VOTRONIC

Mounting Instructions and Operating Manual for
Fully Automatic Battery Chargers:

Automatic Charger Pb 1240 SMT 3B	Charging Capacity 12 V - 12 V / 40 A	**No. 3124**
Automatic Charger Pb 1250 SMT 3B	Charging Capacity 12 V - 12 V / 50 A	**No. 3125**
Automatic Charger Pb 1260 SMT 3B	Charging Capacity 12 V - 12 V / 60 A	**No. 3126**

Please read the mounting instructions and the operating manual including the safety instructions attentively.
Particularly observe page 2 "Safety Regulations and Appropriate Application", prior to starting connection and start-up.

Fully automatic battery charger with 3 charging ports for motor homes, intervention and special purpose vehicles, as well as the marine field.

VOTRONIC chargers of series "Pb - SMT" distinguish by their compact design, low weight (high-frequency switching power supply, Switch Mode Technology), as well as full charging capacity - even in the event of large fluctuations in the power supply (undervoltage/overvoltage, sine wave form, frequency).
The intelligent microprocessor charging control with charging programs "IU1oU2oU3" (constant current - constant voltage) and dynamic charging time calculation ensures automatic, quick and gentle full charging, as well as subsequent 100 % trickle charge of the connected batteries from any charging state. At the same time, simultaneous supply of 12 V consumer loads, which are connected in parallel, is ensured or charging of very large batteries (depending on case of application).

Charging Ports and Charging Programs:

1. **Main Battery "A (Master)",** full charging capacity**:**
   Charging programs **1) - 3)** for batteries in **lead** technology "Lead Acid/AGM 1" - "Motor" - "AGM 2" - "Gel"
   Charging Program **4)** for batteries in **LiFePO4**-technology "14.4 V"
   Automatic lithium trickle charging **5)** of the LiFePO4 battery when the vehicle is stopped (seasonal operation) to maintain a charging state of 50-80 %, which is advantageous for the battery lifetime. Simultaneous floating of 12 V consumer loads, such as alarm systems, WLAN etc., as well as the vehicle's starter battery. See page 6.
2. **Main Battery "B",** full charging capacity, with built-in switchable charging current distributor:
   a) Battery type **"B = A"**. Parallel charging **B** with the same charging programs as battery **A 1) – 4)**. See table 3.
   b) Starter battery **"B < A"**. The charging program **B** is designed for the vehicle starter battery for quick starting ability and trickle charging by additional components, particularly in case of very high consumer current rates.
3. **Signalling/Charging Port "C":**
   Signalling port 12 V for vehicle engine immobilizer, mains display or as separate auxiliary port 12 V/4 A, usable for support charging and trickle charging of a (lead) vehicle starter battery with overcharge protection. See **page 3**.

Further Characteristics of the Unit:

- The **charging voltage** is **free from peaks** and is **controlled** in such a way, that **overcharging** of the batteries is **excluded**.
- **Fully Automatic Continuous Operation:** The charger may be connected continuously to the battery, thus keeping the full charge. Battery discharge in case of power failure **is avoided** (separation by safety relay).
- **Charging aid for deeply discharged (lead) batteries or switched-off LiFePO4 batteries:** Gentle preliminary charging of the (lead-acid, gel, AGM) battery or automatic reactivation of the Li battery, in case of possibly switched-on consumers.
- **Maintenance Lithium LiFePO4, Auto Wake Up, Maintenance Phase**: Regular, automatic activation of the battery cell equalization charging (balancing) every 10 days to ensure continuous full capacity of the battery.
- **Battery regeneration in case of extended standstill periods:** twice a week to avoid harmful acid accumulation.
- **Parallel and Floating Operation:** In case of simultaneous consumption, the battery will either continue to be charged or maintained via trickle charging. Calculation and control of the adaptation of the charging times is effected automatically by the charger.
- **Unattended Charging:** Multiple protection against overload, overheating, overvoltage, short circuit, reverse battery, incorrect behaviour and back discharge of the battery by electronically controlled gradual reduction down to complete separation of charger and battery **by integrated safety relays**.
- Connection for **Battery Temperature Sensor** (Temperature Sensor 825, Order No. 2001, is required):
  Lead batteries (acid, gel, AGM): In case of **low outside temperatures**, **full charging** of the weak battery is **improved** by

automatic adaptation of the charging voltage to the **battery temperature**, and in case of summery temperatures **unnecessary battery gassing** and battery load will be avoided.
For **LiFePO4** batteries, the battery temperature sensor is **required** for the unit:
It serves for battery protection in case of high temperatures or particularly in case of low temperatures below 0 °C.

- **Silent Run Function:** Noise-optimised operation (night operation) at the touch of a button.
- **Power Pack Function:** Allows supply of the consumers without battery (such as during battery replacement).
- **Charging Cable Compensation:** Automatic compensation of voltage losses on the charging cables.
- **Integrated On-board Mains Suppression Filter:** Unproblematic parallel operation with solar systems, wind and petrol-driven generators, dynamos etc. on one battery.

Battery Lifetime and Efficiency:

- **Keep the batteries cool, LiFePO4** preferably **above 0 °C**. Choose an appropriate location for installation.
- **Store only fully charged lead batteries and recharge them periodically.**
- **Open lead-acid batteries and batteries being "maintenance-free according to EN / DIN": Check the acid level periodically!**
- **Recharge deeply discharged lead batteries immediately!**
- **LiFePO4: Only use complete batteries with BMS and safety circuit.**
  ! Deep discharge is to be absolutely avoided!

Safety Regulations and Appropriate Application:

The charger has been designed according to the valid safety regulations.

Appropriate application is restricted to:

1. **Charging of lead-gel, lead-AGM, lead-acid or LiFePO4 complete batteries (with integrated BMS, balancing, safety circuit and approval!) Charging of batteries of the indicated nominal voltage and simultaneous supply of the consumers being connected to these batteries in fixed installed systems with the indicated battery capacities and charging programs.**
2. **Connection to a shock-proof socket, which has been installed according to the valid technical regulations, protected with max. 16 A (if required mobile/stationary with a fault current breaker (FI) with a nominal residual current of 30 mA).**
3. **Connection in consideration of the indicated cable cross-sections at the charging ports.**
4. **Fuses of the indicated capacity are to be provided near the battery to protect the cabling between battery and charger output.**
5. **Technically faultless condition.**
6. **Installation in a well-ventilated room, protected from rain, humidity, dust, aggressive battery gases, as well as in an environment being free from condensation water.**

Never use the unit in locations where the risk of gas or dust explosion exists!

- Open-air operation of the unit is not allowed.
- Lay the cables in a way, that damages are excluded and observe to fasten them tightly.
- Never lay 12 V (24 V) cables and 230 V mains supply cables into the same cable conduit (empty conduit).
- Check live cables or leads periodically for insulation faults, points of break, as well as loosened or overloaded connections and remedy possible defects.
- The unit is to be disconnected from any connection prior to execution of electrically welding or work on the electric system.
- If the user is not able to draw from the manual, which characteristic values are valid for a unit or which regulations are to be observed, a specialist is to be consulted.
- The user / buyer is responsible for the observation of construction and safety regulations of any kind.
- **The unit does not contain any parts, which can be replaced by the user.** Even after withdrawal of the mains plug, the unit may be **extremely live** for an extended period (particularly in case of failure).
- Keep children away from the charger and the batteries.
- Observe the safety regulations of the battery manufacturer; deaerate the battery room.
- Non-observance may result in injury or material damage.
- The warranty period is 36 months from the purchase date (against presentation of the sales slip or invoice).
- The warranty will be void in case of any inappropriate utilisation of the unit, if it is used beyond the technical specification, in case of improper operation or external intervention. We do not assume any liability for any damage resulting hereof. The liability exclusion is extended to any service being executed by third, which has not been ordered by us in writing. Service is to be effected exclusively by VOTRONIC, Lauterbach.

Installation of the Unit:

Install the charger **near batteries A (Master) and B** (short charging cables) at a clean, level and hard mounting surface, which is protected from moisture and humidity.
The unit can be installed in any position. Protect the unit from aggressive battery gases.

Despite the charger's high efficiency, heat is produced, which is brought out of the casing by means of the built-in fan. The vent holes of the unit should never be covered (minimum distance 10 cm) to ensure full charging capacity. Ensure sufficient **ventilation** in the **environment of the unit,** so that the heat can be dissipated.
Otherwise, in the event of overheating, the charger will reduce its charging capacity.

Battery Connection and Battery Settings for Start-up:

Observe the connection plan with the cable cross-sections and the lengths of the cables, the polarity, as well as the fuses near the battery!

1. Connect the main battery to the large terminals "**- Com ABC**" and "**+ A (Master)**" observing the correct polarity. **Tightening torque 1,2 Nm!**
2. Option: Fasten the temperature sensor at battery "A" (Master) and at the terminals "**A T T** ".
3. **Never forget to set the charging program 1) - 4)** for the type (design) of main battery A (master), from page 8.
4. **Imperatively set the battery size (Ah).** See **table 2, page** 7.
5. Option: Large terminal **"+ B"**: Connect the second main battery B at this location and to ground observing the correct polarity.
   The main battery B can be at choice: (also refer to table 3, page 10, Functions):
   a.) A further battery (bank) of the same type as main battery A (switch B=A).
   b.) The vehicle's starter battery (full charging current, own charging program for starter batteries, B < A).
6. Option: Small terminal **"+ C"** can be used as:
   a.) Signalling port 12 V for indicator or vehicle engine immobilizer by external relay.
   b.) Auxiliary charging port for the vehicle's starter battery, if option 5. a). has already been used.

Insert the mains plug, mains switch "I" (unit rear), and the automatic charging process starts.

Main Charging Port Battery "A" (Master):

Connect the main battery observing the recommended cross-sections and lengths for charging cables according to **Table 1**.

Note: If the unit is used with only 1 battery, use this charging port A (master).

Option: 2. Charging Port Battery "B":

Charging port with full charging current. Connection according to **table 1**.
Use and setting of the charging program according to **table 3**.
If not used, the terminal is to be left free.

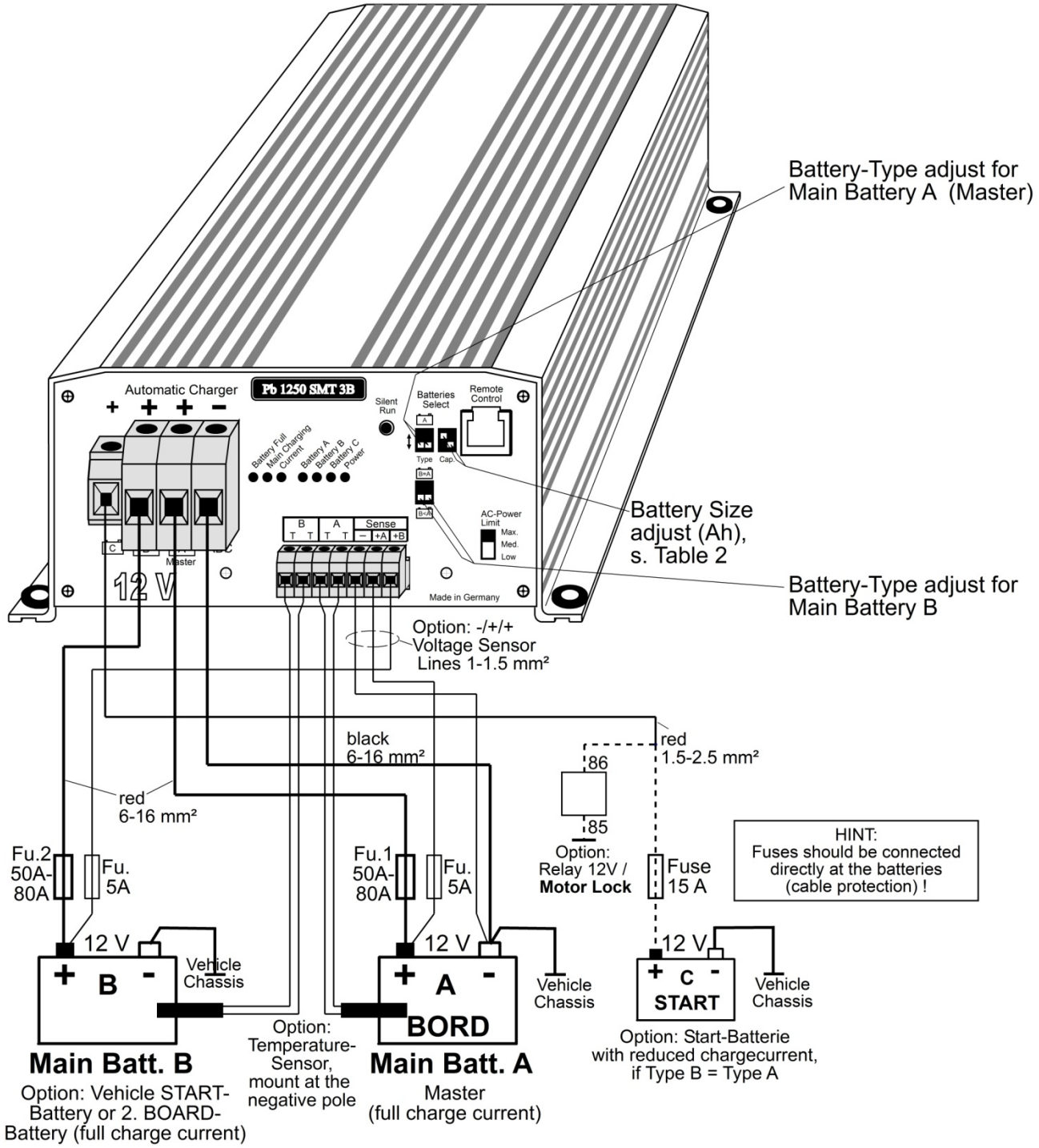
Option: 3. Signalling/Charging Port "C" 12 V / 4 A

Combined port, which can be used:

- As **signalling port** for an indication "mains supply available" or as vehicle engine immobilizer preventing an engine start, if the power supply of the vehicle is still inserted.
  The output **always** supplies **voltage, as soon as mains voltage is supplied to the unit,** also in case of battery overtemperature/low temperature, overvoltage, silent run function etc.
  Voltage is **not** supplied in case of disconnection because of battery cell defects, mains switch "0" or power failure.
- For the **3rd battery** for support charging and trickle charging of the **vehicle's starter battery** in case of extended standstill periods and for equalization of the charge for short-term consumer loads, such as interior lighting of the driver's cabin etc. It is active together with the main charging port A.
  The output voltage of that 3rd output is slightly lower than the output voltage of the main charging ports, and its average current intensity is limited to approx. 4 A. Overcharging of the vehicle's starter battery is excluded.

The auxiliary charging port of battery C may be used or not used, the function of the main charging ports of battery A and B will not be affected, except that the current rate is reduced by the inferior current rate of battery **C**.

Connection Plan 12 V (With all Options)**:**



Note: For safety reasons, the unit does not operate with LiFePO4 batteries, **unless** the temperature sensor "A" had been connected (temperature sensor 825, order No. 2001, is required)! The sensor must be screwed-down to the negative pole of the battery. Recommended also for lead batteries, if the battery is exposed to strong variations in temperature!

Table 1: Recommended Cable Cross-Sections, Cable Length (one-way) and +Fuse Capacities: Tightening torque 1.2 Nm!

Lengths of Charging Cables	Pb 1240 SMT 3B	Pb 1250 SMT 3B	Pb 1260 SMT 3B
1.0 ... 2.0 m	6 mm²	10 mm²	10 mm²
1.5 ... 3.0 m	10 mm²	16 mm²	16 mm²
2.5 ... 5.0 m	16 mm²	16 mm² **	16 mm² **
Fuse 1 and 2	60 A	80 A	80 A

** = It is recommendable to use the sensor lines (terminals **"Sense –**, **+**A, **+B", s**ee option sensor lines).

Safety Instruction: Connection is only allowed to a shock-proof socket, which has been installed according to the valid technical regulations, protected with max. 16 A (if required mobile/stationary with a fault current breaker (FI) with a nominal residual current of 30 mA).

Option: Temperature Sensors (Terminals "T T" Battery A and B):

The temperature sensors control the **battery temperatures** and ensure the temperature-depending correction of the charging voltage (automatic "**temperature compensation**"). Also refer to Charging Programs "with TS", "without TS". Temperature sensor 825, order No. 2001, is required.

Recommended to be used for batteries on lead basis (acid/gel/AGM). For**LiFePO4** batteries at least a **Sensor "A" must** be connected. Connect the sensor to the corresponding terminals **"T T"** of the unit (any polarity).

Ensure that the installation place of the sensors is not influenced by any source of heat (engine heat, exhaust, heater etc.)!

Lead-Acid, Gel, AGM Batteries:

Installation: The **thermal contact** of sensor and **battery inside temperature should be well.** Thus, it should be screwed down to the negative pole or positive pole of the battery. It is also possible to fasten it at the sidewall centre of the battery casing.

Function: The temperature-dependent charging voltage of the battery will be adapted automatically to the battery temperature (automatic temperature equalization). For this purpose, the temperature sensor measures the battery temperature. In case of low temperatures (winter operation), the charging voltage will be increased, in order to improve and accelerate full charging of the weak battery. Sensitive consumers are protected by a voltage limitation in case of very low outside temperatures.
In case of summery temperatures, the charging voltage is reduced to minimize the load (gassing) of the battery and to extend the lifetime of gas-tight batteries.

Battery Protection: In case of excessive battery temperatures (from +50 °C), the charging voltage will be reduced strongly to the **safety charging voltage**, approx. 12.80 V, for battery protection, and the maximum charging current rate will be halved (safety mode). LED **"Battery A"** or "**B**" is flashing. Any charging data being recorded hitherto will be kept in memory. Battery charging is then interrupted, but the supply of possibly connected consumers will be continued by the unit, and the battery is allowed to cool down. After that, automatic charging is resumed.

The unit recognizes automatically a missing sensor, cable break or short circuit of the sensor cables, as well as unreasonable measuring values. In that case, it will switch automatically to the usual charging voltage rates of 20 °C / 25 °C being recommended by the battery manufacturers. If 2 temperature sensors are connected, the battery being warmer (A or B) will be automatically considered for reasons of safety. **Never mix up the sensors "A" and "B"!**

LiFePO4 Batteries:

Installation: The **thermal contact** of sensor and **inside temperature** of the battery **should be well**. Thus, it should be screwed down to the **negative pole** of the battery, because in most of the cases, this is the cooler side (the positive pole is often biased by the exhaust heat of internal fuses of the battery, electronic systems for cell equalization, balancers etc.)

Function: In case of abnormal battery temperatures, such as < -20 °C, > 50 °C, the charging voltage will be reduced strongly to the **safety charging voltage**, approx. 12.80 V, for battery protection, and the maximum charging current rate will be halved (safety mode). The LED **"Battery A"** or **"B" is flashing**. Any charging data being recorded hitherto will be kept in memory. Battery charging is then interrupted, but the supply of possibly connected consumers will be continued by the unit, and the battery is allowed to cool down. After that, automatic charging is resumed.

Below 0 °C, the charging current will be reduced significantly for battery protection, LED **"Battery A" turns off shortly** every 2 seconds and longer charging times can be expected.

If the charging program LiFePO4 had been set, the temperature sensor "A TT" must be connected for reasons of battery safety. Otherwise, the unit will not operate, and the LED **"Main Charging"** will be **flashing**!

Option: Voltage Sensor Lines (Terminals "Sense -, +A, +B")

In case of long charging cables (voltage loss), it is recommendable to measure the battery voltage via "sensor lines" directly at the battery. This allows a more precise observation of the charging voltage rates.

It is recommendable to install these sensor lines in case of charging cables, which are strongly deviating from the values in table 1.

Never mix up batteries A and B! Absolutely observe the connection plan!

The charger will automatically recognize the sensor lines as "**Sense -**" by means of the type of line. Thus, if sensor lines are applied, this line **must** be connected to the negative pole of main battery "A".

Connect "Sense +A" to the positive pole of main battery "A".

Connect "Sense +B" to the positive pole of main battery "B". Recommendable, if type "B" is identical with type "A".

However, "Sense +B" can be omitted, if "B" is the vehicle's starter battery, which must only be charged quickly to starting capacity and which afterwards changes to trickle charge and supply of consumers.

Without sensor lines, in case of a cable break or fuse failures, it will be switched to normal operation with charging cable compensation, which means calculated compensation of the voltage losses on the charging cables within the values of **table 1**.

If several batteries are connected in parallel as battery system (battery bank) to A or B, the "Sense" lines "+" and "-" should be connected to the corresponding inputs/outputs of the system.

Option: Remote Control (Tip Jack "Remote Control")

If the charger has been installed in a difficult to access location, the **Remote Control S for Automatic Charger (Order No. 2075)** can be used for remote control of the charging process (plug-and-go connection cable of 5 m length is included in the delivery scope).

Connection:

Just insert the plug of the remote control into the tip jack "Remote Control" of the charger.

Function:

The remote control is equipped with the same pilot lamps (light-emitting diodes) as the charger.

Switch Function:

Position "ON": Charger works with full charging capacity.

Position "OFF": Ensures silent operation on board by means of the function "silent run ", noise-optimised operation (night operation), see above.

Mains Switch (Unit Rear):

The charger is to be switched off prior to connection of the batteries or other connection tasks (switch position "0")!

It is a "real" mains switch. In switch position "0" the unit does not consume any (stand-by) capacity, and also the batteries will **not** be discharged.

3-Stage Switch "AC Power Limit":

This switch allows a **reduction of the charger capacity** to be able to use it, even if the local 230 V mains only offers smaller capacity rates (weak protection of the parking lot with only 2 A, shore power supply of Marina, generator operation).

The reduced current draw of the unit from the mains supply in case of switch position "Med." or "Low" can be drawn from the technical data below "Delimitation of Capacity Switch "AC Power Limit".

Normal operation with maximum input power and charging capacity is realised by switch position **"Max"**.

Functions of Unit **Key "Silent Run"** on the Front Panel:

Short keystroke **1 sec.**: **"Silent Run"** noise-optimised operation (night operation)

- The internal cooling fan of the unit will be set to constant lowest noise, steady speed.
- All light-emitting diodes will be switched off, only the current indicator "Current" will still be lighting weakly.
- Of course, all charging and control functions continue working internally to the full extent.
- The lower cooling capacity might effect a slightly reduced charging capacity.

Reactivation of the display and thus of the full charging capacity:

- is possible at any time by pressing the key again.
- Automatic reactivation after 10 hours by integrated timer (end of nighttimes)

5) **Longer** keystroke **4 sec.**: Special charging program **"Lithium Standstill Trickle Charge" (LiFePO4 Storage)** for LiFePO4 batteries and extended shutdown (seasonal operation):

This charging mode can only be activated, if the "charging program LiFePO4" had been set. It cannot be activated for lead charging programs!

Press the key > 4 sec. until the light-emitting diodes "Battery Full" and "Main Charging" will be flashing quickly. Then, release the key:

After that, „**Battery Full" and "Main Charging" are flashing slowly and alternately,** the charger had switched, ready.

This special charging program automatically maintains an advantageous charging state of 50-80 % of the LiFePO4 battery, when the vehicle is stopped. This charging state is advantageous for the battery lifetime and simultaneously supplies the 12 V consumer loads of body and systems, such as alarm systems, WLAN etc., as well as the vehicle's (lead) starter battery and the consumer loads in idle mode.

Note: For reasons of safety, the charger always remains in this operating mode, even in case (inadvertently) of power failure, engine start, higher charging of the battery (batteries) by the solar system, high 12 V consumer current rates etc., in the meantime. Of course, the temperature control for the LiFePO4 battery and the internal monitoring functions of the equipment continue working.

The lighting intensity of the LED "Current" will be reduced or increased depending on the supplied current intensity. It will turn off, if the charging current rates are approx. <0.3 A.

At the beginning of this charging mode there are two possibilities in practice:

1. *Low charging state of the battery: The LED "Current" is lighting:*

The unit charges the battery to the desired charging state of 50-80 % and keeps it constant.
Further action is not required.

2. *High charging state of the battery: The LED "Current" is turned off:*

The charger cannot discharge the battery by itself. This is effected by the 12 V consumer loads being continuously connected.
The battery will be discharged until the charger automatically "catches" it and the consumer loads. From this moment, the desired charging state of 50-80 % is kept. Further action is not required.
Depending on the consumer loads and the battery size, this can take long, possibly days. However, the process is executed automatically.
*Users in a hurry can drop the battery with strong consumer loads, until the LED "**Current**" is lighting **intensively** for an extended period or an existing battery computer indicates approx. 60-70 % charging state. The system levels off automatically over the coming weeks.*

Return to the standard LiFePO4 charging program:

This is **solely** and **only** possible by a **longer keystroke** of min. **4 sec.** until the LEDs "Battery Full" and "Main Charging" will be flashing quickly. Then release the key. Ready.

Actions, such as mains switch "0" or withdrawal of the mains plug, do not have any effect (see above).

It follows the automatic full charging process with the charging program LiFePO4. End of season break.

Unit Settings:

Table 2: Setting of the battery size A or A+B, (capacity, Ah) by means of the switch "Cap.":

Battery **Capacity** Selector Switch **"Cap."**	**Pb 1240 SMT 2B**		**Pb 1250 SMT 2B**		**Pb 1260 SMT 2B**		Charging Phase I Safety Timer max. **h**
	Battery Capacity **Ah**	Charging Current **A**	Battery Capacity **Ah**	Charging Current **A**	Battery Capacity **Ah**	Charging Current **A**	
	**75 - 100**	33	**88 - 120**	40	**110 - 145**	50	6
	**100 - 140**	40	**120 - 170**	50	**145 - 210**	60	7
	**140 - 230**	40	**170 - 290**	50	**210 - 350**	60	10
	**230 - 480**	40	**290 - 550**	50	**350 - 660**	60	17

If two or several batteries are connected to the charging ports A and B, set the total capacity A+B (total Ah-value of the connected units)!

This value should not exceed the max. "Total Battery Capacity A or A+B", which is mentioned in the technical data.

In case of high additional current consumption by connected consumers, the switch "Cap." can also be set by 1 step higher for equalization.

Due to the low current intensity, auxiliary port "C" must **not** be considered for calculation.

How to Set the Type (Design, Technology) of Main Battery "A":

4 Charging programs for the different battery types are stored in the unit. They can be selected by means of the **2 micro slide switches "Type"** at the unit front.

The **control levers** of the slide switches are shown in **white**.

If not being specified divergently by the battery manufacturer, the suitable charging program for the supply battery Board "A" can be determined by means of the following description and the technical data (voltage rates U1 and U2).

The possible parallel/floating operation with consumer loads 12 V being connected to the battery is also automatically considered by all charging programs.

TS = Temperature Sensor 825 (effect with/without connection of the battery temperature sensor)

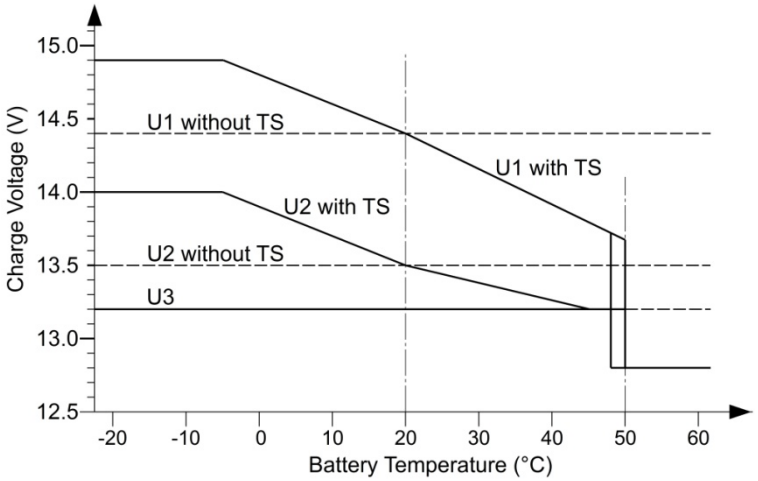
Charging Programs **1) – 3)** for **Lead** Batteries (Acid, Gel, AGM):

3 Charging programs, charging voltage rates and temperature equalization for batteries in lead technology:

1)

Lead Acid/
AGM 1 14.4 V

U1=14.40 V U2=13.50 V U3=13.20 V
2-5 h 24 h Continuous
Battery Regeneration: 2 x week 1 h



Universal charging program IU1oU2oU3 for acid-lead-acid batteries acc. to DIN 57 510 / VDE 0510 for charging and trickle charging of **supply (board) batteries**.

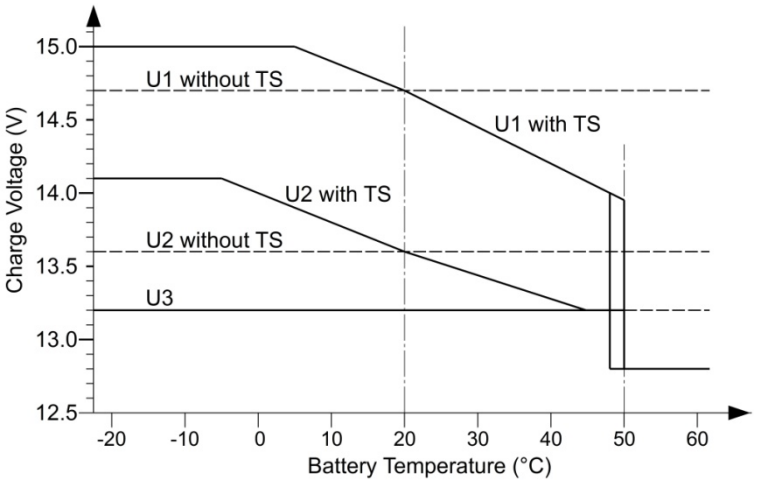
Ensures short charging times, high charging factor and acid mixing for open standard batteries and closed, SLA, low-maintenance, maintenance-free "non-solid electrolyte", "lead-acid", drive, lighting, solar and heavy-duty batteries. Also suitable for recently developed batteries (low-antimonous, with silver-alloy, calcium or similar) and batteries with low (L) and very low (VL) water consumption.

Adapted to closed, gas-tight **AGM** (absorbed glass mat) / lead-fleece batteries **VRLA** with indication of the charging voltage "**14.4 V**".

2)

AGM 2
14.7 V

U1=14.70 V U2=13.60 V U3=13.20 V
1.5-5 h 24 h Continuous
Battery Regeneration: 2 x week 1 h

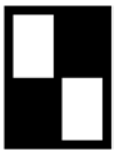


Charging program IU1oU2oU3, adapted to closed, gas-tight **AGM** (Absorbent Glass Mat) / lead-fleece batteries **VRLA** with indicated voltage "14.7 V or 14.8 V".

It is highly recommended to check the specification sheet of the battery concerning the high charging voltage U1 **14.7 V**.

Unsuitable batteries might age prematurely due to loss of electrolyte.

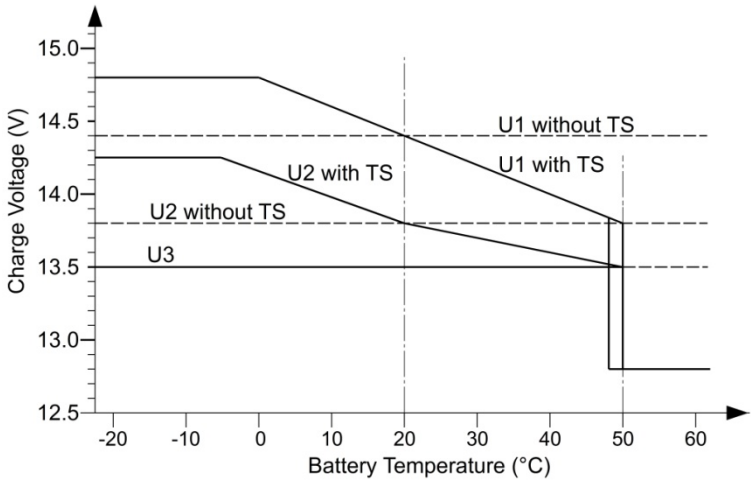
3)



Gel/dryfit

14.4 V

U1=14.40 V U2=13.80 V U3=13.50 V
6-12 h 48 h Continuous
Battery Regeneration: 2 x week 1 h

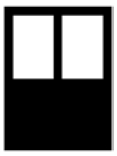


Charging program IU1oU2oU3, adapted to closed, gas-tight **gel/dryfit** batteries **VRLA** with determined electrolyte, which are generally requiring longer dwell times U1 to achieve particularly high capacity storage and to avoid deep discharge (becoming deaf) of the battery, such as EXIDE, Sonnenschein, "dryfit", Varta, Bosch, Banner, Mobil Technology etc. If not being specified divergently by the battery manufacturer, also recommended for batteries in round cell technology, such as EXIDE MAXXIMA (DC).

Charging Program for **LiFePO4** Batteries**:**

- **The charging regulations of the battery manufacturer are absolutely to be observed!**
- **An operation of the unit at a LiFePO4 battery without BMS Battery Management System and without equalization charging of the cells (balancing) as well as safety circuit is not admissible!**
- **The battery temperature sensor must be installed at the battery (screw to the negative pole)** and must be connected at the unit. It serves as protection for the battery.
  No function without temperature sensor, LED **"Main Charging" is flashing**!
- If possible, the battery temperature should be kept above 0 °C.

4)

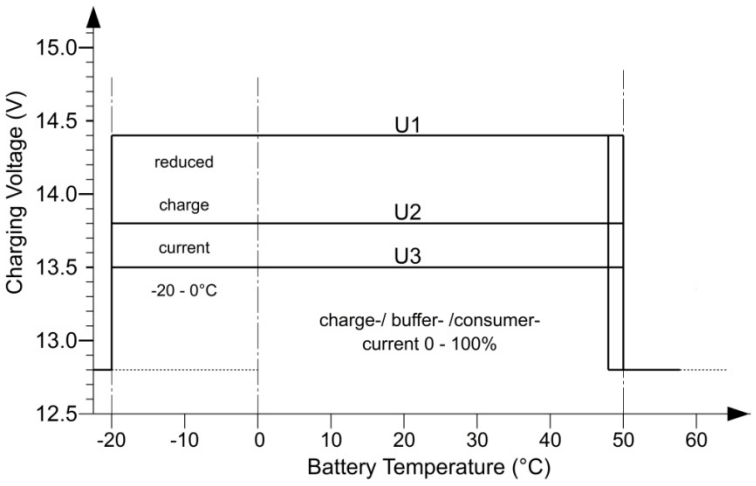


LiFePO4

14.4 V

U1=14.40 V U2=13.80 V U3=13.50 V
0.3-1 h 24 h Continuous
Auto Wake Up every 10 days 0.4 h

Charging program IU1oU2oU3



5) Special charging program **"Lithium Standstill Trickle Charge" (LiFePO4 Storage)** for LiFePO4 batteries and extended shutdown (seasonal operation). See **page 6**.

Setting of the Correct Charging Program for Main Battery "B" (Type, Design)

Use a small screw-driver to carefully move the **2 slide switches** behind the front panel of the unit to the desired position for **battery B.** Also refer to connection plan (factory adjustment "B < A" = starter battery).

Table 3:

If **charging port B is used, 2 different operating modes** are available for the integrated charging current distributor for battery **B**.

The **total of the battery capacities** (Ah) should **not exceed** the max. "battery capacity **A** or **A+B** (depending on case of application)" being indicated in the technical data.

*Due to the low current intensity, auxiliary port C must **not** be considered for calculation.*

Non-utilization of charging port "B":

*If terminal **B** is not used, the total capacity range is always at disposal for battery **A** (master). Move the switch to factory-adjustment ("below") "**B < A**" = starter battery.*

Batt. B = Batt. A, i.f. as separate 2. BOARD-Batterie

Battery B is of the **same type** (design/technology gel, AGM, acid or LiFePO4) **as battery A**. Thus, it requires the **same charging program as battery A**.

Application: **2 separate battery (banks)** for instance separate batteries for application and emergency.

The integrated **charging current distributor** charges **both batteries** with equal rights. **Automatic** charging begins with the battery showing the lower charging state ("A" or "B") with full charging current.
If the charging state of both batteries is identical, the respective second battery will be included, both batteries (A and B) will be charged fully at the same time, and the charge will be conserved fully (trickle charge).
The charging currents will be distributed automatically in the correct ratio. Consequently, battery **"A"** and **"B"** may have **different capacity rates (Ah)**. In this case, **the larger battery** should be connected to charging port **A (Master)**.
The temperature equalization for battery **A** will also be applied to battery **B**.

Note: If required, the vehicle's starter battery is to be connected to the auxiliary port C 12 V/4 A.

Charging program for battery **B =** battery **A**. Also refer to charging programs **1) – 4)**

Batt. B is the Vehicle-STARTER-Battery

"**B < A**" the **starter battery** of the vehicle is connected at charging port **battery B:**

In case of need, **full charging current** is supplied to it by the built-in charging current distributor with an **own fixed charging program** for starter batteries (high starting capacity, low water consumption and low maintenance expenditure.

Application: Intervention vehicles with **high load of the starter battery** due to additional consumer loads with immediate start readiness.

The built-in charging current distributor **automatically** starts charging with **full charging current** of the battery showing the lower charging state (A or B), with which also the **starter battery** will be charged **very quickly** up to **starting capacity**, in case of need (contrary to auxiliary port C).
After that, the respective second battery will be included and full charging of both batteries (A and B) will be effected at the same time, whereas an **own charging program** (charging current, charging voltage, charging time) is active for the **starter battery**, and the charging currents are distributed in the correct ratio. This applies also to the trickle charge.
The different battery sizes (capacity rates, Ah) of the board battery at charging port **A** and of the starter battery at charging port **B** are considered by the charger.
The batteries may also have a different design (acid, gel, AGM, LiFePo4 / lead starter battery).
A LiFePo4 board supply battery should be kept above 0°C to avoid a reduction of the charging currents in case of low temperatures (battery protection).

Starter Battery Charging Program Battery **B**: IU1oU2oU3

U1	Full Charging:	14.2 - 14.4 V	1 - 3 h
U2	Full/Trickle Charging:	13.2 - 13.5 V	1 - 24 h
U3	Storage Charging:	13.1 - 13.5 V	Continuous

Option: Several batteries (battery bank) at <u>one</u> charging port A or B:

Parallel charging of two or several batteries of the same voltage (12 V) is admissible. For this purpose, the batteries are connected "in parallel". The capacity values (Ah) are summed up. **The total capacity (total Ah) should not exceed the indicated maximum battery capacity** (depending on the case of application).

According to the battery manufacturers, **permanent parallel operation** is admissible in case of two or several batteries of the same voltage, same type, same capacity, and of about the same age (history).

Example: Connection in parallel of 2 batteries:

Both positive poles must be connected with a powerful cable. Also both negative poles must be connected with a powerful cable.

Now, the supply cables are connected advantageously "in cross connection", which means

Minus supply cable at negative pole of battery "1".

Plus supply cable at positive pole of battery "2".

This ensures that both batteries "1" and "2" of the system will receive/supply the same voltage, without a disadvantage for one of the batteries due to voltage losses between the batteries.

This cross connection can also be applied for 3 or several batteries in parallel connection. In this case, the supply cables must be connected to the "first" and "last" battery.

Pilot Lamps:

"Battery Full" Battery (Batteries) fully charged, **green**)) **:

- If it is on: Battery (batteries) has (have) been charged to 100 %, trickle charge U2 and storage charge U3, finished.
- If it is flashing: Main charging process is effected in the charging phase U1, the display of the residual charging time rises gradually from approx. 75 % (lead) or 90 % (LiFePO4) (short flashing) to 100 % (long flashing).
- Off: Main charging process is still effected in the phase I.

"Main Charging" (Main charging, **yellow**) **:

- If it is on: Main charging process is effected in the phase I and after that in the charging phase U1.
- Off: Trickle charge U2 or U3.
- If it is flashing:
  1. Battery temperature sensor at terminals "**A T T**" is not connected (only with LiFePO4).
  2. External overvoltage battery A or B, > 15.50 V 20 sec. disconnection, automatic reset after drop to the nominal voltage.

"Current" (Charging Current, **red**):

- If it is on: The lighting intensity will be **reduced or increased** depending on the **supplied charging current.**
- Off Charging current is less than approx. 0.3 A.

"Battery A" (**yellow**)**:**

- If it is on: Charging port "A" is active.
- If it is flashing: Battery Protection: Battery overtemperature **"A"** > 50 °C (depending on type): Switchover to low safety charging voltage and half of the max. charging current, automatic return in case of slightly dropped temperatures.
- Turns off shortly: Is lighting longer and turns off shortly approx. every 1.5 sec., only with charging programs LiFePO4: Li battery protection, battery temperature below 0 °C, the charging current might be reduced for protection of the Li battery, in case of discharged battery, longer charging times can be expected.
- Off: Charging port is blocked (safety switch).

"Battery B" (**yellow**)**:**

- If it is on: Charging port "B" is active.
- If it is flashing: Battery Protection: Battery overtemperature **"B"** > 50 °C (depending on type): Switchover to low safety charging voltage and half of the max. charging current, automatic return in case of slightly dropped temperatures.
- Off: Charging port is blocked (safety switch).

"Battery C" (**yellow**)**:**

- If it is on: Auxiliary charging port "C" is active.
- Off: Charging port is blocked (safety switch).

"Power" (Mains, **red)**:

- If it is on: Mains supply is available and charger is ready for operation
- If it is flashing:
  1. Disconnection by safety timer. Duration of the charging phase I was too long (> 10 h). Also refer to table 2, excessive current consumption by consumers, battery defective (short-circuit of the cells). Reset by means of mains switch "0" or by withdrawal of the mains plug.
  2. Internal unit failure (self-test, overheating), automatic reset after cooling down.

****** **"Battery Full"** and **"Main Charging"** are flashing **slowly and alternately**:

The charging program **5) Lithium Standstill Trickle Charge** is active (such as during seasonal operation). It automatically maintains an advantageous charging state of 50-80 % of the LiFePO4 battery, when the vehicle is stopped. This charging state is advantageous for the battery lifetime. See **page 6.**

Return from this function to the standard charging program LiFePO4:

Only possible by pressing the **key "Silent Run"** for more than **4 seconds**. Mains switch "0" or withdrawal of the mains plug do not have any effect. See **page 6**!

During power pack operation (without batteries or with defective fuse) the active charging ports provide the desired charging voltage. The LEDs battery "A" and "B" are still lighting.

Further actions at the unit are not required during normal automatic mode.

Chronological Sequence Charging Process Main Port Battery A (Master):

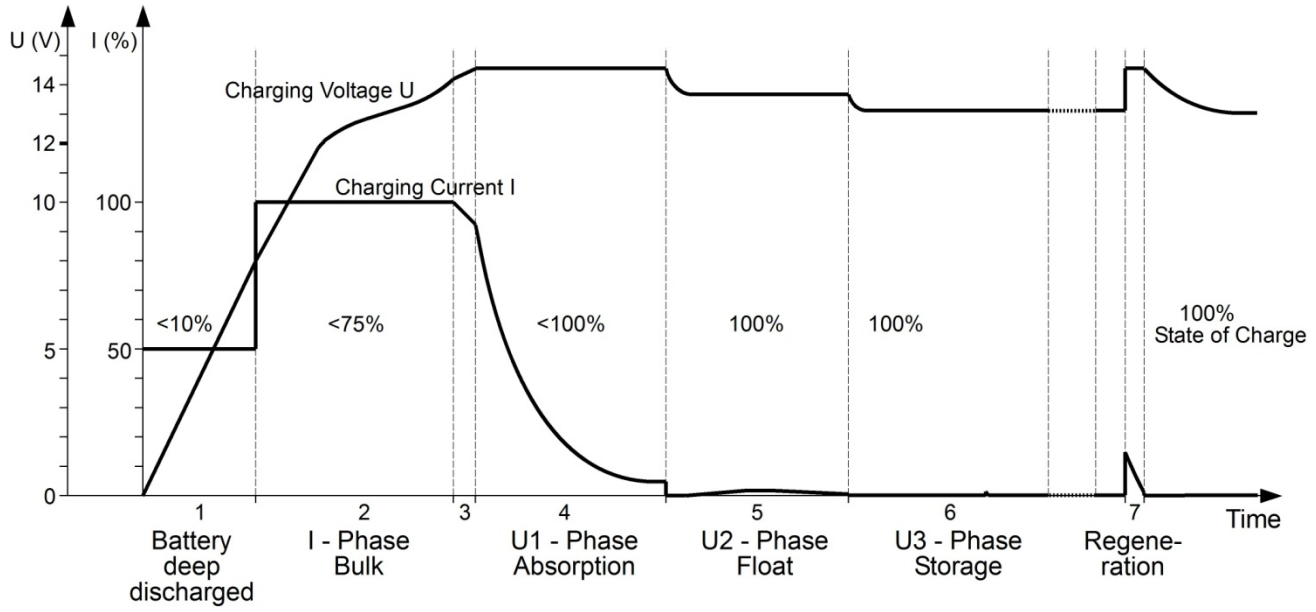
A new, complete main charging cycle will be executed:

- After a power failure or disconnection by means of the mains switch (position "O").
- If the battery voltage drops below the reset voltage of 12.75 V / 13.25 V due to high current load beyond the maximum charger current for 30 seconds.

1. Charging aid for deeply discharged (lead) batteries. From 0 V, they will be subject to gentle preliminary charging for recovery with a small current rate up to approx. 8 V or a switched-off LiFePO4 battery will be reactivated.
2. **Main charging** with maximum charging current (**phase I**) in the mean voltage range up to close to the phase U1 **for short charging times**, LED **"Main Charging"** is lighting, and approx.75 % (lead), approx. 90 % (LiFePO4) of the capacity will be charged. The duration of phase I depends on the battery conditions, the load by additional consumers and the charging state. The charger is recording the course of charging. For reasons of safety, the phase I will be terminated by the safety timer (see table 2) after 6 to 17 hours, at the latest (cell defects of the battery etc.).
3. In case of high battery voltage rates, the charging current will be slightly reduced for battery protection (orientation phase). After that, automatic switching to the following phase U1.
4. During the **phase U1** (**full charging**, cell equalization charging, LED "**Main Charging**" is lighting), the battery voltage will be kept constant on a high level. The green LED **"Battery Full" is flashing** (at first, short flashing, with rising charge increasingly longer flashing), and gentle charging of the additional high battery capacity. The charger controls the charging time and the charging current. From these values and from the course of charging being recorded during the phase I, the charger determines the **100 % full charge point** of the battery for automatic switching to U2. In case of slightly discharged batteries, the duration of phase U1 will be kept short for relief of the battery and low maintenance expenditure. In case of major discharge, the phase U1 must be extended for full charging of the battery and cell equalization charging. During this process, any influence by consumer loads is avoided reliably. The LED **"Main Charging"** turns off at the end of the phase U1.
5. **Phase U2 (Full trickle charge, LED "Battery Full" is lighting permanently):** The charger has now switched to the lower voltage for trickle charge maintaining and buffering 100 % charge of the battery. Depending on the battery type, the duration of the phase U2 is limited to 24 to 48 hours to allow gentle recharging and equalization charging of the cells with small charging current rates.
6. **Phase U3 (storage charge,** LED **"Battery Full" is permanently on**, adapted to the battery type):
   In case of long-term operation, such as for extended standstill periods or during winter break with lead batteries, the charging voltage will be reduced to the low level U3 for minimization of battery gassing and corrosion.
7. **Regeneration of Lead** Acid/AGM/Gel **Batteries**: For battery activation (avoidance of electrolyte accumulation and sulphation), the charger will automatically run up to the charging voltage U1 twice a week for a short time (approx. 1 hour). After that, direct return to the lower storage charge U3.

   Maintenance LiFePO4, Auto-Wake Up, Maintenance Phase: Periodical automatic activation of the cell equalization charging (balancing) by the battery BMS in case of extended standstill periods by systematic voltage increase every 10 days for 0.4 hour. After that, return to the lower storage charge U3.
   This function is blocked during lithium standstill trickle charge.

Note: During the phases **U1, U2, U3** (battery full) **almost the total charger current** is available for **additional supply** of consumers without any discharge of the battery.

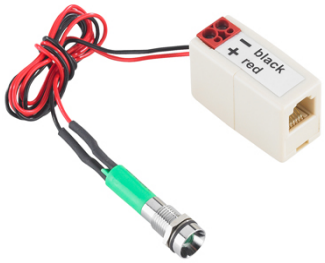


Operating Instructions:

- **Display of the residual charging time:**
  A flashing pilot lamp **"Battery Full"** allows conclusions concerning the progress of the charging phase U1 (full charging). Directly after the charging phase I (approx. 75 % for lead, approx. 90 % for LiFePO4), the pilot lamp will only be flashing momentarily.
  With progressing charging time, flashing will change more and more to permanent lighting, until the pilot lamp will be lighting most of the time and will only stop lighting for a short moment, shortly before 100 % full charge is reached.
- **Interruption of the charging process:**
  In case of a power failure or withdrawal of the mains plug during the charging process, the charging process will be interrupted. The connected batteries will **not** be discharged by the charger. Thus, the charging process can be interrupted at any time.
  In case of frequent interruptions, particularly before reaching full charge (LED "Battery Full" is lighting **permanently**), the battery should be subject to an **occasional full charging cycle of 24 hours** for equalization of the charge.
- **Overvoltage Limitation:**
  Charging voltage limitation to max. 15.0 V during all charging modes to protect sensitive consumers.
- **Overload / Overheating Protection Charger:**
  The charger is equipped with a double electronic protection against overload and with an automatic protection against adverse installation conditions (e. g. insufficient ventilation, excessive ambient temperatures) by reduction of the charging capacity.
- **Lifetime of the battery:** Partially discharged **Lead** batteries:
  Partially discharged batteries are to be **charged fully** as soon as possible. Always store **fully charged batteries** and recharge them periodically, particularly in case of used (older) batteries and higher or lower temperatures.

Technical Data:	**Pb 1240 SMT 3B**	**Pb 1250 SMT 3B**	**Pb 1260 SMT 3B**
Rated operating voltage (full charging power)	230 V, 45...65 Hz	230 V, 45...65 Hz	230 V, 45...65 Hz
Operating voltage range	85...265 V	85...265 V	85...265 V
Operating voltage range full charging power	190...265 V	190...265 V	190...265 V
Operating voltage range reduced charging power	85...190 V	85...190 V	85...190 V
Sinusoidal power factor correction	active	active	active
Max. Power consumption (AC)	680 W	840 W	1020 W
Max. current consumption (230 V AC)	3.0 A	3.7 A	4.4 A
Max. current consumption (AC)	5.2 A	5.2 A	5.2 A
Switch "**AC Power Limit**", Limitation of the Mains Current Draw/Capacity			
Position "**Max**" (Maximum Charging Capacity)	5.2 A / 680 W	5.2 A / 840 W	5.2 A / 1020 W
Position "**Med**" (Reduced Mains and Charging Capacity)	1.9 A / 390 W	1.9 A / 390 W	2.4 A / 500 W
Position "**Low**" (Reduced Mains and Charging Capacity)	1.4 A / 280 W	1.4 A / 280 W	1.9 A / 390 W
Charging Ports Batteries "A" and "B":			
Nominal Battery Voltage Lead/LiFePO4 Battery	12 V/12 V-13.3 V	12 V/12 V-13.3 V	12 V/12 V-13.3 V
Battery Capacity adjustable (A or A+B total)	75 Ah-480 Ah	88 Ah-550 Ah	110 Ah-660 Ah
Charging Current Phase I (A, B or A+B) max.	**40 A**	**50 A**	**60 A**
Charging/Floating/Load Current, controlled, Phase U1, U2, U3	0 A - 40 A	0 A - 50 A	0 A - 60 A
Automatic Charging Current Distributor Batteries A/B	Yes	Yes	Yes
Minimum Battery Voltage for Charging Start	0 V	0 V	0 V
Preliminary Charging Current, Deeply Discharged Batt. 0 V-8 V	20 A	25 A	30 A
Reverse Current from Battery (Power Failure)	<0.2 mA	<0.2 mA	<0.2 mA
Reset Voltage (30 sec.), depending on Battery Type	12.75 V / 13.25 V	12.75 V / 13.25 V	12.75 V / 13.25 V
Limit of Charging Voltage (Protection of Connected Consumers)	15.00 V	15.00 V	15.00 V
External Overvoltage Disconnection (20 sec.)	15.50 V	15.50 V	15.50 V
Ripple Factor Voltage	< 40 mV rms	< 40 mV rms	< 40 mV rms
Charging Timer	4-fold	4-fold	4-fold
Reverse polarity/short circuit/back discharge/safety protection	Yes	Yes	Yes
Safety Timer per Charging Phase I/U1/U2	Yes	Yes	Yes
Sensor Lines "Sense" Inputs, for Battery "-" and "+A", "+B"	Yes	Yes	Yes
Lead Battery Regeneration at extended down-time 2x week 1 h	Yes	Yes	Yes
LiFePO4-Auto Wake Up in case of extended down-time every 10 days 0.5 h	Yes	Yes	Yes
or LiFePO4 Lithium Standstill Trickle Charge (Seasonal Operation)	Yes	Yes	Yes
Main Charging Port Battery "A" (Master):			
Selectable Charging Programs Lead-Gel/AGM/Acid, LiFePO4	4	4	4
Charging/Floating/Load Current, controlled, Phase IU1oU2oU3	0 A - 40 A	0 A - 50 A	0 A - 60 A
Input for Battery Temperature Sensor: "A"	Yes	Yes	Yes
Power Pack Operation (e.g. Supply During Battery Replacement)	Yes	Yes	Yes
2. Charging Port Battery "B"(Integrated Charging Current Distributor, switchable):			
4 Charging Programs, Optionally Identically with Battery "A" Master	Yes	Yes	Yes
or Charging Program for Vehicle (Lead) Starter Battery	Yes	Yes	Yes
Charging/Floating/Load Current, controlled, Phase IU1oU2oU3	0 A - 40 A	0 A - 50 A	0 A - 60 A
Input for Battery Temperature Sensor "B"	Yes	Yes	Yes
Power Pack Operation (e.g. Supply During Battery Replacement)	Yes	Yes	Yes
3. Auxiliary Charging Port "C" (Signalling Port Mains)**:**			
Nominal Battery Voltage (Lead)	12 V	12 V	12 V
Charging Current or Rating as Signalling Port	0 A-2 A	0 A-2 A	0 A-2 A
Reverse polarity/short circuit/back discharge/safety protection	Yes	Yes	Yes
Connection for Remote Control Automatic Charger:	Yes	Yes	Yes
Fitting Position of Unit	any	any	any
Temperature Range	-20/+45° C	-20/+45° C	-20/+42° C
Speed-controlled, Temperature-controlled Fan	Yes	Yes	Yes
Gradual Reduction of Charging Capacity at Overtemperature	Yes	Yes	Yes
Safety Disconnection in Case of Overheating	Yes	Yes	Yes
Noise-reduction of Fan, Night Operation (Silent Run)	Yes	Yes	Yes
Protection Class/System of Protection	I / IP2X	I / IP2X	I / IP2X
Dimensions, incl. mounting flanges/feet (D/W/H)	327 x 139 x 74 mm	327 x 139 x 74 mm	327 x 139 x 74 mm
Weight	2400 g	2450 g	2500 g
Ambient Conditions, Humidity of Air	max. 95 % RH, no condensation		
Safety Regulations	EN 60335-2-29		
Tightening torque battery terminals	1.2 Nm	1.2 Nm	1.2 Nm
Tightening torque sensor and “Start” terminals	0.5 Nm	0.5 Nm	0.5 Nm

Option: Remote Indicator IP67, Order No. 2081



The green light-emitting diode indicates the readiness for operation of the charger and the mains power supply.

The remote indicator can be installed at any desired location via a bore hole, 8 mm. It can be installed at a well visible location in the inside area (for instance in the dash board), as well as outside, such as near the driver's door. The delivered packing washer allows front installation with high tightness IP67.

Connection: Just insert the plug of the remote control into the tip jack "Remote Control" of the charger.

Delivery Scope: Connection strands red/black of 0.4 m length, connection adapter, connection cable of 5 m length, plug-and-go on both sides, packing washer, coupling ring.

Option: Extension of the control cable, 5 m length, 6 poles with modular coupling, Order No. 2005

If required, for further extension of the connection cable, plug-and-go on both sides.

UK CA

Declaration of Conformity:
In accordance with the provisions of the statutory requirements and the relevant directives, Electrical Equipment (Safety) Regulations 2016, Electromagnetic Compatibility Regulations 2016, The Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012 this product complies with the following standards or normative documents:
BS EN55014-1; BS EN 61000-3-2; BS-EN 61000-3-3; BS EN61000-6-1; BS EN61000-4-2; BS EN61000-4-3; BS EN61000-4-4; BS EN61000-4-5; BS EN61000-4-6; BS EN61000-4-11; BS EN60335-1; BS EN60335-2-29; BS EN50498, BS EN IEC 63000.

CE

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; EN 61000-3-2; EN 61000-3-3; EN61000-6-1; EN61000-4-2; EN61000-4-3; EN61000-4-4; EN61000-4-5; EN 61000-4-6; EN 61000-4-11; EN60335-1; EN60335-2-29; EN50498.

The product must not be disposed of in the household waste.

RoHS COMPLIANT

The product is RoHS compliant. It complies with the directive 2015/863/EU for Reduction of Hazardous Substances in electrical and electronic equipment.

Quality Management System
DIN EN ISO 9001

Recycling:
At the end of its useful life, you can send us this device for professional disposal.
You can find more information about this on our website at **www.votronic.de/recycling**

Delivery Scope:
1 Charger
1 Mains Supply Cable with Shock-proof Plug
1 Installation and Operating Manual

Temperature Sensor 825

Available Accessories:	Temperature Sensor 825 (1 or 2 Pcs. can be connected)	Order No. 2001
	Remote Control S for Automatic Charger	Order No. 2075
	Remote Indicator IP67	Order No. 2081

Made in Germany by VOTRONIC Elektronik-Systeme GmbH, Johann-Friedrich-Diehm-Str. 2, 36341 Lauterbach/GERMANY
Phone: +49 (0)6641/91173-0 Fax: +49 (0)6641/91173-10 E-mail: info@votronic.de Internet: www.votronic.de