mm², 6mm², 10mm² and 16mm² using the arrow keys.

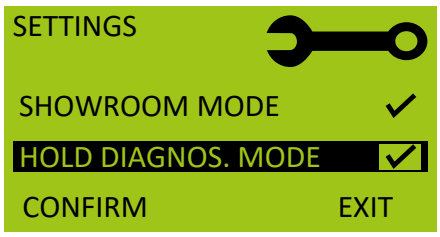
Firmware version



The current firmware version on the device is displayed in the "FIRMWARE VERSION" menu. Press "EXIT" to return to the settings area.

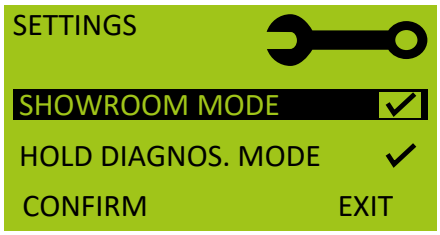
You can download the latest software updates and the associated manuals at *www.akkuteam.de/eng/products/vas-charger/*

Acoustic signal

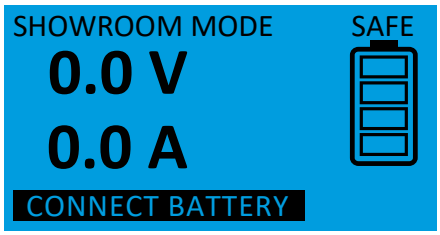


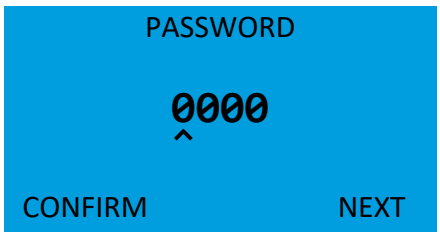
You can use the "CONFIRM" key to switch the beeper on (tick appears on display) or off (no tick in display).

Showroom mode



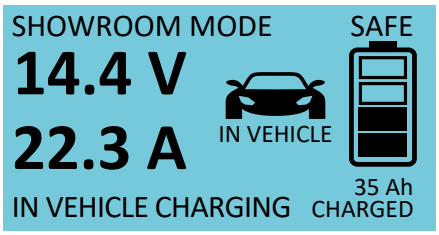
The showroom mode is used to protect the charger from changes in settings by unauthorized operators. The charging behavior corresponds to the charging in the safe mode.





You can use the “CONFIRM” key to switch “SHOWROOM MODE” on (tick appears on display) or off (no tick in display). If “SHOWROOM MODE” is activated (tick appears) you can return to safe mode using "EXIT".

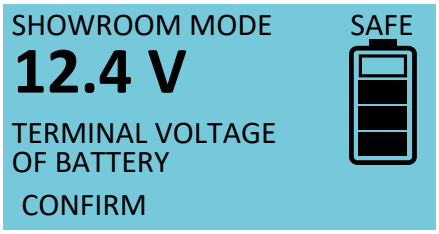
Press the STOP key to deactivate "SHOWROOM MODE". A password query will follow. Enter the password: "4182". To do this, use the arrow keys to select the appropriate number. Select the individual numbers by pressing the "NEXT" selection key. Once you have entered the password correctly confirm your selection with "CONFIRM". Now remove the tick for "SHOWROOM MODE" in the settings using the "CONFIRM" selection key.



If the tick for Showroom mode is displayed in the settings, the charger will charge with maximum 14.4 V as in safe charging mode but, however, without a current limitation of 40 A. Once charging is complete the charger will switch over to charging retention at 13.8 V and will support this with a maximum of 40 A.

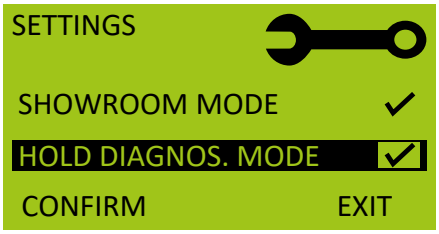
If the charger is working at 40 A during charge retention and the voltage drops below 13.2 V, charge retention is stopped and the charging program starts anew.

Press the STOP key during charging in order to interrupt the charging process in showroom mode. Charging is then cancelled.



Standby operation can be continued by pressing the left-hand "START" selection key. The current battery open-circuit voltage will again be displayed for 30 seconds. The charging process starts automatically after this.

Continuous standby operation



You can use the "CONFIRM" key to switch "HOLD DIAGNOSIS MODE" on (tick appears on display) or off (no tick in display).

If continuous standby operation is active (tick appears for "HOLD DIAGNOSIS MODE") and the battery is disconnected after a standby process the charger will not switch back to the initial screen but remains in "DIAGNOSIS SUPPORT" mode.

The device will only start up with the initial screen after the mains plug is disconnected from the mains supply and the device is then switched on again.

"I-Check" operating mode

General information

"I-CHECK" operating mode is used to determine the input power capability of the discharged battery. The power input check is used if a battery test which was previously carried out returned results of "defective", "bad", "charge" or "tester will not start". The framework conditions for the power input check are oriented using the specifications provided in the VW Group test instructions.

The power input check runs as follows:

- automatic power input check within a few minutes.
- the power input check will be stopped and the results shown in the display after a predefined testing time.

Note! The power input check can only be carried out successfully on a discharged battery. A completely charged battery will not pass the test.

Power input check

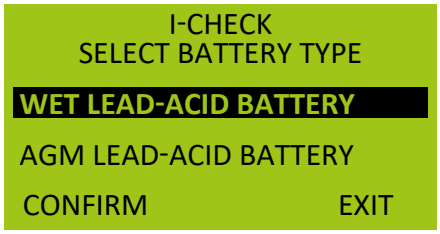
1. Insert the charger's mains plug

The "CHARGING" operating mode is available once the charger has been connected to the mains as standard.

2. Selecting the operating mode

Select the operating mode using the arrow keys and confirm your selection with "CONFIRM".

3. Selecting the battery type

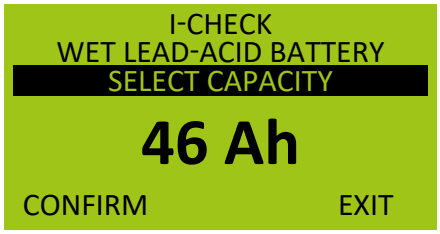


Select the battery type using the arrow keys and confirm your selection with "CONFIRM".

The following types are available the selection:

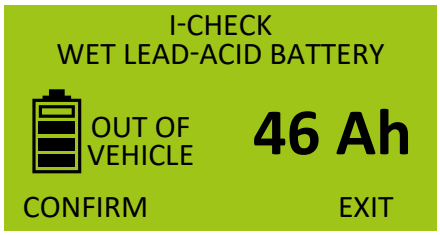
- STANDARD WET-CELL BATTERY
- AGM BATTERY
- EFB/EFB+ BATTERY
- GEL BATTERY

4. Select battery capacity



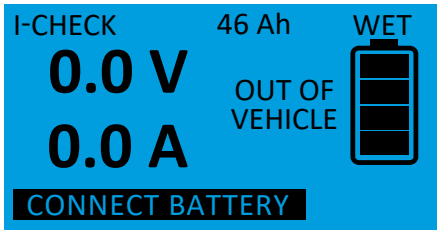
Use the arrow keys to select a battery capacity from between 10 and 300 Ah and confirm your selection with "CONFIRM".

5. Overview of selected settings



The I-Check can only be carried out within the vehicle!

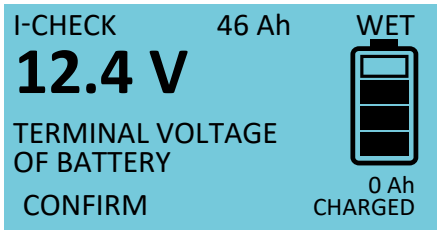
Check your settings, and then confirm these with the "CONFIRM" key.



Once all the settings have been carried out the device is ready to start the selected function once you have connected the terminals to a battery with at least 1.0 V open-circuit voltage.

6. Connecting the battery - no sparks will be produced when the battery is connected thanks to the voltage-free charging terminals even if the charger has been connected to the mains.

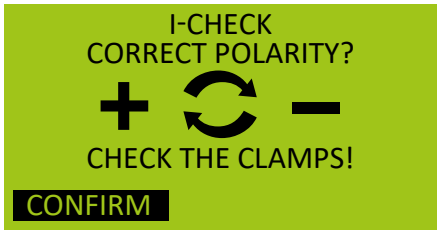
- Connect the red charging clamps to the positive terminal (+) on the battery.
- Connect the black charging clamps to the negative terminal (-) on the battery.



Once the battery has been connected to the charging clamps the charger shows the terminal voltage at the connected battery as a number and as a battery symbol on the bar display for 30 seconds. The charging process starts automatically after this.
You can skip display of the battery open-circuit voltage using the "CONFIRM" key.

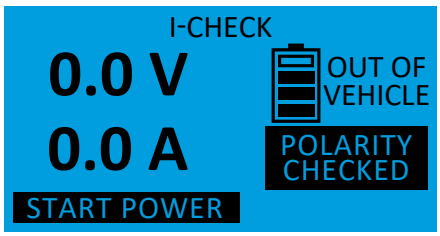
The battery must have an open-circuit voltage of at least 1.0 V for this process. If the battery voltage information window is not displayed the battery is extremely deep-discharged at below 1.0 V.

7. Checking polarity when connecting deep-discharged batteries



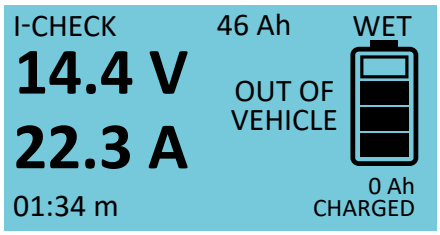
The polarity will be queried the safety reasons. The operator is then requested to check the charging clamp polarity! You then have to confirm the polarity check using the "CONFIRM" key.

Material damage hazard if charging cable has incorrect polarity. Always observe the charging cable polarity at the battery.

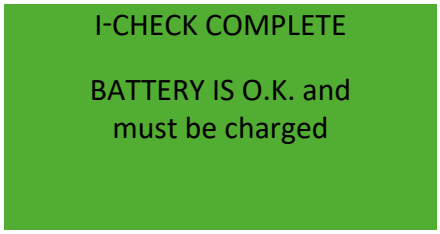


Then confirm the polarity check by pressing the "START POWER" key. The charger is now ready for operation.

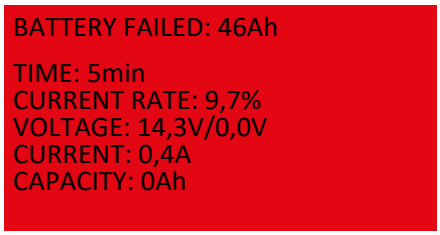
8. Starting the I-Check



During the I-Check, the input power capability of the battery will be checked over a period of 5 minutes. It is charged at a current of 30.0 A under a maximum charging voltage of 14.4 V over 5 minutes. After this, a check of the open-circuit voltage is made over another minute when the current is turned off in order to determine whether there are any cell or plate short-circuits. The test is complete after a total of 6 minutes, and the result is then shown in the display.



If the battery has passed the I-Check, the display is coloured dark green and the successful test is confirmed. The result is shown for 2 minutes in the display, and after this the charging process will automatically start in "CHARGING" operating mode with the selected battery parameters.



If the battery has not passed the I-Check, the display will be coloured red. The results of the test which has not been passed will then be displayed with the collected data and can be written into the test protocol.

The result will be shown in the display until one of the two charging clamps is disconnected from the battery.

9. Cancelling the I-Check

Damage hazard to connecting sockets and connecting plugs. Do not unplug or disconnect the charging cables during power input check.

Press the STOP key during the test procedure:

- test procedure will be cancelled.
- the test procedure cannot be continued.
- a charging cable must be disconnected from the battery and you must reselect the operating mode.

Characteristic curves

Safety

Incorrect operation can result in serious personal or material damages. Observe battery manufacturer's information. Do not connect a battery to the charger during parameter settings.

Available characteristic curves

Operating mode	Battery	Characteristic curve	I_1	U_1	I_2 / $U_{max.}$	U_2
CHARGE	SAFE**	IU_0U	40*	14.4	–	13.8
	WET-CELL			14.8		
	AGM			14.8		
	EFB / EFB+			14.8		
	GEL			14.3		
	LITHIUM ION			14.6		
REFRESH CHARGE	WET-CELL	IUI_0U	40*	14.8	4/16.0	13.8
	AGM			14.8	1.2/15.2	
	EFB / EFB+			14.8	4/16.0	
	GEL			14.3	1.2/15.2	
DIAGNOSIS SUPPORT	ALL	IU	40	13.8	–	–
POWER SUPPLY	ALL	IU	40	13.8	–	–
SHOWROOM MODE	ALL	IU_0U	40	14.4	–	13.8

I_1 Main charging current [A] Maximum device current: 40 A

* 20 A per 100 Ah set battery capacity

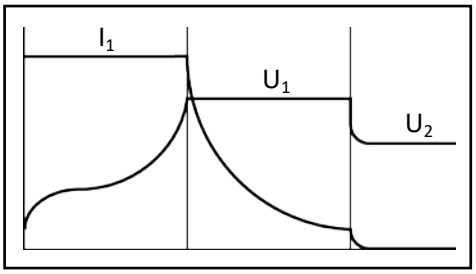
U_1 main charging voltage [V]

I_2 Gassing voltage [A] per 100 Ah set battery capacity / maximum charging end voltage

U_2 Retention charging voltage [V]

** Safe mode without previous settings for the battery type

$U_{max.}$ maximum recharge voltage

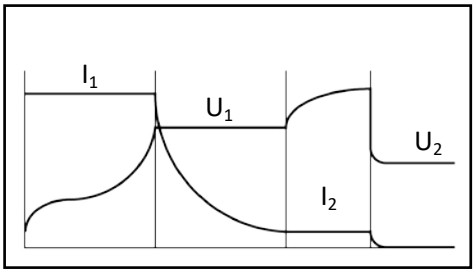


Charging characteristic curve IU_0U:

I_1 = main charging current

U_1 = main charging voltage

U_2 = retention charging voltage



refresh charging characteristic curve IUI_0U:

I_1 = main charging current

U_1 = main charging voltage

I_2 = gassing current

U_2 = retention charging voltage

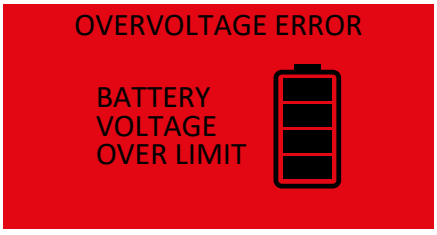
Error diagnosis

Safety

An electrical shock can be deadly.
Before opening the device
– disconnect it from the mains,
– disconnect the connection to the battery,
– attach an understandable warning sign against restarting
– Use a suitable measuring device to ensure that electrically-charged components (e.g. condensers) have discharged.

An insufficient protective grounded connection can result in serious personal or material damages. The housing screws represent a suitable protective grounded connection for grounding the housing and may never be replaced by other screws without a reliable protective grounded connection.

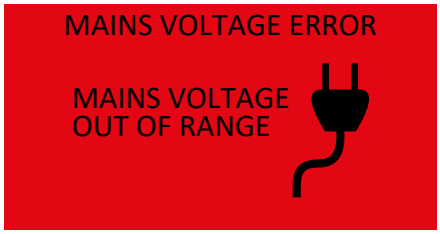
Safety equipment



Overvoltage error

If the battery open-circuit voltage is greater than 14.0 V the charger will not start and displays "OVERVOLTAGE ERROR – BATTERY VOLTAGE OVER LIMIT"

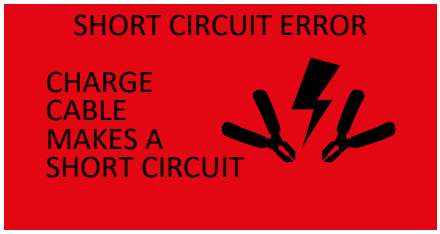
Remedy:
– observe correct operating mode and correct voltage.



Mains voltage error

If the mains has voltages above or below the permissible range the charger will not start and displays "MAINS VOLTAGE ERROR – MAINS VOLTAGE OUT OF RANGE".

Remedy:
– check the mains conditions.

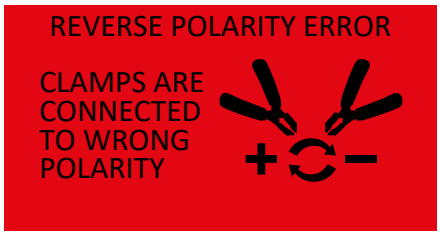


Short-circuit

If the charging clamps or the charging cables are causing a short-circuit, the charger will not start and displays "SHORT-CIRCUIT ERROR – CHARGE CABLE MAKES A SHORT-CIRCUIT".

Remedy:

– check charging cables, contacts and battery terminals.

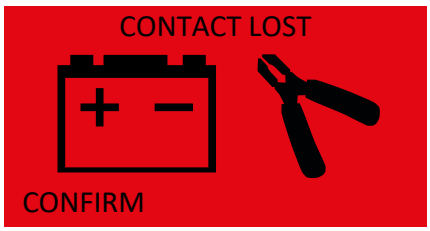


Polarity reversed

If the charging clamps have been reversed and connected to the wrong terminal, the charger will not start and displays "REVERSE POLARITY ERROR – CLAMPS ARE CONNECTED TO WRONG POLARITY".

Remedy:

– connect the battery with the correct polarity.



Contact error

If the charging clamps are insufficiently connected to the battery or the vehicle connections and a we contact is the result, the charger will not start and displays "CONTACT LOST".

Charging Timeout

Under the "REFRESH" operating mode the main charging phase U1 has exceeded the maximum time depending on the battery capacity:

10 – 100 Ah	7 Stunden
101 – 200 Ah	12 Stunden
> 200 Ah	16 Stunden

Remedy:

– check the battery
– check parallel consumers (radio, …)

Capacity Overload

Under the “REFRESH” operating mode more than 112% of the battery capacity has been charged in the main charging phase

Remedy:

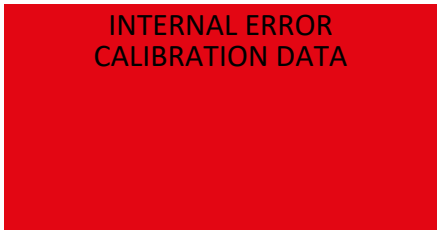
– check the battery
– observe the correct battery capacity
– check parallel consumers (radio, …)

Internal Error

Internal circuit error

Remedy:

– disconnect the charger from the power for approx. 30 seconds and reboot. If the error still exists, please return the battery charger immediately to the manufacturer



Internal Error
Calibration Data

Internal parameter error

Remedy:

– disconnect the charger from the power for approx. 30 seconds and reboot. If the error still exists, please return the battery charger immediately to the manufacturer

Internal Error F11

Internal voltage error

Remedy:

– disconnect the charger from the power for approx. 30 seconds and reboot. If the error still exists, please return the battery charger immediately to the manufacturer

Technical data

Electrical data input	Nominal mains voltage	1p 100 VAC up to 240 VAC ± 10 %
	Mains current	1p 90V .. 265 VAC
	Mains frequency	50 / 60 Hz ± 5 %
	Mains current	max. 7 A eff. at 100 VAC max. 2.9 A eff. at 230 VAC
	Mains fuse	1p 10 A, Char. B
	Effectivity	up to 93 %
	Nominal effective power at output	620 W
	Power consumption (standby)	max. 2.4 W
	Protection Class	I (with ground conductor)
	Conformity mark	CE
Electrical data output	Nominal output voltage	12 V DC
	Output voltage range	1 V – 17 V DC
	Output current	40 A at 14.4 V DC
	Battery return current	approx. 15.4 mA
Battery data	12 V DC	10 – 300 Ah
Technical data	Cooling system	Outside cooling system, ventilator with speed regulation
	Dimensions L x W x H	285 x 265 x 115 mm
	Weight (without cable)	4.7 kg

Surrounding conditions	Operating temperature	-10°C – +50°C at 230 V AC mains voltage -10°C – +45°C at 100 V AC mains voltage
	Storage temperature	-25°C – +80°C
	Climate class	B
	Protection Class	IP21D

Standards	EN 60950-1
	EN 61000-6-2
	EN 61000-6-3

Equipment

1 x	Battery charger Charge Cube	Art.-No: A003494
1 x	Mains cable 3,0 m	Art.-No: A004907
1 x	Charging cable 5,0 m with charging clamps	Art.-No: A004908
1 x	Set of Edge protection (2 pieces)	Art.-No: A004440
1 x	Operating manual	Art.-No: A005599

Warranty

The battery charger from akkuteam comes with a product warranty of 24 months against materials or manufacturing defects.

The product warranty begins on the shipping date as confirmed on the invoice or the shipping ticket.

The product warranty is valid for the user/buyer, provided the battery charger was purchased from an authorized dealer and that it was used as intended.

The product warranty is null and void if the battery charger was used for other purposes that are in violation of the intended uses.

The warranty expires when the battery charger was not used in accordance with the operating manual.

In case of a defect, akkuteam will at its own discretion repair or replace only the defective components.

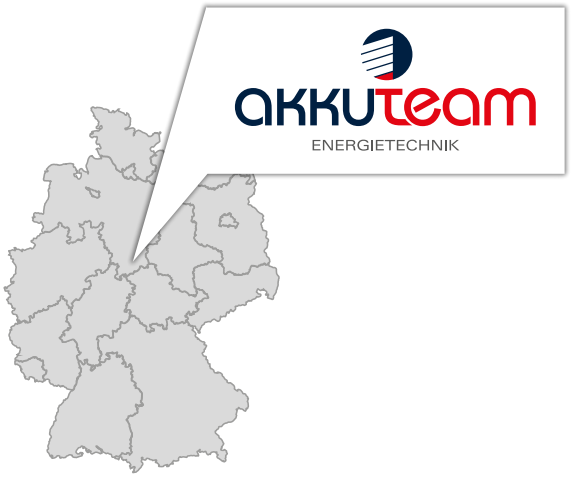
Service Address: akkuteam Energietechnik GmbH
Theodor-Heuss-Straße 4
D-37412 Herzberg am Harz
cube-service@akkuteam.de

Service

In the case of a device defect the maintenance are offered by akkuteam Energietechnik. Please contact us by indicating the device type and serial number: **cube-service@akkuteam.de**.

Shipping Address: akkuteam Energietechnik GmbH
Theodor-Heuss-Straße 4
D-37412 Herzberg am Harz

You can also order spare parts in our online shop. **www.shop.akkuteam.de**



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