

VOTRONIC

Assembly and operating instructions

Charging converter, B2B battery to battery, optimal battery charging while driving:

VCC 1212-30

Input voltage 12 V Charging power 12 V / 30 A

No. 3324



Please read these assembly and operating instructions completely, especially page 15 "Safety guidelines and intended use", before you start connecting and commissioning.

Fully automatic battery charging converter for special vehicles, motorhomes, boats.

While driving, the "VCC" series charging converter (booster) is used to optimally charge the living area/supply battery (BOARD battery). 4 adjustable IU1oU2 charging programs for classic gel, AGM and lithium LiFePO4 supply batteries enable monitoring-free, rapid and gentle full charging from any charging state with subsequent full maintenance.

The charging converter draws its energy from the vehicle starter circuit (alternator with STARTER battery). There is no intervention in the starter circuit itself; the device simply behaves like a powerful consumer on the alternator. The automatic power control ensures the necessary safety and starting ability of the vehicle.

In modern EURO standard 6, 6 + plus vehicles with energy-saving, intelligent alternators, their voltage fluctuates significantly depending on the driving condition (12.6 V ... 15.5 V). The charging converter now completely compensates for these fluctuations to ensure even charging of the BOARD battery and to protect the 12 V consumers connected there. Energy used is immediately recharged.

Even with conventional alternators and long connecting cables, significantly shorter charging times and fully charged batteries can be achieved thanks to the higher charging currents that are now possible.

- The powerful charging converter ensures high charging performance even on short journeys.
- Full charge for longer journeys.
- It increases or reduces the voltage to the necessary level to provide the BOARD battery with the optimal voltage for its charging program to be able to charge precisely.
- It is characterized by its compact design, low weight (high-frequency switch mode up/down converter technology) and powerfully dimensioned power components for safe operation.
- The 12 V consumers supplied are protected against overvoltage and voltage fluctuations.
- Built-in recharging branch 12 V/0 ... 1 A, ensures charging/charge retention of the 12 V STARTER battery during long periods of downtime. It activates automatically when the BOARD battery is charged externally using a mains charger.

Additional device features:

- The charging voltage is free of peaks and regulated in such a way that overcharging of the batteries is impossible.
- Fully automatic operation: The device is constantly connected to the batteries and is powered by the running. The vehicle's alternator is automatically activated. The batteries are not discharged when the engine is stopped.
- Charging aid for deeply discharged lead or switched-off LiFePO4 batteries: Gentle pre-charging of the (Gel, -AGM) batteries. Battery or automatic reactivation of the Li battery if consumers are still switched on.
- Parallel and buffer operation: If consumption occurs at the same time, the battery will continue to be charged or kept fully charged. The device automatically calculates and monitors the charging times.
- Monitoring-free charging: Multiple protection against overload, overheating, overvoltage, short circuit, Misbehavior and battery back-discharge due to electronic regulation up to and including the separation of the device and battery.
- Built-in on-board network filter: Problem-free parallel operation with other charging sources (EBL, chargers, engine and Fuel generators, solar systems) on a battery.
- Charging cable compensation: Voltage losses on the charging cables are automatically compensated.
- Connection for battery temperature sensor (Sensor 825 included in delivery):
With lead batteries (gel, AGM), the charging voltage is automatically adjusted to the battery temperature, ensures a better full charge of the weaker battery when it is cold; unnecessary battery gassing and strain is avoided in summer temperatures.
LiFePO4 batteries: Battery protection at high temperatures and especially adapted charging at low temperatures below 0 °C.

Device assembly

Mount the device **near the BOARD battery to be charged (for short charging cables)** on a clean, flat and hard mounting surface, protected from moisture, moisture and aggressive battery gases; the installation position is arbitrary.

Although the device has a high level of efficiency, heat is generated, which is transported out of the housing by a built-in fan. For full charging performance, the ventilation openings in the housing must be free (10 cm minimum distance) and sufficient **air exchange** must be ensured in the **area around the device** to dissipate heat.

Otherwise, if the temperature increases significantly, the device may reduce the charging power slightly.

Device connection

a. Select the appropriate connection scheme for the device application:

- 1** **Standard** connection diagram, page 3.
- 2** **Combination** with electrical block **"EBL"** (often already present in the vehicle) with continued use of the existing cabling/fuses, page 4.
- 3** **Combination** with **"EVS"** electrical supply (often already present in the vehicle) with continued use of the existing cabling/fuses, page 5.
- 4** **Special case** if there is a cut-off relay in the vehicle if it is not accessible or is very difficult to access., page 6.
- 5** **Connection diagram** for pick-up and separable living cabins, page 7.

b. Create **power connections** on large terminals, observe **Table 1** , see below
Reverse polarity (swapping +/-) can lead to serious damage to the device!
Tightening torque 1.2 Nm!



c. **Control connections** on 5-pin. Create a terminal strip, including:

Terminal "D+": 1) connect: automatic device control via vehicle signal D+. _____

2) leave blank: automatic device control by operating voltage. _____

Further description on page 8.

Device settings

d. Be sure to set the charging program for the "BOARD" battery type (design/technology Gel, AGM, LiFePO4).
 Page 10.

Commissioning and functional test

e. Further description on page 13.

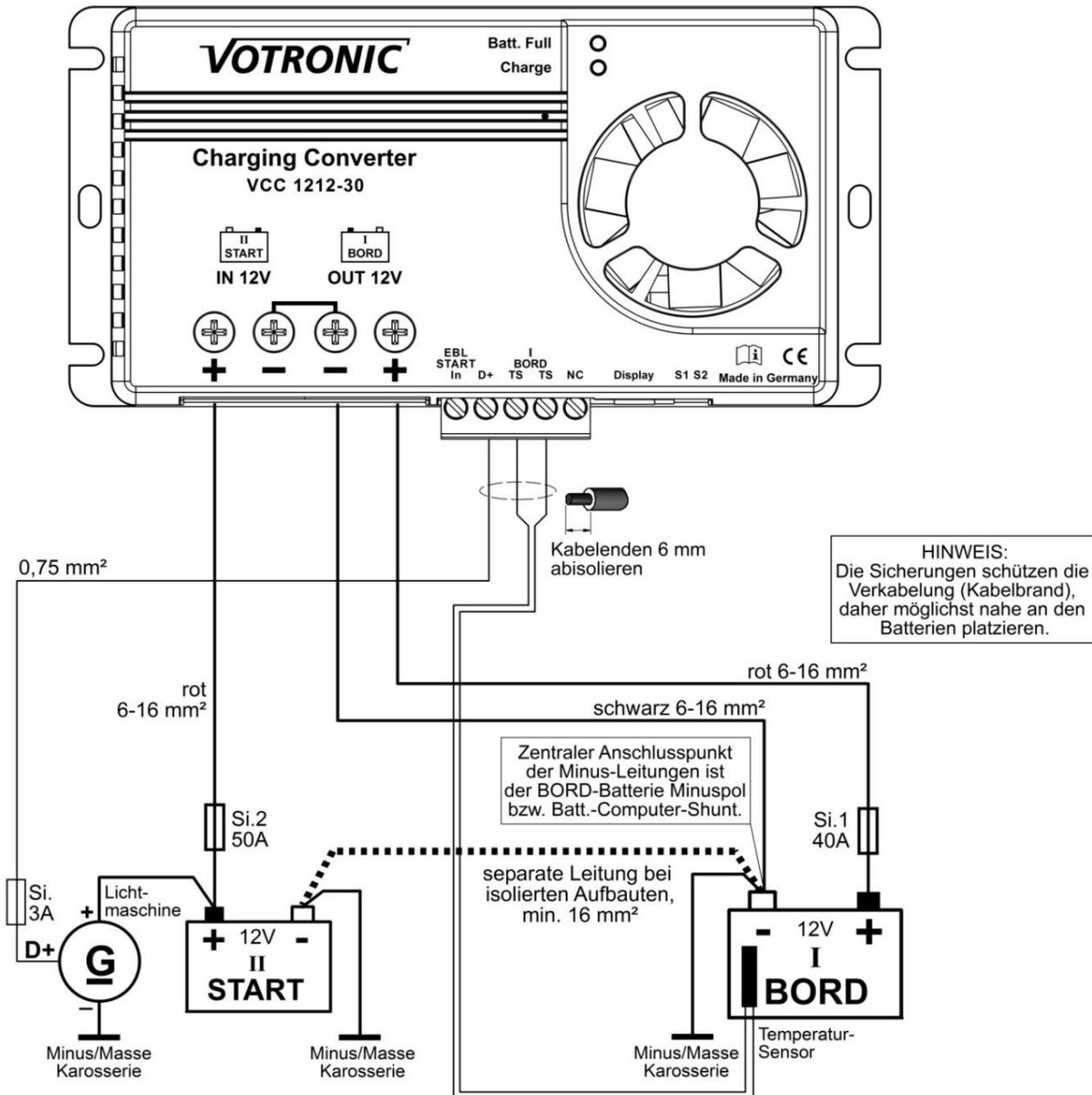
Table 1: Recommended cable cross-sections, lengths and fuse strengths

Assignment of the power connection terminals **"IN START + / -"** and **"OUT BORD + / -"**:

- **The central connection point for all device and battery negative cables is the pole of the BOARD battery!**
- When using a **current measuring shunt** in the negative line (e.g. from the battery computer) the **The meeting point** of all negative lines is at the **measuring shunt**, not at the BOARD battery!
- For **insulated structures** there is a **line between the two** as shown
Battery negative poles -START and -BORD must be laid, min. cross section 16 mm²!
- For full charging performance, carry out the **cable cross-sections and lengths** according to the **table** below !

VCC 1212 - 30					
Cable cross-section	Cable length "IN" at "+ START"	"Si. 2" Cable protection	Cable length "- OUT" at "- BOARD"	Cable length "+OUT" at "+BOARD"	"Si. 1" Cable protection
6mm ²	up to 3.5 m	50A	0.8 ... 2.0 m	0.8 ... 2.0 m	40A
10mm ²	up to 6 m	50A	1.5 ... 3.0 m	1.5 ... 3.0 m	40A
16mm ²	up to 10 m	50A	2.5 ... 5.0 m	2.5 ... 5.0 m	40A

1 Standard connection scheme:



If possible, the device should be installed **closer** to the **BOARD battery** if possible .

When the ON-BOARD battery is being charged from the mains, the reverse charging branch of the VCC 1212-30 is active to charge/ maintain charge of the vehicle STARTER battery.

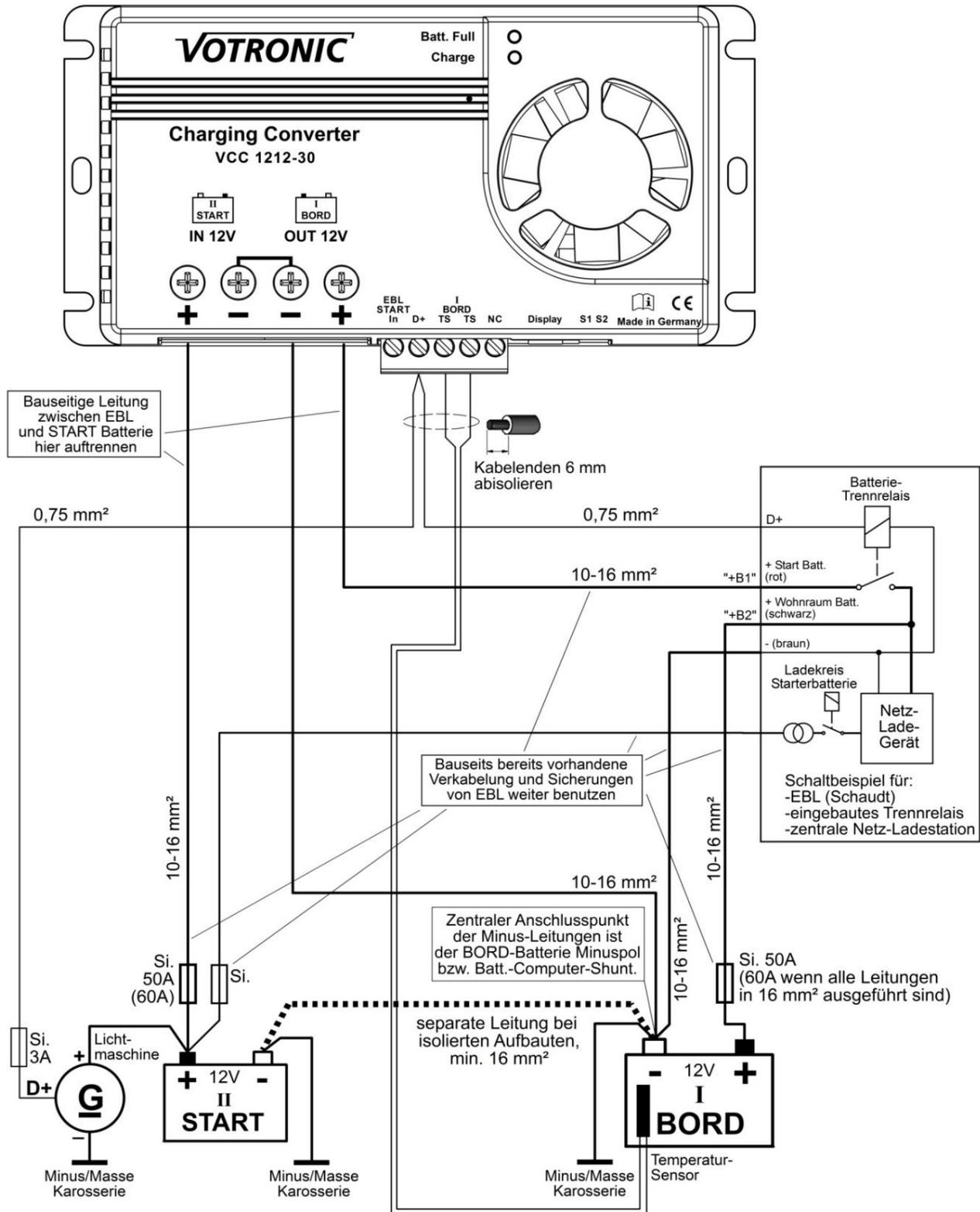


Safety instructions for all connection types:

- Pay attention to cable cross-sections and lengths (table 1).
- Use fuses to protect the cables near the battery.
- Be sure to avoid reverse **polarity** (**swap** 12 V +/-) on the large power terminals.
it will cause serious damage to the device!

2

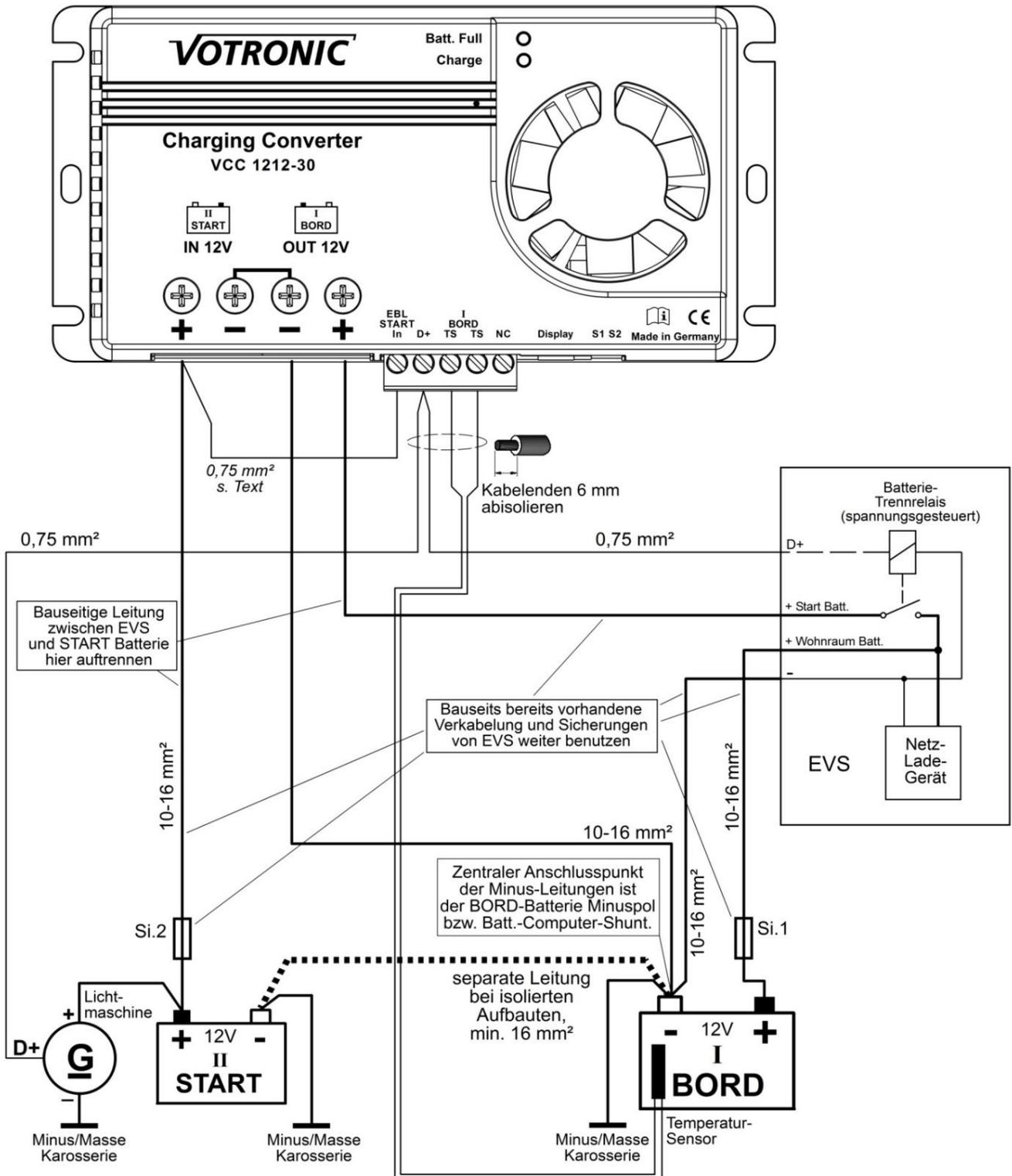
Combination with electrical block "EBL", with continued use of the cabling and fuses already present in the vehicle; +
Disconnect the cable to the STARTER battery:



The charging of the STARTER battery during mains operation is taken over by the EBL. The recharging branch of the charging converter is not active here.

Special feature: Voltage display on older EBL models without a separate charging/measuring circuit for the STARTER battery:
After installing the charging converter in conjunction with an older model EBL, it may happen that the voltage for the STARTER battery is no longer displayed when the charging converter is switched off. In this case, the "EBL Start In" connection on the charging converter is bridged with the "+IN 12 V" terminal (as with "EVS") so that the EBL can display the voltage of the STARTER battery. Due to the system, the voltage of the STARTER battery is not displayed correctly on the EBL while driving. During EBL mains operation, the recharging branch of the charging converter for charging/maintaining the STARTER battery is active here, see EVS page 5.

- 3 Combination with “EVS” electrical supply , with continued use of the cabling and fuses already present in the vehicle; + Disconnect the cable to the STARTER battery:



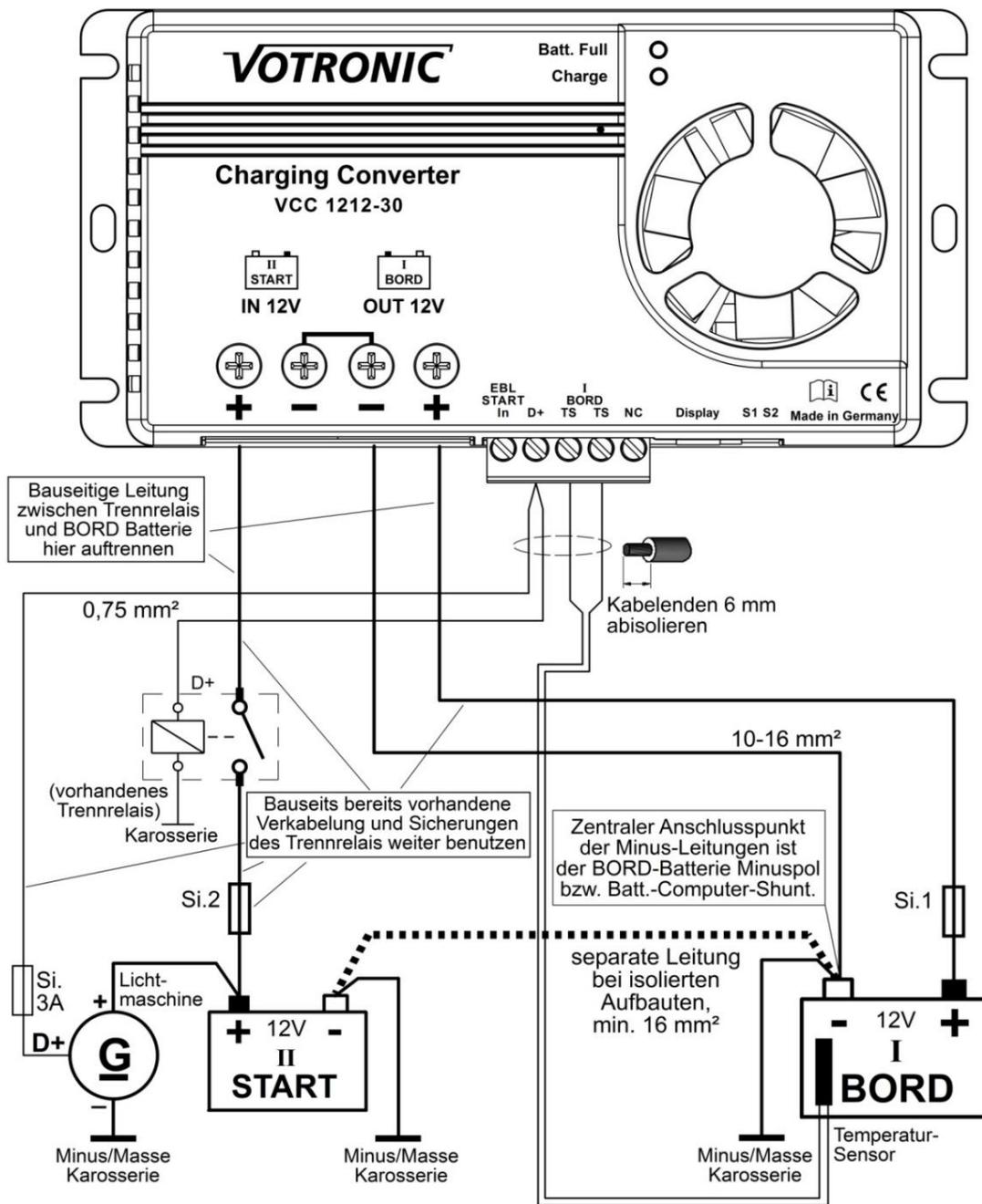
A special feature of the “EVS” is that they only have a single connection to the starter battery, i.e. there is no separate connection for voltage measurement for the STARTER battery.

For this reason, the “EBL Start In” connection on the charging converter must be bridged with the “+IN 12 V” terminal so that the EVS can display the voltage of the STARTER battery when the charging converter is switched off.

Due to the system, the voltage of the STARTER battery is not displayed correctly on the EVS while driving.

During EVS mains operation, the recharging branch of the VCC 1212-30 is active to charge/maintain charge of the STARTER battery.

- 4 **Special case** if there is a cut-off relay in the vehicle if it is not accessible or is very difficult to access; + Disconnect the cable to the BOARD battery:

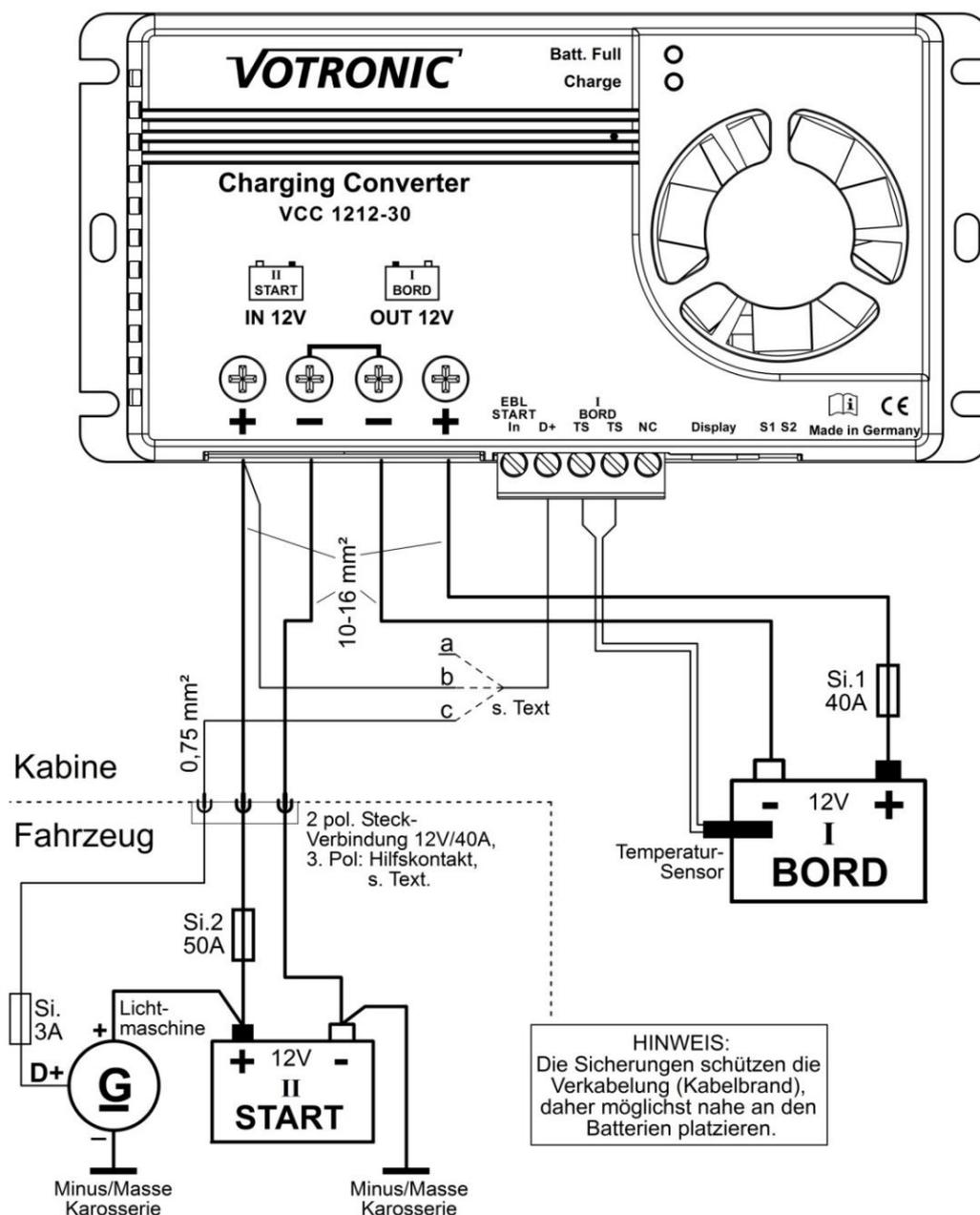


Note: The recharging branch of the VCC 1212-30 for charging/maintaining the STARTER battery from the BOARD battery during external mains charging is not active here (the isolating relay is then switched off).

5

Connection diagram: Pick up and separable living cabins:

Note: Not suitable for standard car trailer plugs (too low current carrying capacity)!



Plug connection:

- 2-pole, the contacts must have a load capacity of 12 V/40 A!
- If available, the "D+" signal can be supplied from the vehicle with a 3rd pole (auxiliary contact 12 V/< 1 A).

"D+" connection for 2-pin. Plug connection:

- The "D+" terminal on the charging converter remains free. The device therefore works with voltage control (see page 8), the STARTER battery cannot be discharged (even when the engine is at a standstill). However, full converter performance is required. Strong cable cross-sections and a constantly high LiMa voltage so that at least 13.3 V "arrives" at the device. Not suitable for vehicles with intelligent LiMa (Euro 6).
- The "D+" terminal is connected to "+ IN", the device works as soon as the plug connection is plugged in. Only at least 11.7 V needs to arrive at the device, making it suitable for Euro 6 with intelligent LiMa and longer cable lengths.

ATTENTION: When the engine is stopped, the STARTER battery can be severely discharged! A remedy, however, is possible with a vehicle-side isolating relay (12 V/40 A behind Si.2), which is automatically controlled by "D+".

"D+" connection for 3-pin. Plug connection:

- The "D+" terminal is connected to the vehicle's "D+" signal, making it suitable for Euro 6 with intelligent LiMa and longer cable lengths, as only at least 11.7 V needs to arrive at the device. The STARTER battery is not discharged when the engine is stopped. When the ON-BOARD battery is being charged from the mains, the reverse charging branch of the VCC 1212-30 is active to charge/maintain charge of the vehicle STARTER battery.

Connection of the **5-pin terminal strip** (control connections):

Plug-in terminal strip: If space is limited, the strip can be **removed** at any time to make cable connection easier and be **plugged** back in . **Tightening torque 0.5 Nm!**

Cable cross sections: 0.75 mm² or larger.

Stripping length: approx. 6mm.

Protection: The inputs of this strip are protected against overvoltage and reverse polarity.

“TS TS”:

 Measuring input for the **temperature** of the BOARD supply battery:

Connect the temperature sensor to the **connection terminals “TS - TS”** (any polarity). The effect of the sensor is described in more detail under **“Battery temperature sensor”** (page 9) and can be found in the charging programs.

When the LiFePO4 charging program is set: The charging converter does not function without a temperature sensor (safety)!

“EBL START In”:

 (passing the STARTER battery voltage through to EVS for measurement purposes)

After installing the charging converter in conjunction with EVS or older EBL, it may happen that the voltage for the STARTER battery is no longer displayed when the charging converter is switched off.

In this case, the input is used to display the voltage of the STARTER battery on the EVS electrical supply, shown and described on the “EVS” connection diagram, page 5. _____

Can also be used with older EBL designs without a separate charging/measuring circuit for the STARTER battery, described in more detail on page 4 in the text block “*Special feature...*”.

If these two cases do not apply, the terminal must be left free.

“NC”:

 Connection without function, leave terminal free.

“D+”:

 Control input charging converter ON / OFF and function selection:

2 operating modes for automatic ON/OFF control of the device are possible:

1) Connect terminal “D+”:

 Activation of the charging converter by control signal “D+” from the vehicle:

This operating mode is particularly necessary for **EURO standard 6, 6+ vehicles** with energy management, start/stop, strongly fluctuating alternator/STARTER battery voltages due to energy recovery, etc.

Also **required** for operation in combination with electric block **EBL**, electric supply **EVS** and for long cables between STARTER battery and charging converter.

*If necessary, the control input “D+” can also be connected to vehicle terminal 15 (ignition ON), but the STARTER battery can then be accidentally **heavily** discharged when the engine is stopped!*

Increase in charging power *: > **11.70V**
 Reduction in charging power *: Switch- < **11.40V**
 off threshold (with continuous signal “D+”) *: < **11.20 V** with 30 sec. delay

Recharge branch for START battery (trickle charge) when charging the BOARD battery using the mains charger: **ACTIVE**

2) Do not connect terminal “D+”, leave it free:

 Pure voltage control of the charging converter:

The device is activated by the increased voltage on the STARTER battery when the engine is running and switches off again when the voltage drops (engine off).

The prerequisite for this operating mode are strong, short cables to the STARTER battery and a conventional, non-intelligent alternator with a sufficiently high, consistent charging voltage (not Euro 6).

The STARTER battery cannot be discharged in this operating mode because of the high switch-off threshold. _____

A notice:

If the “D+” terminal was accidentally supplied with voltage, the device remembers the “control by D+ signal” and continues to expect this signal for operation.

Reset: The “Voltage control” operating mode (without “D+”) can be restored by switching the device on for _____ is disconnected from all operating voltages for 30 seconds (disconnect BOARD and STARTER battery).

Increasing charging power*: > **13.30V**
 Reduction in charging power*: <**13.00V**
 Switch-off threshold *: < **12.90 V** with 30 sec. delay

Recharge branch for START battery (trickle charge) when charging the ON-BOARD battery using the mains charger: **DISABLED**

*sa How the power control works on the STARTER battery and alternator, page 12.

Battery temperature sensor:

Connect the temperature sensor (included in delivery) to the “**TS TS**” **connection terminals** (any polarity).

It is used to monitor the **temperature** of the ONBOARD supply battery.

The installation location of the sensor must not be influenced by heat sources (engine heat, exhaust, heating, etc.)!

Gel, AGM batteries:

Installation: The sensor must have **good thermal contact with the internal battery temperature** and should therefore be screwed to the negative or positive pole of the battery. Alternatively, it can also be attached to the center of the battery housing on the long side.

Effect: The temperature-dependent charging voltage of the BOARD battery is automatically adjusted to the battery temperature (automatic temperature compensation). The temperature sensor measures the battery temperature. At low temperatures (winter operation), the charging voltage is increased and the weakened battery is charged better and faster. To protect connected, sensitive consumers, the voltage is limited in extreme cold.

In summer temperatures, the charging voltage is reduced, thereby reducing the load (gassing) on the battery and increasing the service life of gas-tight batteries.

Battery protection: If the battery temperatures are too high (from +50 °C), the charging voltage is reduced significantly to the **safety charging voltage** of approx. 12.8 V to protect the battery and the maximum charging current is halved (safety mode, “**Charge**” **LED flashes**), all previous charging data remains saved. The battery will then no longer be charged, but any connected consumers will continue to be supplied by the device and the battery can cool down, then charging will continue automatically, see also:

“**Lead batteries, 2 charging programs, charging voltages and temperature compensation**” from **page 10**.

Missing sensor, cable break or short circuit in the sensor lines as well as nonsensical measured values are detected by the device. It then automatically switches back to the usual 20 °C/25 °C charging voltages recommended by the battery manufacturers.

LiFePO4 batteries:

Installation: The sensor must have **good thermal contact with the internal battery temperature** and should therefore be screwed to the **negative pole** of the battery, as this is in most cases the cooler side (the plus pole is often exposed to waste heat from battery-internal fuses, cell compensation and charging electronics, balancers etc. falsified).

Effect: In the event of abnormal battery temperatures, e.g. < -20°C, >50°C, the charging voltage is reduced to the **safety charging voltage** of approx. 12.0 V to protect the battery. The maximum charging current is still available to consumers. (Safety mode, “**Charge**” **LED flashes**), all previous charging data remains saved. The battery will then no longer be charged, but connected consumers will continue to be supplied by the device if the battery voltage is below 12.0 V. Once the battery temperature is within the permissible range again, charging continues automatically.

There are two different LiFePO4 charging characteristics to choose from that behave differently below 0°C:

Charging program

3: For batteries that need to be charged below 0°C with a reduced charging current. The charging current is limited to approx. 2A above a battery voltage of 12.0V.

Loading program 4:

For batteries that are internally heated or are suitable for charging below 0°C. Charging current and charging voltage are not limited. A large part of the maximum charging current is still available to consumers during the heating phase.

In both charging programs, the “Charge” LED goes out briefly every two seconds below 0°C.



Attention: When the LiFePO4 charging program is set, the temperature sensor must be connected to ensure battery safety, otherwise no device function.

The LEDs “**Batt.** “**Full**” and “**Charge**” flash alternately!

“Display” 6-pin Plug-in socket for remote control:

A remote display/remote control can be connected here for convenient remote control (plug and play), for example if the charging converter had to be installed in a difficult-to-reach location.

Both devices have a power “limit” function with which the charging power can be temporarily reduced at the push of a button (see technical data).

- LED Remote Control S Item No. 2076
7 LEDs for clear function and charging status monitoring.
- LCD Charge Control S-VCC Item No. 1248
With an illuminated and easy-to-read display, shows the status of the charging converter, the current charging phase, the voltage of the on-board and starter batteries as well as the current charging current.

Make device settings:

Carefully move 2 miniature slide switches on the side wall of the device to the desired position using a small screwdriver.

The switch levers are shown in white.

1.) Set the "BOARD" battery type charging program (design, technology):

There are 4 charging programs for the different battery types stored in the device, select with the 2 slide switches shown:

Unless otherwise specified by the battery manufacturer, the appropriate charging program for the ON-BOARD supply battery can be determined using the following description and the technical data (U1 and U2 voltages).



All loading programs automatically take into account the possible parallel and Buffer operation with 12 V consumers connected to the BOARD battery.

TS = temperature sensor (effect with/without connected temperature sensor)

Charging programs for lead batteries (Gel, AGM):

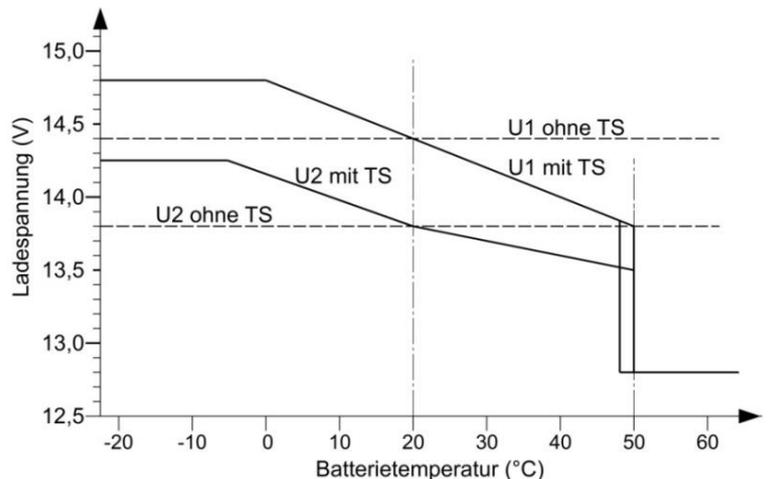
Charging programs 1-2, charging voltages and temperature compensation for lead technology batteries:

1 "Gel 14.4V"

U1=14.4V U2=13.8V
6-12 h

Adapted to sealed, gas-tight gel/dryfit batteries VRLA with a fixed electrolyte, which generally require longer U1 holding times in order to achieve high capacity storage and a battery To avoid "starving" (going deaf), e.g. EXIDE, Sonnenschein, "dryfit", Varta, Bosch, Banner, Mobil Technology and many others. Also recommended, unless otherwise specified by the battery manufacturer, for batteries with round cell technology.

Switch position



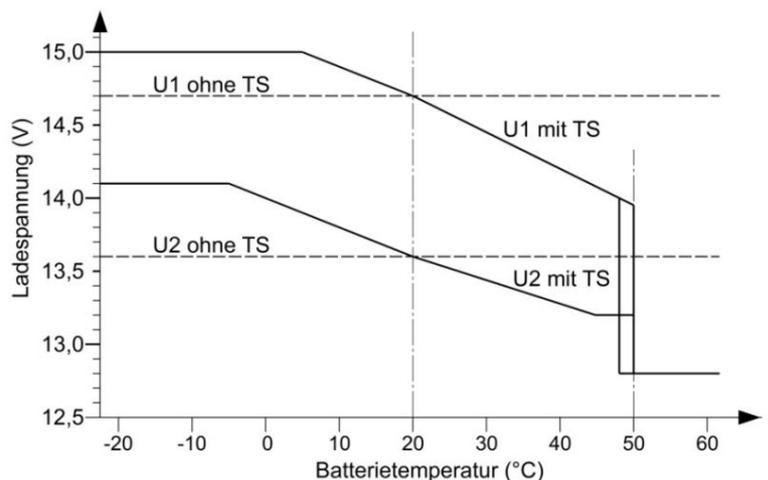
2 "AGM 2 14.7 V"

U1=14.7V U2=13.6V
1.5-5 hours

Matched to sealed, gas-tight AGM (Absorbent Glass Mat)/lead fleece batteries, Lead Crystal, VRLA with charging voltage "14.7 V or 14.8 V".

Be sure to check the battery data sheet regarding the high U1 charging voltage of 14.7 V!

Switch position



Charging program for **LiFePO4** batteries:

Charging program 3-4, charging voltages and temperature monitoring tailored to lithium batteries:



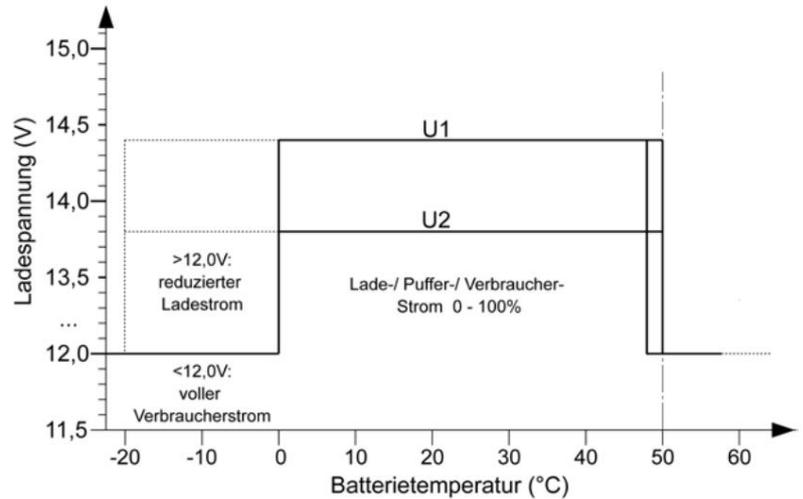
- Observe the battery manufacturer's charging instructions!
- **Operating the device on a LiFePO4 battery without a BMS battery management system and without cell balancing and protective circuitry is not permitted!**
- **The battery temperature sensor must** be mounted on the battery (screw on the negative pole) and connected to the device; it serves to protect the battery.
No function without temperature sensor, LEDs "Batt. "Full" and "Charge" flash alternately!
- If possible, keep the battery temperature above 0°C.

3 "LiFePO4 14.4V"

Switch position



U1=14.4V U2=13.8V
0.3-1 h

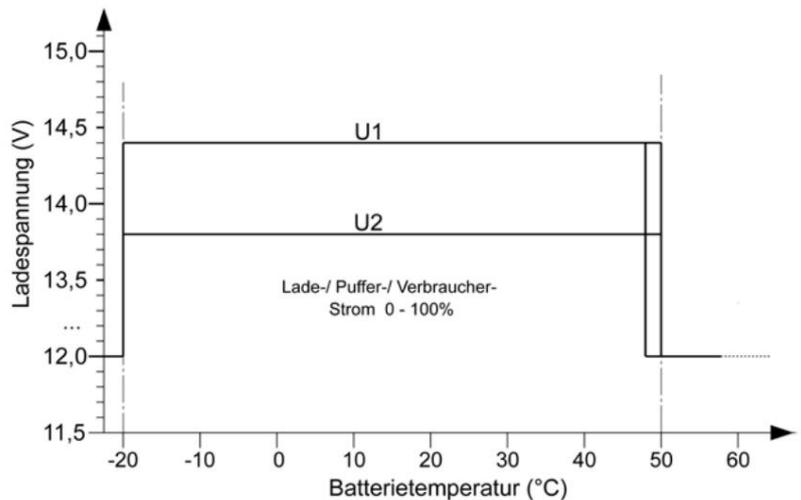


4 "LiFePO4 (Heated) 14.4 V" switch position

U1=14.4V U2=13.8V
0.3-1 h



Only for LiFePO4 batteries with internal heating!



In automatic normal operation, no further operation of the device is required.

Operating displays:

“Batt. Full” (BOARD battery fully charged, green)**:

- Shines: Battery charged to 100%, trickle charge U2, done. _____
- Flashing: Main charging process works in the U1 charging phase, charge status display from 75% (lead), approx. 90% (LiFePO4) (short flashing) gradually increasing to 100% (long flashing).
- Out of: Main charging process still works in phase I. _____

“Charge” (main charge of BOARD battery, yellow)**:

- Shines: Charging converter in operation, the ONBOARD battery is being monitored and charged.
- Flashing: Battery protection: battery overtemperature > 50°C, switching to low safety charging voltage and half max. charging current, automatic return 2°C cooler.
- Goes out briefly every 2 seconds:
 1. The power control of the charging converter has increased the output power by more than 30% reduced (STARTER battery discharge protection) because the voltage of the STARTER battery has fallen below the value for “reducing the charging power”. If the voltage rises above the “increase in charging power” value, it will automatically be regulated again.
 2. Only with LiFePO4: Battery temperature below 0°C, the charging current can be reduced to protect the battery for all charging types, which means longer charging times if the battery is discharged.
- Out of: Charging converter at rest.

**

“Batt. Full” and “Charge” flash alternately:

The battery temperature sensor is not connected to the LiFePO4 charging program!

How the power control on the STARTER battery and alternator works:

The charging converter is voltage-controlled or activated via the control input “D+” and is automatically switched off again when the engine is “OFF”. It starts with minimal charging power.

After starting the engine, the STARTER battery should also be charged again immediately and remain startable. Therefore, the charging converter only starts charging the ON-BOARD battery when at least the voltage value “increase in charging power” is reached on the STARTER battery.

The charging converter then gradually increases the charging power for the ON-BOARD battery if at least the voltage value “increase in charging power” is still reached and exceeded on the STARTER battery.

If the starter circuit is heavily loaded by many large consumers and the STARTER battery voltage drops below the “reduction in charging power” value, the charging power for the ON-BOARD battery is reduced in order to relieve the starter circuit. If the voltage drops below the “switch-off threshold” for 30 seconds, the charging converter switches itself off.

If the voltage rises above the “increase charging power” threshold, the converter switches on again and gradually increases the power until the required (maximum) charging power is reached.

A reduction in charging power of more than 30% due to insufficient input voltage from the alternator is indicated every 2 seconds by the “Charge” LED briefly going out. It lights up again permanently when either there is enough input voltage again or the power requirement has already decreased due to a charged ON-BOARD battery.

The charging converter simulates a larger consumer on the alternator/starter circuit, so that it can also be used with Euro 6 Vehicles with intelligent alternators activate them when necessary.

Recharge branch for 12 V STARTER battery:

There is a charging branch in the device that can provide backup charging and charge maintenance for the 12 V STARTER battery during long periods of downtime. It activates automatically when the ON-BOARD battery is sufficiently charged, e.g. by a mains charger (see technical data “recharge branch”). A small part of the charger current (approx. 0 - 1 A) is branched off from the BOARD for the STARTER battery.

Charging voltage and current are reduced so that overcharging of the STARTER battery is impossible.

The recharging branch can only be activated with “D+” control of the charging converter, not with “voltage control”. described under “D+” control input, page 8!

Furthermore, the possible use of the recharging branch is discussed in the various connection diagrams.

Commissioning and functional test:

After connecting and setting the charging converter, the function can be tested:

1. Start the vehicle:

- The charging converter is activated ("Charge" LED lights up) and starts with minimum charging power.

2. Increase the speed of the vehicle so that the voltage at the STARTER battery exceeds the set value for

"Increase in charging power" increases.

- The charging power is regulated and rises to the maximum value or, if the ON-BOARD battery is already full, to the required value of the charging characteristic.

Tips:

Device does not start, LED "Charge" does not light up:

a. Check voltage at activation input terminal "D+", > 8 V.

b. For pure voltage control (without D+), check voltages directly at the terminals, page 8.

Full charging current is not achieved:

c. ON-BOARD battery is already charged: load it with powerful consumers.

Full charging current is not reached, LED "Charge" goes out briefly every 2 seconds:

d. Check the voltage directly at the +/- IN 12 V terminals: The voltage must be above the "increase in charging power" threshold. Increase engine speed so that the charging converter can regulate.

e. Check cabling +/-OUT 12 V BOARD and fuse 1, check cross sections and lengths according to table 1.

f. Wiring +IN 12 V START, fuse 2, cross sections and lengths (also chassis "minus" connection, separate if necessary

For insulated structures, check the cable between the START and BOARD batteries according to Table 1. G.

Hidden battery isolating relay (e.g. in EBL, EVS) bridges the charging converter: Check connection diagram.

Operation with EBL, EVS etc.:

H. Device constantly switches between active and idle state: "D+" must come directly from the vehicle, not from EBL.



Battery life and performance:

- Keep batteries cool, keep **LiFePO4 above 0°C** if possible, select installation location accordingly.
- **Only store charged batteries and recharge them regularly.**
- **Open lead-acid batteries and batteries "maintenance-free according to EN/DIN":
Check the acid level regularly!**
- **Recharge deeply discharged lead batteries immediately!**
- **LiFePO4: Only use complete batteries with BMS and safety circuit.**

Option: Multiple batteries at the charging output:

Parallel charging of two or more batteries of the same voltage (12 V) is permitted. To do this, the batteries are connected "in parallel" and the capacities (Ah) of the batteries add up. **The total capacity (sum Ah) should not exceed the specified maximum battery capacity** (according to the application).

According to battery manufacturers, such **permanent parallel operation** is permissible with two or more batteries of the same voltage, the same type (Gel/AGM/LiFePO4), the same capacity and approximately the same age (history).

Example of parallel connection of 2 batteries (diagonal connection):

Connect both plus poles with a strong cable and also connect both minus poles with a strong cable.

The supply lines to this battery block are now advantageously connected "diagonally", ie

Negative lead to the negative pole of battery "1", plus lead

to the plus pole of battery "2".

This ensures that both batteries "1" and "2" in the group receive/output the same voltage.

Option: Parallel connection of two charging converters:



To increase the charging power for larger battery packs or high loads, two identical devices can be connected in parallel. It should be noted that both devices are connected as symmetrically as possible with the same cable lengths and cable cross-sections to ensure the same power development.

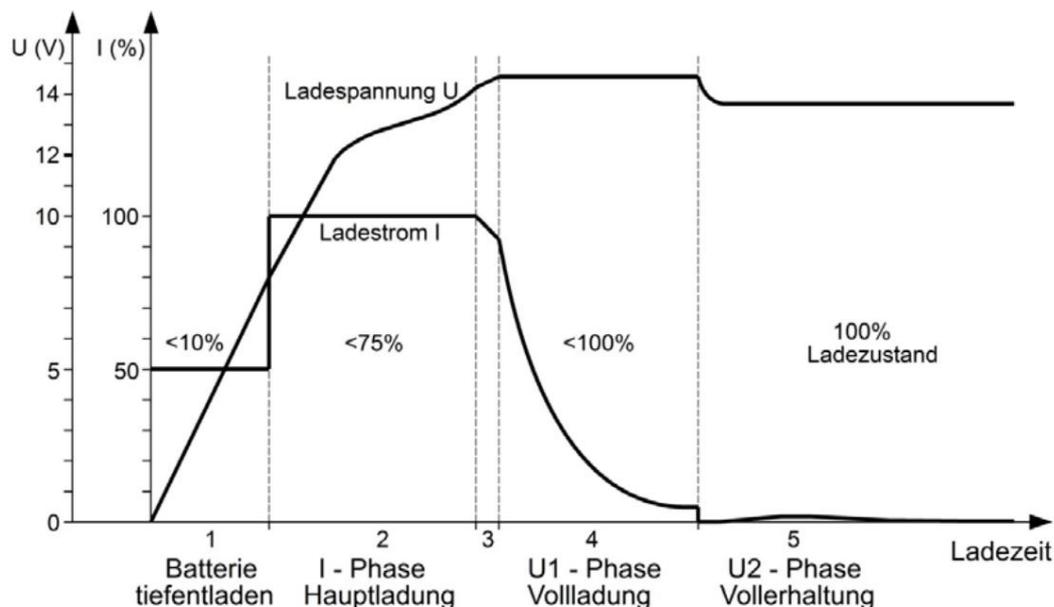
The required **cable cross-sections** of the power connections must be doubled for the high currents that occur or must be adhered to when laying individually (Table 1).

Time course of charging on the BOARD battery (OUT):

A new, complete main loading cycle is carried out:

- After the alternator has stopped or the control signal "D+" has been removed.
- After the voltage of the STARTER battery drops below the set switch-off threshold for more than 30 seconds.
- If the BOARD battery is brought below the reset voltage for 30 seconds due to high load beyond the maximum charging current.
 1. Activation of switched off LiFePO4 batteries; Charging aid for deeply discharged lead batteries
Gently pre-charged with low current up to approx. 8 V.
 2. Maximum charging current (I phase) in the medium voltage range from 8 V to the start of the U1 phase for short charging times, the "Charge" LED lights up, approx. 75% (lead), approx. 90% (LiFePO4) of capacity invited. The duration of the I phase depends on the battery conditions, the load from consumers and the state of charge. The charging converter registers the charging process.
 3. If the battery voltage is high, the charging current is reduced slightly to protect the battery (orientation phase).
automatically switched to the following U1 phase.
 4. During the U1 phase ("Charge" LED lights up), the battery voltage is kept constant at a high level, the green "Batt. Full" flashes, the high additional battery capacity is being loaded. As the full charge increases, the battery charging current slowly decreases. The charging converter monitors the charging time and charging current and, based on this and the charging history recorded during the I phase, determines the 100% full charge point of the battery for automatic switching to U2. Compared to conventional voltage converters or boosters with fixed switching charging current specifications, an unnecessarily long U1 phase is avoided due to consumer loads that may have to be supplied and distort the charging current.
 5. U2 phase (LED "Batt. Full" lights up constantly): The charging converter now has the lower charging maintenance voltage is switched, which maintains the 100% charge of the battery. Only the small compensating recharging current determined by the battery flows to maintain full charge.

Note: During the U1 and U2 phases (battery full), almost all of the possible device current is available for the additional supply of consumers without the battery being discharged.





Safety guidelines and intended use:

The charging converter was built based on the applicable safety guidelines.

It may only be used:

1. For charging lead-gel, lead-AGM batteries or LiFePO4 complete batteries (with integrated BMS, balancing, safety circuitry and approval!) of the specified nominal voltages and supplying consumers connected to these batteries in permanently installed systems with the specified battery capacities and charging programs.
2. For the co-supply of consumers connected to these batteries in permanently installed systems.
3. With the specified cable cross sections at the device inputs and outputs.
4. With the specified battery capacities at the device inputs and outputs.
5. With fuses of the specified rating near the battery to protect the battery wiring.
6. In technically perfect condition.
7. In a well-ventilated room, protected from rain, moisture, dust and aggressive battery gases as well in a non-condensing environment.

The device must never be used in places where there is a risk of a gas or dust explosion!

- Do not operate the device outdoors.
- Lay cables in such a way that damage is prevented, making sure they are securely fastened.
- Do not lay 12 V cables together with 230 V power cables in the same cable duct (empty conduit).
- Regularly examine live cables or lines for insulation faults, breaks or loose connections. Correct any defects that arise immediately.
- When carrying out electrical welding work or work on the electrical system, the device is disconnected from all connections to separate.
- If the descriptions provided do not make it clear to the non-commercial user which characteristics apply to a device or which regulations must be adhered to, the information is one Get a specialist.
- Compliance with all types of construction and safety regulations is the responsibility of the user/buyer.
- The device does not contain any parts that can be replaced by the user and can still contain voltage for a long time after it has been switched off (especially in the event of an error).
- Keep children away from the device and batteries.
- Observe the battery manufacturer's safety regulations and, if necessary, ventilate the battery compartment.
- Non-observance can lead to personal injury and material damage.
- The warranty is 36 months from the date of purchase (upon presentation of the receipt or invoice).
- If the device is not used for its intended purpose, if it is operated outside of the technical specifications, if it is operated improperly or if someone intervenes, the warranty will be void. No liability is accepted for any resulting damage. The exclusion of liability also extends to any services provided by third parties and not commissioned by us in writing. Services provided exclusively by VOTRONIC, Lauterbach.



Declaration of conformity:

In accordance with the provisions of Directives 2014/35/EU, 2014/30/EU, 2009/19/EC, this product complies with the following standards or normative documents:

EN55014-1; EN61000-6-1; EN61000-4-2; EN61000-4-3; EN61000-4-4; EN60335-1; EN60335-2-29; EN50498.



The product must not be disposed of with household waste disposed of become.



The product is RoHS compliant. It therefore complies with Directive 2015/863/EU on the restriction of dangerous substances in electrical and electronic equipment.

Qualitäts-Management
produziert nach
DIN EN ISO 9001



Recycling:

At the end of its useful life, you can send this device to us for professional disposal. Further information can be found on our website at www.votronic.de/recycling

Technical data:**VCC 1212-30****Vehicle STARTER battery input "START + IN 12 V":**

Vehicle STARTER battery nominal voltage	Battery	12V
capacity (size), minimum recommended Input voltage range		50 Ah
(EURO 6 +), D+ controlled Input overvoltage shutdown, max.		10.5 - 16.5V
		16.5V
Power consumption max.		490W
Current consumption (at lowest input voltage) depending on load	Activation control input	0.05A - 39A
"D+"		8 - 17V / < 1mA

Charging output on BOARD supply battery "BOARD + OUT 12 V":

Charging/buffer/load current, regulated IU1oU2, lead, LiFePO4 gel, 0A - 30A (0A - 20A *)

AGM battery Nominal voltage: Capacity 12V
(battery size), recommended / up to Lead charging 60-200/260Ah
programs stored in the memory Pre-charging current 2
(battery deeply discharged < 8 V), max. 15A (10A *)

Safety charging voltage in the event of battery overtemperature 12.8V

LiFePO4 battery Nominal voltage: 12V - 13.3V

Capacity (battery size), recommended / up to LiFePO4 60-200/260Ah

charging programs stored in memory 2

Safety charging voltage in the event of battery overtemperature 12.0V

Recharge branch, charge/charge maintenance for the 12 V STARTER battery from the ON-BOARD battery (e.g. when charging the ON-BOARD battery from the mains)

12V / 0 - 1A

Active at Gel, -AGM BOARD battery voltage Active at

On: > 13.1 V, Off: < 13.0 V

LiFePO4 BOARD battery voltage

On: > 13.5 V, Off: < 13.4 V

"TS TS" input for battery temperature sensor "BOARD"

Yes

EBL START In, EVS measurement input

Yes

Quiescent current, standby

3...7 mA

Charging timer

3-fold

Voltage ripple

<30 mV rms

Charging voltage limit "+OUT BORD" (protection of consumers)

15.0V

Short circuit/reverse discharge/safety protection

Yes

Device installation

any

position Temperature

-20 / +45 °C

range Speed-controlled, temperature-controlled fan Gradual

Yes

reduction of the charging power in the event of overtemperature Safety

Yes

shutdown in the event of overheating "Display"

Yes

connection Dimensions,

Yes

incl. mounting flanges and clamps (DxWxH)

73x146x40mm

Weight

280g

Environmental conditions, humidity

max. 95% RH, non-condensing

Tightening torque connection terminals "IN + OUT"

1.2Nm

Tightening torque for connection terminals "EBL", "D+" and "TS"

0.5Nm

* "Power Limit" or "Limit" function, temporary charging current reduction, available when connecting a remote control No. 2076 or No. 1248.

Scope of delivery:

1 charging converter

Temperature sensor 825

1 temperature sensor 825

1 assembly and operating instructions

**Available accessories:**

LED Remote Control S

Item No. 2076

LCD Charge Control S-VCC

Item No. 1248

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