

VOTRONIC

Mounting Instructions and Operating Manual for Battery Charger:

| | | |
|---|-----------------------------|-----------------|
| Automatic Charger Pb 1210 SMT 2B | Charging Capacity 12V / 10A | No. 3103 |
| Automatic Charger Pb 1215 SMT 2B | Charging Capacity 12V / 15A | No. 3105 |
| Automatic Charger Pb 1220 SMT 2B | Charging Capacity 12V / 20A | No. 3107 |
| Automatic Charger Pb 1225 SMT 2B | Charging Capacity 12V / 25A | No. 3109 |
| Automatic Charger Pb 1230 SMT 2B | Charging Capacity 12V / 25A | No. 3116 |



Please read this operating and installation manual thoroughly prior to connection and start-up.

NOTE: The values being indicated in parentheses () apply to 24 V operation.

All-automatic battery charger with 2 charging ports for intervention vehicles, special-purpose vehicles, special high-quality campers, as well as marine application.

VOTRONIC chargers of series "PB SMT" are of compact design and have only a low weight (high frequency switching power supply, switch mode technology). They distinguish by full charging capacity, even in case of large deviations of the power supply (low voltage/overvoltage, sine curve, frequency).

The intelligent microprocessor charging control with characteristic lines of charging „IU1oU2“ and dynamic calculation of the charging time automatically ensures quick and careful full charging followed by 100 % trickle charging of the connected batteries from any charging state, allowing always simultaneous supply of 12 V (24 V) consumers being connected in parallel or charging of very large batteries (depending on the case of application).

Battery outputs and Charging Programs:

Main output Battery I, depending on the type of battery, 3 charging programs selectable (see table 1):

- „AGM“: Closed, gas-tight AGM/fleece batteries VRLA (lead-fleece technology) **“14.8 V”**
- „Gel“: Closed, gas-tight Gel/dryfit batteries VRLA (determined electrolyte)
- „Lead Acid“: Closed and open acid/lead-acid batteries, as well as **AGM 14.4 V**

Second output Battery II:

Separate auxiliary charging output with reduced charging current 12 V (24 V) / 2 A for support charging and conservation of charge of the vehicle's starter battery with overcharge protection.

Further Characteristics of the Unit:

- The **charging voltage** is **free from peaks** and is **controlled** in such a way, that any **overcharging** of the batteries is **excluded**.
- **All-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 switch)**.
- **Battery regeneration in case of extended stop periods:** twice a week to avoid harmful acid accumulation.
- **Silent Run Function:** Noise optimised operation (night operation) at the touch of a button.
- **Parallel and Floating Operation:** In case of simultaneous consumption, charging of the battery is continued or the charge will be conserved fully. Calculation and control of the adaptation of the charging time is effected automatically by the charger.
- **Unattended Charging:** Multiple protection against overload, overheating, overvoltage, short circuit, wrong polarization, incorrect behaviour and back discharge of the battery by electronically controlled gradual reduction down to complete separation of charger and battery **by integrated safety switch**.
- **Power Supply Function:** Allows supply of the consumers without battery (e. g. replacement of battery)
- **Charging Cable Compensation:** Automatic compensation of voltage loss on the charging cables.
- **Charging aid for totally discharged batteries:** Gentle preliminary charging of the battery from 0 V to 8 V (16 V), followed by powerful support of the battery, should consumers be still switched-on.
- **Integrated On-board Mains Suppression Filter:** Unproblematic parallel operation of solar systems, wind and petrol-driven generators, dynamos etc. at one battery.
- **Temperature Compensation:** 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 stress and gassing** will be avoided. Temperature Sensor, Order No. 2001, is required.

- **Interruption or restart of the charging process:**

Due to power failure or unit switch OFF.

In case of frequent interruptions, particularly before reaching the full charge ("Battery Full" is lighting **permanently**), a **complete charging cycle of 24 hours** of the battery should be executed more often (compensation charging).



Lifetime of the battery:

- Keep batteries cool; choose an appropriate location for installation.
- **Open acid batteries („maintenance-free according to EN / DIN“): Check the acid level periodically!**
- **Batteries being totally discharged should be recharged immediately, partially discharged batteries should be recharged fully as soon as possible to avoid sulphation!**
- **Store only fully charged batteries and recharge them periodically**, particularly in case of older, used batteries and in case of higher temperatures! If the grade of sulphation is not too intensive, the battery can recover part of the battery capacity after several charging/discharging cycles.



Safety Regulations:

Appropriate Application:

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

Appropriate application is restricted to:

1. **Charging of lead-acid, lead-gel or lead-AGM batteries of the indicated nominal voltage and the supply of the consumers being connected to these batteries in fixed installed systems with the indicated battery capacities and charging programs.**
2. **Mains connection to a fused shockproof socket (6-16 A) and depending on local regulations being protected by a fault current breaker (RCD, FI) with a nominal residual current of 30 mA.**
3. **Observe the indicated cable cross-sections at the charger outputs.**
4. **A fuse of the indicated capacity is to be provided near the battery to protect the cabling between battery and charger port.**
5. **Technically faultless condition.**
6. **Installation in a well-ventilated room, protected from rain, humidity, dust, aggressive battery gas, as well as in an environment being free from condensation water.**

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

- Open-air operation of the unit is not allowed.
- Cables are always to be laid in such a way that damage is excluded. Observe to fasten them tightly.
- Never lay 12V (24V) cables and 230V mains supply cables into the same cable conduit (empty conduit).
- Check live cables or leads periodically for insulation faults, points of break or loosened connections. Occurring defects must be remedied immediately.
- The unit is to be disconnected from any connection prior to execution of electrically welding or work on the electric system.
- If the non-commercial end-user is not able to recognize the characteristic values being valid for a unit or the regulations to be observed, a specialist is always to be consulted.
- The user/buyer is obliged to observe any construction and safety regulations.
- **The unit does not contain any parts, which can be replaced by the user.** Even after withdrawal of the mains plug, the unit could have **dangerous high voltages** 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.
- Venting the battery room.
- Non-observance may result in injury or material damage.
- The warranty period is 24 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:

The charger can be installed **near Battery I** (short charging cables) at any location being clean and being protected from humidity and dust. Despite the charger's high efficiency, heat is produced, which is brought out of the casing by means of the built-in fan.

Ensure sufficient **ventilation** in the **environment of the unit**, so that the heat can be carried-off. Protect the unit from aggressive battery gas.

The unit can be installed in any position. However, the **vent holes** of the casing should never be covered to ensure the full charging capacity (**minimum distance: 10 cm**).

Ensure a solid and vibration reducing installation using **rubber bushings** on an even and hard mounting surface.

Battery Connection and Battery Settings for Start-up:

Observe the connection plan! Observe the cable cross-section and length, as well as the polarization, and insert the fuses near the battery.

First connect the charger (it is short circuit-proof), and after that the battery (it is not short circuit-proof).

1. Connect 1 battery to the large terminals „-“ und „+“ observing the correct polarity.
2. Set the **charging program** for the battery type (technology): See Table 1.

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

Option: Several Batteries at Main output Battery I:

Parallel charging of two or several batteries of the same voltage (12 V) is admissible. The batteries are to be „paralleled“, i. e. the „+“ connections of the batteries have to be coupled and should be connected to the „+“ connection of the charger. The minus (-) connections have to be coupled in the same way. **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, type, capacity, as well as of the same age (history) in cross connection.

Option: Temperature Sensor (Temperature Sensor, Order No. 2001 is required):

The temperature sensor controls **battery temperature I** and the temperature-dependent correction of the charging voltage. It is connected to the unit terminals „TT“ (any polarity).

Installation:

The **thermal contact** of sensor and **battery I** (inside temperature) **should be well**. Thus, it should be screwed to the negative pole of the battery. It is also possible to fasten it at the centre of the battery's casing sidewall. Ensure that the installation place is not influenced by any source of heat (motor unit, exhaust, heater etc.).

Effect:

The temperature-dependent charging voltage of the battery will be adapted automatically to the battery temperature (also refer to „Charging Voltage Rates of Battery I and Temperature Compensation“).

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 the full charging of the weak battery. Sensitive consumers are protected by a limitation of the voltage in case of very low outside temperatures.

In case of summery temperatures, the charging voltage is reduced to minimize the stress (gassing) of the battery and to extend the lifetime of gas-tight batteries.

Battery Protection (see Characteristic Lines "charging voltage and temperature compensation"):

At high temperatures of the battery (depending on type, for example 54 °C or 58 °C) the charging current will be reduced to 50 % as a precaution. If the temperature of the battery rises still further, few °C higher a complete disconnection is issued by the safety switch. **LED "Main Charging" will be flashing.** All previous data of charging will be recorded. The automatic charging will continued if the temperatures is fallen below the above temperatures. The charging process is also blocked at battery temperatures below – 40 °C.



The charger recognizes automatically a missing sensor, cable break or short-circuit of the sensor lines, as well as unreasonable measuring values! In that case, it will switch to the usual nominal voltage rates of 20 °C / 25 °C being recommended by the battery manufacturers.

Option: 2. (Auxiliary) Output „Battery II“ 12 V/2 A (24 V/2 A):

That charging output is provided for support charging and conservation of charge of the **vehicles' starter battery** in case of extended stop periods and for compensation of the charge for e. g. short-term consumers (interior lighting of the driver's cabin etc.). The LED „**Battery II**“ is lighting, which indicates the readiness for service and control of that output.

The output voltage of this output is slightly lower than the output voltage of the main output, and its current and output voltage is limited in such a way, that overcharging of the vehicle's starter battery can be excluded.



The auxiliary charging output of battery II may be used or not used, the function of the main output battery I will not be affected, except that the current rate is reduced by the inferior current rate of battery II.

Option: Remote Control (Tip Jack „Remote Control“)

If the charger has been installed at a difficultly accessible location, the **Remote Control for Automatic Charger SMT (Order No. 3129)** can be used for remote control of the charging process (connection cable of a length of 5 m being ready for connection is included in the delivery scope).

Connection:

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

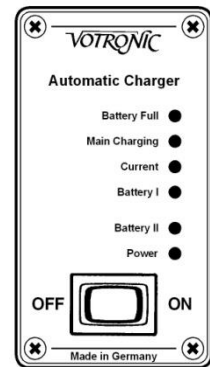
Functioning:

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

Switch Function (also refer to paragraph Switch „Silent Run“):

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 below



Key „Silent Run“, noise optimised operation (night operation):

Press the key for a short moment for activation:

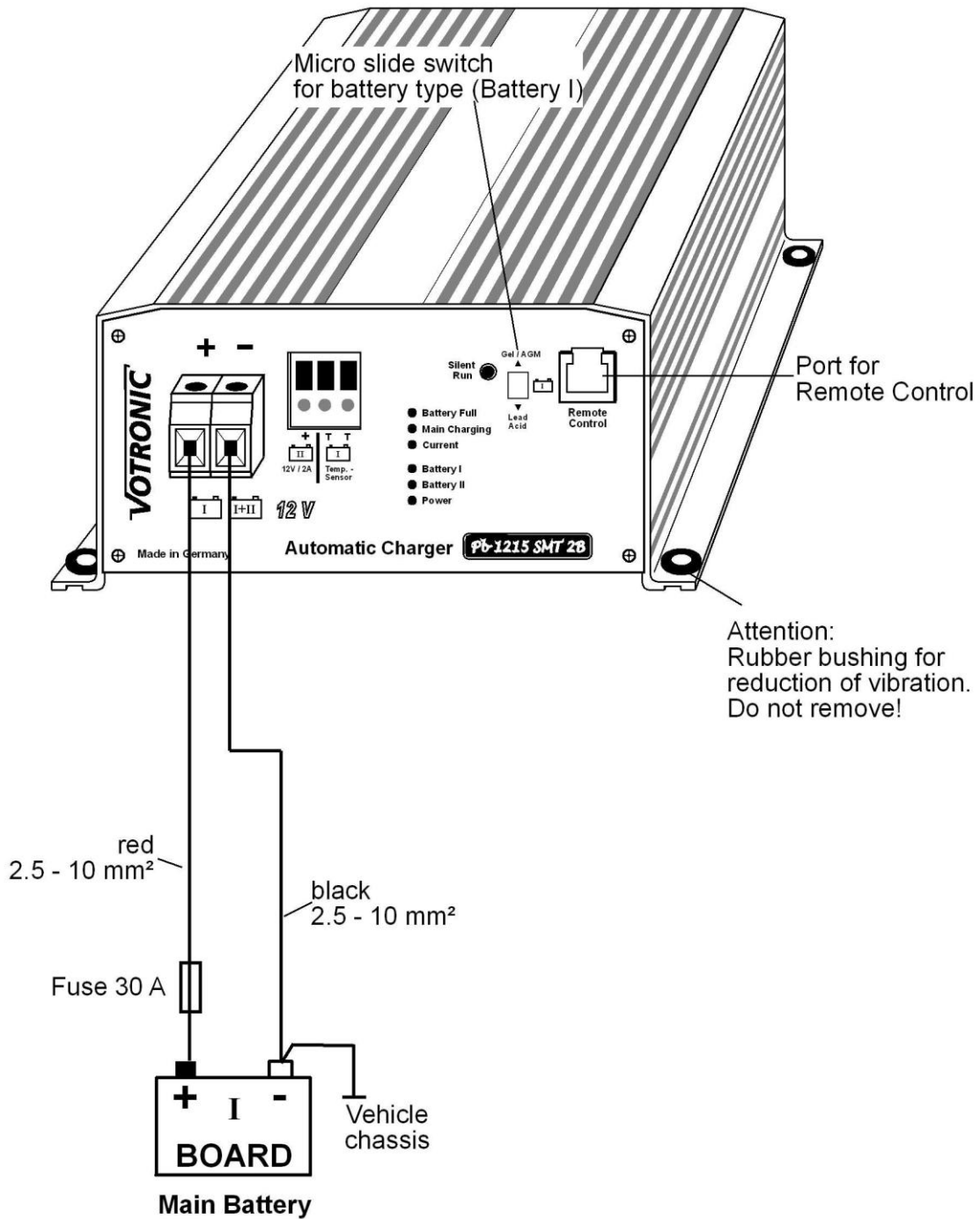
- The internal cooling fan of the unit will be set to constant low noise, steady speed.
- Any light-emitting diodes will be switched off, only the current display „Current“ will still be lighting weakly.
- Of course, any charging and control functions continue working internally to the full extent
- The reduced cooling capacity might reduce the charging capacity to approx. 80 %, depending on the ambient temperature of the charger.

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

- Possible at any time by manual pressing the key again
- Automatic reactivation after 10 hours by integrated timer (end of nighttimes) and thus back to full charging capacity

Further actions or maintenance of the unit are not required.

Connection Plan for 12 V Operation:



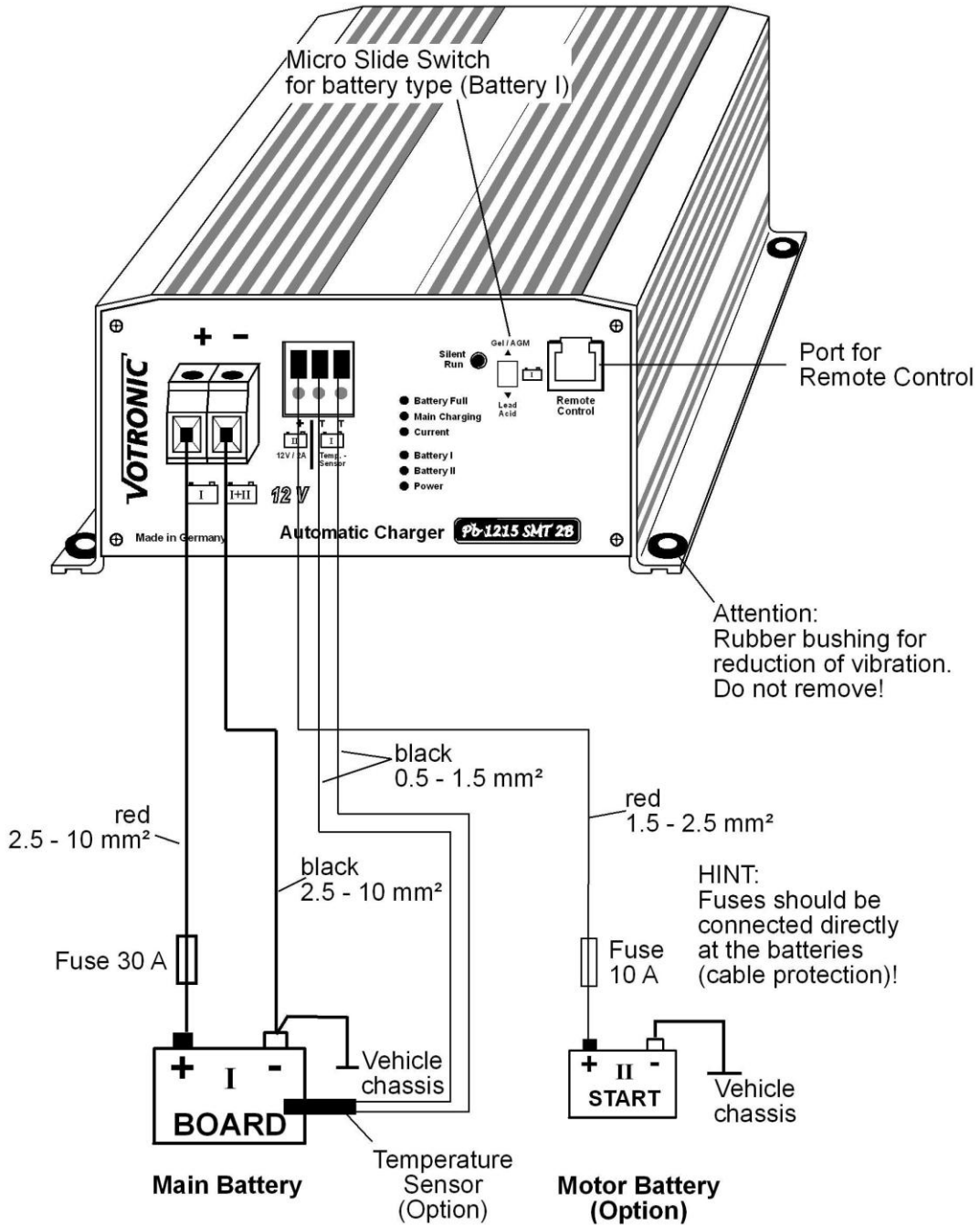
| Lengths of Charging Cables Main Battery I | Pb 1210 | Pb 1215 | Pb 1220 | Pb 1225 | Pb 1230 |
|---|---------------------|-----------------------|--------------------|--------------------|--------------------|
| 2 x 0.7 -1.1 m | 2.5 mm ² | 4 mm ² | 4 mm ² | 4 mm ² | 4 mm ² |
| 2 x 1.1 -1.8 m | 4 mm ² | 6 mm ² | 6 mm ² | 6 mm ² | 6 mm ² |
| 2 x 1.8 -3.0 m | 6 mm ² | 10 mm ² ** | 10 mm ² | 10 mm ² | 10 mm ² |

** reduce wire cross section at the terminal if necessary



CAUTION, Safety Instructions: Mains 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).

Connection Plan 12 V with Temperature Sensor and Motor Battery:



| Lengths of Charging Cables Main Battery I | Pb 1210 | Pb 1215 | Pb 1220 | Pb 1225 | Pb 1230 |
|---|---------------------|-----------------------|--------------------|--------------------|--------------------|
| 2 x 0.7 -1.1m | 2.5 mm ² | 4 mm ² | 4 mm ² | 4 mm ² | 4 mm ² |
| 2 x 1.1 -1.8m | 4 mm ² | 6 mm ² | 6 mm ² | 6 mm ² | 6 mm ² |
| 2 x 1.8 -3.0m | 6 mm ² | 10 mm ² ** | 10 mm ² | 10 mm ² | 10 mm ² |





** reduce wire cross section at the terminal if necessary



CAUTION, Safety Instructions: Mains 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).

Table 1: Main Battery I: How to set the correct charging program for the battery type (lead technology):

Move the **2 slide switches** behind the front panel of the unit to the desired position for **battery I (main battery)** using a small screw-driver. (Factory-adjusted position „Lead Acid“=Lead Acid Battery).

| | | | | | | | | | | | | | |
|---|---|------------------------|------------------------|-------|---------|--|--------------------|-------|------------|--|--------------------|-------|------------|
| <p>Battery Type Selector Switch</p> | <p>If not being specified divergently by the battery manufacturer, the suitable charging program for the battery type (design, technology) can be determined by means of the following description and the technical data (voltage rates U1 and U2, nominal temperature and dwell times U1).</p> <p>Note: The possible parallel/floating operation with consumers being connected to the battery is also automatically considered by all charging programs.</p> | | | | | | | | | | | | |
|  | <p>„Lead Acid“: Universal charging program for Lead, Acid/Lead-acid batteries: For charging and conservation of charge of supply (board) batteries. Ensures short charging times, high charging factor and acid mixing for open standard batteries and closed, low-maintenance, maintenance-free "non-solid electrolyte", "lead-acid", drive, lighting, solar and heavy duty batteries. Also suitable for recently developed low-antimonous batteries and batteries with lead-silver alloy with low and very low water consumption, as well as AGM batteries with charging voltage indication "14.4 V".</p> <hr/> <p>Universal Characteristic Line IU1oU2oU3:</p> <table border="0"> <tr> <td>U1 Main/Full Charging:</td> <td>14.30 V - (28.6 V)</td> <td>25 °C</td> <td>2.5-6 h</td> </tr> <tr> <td>U2 Full/Compensation Charging:</td> <td>13.85 V - (27.7 V)</td> <td>25 °C</td> <td>2 h</td> </tr> <tr> <td>U3 Full/Conservation/Storage Charging:</td> <td>13.40 V - (26.8 V)</td> <td>25 °C</td> <td>Continuous</td> </tr> </table> | U1 Main/Full Charging: | 14.30 V - (28.6 V) | 25 °C | 2.5-6 h | U2 Full/Compensation Charging: | 13.85 V - (27.7 V) | 25 °C | 2 h | U3 Full/Conservation/Storage Charging: | 13.40 V - (26.8 V) | 25 °C | Continuous |
| U1 Main/Full Charging: | 14.30 V - (28.6 V) | 25 °C | 2.5-6 h | | | | | | | | | | |
| U2 Full/Compensation Charging: | 13.85 V - (27.7 V) | 25 °C | 2 h | | | | | | | | | | |
| U3 Full/Conservation/Storage Charging: | 13.40 V - (26.8 V) | 25 °C | Continuous | | | | | | | | | | |
|  | <p>„AGM“: Charging Program for Lead, AGM / Fleece Batteries: Adapted to closed, gas-tight AGM (absorbet glass mat) batteries and batteries in lead-fleece technology requiring a particularly high level U1 for full charging.</p> <p>ATTENTION: 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!</p> <p>Some manufacturers of AGM / fleece batteries are also prescribing a "gel" or "acid" charging program with 14.4 V for charging! In this case, please adjust "Lead Acid" (14.3 V/13.4 V)</p> <hr/> <p>Characteristic Line AGM- / Fleece IU1oU2:</p> <table border="0"> <tr> <td>U1 Main/Full Charging:</td> <td>14.70 V !! (29.4 V) !!</td> <td>20 °C</td> <td>3-6 h</td> </tr> <tr> <td>U2 Full/Conservation/Storage Charging:</td> <td>13.50 V (27.0 V)</td> <td>20 °C</td> <td>Continuous</td> </tr> </table> | U1 Main/Full Charging: | 14.70 V !! (29.4 V) !! | 20 °C | 3-6 h | U2 Full/Conservation/Storage Charging: | 13.50 V (27.0 V) | 20 °C | Continuous | | | | |
| U1 Main/Full Charging: | 14.70 V !! (29.4 V) !! | 20 °C | 3-6 h | | | | | | | | | | |
| U2 Full/Conservation/Storage Charging: | 13.50 V (27.0 V) | 20 °C | Continuous | | | | | | | | | | |
|  | <p>„Gel“: Charging Program for Lead Gel/Dryfit Batteries: Adapted to closed, gas-tight Gel batteries with determined electrolytes, which are generally requiring a higher charging voltage level and longer dwell times U1 to achieve short charging times with particularly high capacity storage and to avoid total discharge, e. g. EXIDE, Sonnenschein dryfit-Start, Dryfit-Sport-Line, DETA Gel Battery Funline, Bosch AS Gel Batteries Va/Z, AS Gel Drive Batteries, AS Gel Lighting Batteries.</p> <p>If not being specified divergently by the battery manufacturer, also recommended for batteries in round cell technology, such as EXIDE MAXXIMA (DC) .</p> <hr/> <p>EXIDE, DETA, VARTA Characteristic Line Gel IU1oU2:</p> <table border="0"> <tr> <td>U1 Main/Full Charging:</td> <td>14.40 V (28.8 V)</td> <td>20 °C</td> <td>8-12 h</td> </tr> <tr> <td>U2 Full/Conservation/Storage Charging:</td> <td>13.80 V (27.6 V)</td> <td>20 °C</td> <td>Continuous</td> </tr> </table> | U1 Main/Full Charging: | 14.40 V (28.8 V) | 20 °C | 8-12 h | U2 Full/Conservation/Storage Charging: | 13.80 V (27.6 V) | 20 °C | Continuous | | | | |
| U1 Main/Full Charging: | 14.40 V (28.8 V) | 20 °C | 8-12 h | | | | | | | | | | |
| U2 Full/Conservation/Storage Charging: | 13.80 V (27.6 V) | 20 °C | Continuous | | | | | | | | | | |
|  | <p>Not used (operates like the gel / dryfit program)</p> | | | | | | | | | | | | |

Indicator Lamps:

„Battery Full“ Battery (Batteries) fully charged, **green:**

- If it is lighting: Battery (batteries) has (have) been charged to 100 %, Float charge, conservation of charge U2, finished.
- If it is flashing: Main charging process is effected in the Absorb charge charging phase U1, indication of charging state of approx. 80 % (short flashing), gradual increase to 100 % (long flashing).
- Off: Main charging process, Bulk charge, is still being executed in the phase I.

„Main Charging“ Main charging, **yellow:**

- If it is lighting: Main charging process is Bulk- or Absorb charge, in the phase I or the charging phase U1.
- Off: Float charge, conservation of charge U2.
- If it is flashing:
 1. Disconnection of the battery protection: battery “A” temperature < -40 ° C or temperature rise (depending on type, e.g. 57 ° C or 63 ° C), automatic reset in case of slight cooling off or
 2. External battery overvoltage > 15.50 V (> 31.0 V) after 20 seconds
automatic reset < 12.75 V (< 25.5 V) after 30 seconds

„Current“ Charging Current, **red:**

- The lighting intensity of the LED „Current“ (Charging Current) will be **reduced or increased depending on the supplied charging current**.

„Battery I“, **yellow:**

- If it is lighting: Control and charging of main battery „I“.
- Off: Output is blocked (safety switch)

„Battery II“, **yellow:**

- If it is lighting: Control and charging of auxiliary battery „II“.
- Off: Output is blocked (safety switch)

„Power“ Mains, **red:**

- If it is lighting: Mains supply is available and charger is ready for operation.
- If it is flashing:
 1. Disconnection of safety timer, duration of the charging phase I was too long, too many consumers, battery defective (short-circuit of the cells). Reset is only possible by withdrawing the mains plug.
 2. Internal unit failure (overheating), automatic reset after cooling down.
 3. Wrong polarization of battery (+ and - are mixed up).

Operating Instructions:

• **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 the full charge (LED „Battery Full“ is lighting **permanently**), the battery should be subject to an **occasional full charging cycle of 24 hours** for equalisation of the charge.

• **Lifetime of the battery: Partially Discharged Batteries:**

In contrast to other battery types, batteries on lead basis **do not have any** harmful memory effect.

Consequently: In case of doubt, partially discharged batteries are to be **charged fully** as soon as possible.

Store only fully charged batteries and recharge them periodically, particularly in case of used (older) batteries and higher temperatures.

• **Lifetime of the battery: Recharge totally discharged batteries immediately:**

Sulphation of the battery plates due to total discharge is to be prevented by **immediate charging**, particularly in case of low and high ambient temperatures. If the grade of sulphation is not too intensive, the battery can recover part of the battery capacity after **several charging/discharging cycles**.

• **Lifetime of the battery:** Keep batteries cool; choose an appropriate location for installation.

• **Overvoltage Protection:** 12 V chargers are protected against connection of excessive battery voltage rates or will be switched-off in case of defective additional charging systems (solar systems, generators or similar systems), switching threshold 15.5 V (31 V), delay 20 s.

• **Overvoltage Limitation:**

Sensitive consumer loads are protected by means of a limitation of the charging voltage to max. 15 V (30 V) during all modes of charging.

• **Overload / Overheating Protection Charger:**

The charger is equipped with a double electronic protection against overload. The unit is equipped with an automatic protection against adverse installation conditions (e. g. insufficient ventilation, excessive ambient temperatures) by gradual reduction of the charging capacity.

• **Voltage Measurement:** Measurement of the voltage is to be effected at the battery and not at the charger (loss at the charging cables).

Charging Process Main output Battery I:

A new, complete main charging cycle is executed:

- After a power failure (mains plug withdrawn or power failure).
 - In case of a lower deviation of the battery reset voltage of 12.75 V (25.5 V) beyond the maximum charger current for 30 seconds due to high load.
1. Batteries being totally discharged to 0 V, will be subject to a preliminary charging to 8 V (16 V) with reduced current.
 2. Maximum charging current (**I-Phase**) in the mean voltage range from 8 V (16 V) to the beginning of the U1-phase for short charging times, LED „**Main Charging**“ is lighting; approx. 75 - 80 % of the capacity will be charged. The duration of the I-phase depends on the battery conditions, the load of the consumers and the charging state. The charger is recording the course of charging. For reasons of safety, the I-phase will be terminated by the safety timer after 15 hours, at the latest (cell defects etc.).
 3. During the **U1-Phase** (LED „**Main Charging**“ is lighting) the battery voltage will be kept constantly on a high level. The green LED „**Battery Full**“ is flashing, and the additional high battery capacity will be charged. The battery charging current is decreased slowly while full charging is increasing. The charger controls the charging time as well as the charging current. From these values and from the course of charging being recorded during the I-phase, the charger determines the **100 % full charge point** of the battery for automatic commutation to U2. In contrast to conventional chargers with fixed default values for commutation of the charging current, an unnecessary long U1-phase is avoided, which might be caused by consumer load falsifying the charging current. The LED „**Main Charging**“ will stop lighting.
 4. **U2 Phase** (LED „**Battery Full**“ is lighting permanently): The charger has now switched to the lower voltage for conservation of the charge maintaining 100 % charge of the battery. Only the low compensating recharging current is flowing being required for constant conservation of the full charge, which is determined by the battery.

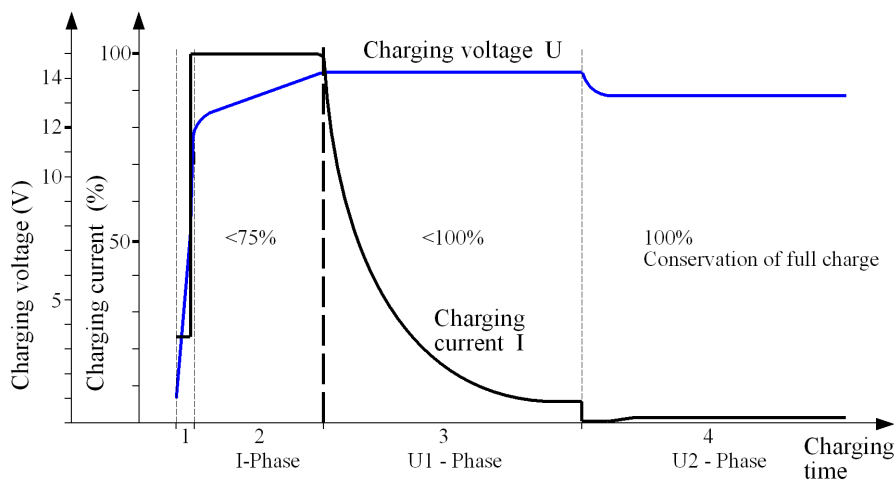
Charging Program Acid / Lead-acid Battery (Lead Acid): The charging voltage U2 is limited in time to ensure gentle recharging, and the equalisation charging of the cells with small charging current rates is a little increased. After that, it will be switched to the third, lower voltage rate U3 for constant conservation of the full charge.

5. **Battery Regeneration:** To ensure a circulation of acid accumulation in case of extended periods of conservation of charge (due to e. g. stop periods of the vehicle), the charging voltage rate will be raised automatically to U1 twice a week for one hour. After that, it will be returned directly to U2 (U3).

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

Charging Process Output Main Battery I:

(In case of 24 V operation: Multiply all indicated voltage rates and current rates by 2!)

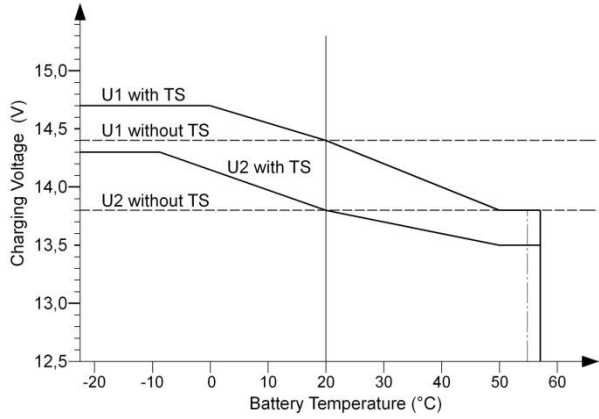


1. **Preliminary Charging** of totally discharged battery, gentle initial charging current (I-Phase)
2. **Bulk: Main Charging** constant, maximum charging current (I-Phase)
3. **Absorb: Main/Full Charging** constant charging voltage 1 (U1-Phase)
4. **Float: Full/Charging Conservation** constant continuous charging voltage 2 (U2-Phase)

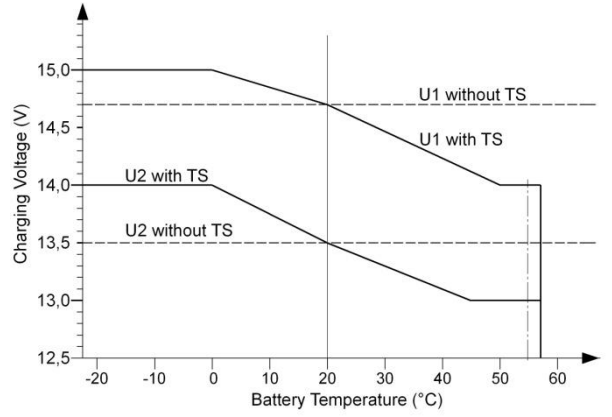
Charging Voltage Rates of Battery I and Temperature Compensation:

(In case of 24 V operation: Multiply all indicated voltage rates by 2! TS = Temperature Sensor)

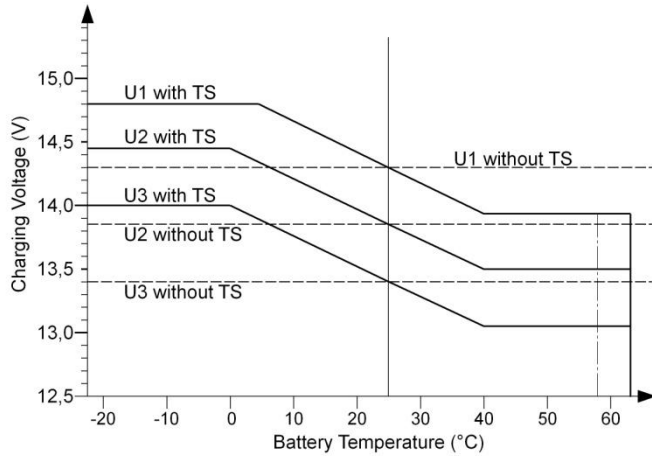
Charging Program „Gel“
Characteristic Line IU1oU2



Charging Program „AGM/ Fleece“
Characteristic Line IU1oU2



Charging Program „Lead Acid“
Characteristic Line IU1oU2oU3



Technical Data:

| | Pb 1210 SMT 2B | Pb 1215 SMT 2B | Pb 1220 SMT 2B | Pb 1225 SMT 2B | Pb 1230 SMT 2B |
|--|--|---------------------------|---------------------------|---------------------------|---------------------------|
| Nominal Operating Voltage (AC): | 230 V / 45 – 65 Hz | | | | |
| Operating Voltage Range (AC): | 190 V – 265 V (Full Charging Capacity), Short-time (5 s) 300 V | | | | |
| Power Consumption (AC) max.: | 160 W | 240 W | 320 W | 400 W | 520 W |
| Power Consumption (AC) min. (Charging Current 0 A): | 3.5 W | 3.5 W | 3.5 W | 3.5 W | 4.0 W |
| Current Consumption (AC) max.: | 0.7 A | 1.1 A | 1.4 A | 1.8 A | 2.3 A |
| Sinusoidal Power Factor Correction (PFC, CosPhi = 1): | Yes | Yes | Yes | Yes | Yes |
| Main output Battery I: | | | | | |
| Nominal Battery voltage: | 12 V | 12 V | 12 V | 12 V | 12 V |
| Battery Capacity (recommended): | 40Ah-72Ah | 60Ah-110Ah | 80Ah-145Ah | 100Ah-180Ah | 120Ah-230Ah |
| Batt. Capacity (acc. to case of application): | 25Ah-115Ah | 38Ah-170Ah | 50Ah-230Ah | 60Ah-290Ah | 75Ah-350Ah |
| Charg.Curr. Main Charg., I-Phase, 8 V to U1, 0-15.5 h: | 10 A | 15 A | 20 A | 25 A | 30 A |
| Charg./Floating/Load Curr., contr., U1-,U2(3)Phase: | 0 A – 10 A | 0 A – 15 A | 0 A – 20 A | 0 A – 25 A | 0 A – 30 A |
| Adjust. Charact. Lines of Charg. Gel/AGM/Lead-acid: | 3 | 3 | 3 | 3 | 3 |
| Min. Battery Voltage for Charging Start: | 0 V | 0 V | 0 V | 0 V | 0 V |
| Preliminary Charging Current, | | | | | |
| Totally Discharged Battery 0 V-8 V (16 V) | 5.0 A | 7.50 A | 10.0 A | 12.5 A | 15.0 A |
| Reverse Current from Battery (Power off): | < 0.3 mA | < 0.3 mA | < 0.3 mA | < 0.3 mA | < 0.3 mA |
| Reset Voltage (30 sec): | 12.75 V | 12.75 V | 12.75 V | 12.75 V | 12.75 V |
| Limit of Charging Voltage (Consumer Protection): | 15 V | 15 V | 15 V | 15 V | 15 V |
| External Overvoltage Disconnection (20 sec.): | 15.5 V | 15.5 V | 15.5 V | 15.5 V | 15.5 V |
| Ripple Factor Voltage: | < 50mV rms | < 50 mV rms | < 50 mV rms | < 50 mV rms | < 50 mV rms |
| Input Battery I -Temperature Sensor: | Yes | Yes | Yes | Yes | Yes |
| Charging Timer: | 3-fold | 3-fold | 3-fold | 3-fold | 3-fold |
| Safety Protection against wrong Polarization/Short-Circuit/ Back Discharge: | Yes | Yes | Yes | Yes | Yes |
| Safety Timer per Charging Phase I- /U1- / (U2-): | Yes | Yes | Yes | Yes | Yes |
| Battery Regeneration in case of extended Down-Time 2 x week: 1 h: | Yes | Yes | Yes | Yes | Yes |
| Power Pack Function (e g battery replacement) | Yes | Yes | Yes | Yes | Yes |
| Auxiliary output Vehicle Starter Battery II: | | | | | |
| Nominal Battery voltage: | 12 V | 12 V | 12 V | 12 V | 12 V |
| Charging Current: | 0 A – 2 A | 0 A – 2 A | 0 A – 2 A | 0 A – 2 A | 0 A – 2 A |
| Safety Protection against wrong Polarization/ Short-Circuit/Back Discharge | Yes | Yes | Yes | Yes | Yes |
| Connection for Remote Control Automatic Charger: | | | | | |
| | Yes | Yes | Yes | Yes | Yes |
| Mounting Position of Unit: | any | any | any | any | any |
| Temperature Range: | -20/+45 °C | -20/+45 °C | -20/+45 °C | -20/+45 °C | -20/+45 °C |
| Built-in Fan with Current and Temperature Control: | Yes | Yes | Yes | Yes | Yes |
| Gradual Reduction of Charging Capacity in case of Overtemperature: | Yes | Yes | Yes | Yes | Yes |
| Safety Disconnection in case of Overheating: | Yes | Yes | Yes | Yes | Yes |
| Noise-reduction of Fan, Night Operation (Silent Run): | Yes | Yes | Yes | Yes | Yes |
| Protection Class/System of Protection: | I / IP21 | I / IP21 | I / IP21 | I / IP21 | I / IP21 |
| Dimensions (mm): | 210x138x72 | 210x138x72 | 210x138x72 | 210x138x72 | 210x138x72 |
| Weight: | 1,250 g | 1,280 g | 1,300 g | 1,350 g | 1,450 g |
| Ambient Conditions, Humidity of Air: | max. 95 % RH, No Condensation | | | | |
| Safety Regulations: | EN 60335-2-29 | | | | |

Notes:

Delivery Scope:

- Battery Charger
- Mains supply cable with shock-proof plug
- Operating Manual

| | | |
|-------------------------------|--|----------------|
| Available Accessories: | Temperature Sensor | Order No. 2001 |
| | Remote Indicator for Automatic Charger | Order No. 3127 |
| | Remote Control for Automatic Charger | Order No. 3129 |

Temperature Sensor



Declaration of Conformity:

CE According to the regulations 2006/95/EG, 2004/108/EG, 95/54/EG, this product corresponds to the following standards or standardized documents: EN60335-2-29; EN55014; EN55022 B; DIN14685; DIN40839-1; EN61000-3-2; EN61000-3-3; EN61000-4-2; EN61000-4-3; EN61000-4-4; EN61000-4-5; EN61000-4-6; EN61000-4-11

**Quality Management
System**

DIN EN ISO 9001

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