Operating Instructions GB

Battery Charger HS-1000

**Charger for 12 V and 24 V lead-acid batteries,
charging current up to 70 A**

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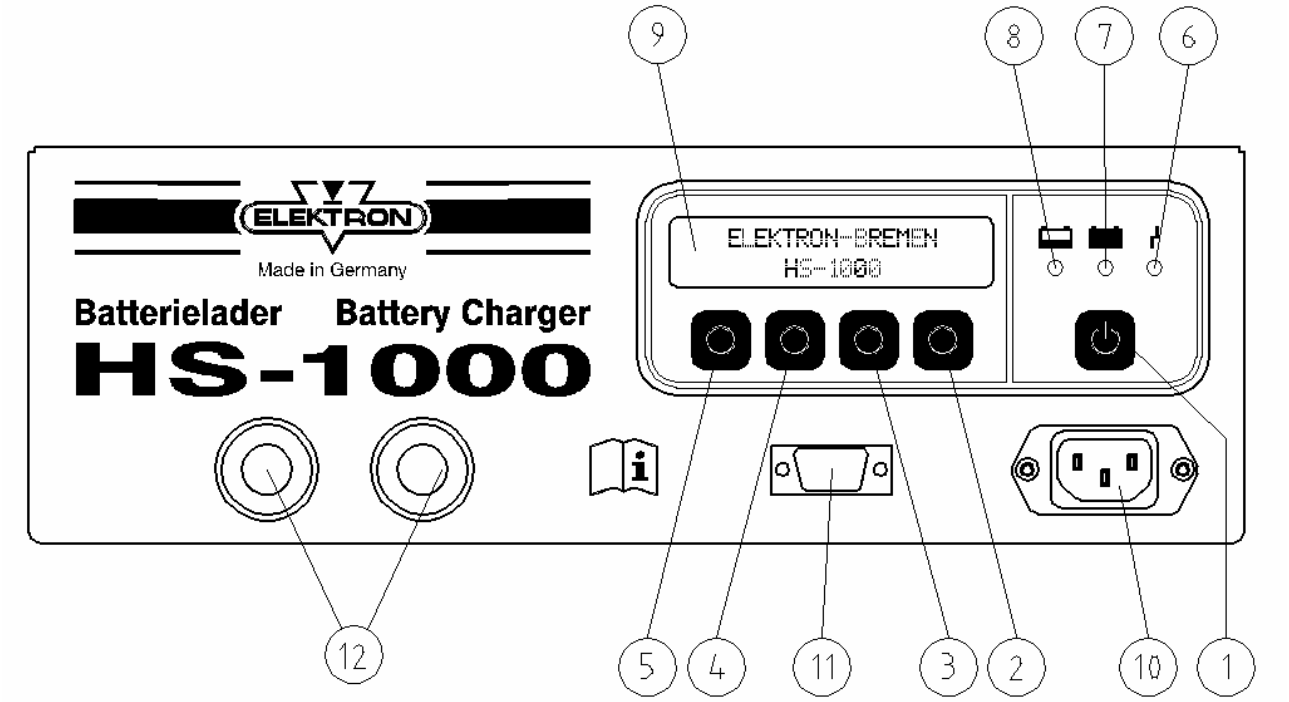


(1) "ON/OFF" Button

(2) "RUN/STOP" Button
+ menu-controlled functions

(3) Button "Type of battery"
+ menu-controlled functions

(4) "SET" Button
+ menu-controlled functions

(5) "MENU" Button
+ menu-controlled functions

(6) Fault indicator
glows red

(7) Floating charge, illuminates green when battery is charged

(8) Charge control, lights up yellow during charging

(9) LC-Display

(10) Cold appliance plug for mains voltage

(11) Serial interface RS 232

(12) Charging cable, red clip (+), black clip (-)

Contents

1.0 Safety information

- ➔ **Connect only lead batteries with rated voltage of 12 and 24 V!**
- ➔ **Caution!** Connect only **rechargeable** batteries.
- ➔ **Caution! Explosive gases are generated during charging of batteries! Only charge batteries in well ventilated areas. Explosion hazard on account of generation of oxyhydrogen gas!**
- ➔ **Avoid all forms of fire, naked light and sparking!**
- ➔ **Wear protective goggles!**
- ➔ **If acid splashes on to skin or clothing, wash off immediately with generous quantities of water!**
- ➔ **Caution!**

If there is a pungent smell of gas, acute explosion hazard is present!
- ➔ **Do not switch the charger off!**
- ➔ **Do not remove the charging clips!**
- ➔ **Thoroughly ventilate the area immediately!**
- ➔ **After adequate ventilation, switch the charger off!**
- ➔ **Check the battery!**

- ➔ **Protect the charger from damp and wet!**
- ➔ **Install the charger such that the air outlet is free!**
- ➔ **Ensure stable location of the charger!**

Electrical safety:
Mains and charging cable must be in perfect condition. If these cables are damaged in any way, contact the authorized workshop or your expert dealer.

Replace defective leads and cables immediately.

Working on the open unit may only be done by an authorized and skilled expert!

- ➔ **Before start up of the unit read the operating instructions carefully.**

  Always operate the charger according to these instructions.

2.0 Description of the unit

The **battery charger HS-1000** can be used to charge 12V and 24V wet batteries (also lead calcium) as well as maintenance-free gel batteries, fleece batteries or AGM-batteries.

(24 V functions disabled at factory! Enabling possible in Service menu).

The appliance can also be used as an external power supply (PSU) for motor vehicles.

The HS-1000 battery charger is equipped with a table-top housing. It is cooled by free convection from bottom to top.

A fan is not used.

Ensure that the HS-1000 battery charger is not covered up.

All connections as well as the displays and controls are located on the front.

Display
While charging the momentary charging current and the momentary charging voltage are indicated on the LC Display (9).

3 LEDs show the particular charging status or fault:
Charging control (8) – Charging current is flowing – see LCD-display (9).

Charge retention (7) – The battery is charged. The charger has changed over to holding the charge.

Fault (6) (see section 4.0)

Maximum charging current:
For 12 V: I_N = 70 A
For 24 V: I_N = 35 A

- **For being charged the battery can stay in the vehicle and does not have to be disconnected from the vehicle electrical system**
- **Absolute protection of the on-board electronic system, as no current and voltage peaks occur.**

Backup mode (PSU Auto mode)

The charger replaces the vehicle battery in case it has to be changed. The on-board voltage will be maintained.

PSU Mode

The charger operates as an external power supply, supplying power to equipment and systems in the vehicle and allowing them to be tested.

Floating mode

The charger ensures that the battery is reliably charged and the charge held, even when consumers are connected up to 70 A for 12 V or 35 A for 24 V.

Wrong polarity protection

The charger detects wrong polarity connection and will not commence the charging process. The red LED is on (6).

Release of clips

The charger reliably detects when the clips are detached from the battery during the charging process and switches off.

3.0 Start-up

➔ **Observe the precautions in the safety notes!**

➔ **Observe the handling instructions of the battery manufacturer!**

3.1 Charging / Charge retention/ Floating mode

- Determine type of battery
- Switch on unit with "ON/OFF" button (1).
- Select battery present with button (3), e.g. wet cell battery, AGM battery, gelled battery, etc.
- Connect charging clips to battery terminals with correct polarity. Red clip (+) to the positive terminal, black clip (-) to the negative terminal!
- If the charger is switched to the automatic mode, charging / charge retention starts automatically, otherwise charging can be started by pressing the "RUN" button (2).
- Caution! Does the charging voltage set coincide with the battery voltage?
- The charging current and the charging voltage are shown at the LCD-display (9).
- The charging control lamp (8) lights up.
- When the green LED "Charge retention" (7) has illuminated for a longer period of time the charger has switched over to charge retention.
- If the battery is being discharged by a consumer during floating operation, the charger HS-1000 automatically provides suitable charging.
- Floating mode can be carried out during an unlimited period of time.
- Observe the maintenance instructions of the battery manufacturer.
- During the entire charging operation or during charge retention, buffer operation for the battery is possible. If the battery is discharged by a load, the HS-1000 battery charger supplies the required current (within the limits specified above).

Charging exhausted batteries/ Desulphation charging

- The charger surely detects exhausted batteries.
- The charger will commence the charging process carefully with low charging current and will subsequently adjust the charging current to the battery condition.

Battery voltage has to be at least 0.6V!

3.2 Backup mode (PSU Auto) / PSU Mode

- The **Backup mode (PSU Auto)** provides a power supply buffer, for example, when changing the battery, so that important data and settings are not lost.
  The HS-1000 battery charger automatically recognizes the voltage required by the vehicle electrical system and continues to supply this voltage up to the maximum current rating.
- Switch on the charger with the "ON/OFF" button.
- Connect charging clips to battery terminals with correct polarity. Red clip (+) to the positive terminal, black clip (-) to the negative terminal.
- Set the charger to the "PSU AUTO" mode with button (5).
- Start operation with "RUN" button.
- The charging control lamp (8) lights up. The charging current and the charging voltage are shown at the LCD-display (9).

- This mode remains set until it is deactivated with the "STOP" button.
- In the **PSU Mode** the charger operates only as a battery reverse-voltage, i.e. when this mode is selected power is always present on the battery clips.

  Caution! Danger of short circuit!

- Switch the charger on with the ON/OFF button.
- **Caution!** Never allow the charging clips to come into contact with one another!
- Select "PSU" mode with button (5).
- Start operation with "RUN" button.
- The charging control lamp (8) lights up. The charging current and the charging voltage are shown at the LC-Display (9).
- This mode remains active until it is discontinued with the "STOP" button.

Before disconnecting the charging clips always switch of the charger with the ON/OFF button.

4.0 Fault indication and troubleshooting

Fault indicator (6) flashes:

- If temperature of unit is too high
- If charging clips have been connected with wrong polarity
- When battery voltage is too high
- If the battery connected is defective:

  The fault is indicated on the LC Display
  The fault display extinguishes after elimination of the fault.

Fault indicator (6) illuminates with steady light:

- There is a system fault in the charger. The fault is simultaneously indicated on the LC Display
- Switch off the charger with the ON/OFF button.
  If the fault is still present after switching the charger back on, contact the authorized workshop or your expert dealer.

5.0 Technical data

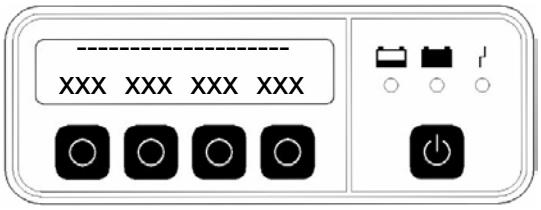
Mains voltage	90 - 260 V
Mains frequency	50/60 Hz
Nominal voltage	12 V and 24 V lead-acid batteries
Constant voltage	2.4 / 2.35 V/cel
Charging current	70 A and 35 A
Charging characteristic	IUoU
Protection type	IP 54
Metal housing (W x H x D in mm)	325x120x406
Weight	6.5 kg
Length of charging cable (incl. clips)	5 m
Length of mains cable	2.5 m
Interface	RS 232

Subject to technical changes without prior notice

The HS-1000 Battery Charger complies with the requirements of the automotive industry and in particular fulfils EN 60335, IEC 801 and EN 55011

6.0 Operation

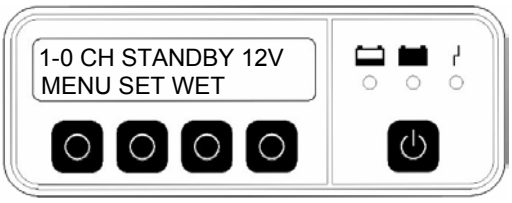
The HS-1000 battery charger offers a variety of features and settings. The operating structure is clearly arranged, allowing the charger to be operated intuitively. Clarity is achieved primarily by using softkeys. This means that the functions of keys (1) – (4) are determined freely by the unit software depending on the specific menu. These assignments are indicated in the bottom line of the display above the keys.



6.1 Operating modes

6.1.1 Auto start feature

The HS-1000 battery charger is equipped with an automatic start feature. The charger automatically starts the selected function immediately after pressing the ON/OFF button without having to start this function separately. **The "12 V Charging" function is set as default.** If a battery is not connected, the charger remains ready for operation in the standby mode:

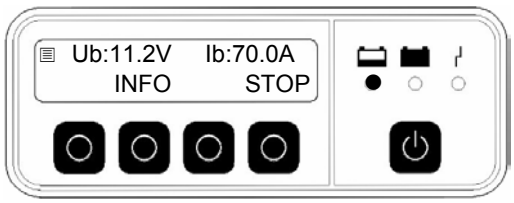


The charging operation starts after a battery is connected.
If the charging operation is interrupted by a clip coming off, the charger immediately switches back to the standby mode. Charging starts again when a battery is reconnected.
In the event of a power failure (or if the plug is disconnected) the charger automatically resumes charging when the power returns.
Discontinuation of the charging operation with the "STOP" button switches off the auto start feature. Then it is necessary to start every further charging operation "by hand" with the "RUN" button. Switching the charger off and then back on with the ON/OFF button reactivates the auto start feature, etc.
The auto start feature can always be switched off by pressing the "MENÜ“ button.
All charger operating modes can be set as the auto start mode (See Chap. 7.1 "General Functions")

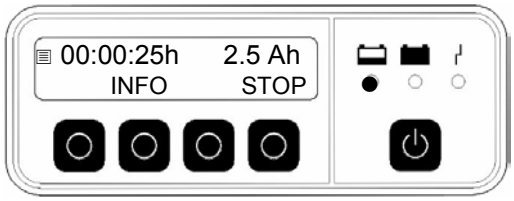
6.1.2 Charging 12V / 24V

The battery is charged according to an IUoU curve, meaning that charging is accomplished during the initial at the maximum possible current until the voltage threshold of 14.4V (28.8V) is reached. This voltage is then kept constant for 6h, after which the charger switches over to charge retention with the voltage maintained at 13.3V (26.6V).

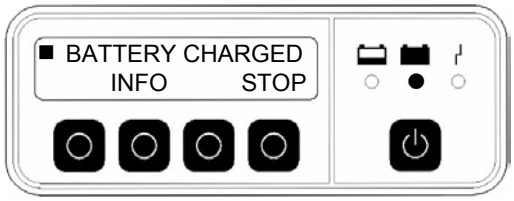
The following display appears while charging:



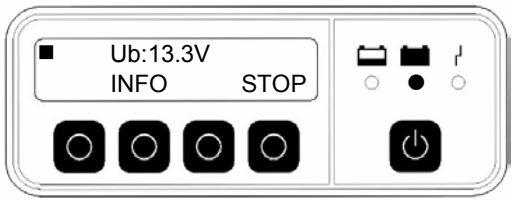
The momentary battery voltage Ub and charging current Ib are indicated permanently in the upper line.
Pressing the "INFO“ button displays the charging time already expired as well as the quantity charged. The display automatically returns to the standard display after 3 s.



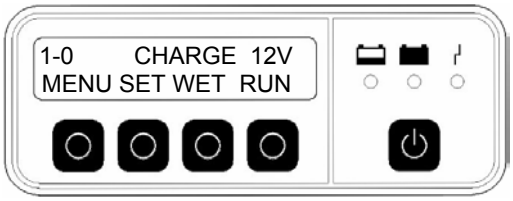
After the battery is completely charged the charger switches over to retention charging.



The current charging voltage is indicated at intervals of 5s.



The charging operation can be terminated at any time by pressing the "STOP" button.
The charger then returns to the basic menu "Charging".



6.1.3 Selecting battery / setting charging parameters / writing special programs

Various settings can be made in the main menu. It is possible to select different types of batteries, change the charging curve parameters and save your own special programs.

6.1.3.1 Battery selection

Button (3) allows selection of different types of specified batteries with fixed parameters or to select special programs you have written yourself (see below).

The following types of batteries can be selected:

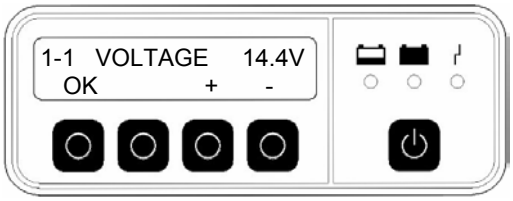
WET
For batteries with liquid electrolyte (including lead/calcium batteries)
AGM
For batteries with electrolyte absorbed in a glass mat (**A**bsorbed **G**lass **M**att)
GEL
For batteries with gelled electrolyte

The proper charging curve parameters are loaded automatically to match the type of battery selected:

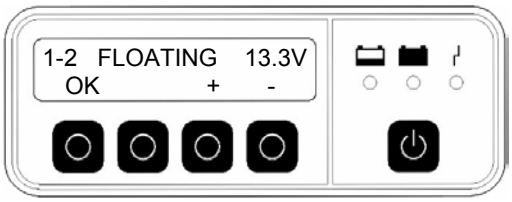
	WET	AGM	GEL
U1	14.4 V	14.4 V	14.1 V
U2	13.3 V	13.3 V	13.3 V
Ia max	70 A	70 A	70 A
t in U1	6 h	6 h	6 h

6.1.4 Adapting charging parameters / writing special programs

The four parameters listed above can be adapted to the specific requirements with the "SET" button.
First the value for the constant voltage U1 appears:

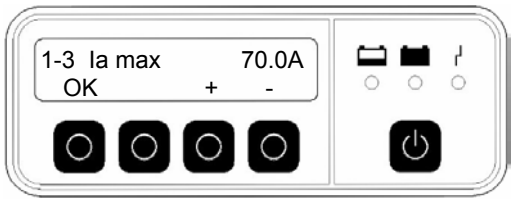


Press the "+" and "–“ buttons to change the value in increments of 0.1 V.
Press the "OK" button to continue to the next parameter, the value for the charge retention voltage U2:



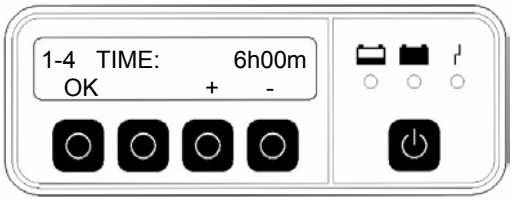
Set in the same manner.

Press "OK" to go to the parameter "maximum output current“ Ia max:



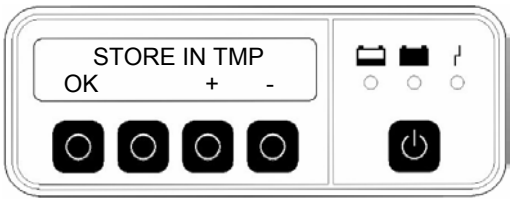
The value can be changed in increments of 0.1A.

Press "OK“ to continue to the parameter for duration of constant voltage charging at U1:



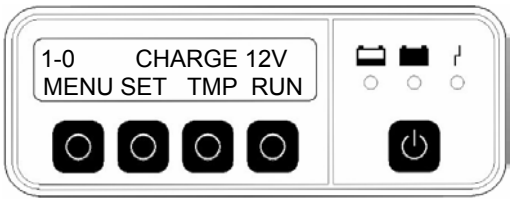
The value can be changed in increments of one minute.

The changes made can only be stored in the "TMP" memory temporarily, i.e. until the ON/OFF button is pressed the next time.



However permanent storage in special programs S1, S2 or S3 is also possible with the "+“ and "–“ keys.
The save operation can be confirmed with the "OK" button or the entire procedure can be aborted with the "ESC" button. Successful storage is confirmed by the display "SAVED“. The display then returns to the basic menu "Charging"

Please Note:
Changes made become active only when selected in the basic menu. For this purpose select again with button (3).
For temporary changes select "TMP“, for permanently stored settings select "S1“, "S2“ or "S3“.



Naturally one of the standard settings ("WET“, "AGM“, or GEL“) can also be selected now; the changes remain stored in "TMP" until the charger is switched off.

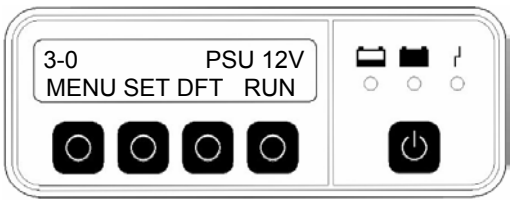
The changing operation can then be started with the modified parameters by pressing the "RUN" button.

The procedures described above are identical for the 12V Charging and 24V Charging functions.

6.1.5 External Power Supply (PSU) 12V + 24V

This mode is provided for vehicles without a battery, for example in a display room at a dealership. The charger provides a previously set output voltage up to the maximum output of the charger whereby the maximum output current can also be set.

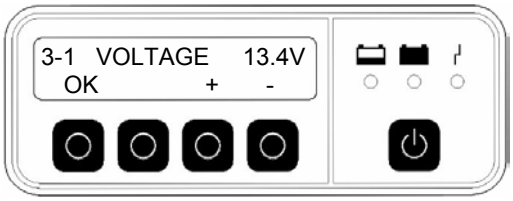
The procedures described here are identical for the 12V PSU and 24V PSU functions.



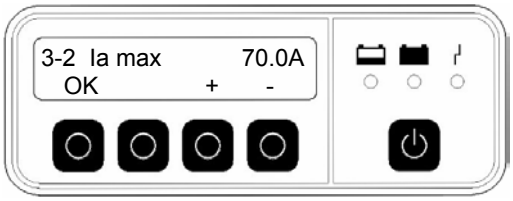
The default setting "DFT" is given in the basic menu.

Ua = 13.4 V (26.8V)
Ia max = 70.0 A (35.0A)

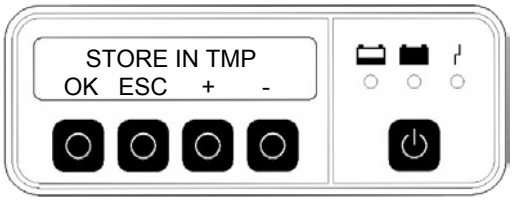
This default cannot be changed. However it is possible to switch to the adjustment mode by pressing the "SET" button. First it is possible to set the output voltage.



Press the "OK“ button to set the maximum output current.

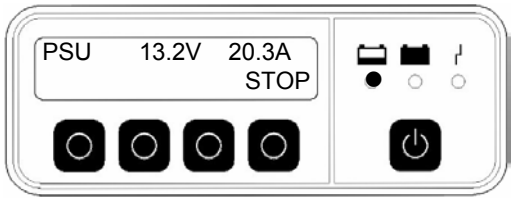


This setting can be saved temporarily in the "TMP“ memory. However permanent storage in special programs S1, S2 or S3 is also possible with the "+“ and "–“ keys.



The save operation can be confirmed with the "OK" button or the entire procedure can be aborted with the "ESC" button. Successful storage is confirmed by the display "SAVED“. The display then returns to the basic menu "PSU".

Please Note: Changes made become active only when selected in the basic menu. For this purpose select again with button (3).
For temporary changes select "TMP“, for permanently stored settings select "S1“, "S2“ or "S3“ (or the default setting "Std"). The charger can then be started with the modified parameters by pressing the "RUN" button.

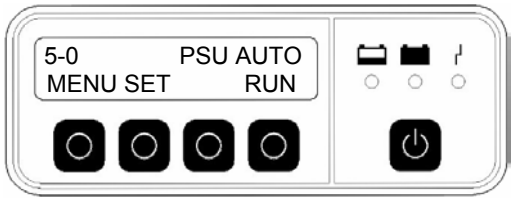


The momentary values for the output voltage and the output current are permanently visible on the display.

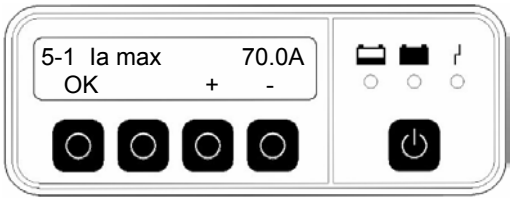
This function is continues for an unlimited time, however can be stopped at any time with the "STOP" button.

6.1.6 Support mode (PSU AUTO)

This mode supports the vehicle battery (by providing a buffer) during demonstrations and prevents loss of data in the vehicle control systems when the battery is replaced. The charger automatically recognizes the correct voltage for the vehicle electrical systems and maintains it up to the maximum output capacity of the charger.

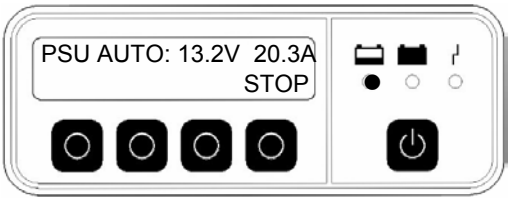


The possibilities for adjustment are limited here to the maximum output current.



Any change made can be confirmed with the "OK“ button and remains permanently stored, i.e. the next time the charger is switched on the value set here is used again.

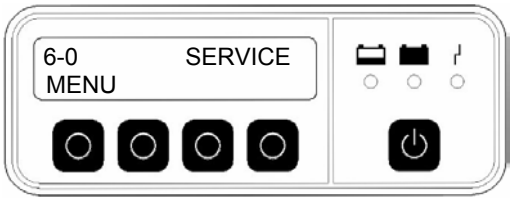
The charger can then be started with the modified parameters by pressing the "RUN" button.



This function is continues for an unlimited time, however can be stopped at any time with the "STOP" button.

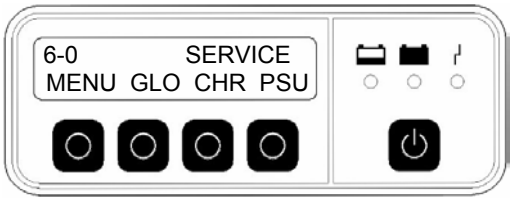
7.0 Service menu

This menu allows setting to be made, which affect the basic function of the charger. Here it is possible to define limits for the setting ranges, select the language for the displays or set the auto start feature.



This area is not accessible for normal users.

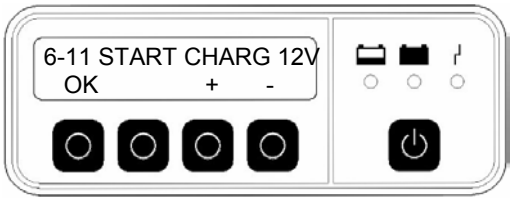
However the menu can be activated by pressing buttons (2) und (3) simultaneously.



7.1 General functions

When the "GLO“ button is pressed the charger switches to the submenu for global settings. Here it is also possible to read out the fault memory or restore the default settings.

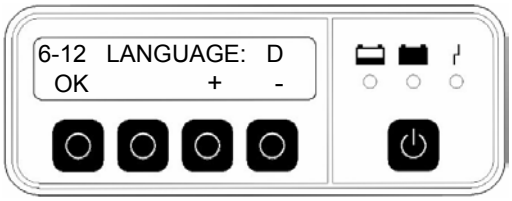
First it is possible to define the auto start feature.



One of the following functions can be selected with the "+“ und "–“ buttons:

- 12V Charging
- 24V Charging
- 12V PSU
- 24V PSU
- PSU Auto

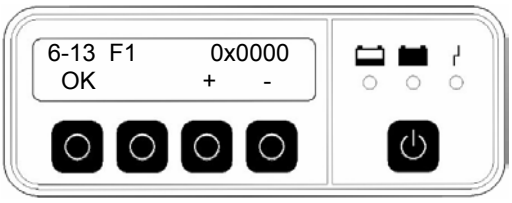
The desired auto start function can be confirmed with the "OK" button. Simultaneously the charger switched to the next menu item "Language".



One of the following languages can be selected with the "+“ und "–“ buttons:

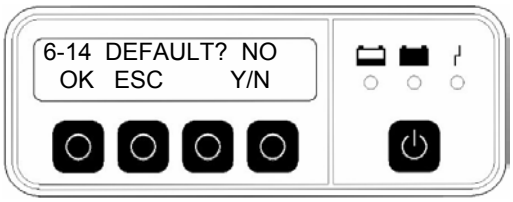
- "D“ = German
- "GB“ = English
- "F“ = French
- "NL“ = Dutch
- "E“ = Spanish
- "I“ = Italian

The display texts are then switched over to the language selected.
Confirm selection with the "OK“ button. The display then continues to the next menu point "Fault memory".



The last ten fault messages F1 through F10 can be viewed by pressing the "+“ and "–“ keys. They are output in hexadecimal numerical format. The meaning of the most important codes is explained in Chap. 8.

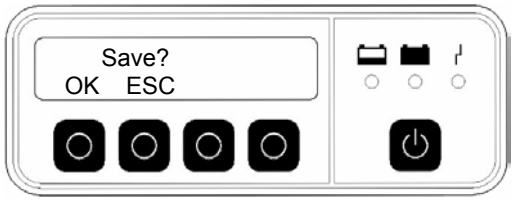
The last menu point allows the charger settings to be returned to the default settings (made at the factory):



The default answer here is "No", meaning that the charger is not set back to the default settings when the "OK" button is pressed. It is possible to switch to "Yes" with the "Y/N" button.

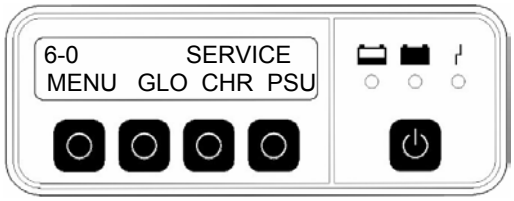
The service menu can be aborted completely pressing the "ESC" button and the program returns to the basic menu "SERVICE".

When the "OK“ button is pressed, the charger again asks if the changes made are to be saved:



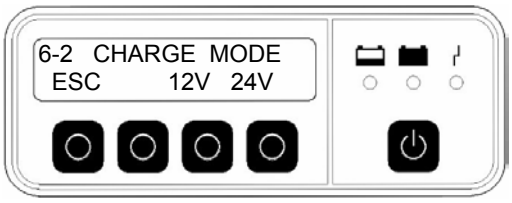
The changes can be saved by pressing the "OK" button again. Press the "ESC“ button to delete the changes; the program returns to the basic menu "SERVICE“.

7.2 Charging parameters



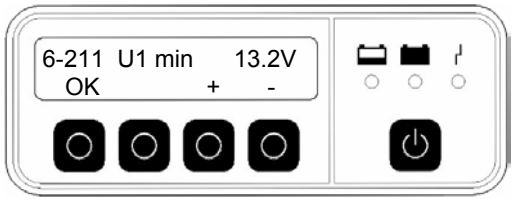
When the "CHR" button is pressed the charger switches to the submenu "Charging function". Here it is possible to define limits for the adjustment ranges for the charging parameters. This makes it possible to allow changes to the charger settings only within extremely close limits to prevent damaging particularly sensitive components in the vehicle with improper settings.
It is also possible to completely disable the 24V function.

Caution: The changes made here are not monitored by the software! Avoid absurd or damaging settings under all circumstances!



Press the "ESC“ button to return to the basic menu "SERVICE“.

Pressing the "12V“ button causes the charger to switch to the 12V parameter limits.
First the minimum limit for the adjustment range for the constant voltage U1:

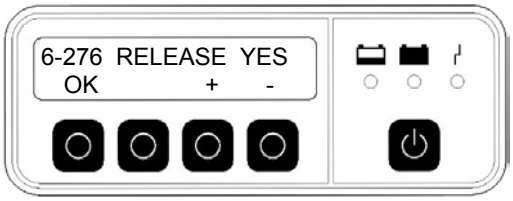


This value can be adjusted with the "+“ and "–“ keys.
Press the "OK“ button to continue to the next parameter in the following sequence:

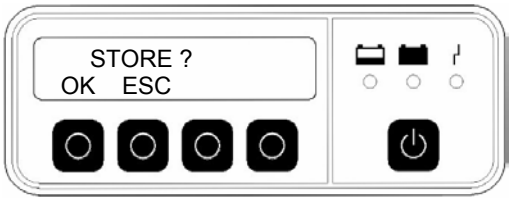
U1 max
U2 min
U2 max
Ia max

The values are then saved. However this operation can be circumvented by pressing the "ESC" button. The charger returns to the basic menu "SERVICE“.
From here it is possible to go to the 24V parameter range by pressing the "24V" button.
Here the settings can be made in the same manner as described for 12V.

However observe the following special feature:
The following question appears as the final subpoint:

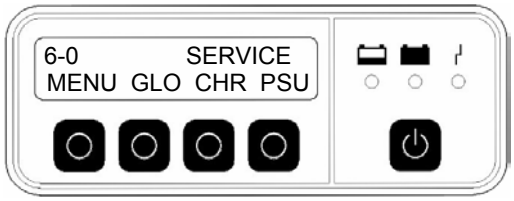


It is possible to switch back and forth between "Yes" and "No" with the "+“ and "–“ keys. After confirmation with the "OK“ button the 24V function is enabled or disabled.
Another question appears for final storage:



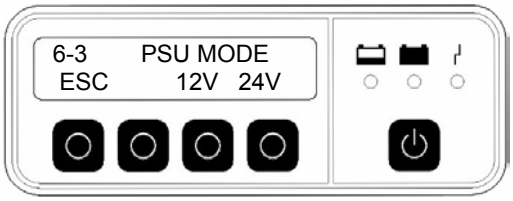
The changes can be saved by pressing the "OK" button again. Press the "ESC“ button to delete the changes; the program returns to the basic menu "SERVICE“.

7.3 PSU parameters



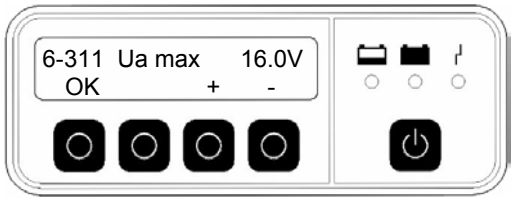
When the "PSU" button is pressed the charger switches to the submenu "PSU function" Here it is possible to define limits for the adjustment ranges for the external power supply parameters. This makes it possible to allow changes to the charger settings only within extremely close limits to prevent damaging particularly sensitive components in the vehicle with improper settings. It is also possible to completely disable the 24V function.

Caution: The changes made here are not monitored by the software! Avoid absurd or damaging settings under all circumstances!

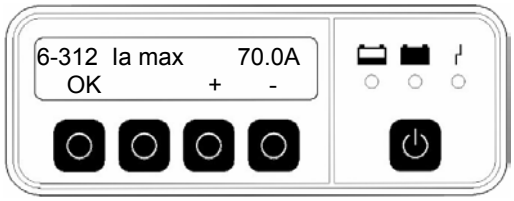


Press the "ESC“ button to return to the basic menu "SERVICE“.

Pressing the "12V“ button causes the charger to switch to the 12V parameter limits.
First the upper limit for the output voltage adjustment range:

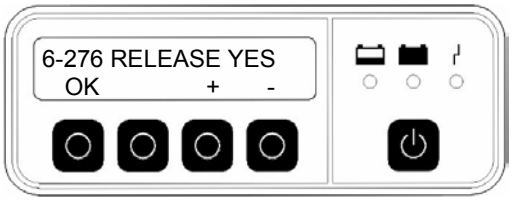


Pressing the "OK“ button switches to the next parameter, the maximum value for the output current.



The values are then saved. However this operation can be circumvented by pressing the "ESC" button. The charger returns to the basic menu "SERVICE“.
From here it is possible to go to the 24V parameter range by pressing the "24V" button.
Here the settings can be made in the same manner as described for 12V.

However observe the following special feature:
The following question appears as the final subpoint:

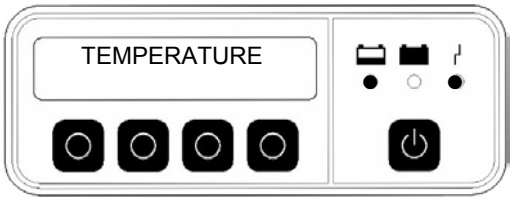


It is possible to switch back and forth between "Yes" and "No" with the "+“ and "–“ keys. After confirmation with the "OK“ button the 24V function is enabled or disabled.
Another question appears for final storage.

8.0 Fault indication / trouble shooting

The fault codes (see Chap. 7.1) are given in the titles below.

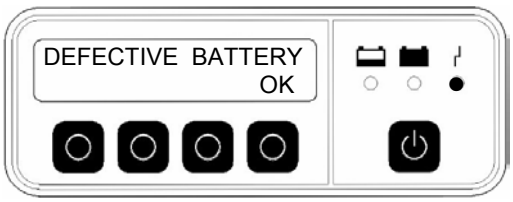
8.1 Temperature fault (0x0020)



Explanation:
To prevent the charger from overheating the output is reduced in a number of stages when the temperature increases above a critical value. If the maximum value is exceeded in spite of this reduction in the output, the charger switches off and the fault message above appears. After an appropriate cooling phase, the charging operation is continued.

Remedy:
Charger covered by rags, paper, etc. Remove all objects, which could cover the ventilation slits.

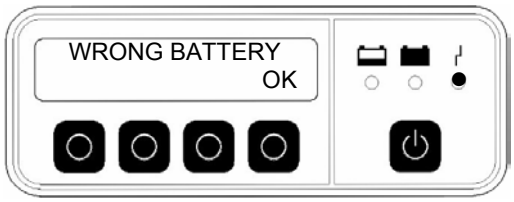
8.2 Defective battery (0x0200)



Explanation:
If the battery voltage does not reach a minimum voltage of 12V (24V) within 30 minutes, the charging operation is aborted with this error. Only a defective battery (short circuit between cells, etc.) behaves in this manner.

Remedy:
Replace battery.

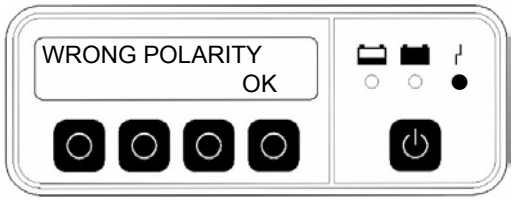
8.3 Wrong battery (0x0100)



Explanation:
The battery voltage goes beyond a maximum value of 17.4V (38.8V) during the initial charging phase or increases to beyond a maximum limit of 15.5V (31V) while charging.

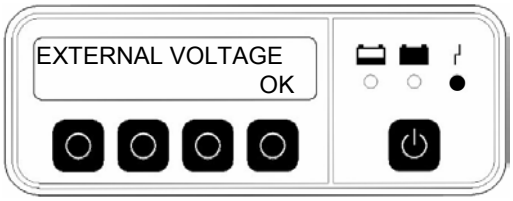
Remedy:
Battery connected has incorrect voltage rating. Replace battery or adapter charger setting

8.4 Reversed polarity (0x0400)



Explanation:
The charging clips were connected to the wrong poles.
Remedy:
Connect charging clips to battery terminals with correct polarity:
Red clip (+) to positive pole; black clip (-) to negative pole.

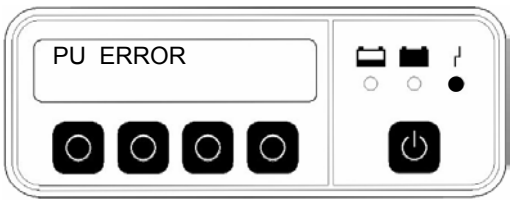
8.5 Reverse voltage (0x0800)



Explanation:
A voltage was detected in the vehicle electrical systems in the PSU mode. The PSU mode is not intended for such cases.

Remedy:
Use the PSU Auto function.

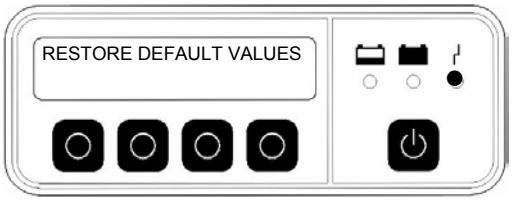
8.6 Output stage fault (0x0040)



Explanation:
The output stage did not react as expected by the control. A hardware fault is present.

Remedy:
The charger is defective. Switch it off with the ON/OFF button.
Contact the service department.

8.7 Check sum error (0x0008)



Explanation:
An error is present in the data memory (data loss, memory defective)

Caution:
The charger tuning is lost!
Please contact the service department, the charger is no longer in an operating state!

9.0 Serial interface / firmware update

The charger is equipped with a serial interface (RS232) . The associated socket (11) is located on the front of the charger (9-pin, Sub D).
If a software update is required, the firmware can be updated easily using the corresponding software and a PC or laptop connected to this interface.