

# Manual

- Valid from firmware version 1.70.011 -

## Deutronic Battery Charger / External Power Supply with MPC4-Board and nominal 14VDC Charging Voltage (suitable for 12VDC Vehicle On-board Networks and Batteries)



Image similar

### Important note

Do not use the charger in applications for which the device was not originally designed! Only qualified personnel are allowed to use this charger. Read these operation instructions carefully! In any case pay attention to the safety instructions and follow the guidelines of the battery manufacturer!

Depending on the customer-specific delivery specifications, the described parameters may differ. If you have any questions regarding your parameterization, please contact Deutronic Elektronik GmbH or one of our worldwide service partners.

## Content

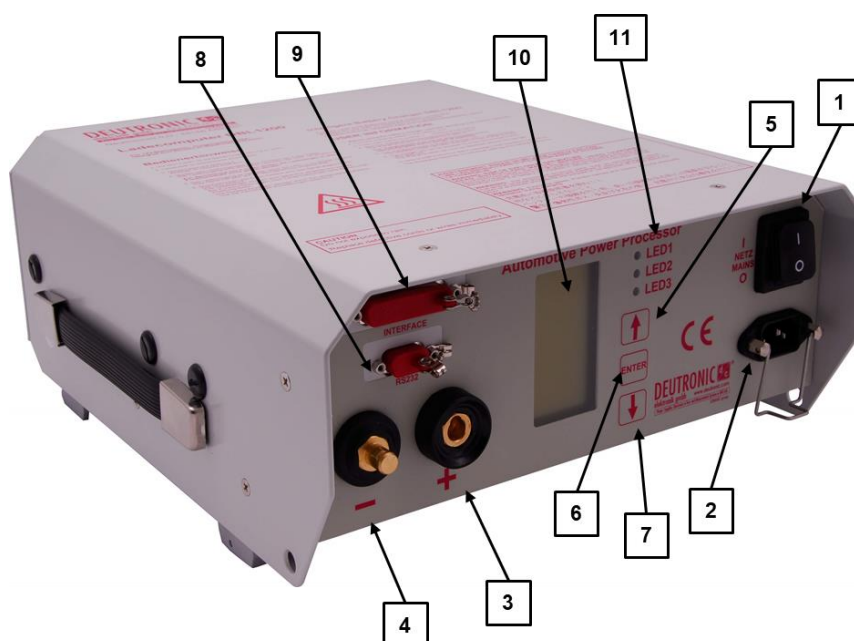
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## 1. Installation and safety instructions

In addition to the operating instructions, always observe the specifications of the battery manufacturer, the related installation and safety instructions as well as the device-specific data sheets.

The installation and safety instructions as well as the data sheets can be found on our website [www.deutronic.com](http://www.deutronic.com). Alternatively, please contact Deutronic Elektronik GmbH or one of our worldwide service partners.

## 2. Connections and Control Elements



1	Mains power switch ON/OFF
2	Connection for power cord with mains connector (AC IN)
3	"+" Plug for POSITIVE charger cable (red clamp)
4	"-" Plug for NEGATIVE charger cable, ground (black clamp)
5	UP - Button (select / edit parameter)
6	ENTER - Button (activate parameter for editing / take parameter)
7	DOWN - Button (select / edit parameter)
8	Communication interface (9-poles)
9	Signal interface (25-poles)
10	LC Display (display operating status / configuration menu)
11	LED1-3: Signalling operation state (see chapter 6. Signalling / LED and Signal Lamp)

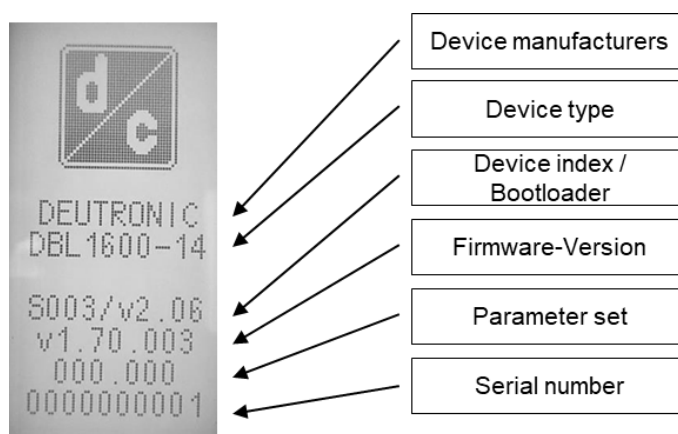
### 3. Commissioning

Before commissioning the charging computer, check the charger and the equipment like the mains supply cord, the charging cable / clamps or optional accessories (e.g. external signal lamp) for damages.

Before commissioning the charging computer, it has to be connected via the power cable with a suitable mains supply (required data for the regarding device can be found on the nameplate or the related data sheet). Please check that the connected cables are correctly seated.

After turning on the device via the mains power switch, the display shows the information of the version for 3 seconds (see Figure 1).

By pressing **ENTER** for at least 3 seconds, the display of the version information on the start screen can be extended to 30 seconds.



**Figure 1: Main screen with version information of the device**

After displaying the version information, the system switches to the main screen. (see chapter 4.3.)

The desired line can be selected with the **Up / Down** buttons in the main screen.

Selecting **START** activates the load detection circuit and with a valid load connected - depending on the preset mode - supply or charging mode will be started. The respective operation mode is shown via LED 1-3 (see chapter 6. Signalling / LED and Signal Lamp). By selecting **STOP**, the supply of the load or the charging process stops and the load detection is deactivated.

When **AUTOSTART** is activated (see chapter 4.6.5. Device menu), the supply or charging process starts automatically when a valid load is connected. By selecting **SELECTION**, the desired operating mode has to be selected after pressing **START**.

The operating status of the charger can additionally be displayed via LED 1-3 or with a powerful glowing external signal lamp option (on request). Further information regarding accessories can be found on our homepage [www.deutronic.com](http://www.deutronic.com).

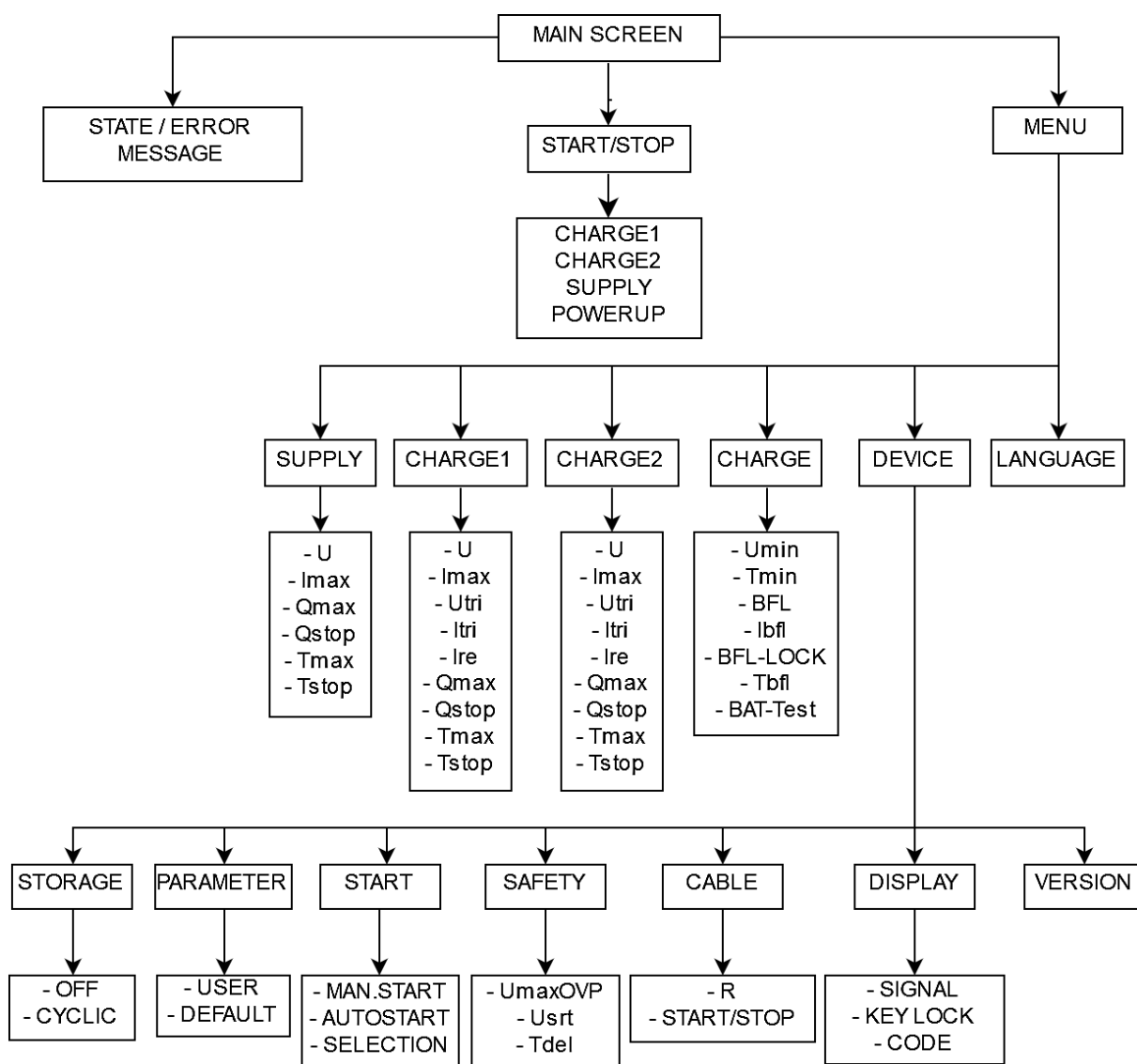
Beside the optical display, it is possible to transmit the operating status of the charger to an external control (e.g. PLC). Three potential-free relays are available on the 25-pin interface for this purpose. Furthermore, a **Remote-OFF** function can optionally be used via this interface.

Further details regarding all available interface functions and the optional software tools from Deutronic for updates, configuration and diagnostic tasks can be obtained on request by Deutronic.

## 4. Operation

### 4.1. Overview menu structure

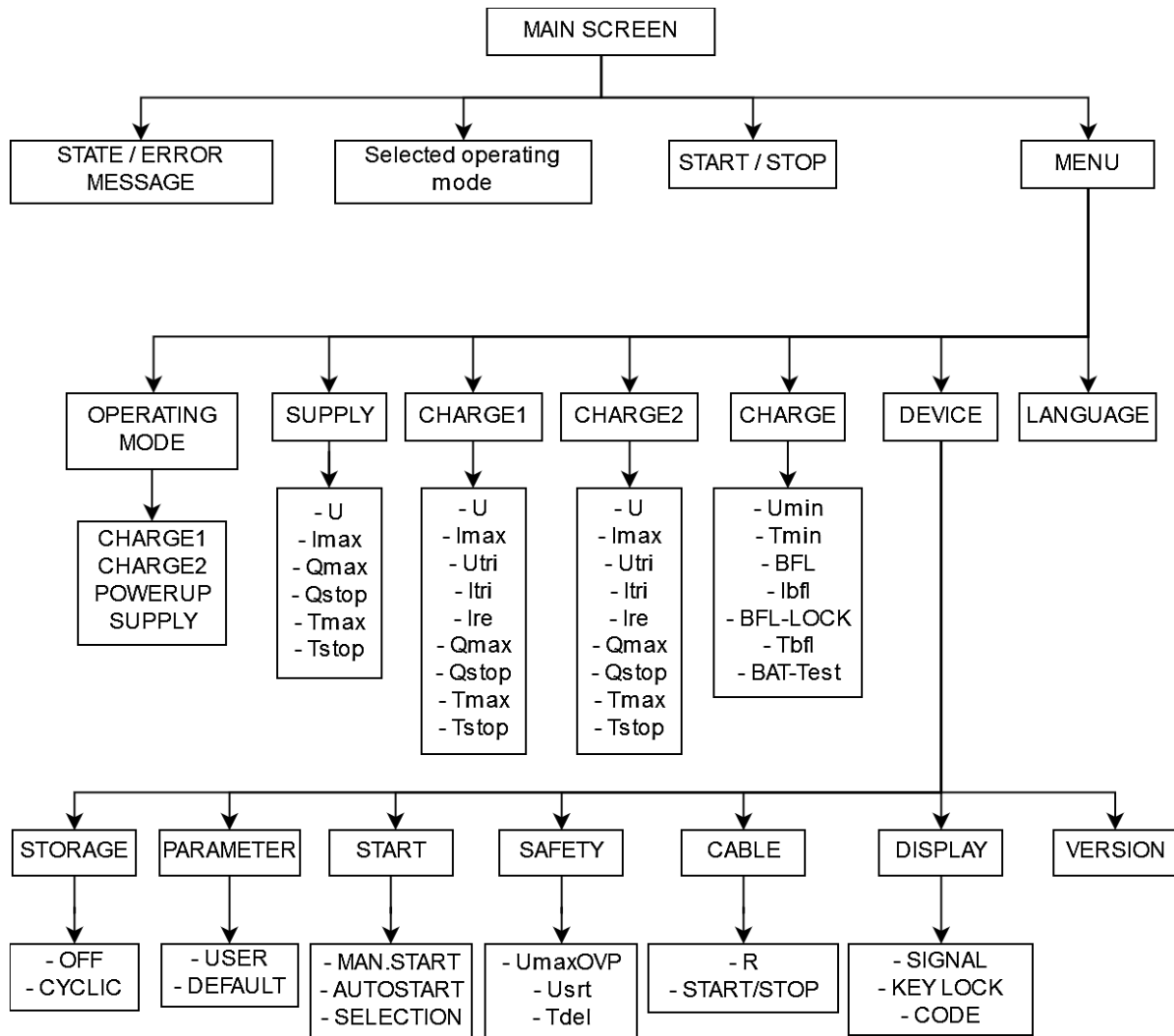
#### 4.1.1. Start option *SELECTION*



The descriptions of “CHARGE1” and “CHARGE2” depend on the customer specific parametrization.

If **SELECTION** was selected as start option in the device menu (see chapter 4.6.5. Device menu), the operating modes are not displayed in the main screen or in the configuration menu. By pressing **START**, a menu will be opened. In this menu the desired operation mode can be selected.

#### 4.1.2. Start option **MAN.START / AUTOSTART**



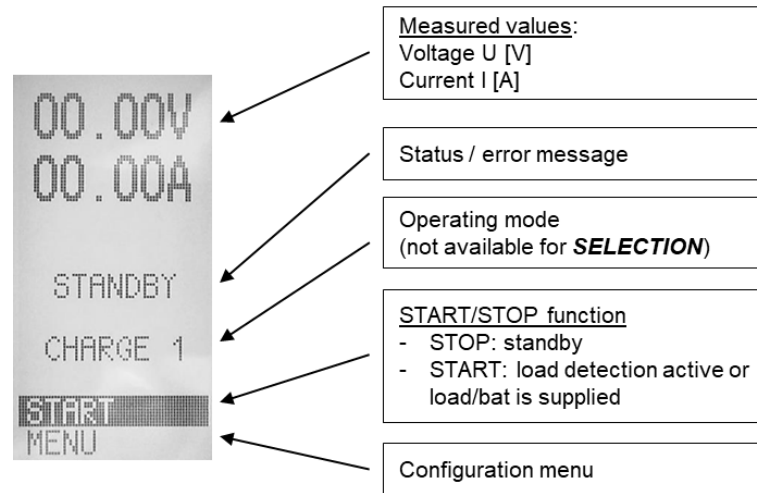
If **MAN.START / AUTO-START** has been selected as start option in the device menu (see chapter 4.6.5. Device menu), the operating modes are displayed on the main screen and in the configuration menu.

## 4.2. General notes on the operation

If any parameter has to be changed, it can be selected with the **UP / DOWN** buttons on the device and activated for editing with **ENTER**. If a parameter value is flashing, the user is able to edit this value with the arrow buttons. By pressing **ENTER** again, the new adjusted value is accepted.

Due to safety reasons some parameters (e.g. changing the operation mode, automatic cable compensation etc.), cannot be configured if the device is in operation mode. In this case the active operation has to be deactivated by pressing **STOP** in the main menu.

### 4.3. Main Display



**Figure 2: Main Display**

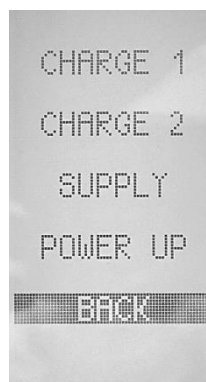
The display of **START / STOP** changes depending on the operation mode:

**Display STAR:** The device is in standby mode. By selecting **START** the load detection can be activated for the displayed operation mode. The process starts when a valid load is recognized.

**Display STOP:** Load detection of the device is activated or the device is in active supply/charging mode. The process is terminated by selecting **STOP**.

Depending on the firmware version or customer-specific supply agreement, the line "Operating mode" can be activated by pressing **ENTER**. If this line is activated, another operating mode can be selected.

If **SELECTION** has been selected as start option in the device menu (see chapter 4.6.5.), pressing **START** opens a menu (see Figure 3) in which the desired operating mode can be selected. After selecting the operating mode, the charging/supply process starts automatically.



**Figure 3: Menu after pressing START with start option SELECTION**

If the **MENU** line is selected, access to the configuration menu is called up. Depending on the active configuration or customer-specific supply agreement, the menu access is optionally protected by a PIN code (see chapter 4.5. and chapter 4.6.5.).



## 4.4. Operating modes

### 4.4.1. Charging program CHARGE1 and CHARGE2

All the following parameters are described in more detail in chapter 4.6.3 Charging program CHARGE1 and CHARGE2 menu and chapter 4.6.4. Charge menu

In this operating mode, both a battery installed in the vehicle and a "stand-alone" battery (disconnect the battery from the vehicle) can be charged. If the charging clamps of the device are connected to a battery voltage greater than the switch-on voltage  $U_{min}$ , the charging process is started after the switch-on delay  $T_{del}$ . The switch-on voltage threshold  $U_{min}$  can be selected via the charging menu. (see chapter 4.6.4. Charge menu)

#### Note:

Due to built-in DC-DC converters, the device switches to the "HOLD" mode if the terminal voltage has a value higher than the value defined in the customer-specific parameterization. If the terminal voltage drops below this voltage limit during "HOLD" mode for a defined period of time, the previously selected charging program is started. After approx. 10 minutes in "HOLD" mode, the device changes to the "BUFFER" mode and increases the measured voltage by a certain value. If the current drops below a certain current limit in "BUFFER" mode, the device switches, depending on the terminal voltage of the battery, back to "HOLD" or the selected charging mode.

During the charging process, the battery poles or charging support points of the vehicle are supplied with the charging voltage  $U$ . If the current consumption exceeds the maximum output current  $I_{max}$ , the device switches to current control mode. If the output current decreases below the threshold value  $I_{tri}$  during the charging process and the time  $T_{min}$  expired, the device changes to the operating state "trickle charging". To reduce the ageing of the batteries, the batteries are charged with  $U_{tri}$  voltage during trickle charging.

If the output current increases by a defined threshold value ( $I_{tri} + I_{re}$ ) during trickle charging, the system switches to the "Recharge" operating state. The output voltage is increased to the charging voltage  $U$  level.

During the charging process special safety timers  $Q_{STOP}$  and  $T_{STOP}$  monitor the charge quantity  $Q_{max}$  and the charge time  $T_{max}$ . If one of the respective safety thresholds is reached, the device behaves according to the parameterization. The behaviour of the device, when the safety threshold is reached, depends on the customer-specific parameterization. For example, this can cause the output current to be switched off, the charging voltage to be limited to the trickle charging voltage  $U_{tri}$  or no reaction, if the parameter has been deactivated.

#### Note:

The charger has an intelligent temperature control. If the internal temperature of the charger exceeds a predefined limit, the output power of the battery charger will be reduced.

#### 4.4.2. PowerUp

The PowerUp is a time-limited mode. This mode attempts to raise batteries with clamping voltages below the  $U_{min}$  switch-on voltage to a clamping voltage level higher than the  $U_{min}$  switch-on voltage. After a successful PowerUp, the clamp voltage of the battery is higher than the customer-specific defined switch-on voltage  $U_{min}$  so that one of the two charging programs can be used.

During the first PowerUp phase, the battery is supplied with the PowerUp voltage  $U_{out\_pwu}$  for the time  $t_{mon}$ . During this phase, output currents below  $I_{min\_pwu}$  are permitted. Afterwards, the actual PowerUp takes place. During this time, the current must not fall below the minimum current limit  $I_{min\_pwu}$ . The clamp voltage of the battery must be higher than  $U_{min\_pwu}$ . The charging time  $T_{sup\_pwu}$  and the maximum current  $I_{max\_pwu}$  depend on the customer-specific parameterization. Finally, the battery clamp voltage is checked without supply by the device for approx. 30 seconds and compared with the switch-on voltage  $U_{esp}$ . If the test is successful, the device switches to "Standby".

If the measured current decreases below the minimum current  $I_{min\_pwu}$  or the measured clamp voltage has a value lower than  $U_{min\_pwu}$  after the load test  $t_{mon}$  has expired, the PowerUp will be aborted with the display message "LOAD ERROR" (see chapter 5).

If the clamp voltage decreases below the switch-on voltage  $U_{esp}$  during the second voltage monitoring, the display message "DISCHARGED" will be shown.

The following parameters can only be changed via customer-specific parameterization. If you have any questions, please contact Deutronic Elektronik GmbH.

Parameter	Designation	Range of values / Explanation
$t_{mon}$ in [s]	Duration of the load test	[30 ... 120] s in steps of 10 s; After this period of time the parameters $U_{min\_pwu}$ and $I_{min\_pwu}$ are queried. If one of the parameters $U_{min\_pwu}$ or $I_{min\_pwu}$ is undershot after $t_{mon}$ has expired, the PowerUp will be aborted with the message "load error". During the load test, the parameters $U_{min\_pwu}$ and $I_{min\_pwu}$ may be undershot.
$U_{min\_pwu}$ in [V]	Minimum voltage limit	[0 ... 15.5] V; Required minimum voltage of the connected battery - defines the voltage limit value which must be exceeded by the battery after the load test phase.
$U_{out\_pwu}$ in [V]	PowerUp-voltage	[ $U_{esp}$ ... 15.5] V; The level of the output voltage must be selected so that the connected loads can be supplied sufficiently.
$I_{min\_pwu}$ in [A]	Minimum current limit	If the current value decreases below this value after the load test, the PowerUp is aborted and "Load error" is indicated on the display.

$I_{max\_pwu}$ in [A]	Maximum current limit	$[I_{min\_pwu} \dots I_{max\_pwu}]$ A; The possible maximum value depends on the power class of the device (for further details see data sheet).
$T_{sup\_pwu}$ in [min]	Maximum supply time	[0..59] min The entire PowerUp time is the sum of $T_{mon} + T_{sup\_pwu} + 30$ s. The duration $T_{sup\_pwu}$ is the supply time of the PowerUp.

**Note:**

During the PowerUp, all parallel loads of the vehicle (ignition, low beam, etc.) must be deactivated. If it is not possible to deactivate the parallel loads, the PowerUp should take place in stand-alone-operation (disconnect the battery from the vehicle).

Due to safety reasons (see Chapter 5 - Load error), the PowerUp must not be carried out several times in row using the same battery.

### 4.4.3. Supply

All the following parameters are described in more detail in Chapter 4.6.2. "Supply menu".

The operation mode "Supply" is used for supplying a vehicle board network if the battery is not connected. That means that the consumers of the vehicle are supplied with power up to the power limit of the charger. If no valid load is connected to the charger, the device is in the load detection mode. If a valid voltage or load is detected over several seconds (switch-on delay  $T_{del}$ ), the supply process is starting.

During the supply process, special safety timers  $Q_{STOP}$  and  $T_{STOP}$  monitor the supply quantity  $Q_{max}$  and the supply time  $T_{max}$ . If one of the respective safety thresholds is reached, the device behaves according to the parameterization. For example, this may cause the output current to shut down, or no response if the parameter is disabled.

#### **Warning:**

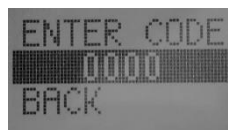
Batteries must NOT be charged in this mode, as the parameters and monitoring functions required for safe battery charging are not activated in this program.

#### **Note:**

The charger has an intelligent temperature control. If the temperature of the charger exceeds a predefined limit, the output power of the battery charger will be reduced.

## 4.5. PIN lock menu access

If the following message appears on the display after pressing Menu in the user menu, the activated key lock must be released as follows.



**Figure 4: Pin lock**

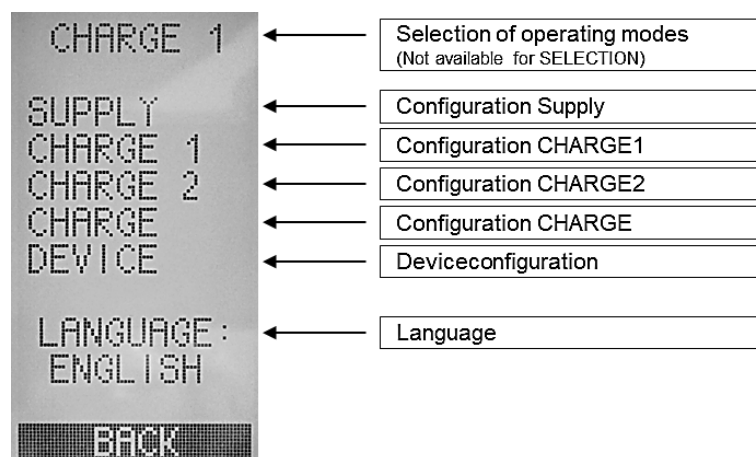
The input field could be activated with **ENTER**. The code can be set with the arrow keys and confirmed with **ENTER**.

#### **Note:**

The code for the lock can be set individually and activated by the user in the device menu (see chapter 4.6.5. Device menu- DISPLAY) or by a customer-specific delivery specification activated by default.

## 4.6. Configuration menu

By selecting **MENU** in the main screen (see chapter 4.3.), the configuration menu will be opened. In this menu the desired operating parameters can be configured in the sub menus.



**Figure 5: Configuration menu**

### Note:

If **SELECTION** has been selected as start option in the device menu (see chapter 4.6.5.), the operating modes are not displayed in the configuration menu. (see Figure 5)

### 4.6.1. Selecting the operating mode

After activating the "Operation mode"-field, the available modes can be selected with the arrow keys and accepted with **ENTER**.

The individual operating modes are described in more detail in chapter 4.4 Operating modes

### Note:

If **SELECTION** has been selected as start option in the device menu (see Chapter 4.6.5.), the operating modes are not displayed in the configuration menu. (see Figure 5)

#### 4.6.2. Supply menu



Figure 6: Supply menu

Parameter	Designation	Range of values / Explanation
U in [V]	Output voltage	[2 ... 17] V (or max. 20 V for type DBL800-14) The level of the output voltage must be selected so that the connected loads can be supplied sufficiently. {1} ATTENTION - excessively high voltage values may cause damage to the vehicle electrical system!
I <sub>max</sub> in [A]	Current limit output current	I <sub>max</sub> [*] is dependent on the power class {2} (for further details have a look at the respective data sheet)
Q <sub>max</sub> in [Ah]	Maximum supply quantity	[0...6000] Ah {3}
Q <sub>STOP</sub>	Safety threshold for maximum supply quantity	[0]: Timer OFF [1]: Timer ON:
T <sub>max</sub> in [Ah]	Maximum charging time	[0,0 ... 255] h
T <sub>STOP</sub>	Safety threshold for maximum supply time	[0]: Timer OFF [1]: Timer ON:

{1} Output voltage [U]:

Whether the selected voltage can be output, depends not only on the (load) conditions during operation, but also on the setting of the **OVP** limit (see parameter **U<sub>max</sub>** in chapter 4.6.5. Device menu- SECURITY).

{2} Current limit [I<sub>max</sub>] – SAFETY NOTE:

Whether the set peak current **I<sub>max</sub>** can be delivered depends on the (load) conditions during operation. Note: The maximum current which is actually effective in utility operation can automatically be adjusted/reduced by the dynamic power and temperature control.

[\*] Note:

If necessary, the device automatically adjusts the limit values in order not to exceed the nominal device power. Example: If the output voltage **U** is increased in the output power limit range, the maximum permissible current **I<sub>max</sub>** is automatically reduced and the other way round.

{3} Maximum supply quantity [ $Q_{max}$ ]:

For a complete charging of the battery without significant parallel loads, the limit value for the charging process (Ah) must be set approx. 10...20% higher than the nominal specified battery capacity of the battery manufacturer.

#### 4.6.3. Charging program CHARGE1 and CHARGE2 menu

Parameter	Designation	Range of values / Explanation
U in [V]	Charging voltage	[ $U_{tri}$ ... 17.0] V (or max. 20 V for type DBL800-14) The level of the charging voltage must be selected that the connected loads can be sufficiently supplied. ATTENTION - excessively high voltage values may cause damage to the vehicle electrical system!
$I_{max}$ in [A]	Current limit	[( $I_{tri} + I_{re}$ ) ... $I_{max}$ ] A The lower limit is dynamic and depends on the configured values $I_{tri}$ and $I_{re}$ . The possible maximum value depends on the power class of the device (see data sheet for details). {4}  ATTENTION - the current limit must be checked for the connected equipment (e.g. charging cable/pliers) and adjusted if necessary.
$U_{tri}$ [V]	Trickle voltage	[ $U_{min}$ ... $U_{charging\ voltage}$ ] V
$I_{tri}$ in [A]	Trickle charging current	[0.5 ... ( $I_{max} - I_{re}$ )] A; Limiting value from which the device switches to trickle charge.
$I_{re}$ in [A]	Recharge current	[0,5 ... 30] A; Threshold (Delta-Value) above $I_{tri}$ , from which the device switches back to charging
$Q_{max}$ in [Ah]	Maximum battery charge capacity	[0...6000] Ah {5}
$Q_{STOP}$	Safety threshold for maximum battery charge capacity	[0]: Timer OFF [1]: Timer in (re-)charging mode ACTIVE/EHL mode ACTIVE → Output relay opens [2]: Timer in (re)charging mode ACTIVE/EHL mode ACTIVE → Charging voltage is reduced to $U_{eh}$ ; "Ah limit" display [3]: Timer in (re-)charging mode ACTIVE/EHL mode INACTIVE → Output relay opens [4]: Timer in (re-)charging mode ACTIVE/EHL mode INACTIVE → Charging voltage is reduced to $U_{eh}$ ; "Ah limit" display {6}
$T_{max}$ in [h]	Maximum charging time	[0,0 ... 255] h

T <sub>STOP</sub>	Safety threshold for maximum charging time	[0]: Timer OFF [1]: Timer in (re-)charging mode ACTIVE/EHL mode ACTIVE → Output relay opens [2]: Timer in (re)charging mode ACTIVE/EHL mode ACTIVE → Charging voltage is reduced to U <sub>eh</sub> !; display "MAX TIME". [3]: Timer in (re-)charging mode ACTIVE/EHL mode INACTIVE → Output relay opens [4]: Timer in (re-)charging mode ACTIVE/EHL operation INACTIVE → Charging voltage is reduced to U <sub>eh</sub> !; "MAX. TIME" {7}
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{4} Current limit [I<sub>max</sub>] – SAFETY NOTE:

If the configured current maximum  $I_{max}$  is available on the output depends on the (load) condition in the operating status. Note: During charging mode the output current limit can automatically be adjusted/reduced via the dynamic output power and temperature control.

{5} Maximum battery charge capacity [Q<sub>max</sub>]:

For a complete charge of the battery without parallel electrical consumers: Rise the limit value in the setup configurations by around 10...20% than nominally given for the battery capacity by the battery manufacturer.

{6} Safety threshold for maximum battery charge capacity [Q<sub>stop</sub>]:

The behaviour of the device when reaching the safety threshold depends on customized terms of delivery (e.g. switch off output current, limitation of charging voltage to  $U_{tri}$  or no reaction if these parameters were predefined by the terms of delivery).

{7} Safety threshold for maximum charging time [T<sub>stop</sub>]:

The behaviour of the device when reaching the safety threshold depends on customized delivery conditions (e.g. switching off output current, limiting charging voltage to  $U_{tri}$  or to no reaction, if these parameters were defined by the terms of delivery).



#### 4.6.4. Charge menu

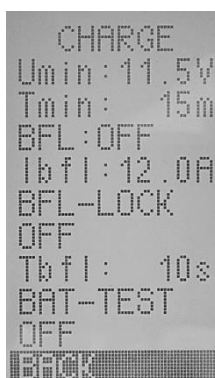


Figure 7: Charge menu

Parameter	Designation	Range of values / Explanation
$U_{\min}$ in [V]	Switch-on voltage	[5 ... $U_{tri}$ ] V Required minimum voltage of the battery - this value defines the voltage limit which must be exceeded by the battery before starting the charging process. {8}
$T_{\min}$ in [min]	Minimal charging time	[0 ... 240] minutes; Before a changeover from charging mode to trickle charging can take place, this time interval has to pass.
BFL (ON/OFF)	Signal 'Battery full' activated / deactivated	BFL signal only takes place after expiration of $T_{\min}$ and is in addition independent from trickle settings.
$I_{bfl}$ in [A]	Current limit at which BFL is signalled	BFL signalization is indicated via LED and connected to an external signal lamp when the output current is below $I_{bfl}$ (see chapter 6). ATTENTION: If <b>BFL LOCK</b> is deactivated, the BFL signal will be reset as soon as the output current increases $I_{bfl}$ .
BFL-LOCK (ON/OFF)	Delay time $T_{bfl}$ for BFL-Signal	After the output current is below $I_{bfl}$ and the timer $T_{bfl}$ has expired, the BFL status signal is permanently on (until the connected battery is disconnected or an error message is displayed).
$T_{bfl}$ in [s]	Signal delay	[1 ... 60] sec
Short cell detect (ON / OFF)	Battery test	If the <b>CELLCHECK</b> parameter is set, the battery is checked at the start of the charging process. If the batteries are broken or very poor, the charging process is not started and "SHORT CELL" is shown in the display.

{8} Starting voltage [ $U_{\min}$ ] - SAFETY NOTE:



Safety limit that guarantees, if configured correctly, that a technically accurate battery is connected to the charger for the charging process!

#### 4.6.5. Device menu



Figure 8: Device menu

Parameter	Setting / Designation	Statement
STORAGE	OFF	No temporary saving of the charging process state.
	CYCLIC	Every 5 minutes relevant operating parameters such as operating modus or timer values are saved and reactivated after mains power returns. {9}
PARAMETER	Default	Factory-made standard settings for the operating parameters of the charger are activated.
	User	When changing the factory settings the display <b>USER</b> appears. <u>Note:</u> On the main screen (see Figure 1 ) you can see '*' in front of the parameter set number.
START	AUTOSTART	The predefined operating mode starts automatically after return of the mains supply if a load or battery is connected to the charger.
	MAN.START	The user starts the device manually with <b>START</b> on the main screen (see chapter 4.3.).
	SELECTION	If <b>START</b> is pressed in the main screen, a menu opens. In this menu the desired operating mode can be selected.
SAFETY	U <sub>max</sub> Maximum output voltage OVP	[15.5 / 17(*)] V; Observe instructions for {10}! 1: OVP limit 15.5V is active 0(*) : OVP-Limit 15.5V is deactivated (*) Max. 20 V for type DBL800-14.
	U <sub>srt</sub> Short circuit voltage	[0 ... 13.9] V; If the voltage on the output drops below the pre-set value, a short circuit is recognized and the output relay of the charger is opened. Important: Follow safety instructions {11}!

	T <sub>del</sub> Switch on delay time	[1 ... 60] sec; Switch on delay is working for both - normal start-up or start-up via external control system.
CABLE	R in [Ω]	[0 ... 0.250] Ohm Displays resistance value for cable compensation (can be configured manually).
	START autom. cable compensation	During an ongoing automatically cable compensation {12} the display switches to <b>STOP</b> (by pressing <b>ENTER</b> the process can be stopped).
DISPLAY	SIGNAL (0-9)	Pre-set signalization modes for LED1-3 and external signal lamp (see chapter 6).
	Key lock ON / OFF	Activate / deactivate pin code to limit access to the user menu.
	CODE 0000 ... 9999	Pin code for key lock (e.g. factory-made delivery pre-set or defined by the user).
VERSION		Shows detailed the information of the version (e.g. firmware, parameter set and the serial number of the device).

{9} CYCLIC STORAGE - NOTE:

If the supply voltage of the charger is interrupted during a charging process, the charging process continues automatically with the setting **STORAGE CYCLIC** as soon as the mains supply is back again (all meter readings, e.g. previous ampere hours, are further updated) and as soon as the supply of the load continues automatically.

{10} MAXIMUM VOLTAGE U<sub>MAX</sub> – SAFETY NOTE:



The limiting value for maximum voltage  $U_{max} = 15.5V$  is an OVP SAFETY LIMITATION for protecting the electrical system of the motor vehicle from harmful overvoltage! On the one hand the 15.5 V safety threshold limits higher parameterized charge and supply output voltage values. On the other hand the safety threshold limits the output voltage if active cable compensation would cause an output voltage over the limit.

Note: The safety threshold can be deactivated (e.g. when a huge voltage drop on the cable clamps occurs and through cable compensation the voltage has to be risen by 15.5 V).

Information: For controlling the output voltage, the main screen (see chapter 4.3.) shows the actual voltage at any time.

{11} SAFETY  $U_{SRT}$  – SAFETY NOTE:



The charger is able to recognize a short circuit automatically and thereby limit the output current down if a prescribed voltage value (short circuit voltage  $U_{srt}$ ) falls below a certain voltage threshold  $U_{srt}$  at the device output. The short circuit voltage, parameterised in the menu, has to be checked in relation with a voltage drop at the connected charging cables. If necessary, the voltage has to be adjusted to the resistance of the cable clamps and the max. output current of the device! Attention: Cable clamps perish in operation which leads to an increase of their resistance. Therefore, please include a wide safety margin for short circuit nominal voltage!

Example for the determination of the short circuit nominal voltage " $U_{SRT}$ ":

- (1) While performing the cable compensation {12}, a resistance value of 15 mOhm was determined for the connected charging cable.
- (2) The maximum output current of the charger is 100A.
- (3) Calculation of the voltage drop:  $\Delta U = 0.015 \text{ Ohm} * 100A = 1.5V$
- (4) Definition of the short circuit voltage: The short circuit voltage has to be configured with a proper distance from the calculated voltage drop for a safe switch-off (because of the aging process of the cable, contamination mechanical tongs in operating state or enhanced contact resistance at contact points).

For the present case a value of  $U_{srt} = 5.0V$  can be configured.

{12} CABLE - REFERENCE TO THE CABLE COMPENSATION:



To perform the cable compensation, the charging cables have to be connected with the device and short-circuited at the free ends (without load) of the current-carrying clamp shoe by direct contact. In order to perform the resistance measurement, please navigate to the **DEVICE MENU - CABLE**, select **START** item and press **ENTER** - the cable compensation is now running for about 30 seconds. If the cable compensation has been performed successfully, the measured resistance value will be shown on the display. The resistance value can also be entered or changed manually by selecting line "R:" and activating edit function with **ENTER**. The value can be modified with the arrow buttons and finally selected with **ENTER**. The measured or configured resistance value is stored and is retained even after the unit has been switched off.

Please note:

- Depending on the customized terms of delivery, the factory-setting of the cable compensation can differ from 0 Ohm!
- If a cable resistance value is deposited, the device automatically activates the dynamic short circuit detection (in addition to the  $U_{srt}$  configuration). The dynamic short circuit detection function considers  $R_{cable}$  as well as the configured  $I_{max}$  and will be activated as soon as the calculated  $U_{srt-dynamic} > U_{srt}$ .

## 5. Status and Error Messages

Display	Meaning / Reasons	Correction
AH LIMIT	Charging process stopped after the predefined limiting value (ampere hours [Ah]) have been exceeded.	<p>Maybe the battery capacity was adjusted to low in the setup?</p> <p>For a complete charge of the battery, switch the limiting value (Ah), given in the setup for the charging process, approximately 20% higher than the manufacturer is declaring for the battery capacity.</p> <p>Were parallel consumers activated during the charging process / supply?</p> <p>The battery might be defective.</p>
BUFFER	The device is in buffer mode.	See "HOLD" and chapter 4.4.1
CABLE COMP	Cable compensation mode is activated.	See chapter 4.6.5 - {12}
CELLCHECK	The cell test is running (only with activated <b>SHORT CELL DETECTION</b> – see chapter 4.6.4)	see chapter 4.6.4 <b>SHORT CELL DETECTION</b>
CHARGE	The DBL is in operation mode battery charge.	Battery is charged
CONTACT (flashing)	Automatic load detection is activated. The DBL checks if a battery or a resistive load is connected.	<p>Connect battery or load to the charger</p> <p>Check the connected consumers for errors (wrong kind of battery or external voltage source)</p> <p>Maybe there is a defective cable (check connection to the load or battery)</p>
DISCHARGED	The voltage of the connected battery is below $U_{min}$ .	<p>Check battery if it is defective?</p> <p>Check the operation mode and the starting voltage <math>U_{min}</math> - see chapter 4.6.4.</p>
EXT.STOP	Operation interrupted via the <b>Remote OFF</b> signal line.	Detach GND connection at PIN 25 ( <b>Remote OFF</b> )
EXT.VOLT.	<p>Overvoltage at the output.</p> <p>The device measures a voltage which is at least 1 V higher than the preset output voltage for the selected operation mode.</p>	<p>Check connected consumers for errors (wrong battery or external voltage source).</p> <p>Press <b>STOP</b> in the main menu - see chapter 4.3. - in standby mode the external voltage will be measured and displayed.</p>

HIGH TEMP.	During operation the DBL detects over temperature - the dynamic power and temperature control is activated (device is running with reduced output power).	In case of strong heating due to high load / insufficient cooling, the device reduces the output current limit and displays the over temperature message. Apart from that the device continues to run at reduced output power.  Ensure good ventilation.  Let the device cool down.
HOLD	Due to built-in DC-DC converters, the device switches to "HOLD" if the terminal voltage is higher than a certain value.	See chapter 4.4.1
LOAD ERROR	The measured clamp voltage of the battery has a value lower than $U_{min\_pwu}$ after the load test phase.  The measured current is lower than the minimum current limit $I_{min}$ after the load test phase.	The parallel load on the battery is too high – reduce or switch of load.  A fully charged battery will not meet the $I_{min\_pwu}$ criterion. In this case the wrong mode was selected.  Battery possibly defective.
MAX.TIME	Stop after the preset limit value (maximum charging time $T_{max}$ ) is reached.	Check battery / load because there might be a defect. The cause of reaching the safety threshold may also be additional parallel loads (e.g. light, ignition, navigation / multi-media systems, etc.)
NTC ERROR	Defective temperature sensor.	Please contact the service department.
POLARITY	Battery is connected with wrong polarity to the charger.	Connect black clamp to (-) pole Red clamp is connected to (+) pole (charging base)
RECHARGE	If in operation mode trickle charge, the load draws a current higher than the recharge threshold ( $I_{tr}+I_{re}$ ), the device will be reset into charging mode	Switch off any additional consumers (e.g. light, ignition etc.)
RELAY VOLT	Voltage adjustment failed.	Please contact the service department.
SHORT CELL	With activated <b>SHORT CELL DETECTION</b> (see chapter 4.6.4) and a defective or very bad battery, the charging process stops and an error message will be displayed.	see chapter 4.6.4  Any parallel load active?  Battery possibly defective.  Replace battery.
SHORTED	Short circuit (!) detected at the output.	Check load and cables for any damages

STANDBY	The device is in standby mode (sleep mode).	Start the charging / supply process with choosing <b>START</b> .  Please consider the configurations <b>MAN.START</b> , <b>AUTOSTART</b> or <b>SELECTION</b> (see chapter 0.).
STARTUP	Switch on delay time is active, the supply starts after the predefined waiting time.	Parameterisation of the switch on delay time - see chapter 4.6.5.
SUPPLY	Operation in SUPPLYMODE is active (external power supply)	Supply operation active.
TRICKLE	The device is in operation mode trickle charge.	Charging process is completed and battery can be removed.

## 6. Signalling / LED and Signal Lamp

To visualize the current operating status, the following table can be used to select between the variants "0...9":

Indication	SIGNAL '0'		SIGNAL '1'	
	CHARGEMODE	SUPPLYMODE	CHARGEMODE	SUPPLYMODE
<b>Green (permanently on)</b>	TRICKLE / BFL	Supply	TRICKLE / BFL	---
<b>Green (blink)</b>	PowerUp	---	PowerUp	---
<b>Yellow (permanently on)</b>	Charge 1 / Recharge 1	---	Charge 1 / Recharge 1	Supply
<b>Yellow (blink)</b>	Load Detect active ('Contact' blink) / Application Error		Load Detect active ('Contact' blink)	
<b>Red (permanently on)</b>	Device Error (Fan, NTC etc.)		Application Error	
<b>Red (blink)</b>	---		Device Error (Fan, NTC etc.)	
<b>Blue bzw. Green&amp;Yellow (permanently on)</b>	Charge 2 / Recharge 2		Charge 2 / Recharge 2	
<b>Off</b>	Ext. OFF / Standby		Ext. OFF / Standby	

Indication	SIGNAL '2'		SIGNAL '3'	
	CHARGEMODE	SUPPLYMODE	CHARGEMODE	SUPPLYMODE
<b>Green (permanently on)</b>	TRICKLE / BFL	Supply	TRICKLE / BFL	Supply
<b>Green (blink)</b>	PowerUp	---	PowerUp	---
<b>Yellow (permanently on)</b>	Charge 1 / Recharge 1	---	Charge 1 / Recharge 1	---
<b>Yellow (blink)</b>	Load Detect active ('Contact' blink)		Load Detect active ('Contact' blink)	
<b>Red (permanently on)</b>	Application Error		(*) Application Error	
<b>Red (blink)</b>	Device Error (Fan, NTC etc.)		Device Error (Fan, NTC etc.) / (*) BAT deep discharged	
<b>Blue bzw. Green&amp;Yellow (permanently on)</b>	Charge 2 / Recharge 2		Charge 2 / Recharge 2	
<b>Off</b>	Ext. OFF / Standby		Ext. OFF / Standby	



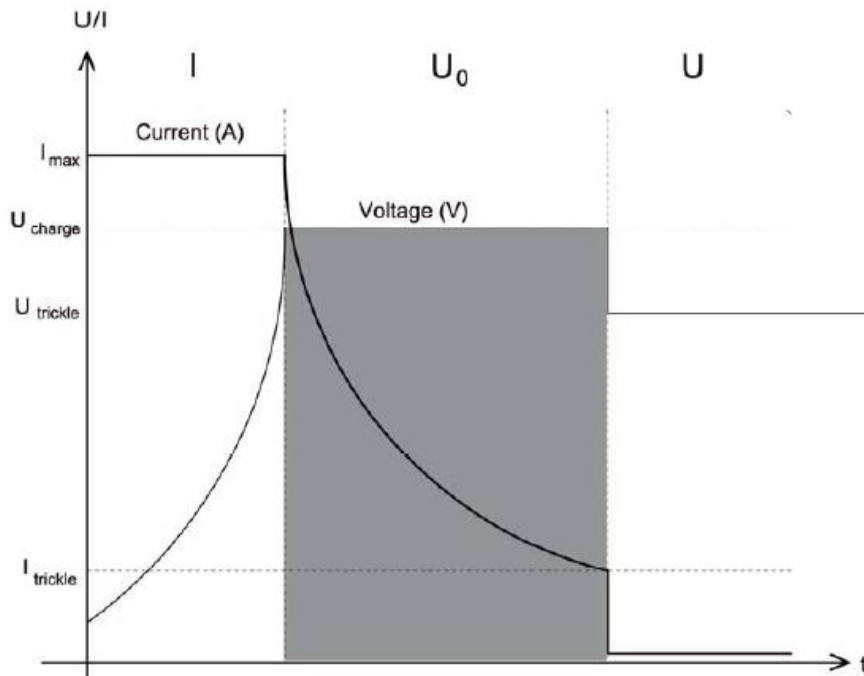
Indication	SIGNAL '4'		SIGNAL '5'	
	CHARGEMODE	SUPPLYMODE	CHARGEMODE	SUPPLYMODE
Green (permanently on)	TRICKLE / BFL	Supply	TRICKLE / BFL	Supply
Green (blink)	PowerUp	---	PowerUp	---
Yellow (permanently on)	Charge 1 / Recharge 1	---	Charge 1 / Recharge 1	---
Yellow (blink)	---	---	---	---
Red (permanently on)	Device Error (Fan, NTC etc.) / Application Error		Application Error	
Red (blink)	---	---	Device Error (Fan, NTC etc.)	
Blue bzw. Green&Yellow (permanently on)	Charge 2 / Recharge 2		Charge 2 / Recharge 2	
Off	Ext. OFF / Standby / Load Detect active ('Contact' blink)		Ext. OFF / Standby / Load Detect active ('Contact' blink)	

Indication	SIGNAL '6' (Kommando Modus)		SIGNAL '7'	
	CHARGEMODE	SUPPLYMODE	CHARGEMODE	SUPPLYMODE
Green (permanently on)	User defined (via Command)		TRICKLE / BFL	Supply
Green (blink)	---	---	PowerUp	---
Yellow (permanently on)	User defined (via Command)		Charge 1 / Recharge 1	---
Yellow (blink)	---	---	---	---
Red (permanently on)	User defined (via Command)		Ext. OFF / Standby / Load Detect active ('Contact' blink)	
Red (blink)	---	---	Device (Fan, NTC etc) / Application Error (e.g. Battery)	
Blue bzw. Green&Yellow (permanently on)	User defined (via Command)		Charge 2 / Recharge 2	
Off	Standard / User defined (via Command)		Device OFF (Mains Supply OFF)	

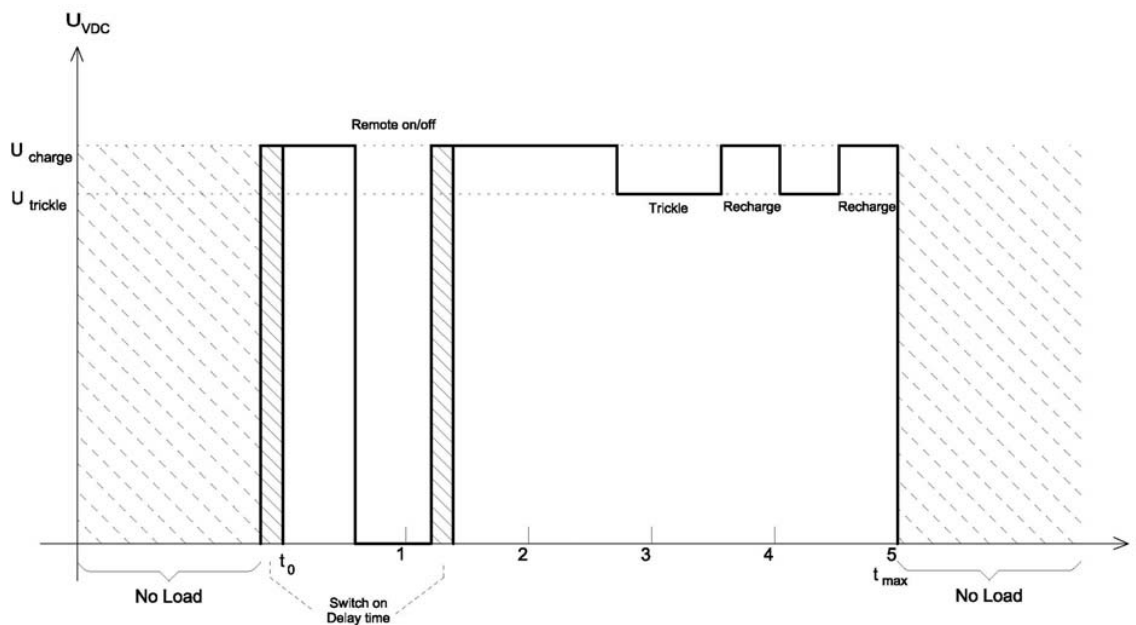
Indication	SIGNAL '8'		SIGNAL '9'	
	CHARGEMODE	SUPPLYMODE	CHARGEMODE	SUPPLYMODE
Green (permanently on)	TRICKLE / BFL; (*)Q-/T-max- State = 2 or 4 [Uout=Tri]	Supply	TRICKLE / BFL	---
Green (blink)	PowerUp	---	PowerUp	---
Yellow (permanently on)	Charge 1 / Recharge 1	---	Charge 1 / Recharge 1	Supply
Yellow (blink)	Load Detect active ('Contact' blink)		Load Detect active ('Contact' blink)	
Red (permanently on)	(*) Application Error		Device Error (Fan, NTC etc.)	
Red (blink)	Device Error (Fan, NTC etc.)		Application Error	
Blue bzw. Green&Yellow (permanently on)	Charge 2 / Recharge 2		Charge 2 / Recharge 2	
Off	Ext. OFF / Standby		Ext. OFF / Standby	

## 7. Characteristic Curves

Charging characteristic I-Uo-U:



Charging characteristic - Remote-ON/OFF, trickle and recharge:



## 8. Maintenance Instruction

The charger works reliably for years with low maintenance. Please note the following points to keep the device in the optimal condition:

- Please pay attention to the safety instructions.
- Clean the housing of the device with a soft cloth. ATTENTION: Do not damage the warning signs on the device by using solvents while cleaning the housing.
- To avoid damages at cable clamps, they have to stay widely winded during storage.
- To guarantee the quality of measurements and charging behaviour on a sustained basis, it is recommended to check technically the used equipment (charging cables, power cables, signal lamp etc.) at regular intervals.

## 9. Service Centre / Repairs

**Please observe the following points:**

**Do not open the device!**

To ensure a fast and smooth processing, it is absolutely important that every device sent for repair has a fully filled out return service scripture in which for every device all relevant data (e.g. address, name contact person, phone number etc.) as well as a detailed fault description is included.

The needed return service scripture as well as the worldwide service partner addresses you will find on our web page [www.deutronic.com](http://www.deutronic.com) in the menu item 'service worldwide'.

To enforce warranty claims within the warranty period, it is absolutely necessary that the complained device is packed safely - if possible packed in the original package or a safe package – when it is returned to us for repair.

**Note:**

Deutronic does not assume warranty repairs on devices with mechanical damage or transport damages.

## 10. Exclusion of liability

The customer is responsible for the use of the device according to the specifications. Regardless of the type, Deutronic is not liable for damage incurred through the use of the device.

## 11. Contact

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