

Manual

- Valid from firmware v1.41.251 -

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



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 operation instructions carefully! In any case pay attention to the safety instructions and follow the guidelines of the battery manufacturer!

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1. General Safety Instructions

- The device mustn't be opened because the test certification as well as the warranty will become invalid.
- This device is not intended to be used by people (including children) with limited physical, sensory or mental abilities or in the absence of experience and/or in the absence of knowledge unless they are supervised by a person responsible for their security or received instructions from a responsible person the way the device has to be used.
- Children should be supervised to make sure that they do not play with the device.
- The charger should only be utilized for the appointed applications.
- It is only permitted to contact car batteries and vehicle on-board networks with 12 volt nominal voltage.
- The battery charger contains components which are likely to generate electric arcs and sparks, thus the device has to be placed during operation in a well ventilated room provided for this purpose.
- Warning: When charging batteries explosive gases can arise. Therefore, please avoid contact with fire, open light and sparks. The storing of flammable materials in the surrounding area is forbidden.
- The battery to be charged must have a nominal capacity of at least 1 ampere hour.
- It is not possible and not permitted to charge non rechargeable batteries with this device.
- It is only permitted to charge batteries in operation modes 'CHARGEMODE' or 'AUTOMODE'. Only in these modes are the necessary parameters and monitoring functions activated for a secure battery charging. Attention: The necessary monitoring functions are not activated in 'SUPPLYMODE'.
- Charging of freshly filled or defective batteries is explicitly forbidden.
- The guidelines of the battery manufacturer must be followed at all times!
- Mains supply cords, charging cables and clamps have to be suitable for use with Deutronic Battery Chargers and furthermore, have sufficient current carrying capacity (you will find further details in the respective data sheet as well as in the present installation guidelines). The cables must be checked regularly for defects and always have to be in a perfect technical condition. Defective cables have to be replaced immediately! It is absolutely necessary to clean dirty battery clamps!
- Warning risk of fire! When not using the battery charger the cable clamps / battery adapter have to be placed in a way to ensure that no electrical conductive connection is possible.
- Attention! In workshops or industrial areas the surfaces are often painted or powder-coated and are therefore initially non-conductive. Due to contact with cable clamps the surface coating can be damaged so that the point of contact will become conductive! Risk of fire!!!
- Important information regarding the of short circuit protection: The battery charger is able to automatically recognize a short circuit on the output and regulates the charger output current if during operation the voltage falls below the user defined safety threshold (U_{srt}). This safety threshold has to be examined for a particular application, i.e. the length/cross-sectional-area of the charging cables connected to the output and if necessary adjusted accordingly. For further details please read Safety Usrt – safety note in chapter 6.5.6 Device Menu.

2. Important Safety Instructions

1. SAVE THESE INSTRUCTIONS

This manual contains important safety and operating instructions.

2. Do not expose charger to rain or snow.
3. Use of an attachment not recommended or sold by the battery charger manufacturer may result in a risk of fire, electric shock, or injury to persons.
4. To reduce risk of damage to electric plug and cord, pull by plug rather than the cord when disconnecting the charger – never on the cable.
5. An extension cord should not be used unless absolutely necessary. Use of an improper extension cord may result in a risk of fire and electric shock. If an extension cord must be used, make sure:
 - a) That the pins on plug of extension cord are the same number, size, and shape as those of plug on charger.
 - b) That the extension cord is properly wired and in good electrical condition.
 - c) That the wire cross-sectional-area is large enough for ac ampere rating of charger.
6. Do not operate charger with damaged cord or plug – replace the cord or plug immediately.
7. Do not operate charger if it has received a sharp blow, been dropped or otherwise damaged in any way; take it to a qualified service technician.
8. Do not open the charger case. When service or repair is necessary, the device must be taken to a qualified service technician. Incorrect reassembly may result in a risk of electric shock or fire.
9. To reduce risk of electric shock, unplug charger from outlet before attempting any maintenance or clearing. Turning the device off does not reduce this risk.

10. WARNING – RISK OF EXPLOSIVE GASES

- a) WORKING IN THE VICINITY OF A LEAD-ACID BATTERY IS DANGEROUS: BATTERIES GENERATE EXPLOSIVE GASES DURING NORMAL BATTERY OPERATION: FOR THIS REASON; IT IS OF UTMOST IMPORTANCE THAT EACH TIME BEFORE USING YOUR CHARGER; YOU READ THIS MANUAL AND FOLLOW THE INSTRUCTIONS EXACTLY.
- b) Reduce risk of battery explosion; follow these instructions and those published by the battery manufacturer and manufacturer of any equipment you intend to use in the vicinity of battery. Carefully review cautionary markings on these products and on engine.

11. SAFETY PRECAUTIONS FOR PERSONAL PROTECTION

- a) Someone should be within the range of your voice or close enough to come to your aid when you work near a lead-acid battery.
- b) Have plenty of fresh water and soap nearby in case battery acid contacts skin, clothing or eyes.
- c) Wear complete eye protection and clothing protection. Avoid touching eyes while working near battery.
- d) If battery acid contacts skin or clothing, wash immediately with soap and water. If acid enters eye, immediately flood eye with running cold water for at least 10 minutes and immediately seek medical attention.
- e) NEVER smoke or allow a spark or flame in vicinity of battery or engine.
- f) Be extra cautious to reduce risk of dropping a metal tool onto the battery. It might spark or short circuit the battery or other electrical parts that may cause an explosion.
- g) When handling with batteries remove all metal objects such as rings, bracelets, necklaces and watches from your body. Batteries can generate a short circuit which is so intense to fuse a ring or similar metal items with each other. This can cause serious burnings.

- h) Only use charger for charging LEAD ACID batteries. It is not intended to supply power to a low voltage electrical system other than in a starter-motor application. Do not use battery the charger for charging dry-cell batteries that are commonly used with home appliances. These batteries may burst and cause injuries to people and damage to property.
- i) NEVER charge a frozen battery.

12.PREPARING TO CHARGE

- a) If it is necessary to remove battery from vehicle to charge, always remove grounded terminal from battery first. Make sure all accessories in the vehicle are off, so as not to cause an arc.
- b) Be sure that the area around the battery is well ventilated while battery is being charged. Gas can be forcefully blown away by using a piece of cardboard or other non-metallic material as a fan.
- c) Clean battery terminals. Be careful to keep corrosion from coming in contact with eyes.
- d) Add distilled water in each cell until battery acid reaches level specified by battery manufacturer. This helps to purge excessive gas from the cell. Do not overfill the batteries! For a battery without cell-caps, follow the manufacturers recharging instructions carefully.
- e) Study all battery manufacturer's specific precautions such as removing or not removing cell caps while charging and recommended rates of charge.
- f) Determine voltage of battery with a selector switch by referring to car owner's manual and make sure it matches output rating of battery charger. If no selector switch is available for the output current don't use the battery charger if the battery voltage does not match with the information of the battery charger.

13.CHARGER LOCATION

- a) Locate charger as far away from battery as dc cables permit.
- b) Never place charger directly above battery being charged; gases from battery will corrode and damage charger. Place the charger as far as it is possible from the battery.
- c) Never allow battery acid to drip on charger when reading gravity or filling battery.
- d) Do not operate charger in a closed-in area or restrict ventilation in any way.
- e) Do not set a battery on top of charger.

14.DC CONNECTION PRECAUTIONS

- a) Connect and disconnect dc output clips only after setting any charger switches to off Position and removing ac cord from electric outlet. Never allow clips to touch each other.
- b) Attach clips to battery and chassis as indicated in 15 e), 15 f), 16 b), and 16 c).

15.FOLLOW THESE STEPS WHEN BATTERY IS INSTALLED IN VEHICLE. A SPARK NEAR BATTERY MAY CAUSE BATTERY EXPLOSION: TO REDUCE RISK OF SPARK NEAR BATTERY:

- a) Position ac and dc cords to reduce risk of damage by hood, door, or moving engine part.
- b) Stay clear of fan blades, belts, pulleys, and other parts that can cause injuries to people.
- c) Check polarity of battery posts POSITIVE (POS, P, +) battery post usually has larger diameter than NEGATIVE (NEG, N, -) post.
- d) Determine which post of battery is grounded (connected) to the chassis. If negative post is grounded to chassis (as in most vehicles), see e). If positive post is grounded to the chassis, see 15 f).
- e) For negative-grounded vehicles, connect POSITIVE (RED) clip from battery charger to POSITIVE (POS, P, +) ungrounded post of battery. Connect the NEGATIVE (BLACK) clip with distance to the battery on chassis or engine block. Do not connect clip to carburettor, fuel lines, or sheet-metal body parts. Connect it with a large, thick piece of metal of the engine block.

- f) For positive-grounded vehicle, connect NEGATIVE (BLACK) clip from charger to NEGATIVE (NEG, N, -) ungrounded post of battery. Connect the POSITIVE (RED) clip with distance to the battery on chassis or engine block. Do not connect clip to carburettor, fuel lines, or sheet-metal body parts. Connect it with a large, thick piece of metal of the engine block.
- g) When disconnecting charger, turn switches off, disconnect AC cord, and then remove clip from battery terminal.
- h) See operating instructions for length of charge information.

16.FOLLOW THESE STEPS WHEN BATTERY IS OUTSIDE VEHICLE. A SPARK NEAR THE BATTERY MAY CAUSE BATTERY EXPLOSION: TO REDUCE RISK OF SPARK NEAR BATTERY:

- a) Check polarity of battery posts. POSITIVE (POS, P, +) battery post usually has a larger diameter than NEGATIVE (NEG, N, -) post.
- b) Connect an isolated, 60 cm (measure AWG 6) cable to NEGATIVE (BLACK) battery pole.
- c) Connect POSITIVE (RED) charger clip to POSITIVE (POS, P, +) post of battery.
- d) Position yourself and the free end of the cable as far as possible from the battery, and then connect the free end of the cable (BLACK) with the charging port.
- e) Do not face battery when making final connection.
- f) When disconnecting charger, always do so in reverse sequence of connecting procedure and interrupt the first connection during standing as far as practicable from the battery.
- g) A marine (boat) battery has to be developed and chargeable onshore. For charging the battery on board especially developed devices for maritime usage are necessary.

17.THE USAGE OF AN ADAPTER IS PROHIBITED IN CANADA:

If no earth connection is available don't use it until an appropriate junction box was installed by a qualified electrician.

GROUNDING AND AC POWER CORD CONNECTION INSTRUCTIONS

Versions having **120 volts** nominal input voltage:

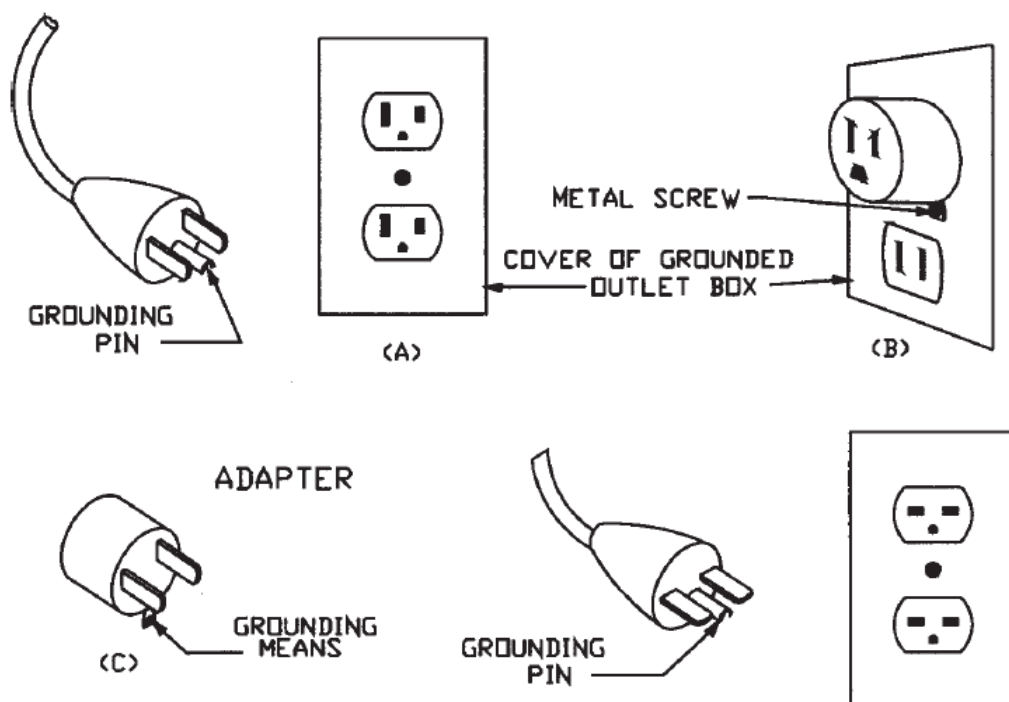
This battery charger is for use on a nominal 120-volt circuit, and has a grounding plug that looks like the plug illustrated in sketch A in Figure 50.1. A temporary adapter, which looks like the adapter illustrated in sketch B and C, may be used to connect this plug to a two-pole receptacle as shown in sketch B if a properly grounded outlet is not available. The temporary adapter should be used only until a properly grounded outlet can be installed by a qualified electrician.

DANGER - Before using adapter as illustrated, be certain that centre screw of outlet plate is grounded. The green-coloured rigid ear or lug extending from adapter must be connected to a properly grounded outlet - make certain it is grounded. If necessary, replace original outlet cover plate screw with a longer screw that will secure adapter ear or lug outlet cover plate and make ground connection to grounded outlet.

Versions having **230 volts** nominal input voltage:

This battery charger is for use on a circuit having a nominal rating more than 120-volts and is factory-equipped with a specific electric cord and plug to permit connection to an acceptable electric circuit. Make sure that the charger is connected to an outlet having the same configuration as the plug. No adapter should be used with this charger.

Figure - Grounding Methods



Source: UL1236 Battery Chargers

3. Device Information

3.1. Device description

The battery chargers of DBL-MPC4 series are designed for industrial applications, especially for the automotive sector. They are used for charging and external power supply operation. Due to their perfect on-board electrical system suitability, the on-board electrical system and airbags are protected. Including extensive protection and self-protection features like short circuit detection, revers polarity protection and a reliable sparks suppression risks in handling are minimized. A simple menu navigation, configurable charging parameters and built-in communication interface enable an easy and efficient use.

3.2. Technical Data



For detailed technical data like input voltage, required mains fuse / automatic circuit breaker to be used etc. see respective data sheet that you can get on our webpage www.deutronic.com or on request from Deutronic.

3.3. Unpacking

3.3.1. Control on product completeness and transport damage

The consignment has to be inspected immediately after receipt of the goods for damages in transit. In case of any damage please inform the carrier promptly for this case it is not allowed to put the DBL into operation.

3.3.2. Warning signs on the DBL housing



Please read the instructions carefully



Warning of hot surfaces

3.3.3. Waste disposal of packaging material

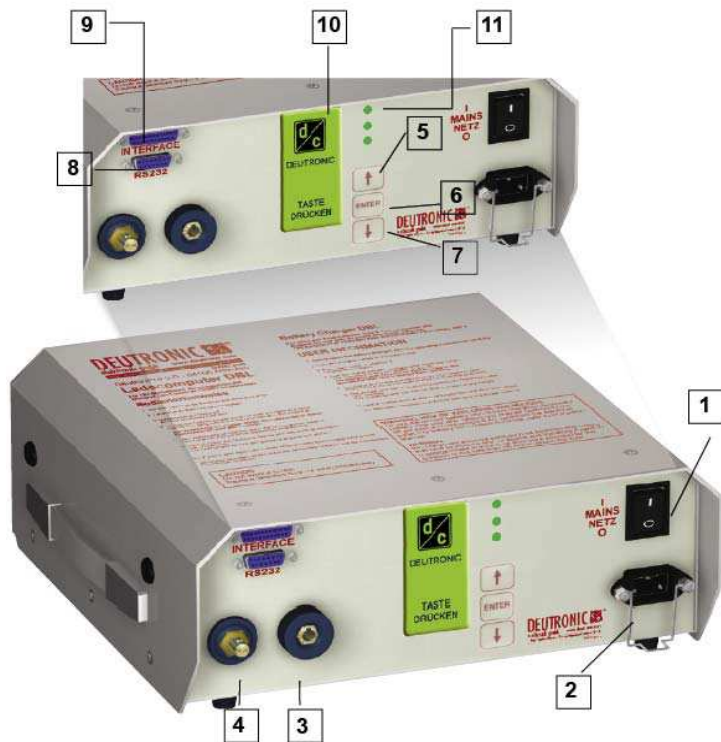
Please keep the packaging material for a possible refuse. If that is not possible please make sure that the disposal of the packaging material will be in an appropriate and environmental friendly way with considering the current environmental directives.

3.3.4. Storage

Due to an inappropriate and improper storage the battery charger might be damaged.

- Please protect the battery charger in storage against any dirt, moisture and extreme temperatures.
- In case of a long-term storage please check the normal functionality before use.

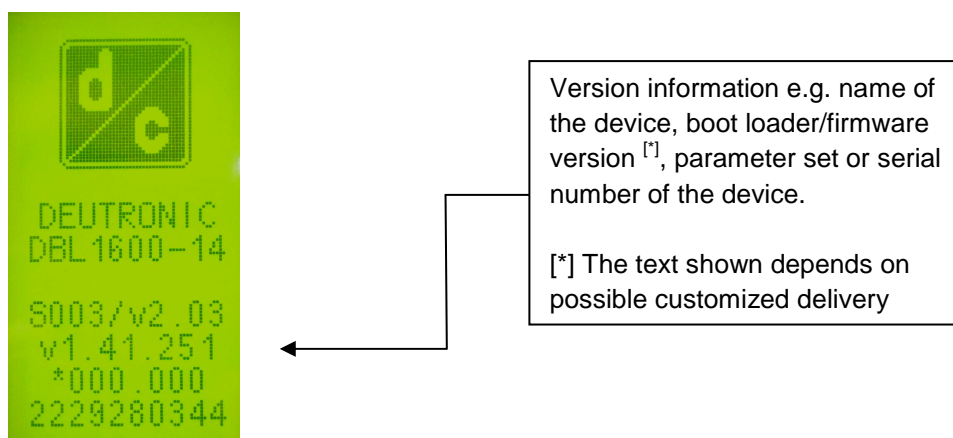
4. Connections and Control Elements



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 / enter parameter)
7	DOWN - Button (select / edit parameter)
8	Communication interface (9-pole)
9	Signal interface (25-pole)
10	LC Display (display operating status / configuration menu)
11	LED1-3: Signaling operation state (see chapter 9 Signaling / LED and Signal Lamp)

5. Commissioning

- Before taking the charging computer into operation check the charger and the equipment like the mains supply cord charging cable / clamps or optional accessories (e.g. external signal lamp) on any damages.
- For taking the charging computer into operation it has to be connected via the power cable with a suitable mains supply (required data for the regarding device you will find on the nameplate or the according data sheet).
- Please check the proper fitting of the connected cables.
- After turning on the device via the power switch the display shows the version information for 3 seconds (see Picture 1). When showing you the information you can choose between the following functions:
 - a) 'ENTER' button: The appearance of the application information can be extended to 30 seconds by pushing the 'ENTER' button for at least 3 seconds.
 - b) 'UP' button: When pressing the 'UP' button permanently while the version information will be displayed the language menu will be displayed afterwards. If necessary the 'default' language version can be changed.



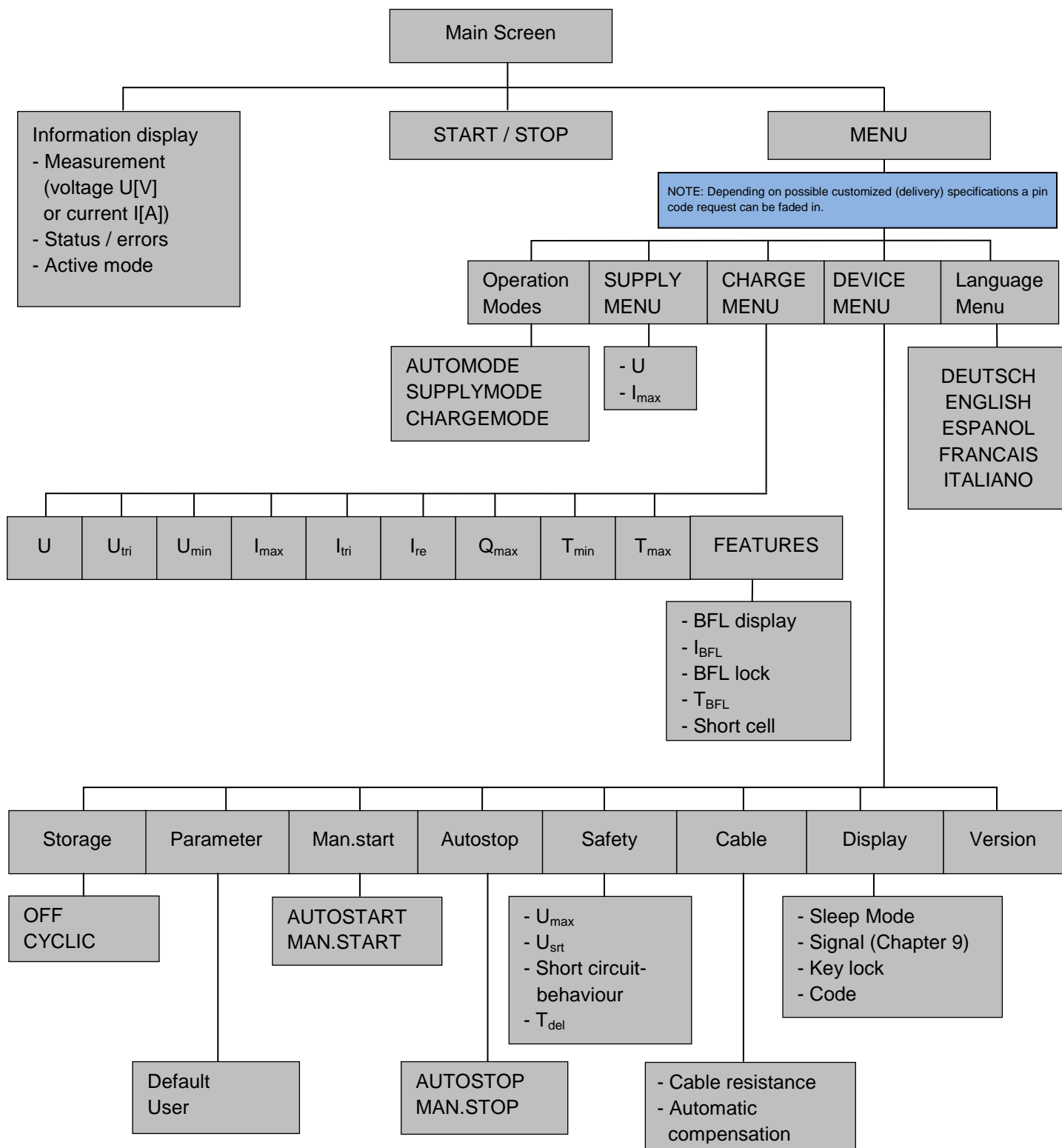
Picture 1 – starting screen showing version information of the device

- After showing the version information or after language selection the display changes automatically to the main screen (see chapter 6.3 Main Screen).
- 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 pre-set mode - SUPPLYMODE or charging mode will be started (the particular operation mode is shown via LED 1-3; see chapter 9 Signalling / LED and Signal Lamp).
The supply of the load or the charging process will be stopped and the load detection will be deactivated by pressing the 'STOP' button.
- Additional to the display the operating status of the charger can be displayed via LED 1 to 3 or with a powerful glowing external signal lamp option (on request). Further information regarding accessories you will find under www.deutronic.com.
- Beside the optical signalisation it is possible to show the operating status of the charger with the help of an external control (e.g. PLC). Therefore three potential-free relays are available on the 25 pole interface. Also through this interface you can use a remote OFF function as further option.

Further details regarding all available interface functions and the optional software tools from Deutronic for updates, configuration and diagnostic tasks you will get on request via Deutronic.

6. Instructions

6.1. Overview of the menu structure



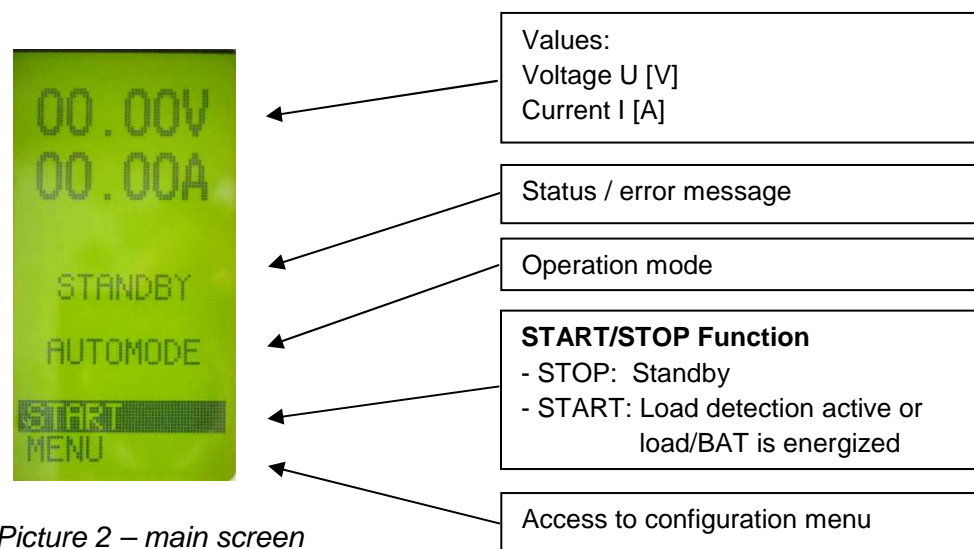
Note: The parameters and functions in detail will be described in the following chapters.

6.2. General notes on operation

Should a parameter be changed by the user, it can be selected with the UP / DOWN buttons at the device and activated for editing by means of the ENTER button. When a parameter value flashes, it is able to be edited with the UP / DOWN buttons. When pressing the ENTER button again the new adjusted value is accepted.

Due to safety reasons some parameters (e.g. changing the operation mode like AUTOMODE, SUPPLYMODE, and CHARGEMODE etc.) cannot be configured when the charging computer is in operation (load detection is activated or SUPPLYMODE or CHARGEMODE). For this purpose the active operation has to be deactivated by selecting 'STOP'.

6.3. Main Screen



Picture 2 – main screen

- Screen display 'START / STOP' changes depending on the operation mode.
 - Display 'START': DBL is on standby and can activate the load detection circuit for the displayed operation mode (AUTO, SUPPLY or CHARGEMODE) by selection of 'START' (pressing the ENTER button). The process will be started by recognized and valid load.
 - Display 'STOP': Device is in an active supply or charging mode or the load detection of the charger is activated. With the selection of 'STOP' via ENTER button the supply or charging mode is ended.
- Selecting MENU with pushing ENTER the access to the configuration menu will be visible. Depending on the active configuration or customized terms of delivery the access to the menu is protected with a PIN code – see chapters 6.4 and 6.5.

6.4. Pin lock

The pin lock is activated when you can see the following display (see Picture 3) after choosing access to the menu. The lock can only be deactivated with entering a predefined code successfully. Please activate the entry field with the ENTER button, set the code with the arrow buttons and confirm it with the ENTER button.

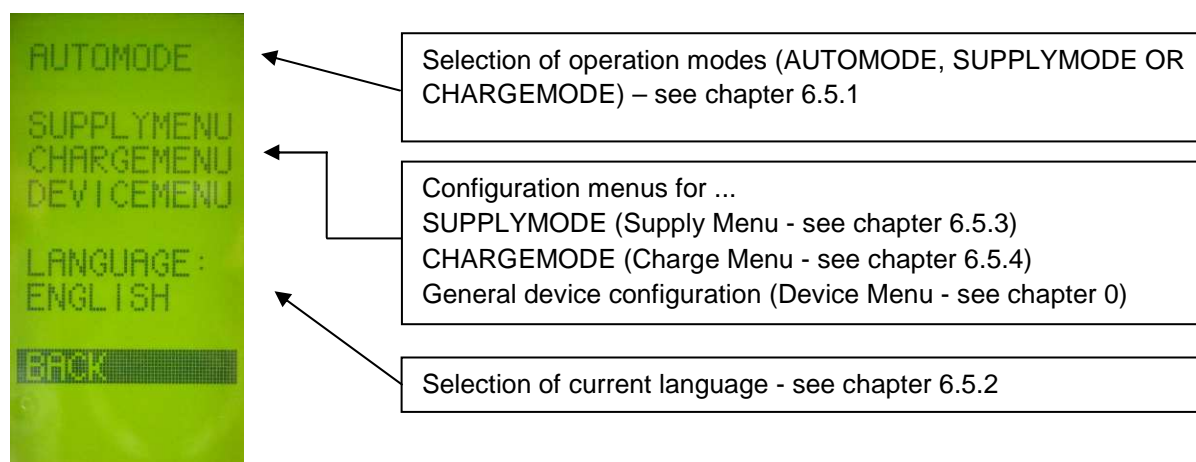


Picture 3 – pin lock

Note: The code regarding to the button lock can be activated or predefined in the menu of the device by the user (see chapter 6.5.6 Device Menu) - or depending on customized delivery specifications pin code be activated by factory default.

6.5. Configuration menu

By choosing the MENU line on the main screen (see chapter 6.3) the configuration menu (picture 4) will be displayed. The desired operating parameters can be configured in the individual menus.



Picture 4 – configuration menu

6.5.1. Selection of operation mode

After selecting the operation mode with ENTER field the available modes can be selected with the arrow buttons and accepted with pressing the ENTER button:

Operation mode	Description
AUTOMODE	The charger identifies automatically if a battery or a resistive load is connected and activates due to this the respective mode.
SUPPLYMODE	It is only allowed to supply a resistive load in the SUPPLYMODE (e.g. motor vehicle electrical system without connected batteries).
CHARGEMODE	In the CHARGEMODE it is possible to charge the battery built into a vehicle as well as a standalone battery. Note: Only use the charge-mode after all parameters in the charge menu (see chapter 6.5.4) are configured appropriately to the specifications of the battery manufacturer.

6.5.2. Selection of language

All available languages are displayed in the LANGUAGE menu item. The language setting can be changed by selecting the 'LANGUAGE' menu item and pushing ENTER with the help of the arrow buttons it is possible to select the desired language. Afterwards confirm the selection by pushing 'ENTER'. Depending on the customized terms of delivery the languages German, English, Spanish, French and Italian are available in the factory default settings.

6.5.3. Supply Menu (parameters for the SUPPLYMODE)



Picture 5 – supply menu

Parameter	Description	Figures / range of adjustment
U in [V]	Output voltage	[2 ... 17] V (or max. 20 V on type DBL800-14) The height of the output current should be selected so that the connected consumers have sufficient power. [1] ATTENTION: Too high voltages can cause damage on the motor vehicle electrical system!
I _{max} in [A]	Current limit Output current	[0 ... I _{max}] A The available maximum value depends on the power class of the device - see data sheet [2]. ATTENTION: The current limit has to be checked and if necessary adapted to the connected equipment (e.g. charging cable and clamps)

[1] Output voltage [U]:

If the chosen voltage is available on the output depends on both the load conditions in operation and the choice of the OVP limit (see parameter U_{max} in chapter 6.5.6 Device Menu submenu “SAFETY”)

[2] Current limit [I_{max}]:

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

6.5.4. Charge Menu (parameters for the CHARGEMODE)



Picture 6 – charge menu

Parameter	Description	Figures / range of adjustment
U in [V]	Charging voltage	[2 ... 17] V (or max. 20 V on type DBL800-14)
U _{tri} in [V]	Trickle voltage	[U _{min} ... U _{charging voltage}] V
U _{min} in [V]	Starting voltage	[5 ... U _{tri}] V Required minimum voltage of the battery - this defines the voltage limit which must be exceeded by the battery before starting to charge [1].
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 to reach depends on the power class of the device (see data sheet). [2] ATTENTION: The current limit has to be checked and if necessary adapted to the connected equipment (e.g. charging cable and clamps)
I _{tri} in [A]	Trickle charging current	[1 ... 20] A; Limiting value from which the DBL switches to trickle charge.
I _{re} in [A]	Recharge current	[0.5 ... 30] A; Threshold (Delta-Value) above I _{tri} , from which on the DBL switches back to CHARGEMODE.

Q_{max} in [Ah]	Maximum battery charge capacity	[0 ... 6000] Ah; Limiting value from which on the charging process will be stopped with an application error. The value has to be adapted depending on the battery to charge or depending on the (production) process. [3]
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.
T_{max} in [h]	Maximum charging time	[0 ... 255] h; Maximum time interval after which the charging process is finished with an application error [4].
FEATURES	Characteristics	A new submenu is opened (see chapter 6.5.5).

[1] Starting voltage [U_{min}] - SAFETY NOTE:



The starting voltage represents a safety limit. This limit ensures by an appropriate correct configuration that a technically accurate battery is connected for the charging process! Information: In the operation mode AUTOMODE due to safety reasons no batteries are accepted which show a lower voltage than 11.5 VDC. Nevertheless, if it is necessary to charge a motor vehicle battery with a lower voltage, please switch from AUTOMODE in the operation mode CHARGEMODE.

[2] Current limit [I_{max}]:

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

[3] Maximum loading quantity [Q_{max}]:

Hint for a complete charge of the battery without parallel electrical consumers: Rise the limit value in the setup configurations round 10...20% than nominal given for the battery capacity by the battery manufacturer. Please note: The behaviour of the device when achieving 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 terms of delivery).

[4] MAXIMUM CHARGING TIME [T_{max}]:

Please note: The behaviour of the device in achieving 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 terms of delivery).

6.5.5. Charge Menu / Features



Picture 7 – features in charge menu

Parameter	Description	Figures / range of adjustment
BFL (ON/OFF)	Signal ‚Battery full‘ activated / deactivated	Note: BFL signal only takes place after expiration of T_{min} and is in addition independent from ‚Tri‘ settings.
I_{bfl} in [A]	Current limit at which BFL is signaled	BFL signalization is indicated via LED and connected to an external signal lamp when the output current is below I_{bfl} (see chapter 9). ATTENTION: If BFL LOCK is deactivated the BFL signal will be reset as soon as the output current increases.
BFL-LOCK (ON/OFF)	Delay time T_{bfl} for BFL-Signal	After current is below I_{bfl} and the timer T_{bfl} has expired, then the BFL status signal is permanent on (until the connected battery is disconnected or error message displayed).
T_{bfl} in [s]	Signal delay	[1 ... 60] sec
Short cell detect (ON / OFF)	Battery test	It is checked if the battery is showing a fail on beginning of charging process (Important: Please follow the instructions in chapter 8 Short Cell Detection - instructions for application).

6.5.6. Device Menu



Picture 8 – device menu

Parameter	Options	Figures / range of adjustment
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. [1]
PARAMETER	Default	Factory-made standard settings for the operating parameters of the charger are activated.
	User	When changing the factory settings the display 'user' appears. Note: On the main screen (refer to Picture 1) you can see '*' in front of the parameter set number.
MAN. START	AUTOSTART	The predefined operating mode starts automatically after network return during recognition of load or battery.
	MAN. START	The user starts the device manually with the start button on the main screen (see chapter 6.3).
AUTOSTOP	AUTOSTOP	Safety shutdown is activated for Q_{max} or T_{max} .
	MAN. STOP	ATTENTION - Switching-off at Q_{max} / T_{max} limit is deactivated! End of supply only takes place after load is disconnected, after choosing the stop function in the main menu or via external control. [2]

SAFETY	U _{max} (maximum output voltage OVP)	[15.5 / 17 ^(*)] V; Important: Follow instructions out [3]! 15.5V: OVP limit 15.5V is active 17.0V ^(*) : OVP limit 15.5V is deactivated ^(*) Note: Max. 20 V on type DBL800-14
	U _{srt} (Short circuit voltage)	[0 ... 13.9] V; If the voltage on the output drops below the pre-set value, so a short circuit is recognized and the output relay of the charger will open. Important: Follow safety instructions [4]!
	LIMITING PULSING	If an overload or short circuit is recognized (the voltage on the output drops below U _{srt}) then the device offers two ways to limit the current: Limiting [5] / pulsing [6]
	T _{del} (Switch on delay time)	1 ... 60 sec Note: 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 manual).
	START (autom. cable compensation)	During an ongoing automatically cable compensation [7] the display switches to STOP (with pressing the ENTER button the process can be stopped).
DISPLAY	SLEEPMODE (ON / OFF)	If the SLEEPMODE is ACTIVATED the display switches after about 1 min of no user action on the DBL into SLEEPMODE. Note: Useful if the operation state should only be signaled via the DBL signal LEDs or with an external signal lamp.
	SIGNAL (0-9)	Pre-set signalization modes for LED1-3 and external signal lamp (see chapter 9).
	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 can be defined by the user).
VERSION		Shows detailed version information (e.g. firmware, parameter set and the serial number of the device).

[1] CYCLIC STORAGE - NOTE:

If during a charge process the voltage supply of the charger is interrupted, then the battery charging is continued automatically at setting STORAGE CYCLIC as soon as the mains supply is back again (all meter readings, e.g. previous ampere hours, are further updated).

[2] MAN. STOP – SAFETY NOTE:



ATTENTION! The protective safety shut-down of the charger at the safety limit (Ah-limit, maximum charging time) is deactivated at MAN. STOP.

[3] MAXIMUM VOLTAGE U_{MAX} – SAFETY NOTE:

ATTENTION! The limiting value for maximum voltage 15.5V is an OVP SAFETY LIMITATION for protecting the electrical system of the motor vehicle from harmful overvoltage! The 15.5 V safety threshold limits on the one hand higher parameterized charge and supply output voltage values and on the other hand the safety threshold limits when an active cable compensation in process 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 15.5 V are needed). Information: For controlling the output voltage the main screen (see 6.3) shows the actual voltage at any time.

[4] SAFETY U_{SRT} – SAFETY NOTE:



The charger is able to recognize a short circuit automatically and is thereby able to charge the output current down if a prescribed voltage wave (short circuit voltage U_{srt}) was fallen short of in the operating state on the output of the device. The short circuit voltage – parameterised in the menu has to be checked in consideration of a voltage drop relating to the connected charging cables. The voltage has to be adjusted to the resistance of cable clamps and max. output current of the device in case of need! Attention: Cable clamps perish in operation due to this their resistance increases. Therefore, please include a wide safety margin for short circuit nominal voltage!

Example of determining the short circuit nominal voltage U_{SRT} :

- In the course of implementation of the cable compensation [7] a resistance value of 15 mOhm was determined for the connected charging cable.
- The maximum output current of the charger is 100A.
- Calculation of the voltage drop $\Delta U = 0.015 \text{ Ohm} * 100A = 1.5V$
- Definition of 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 5.0V can be configured.

[5] SECURITY LIMITING - OVERLOAD OR SHORT CIRCUIT BEHAVIOUR



If the voltage at the measuring point on the device output drops below U_{srt} the output current will be limited and the output relay will open.

[6] SECURITY PULSING - OVERLOAD OR SHORT CIRCUIT BEHAVIOUR



The output relay will open for 60 seconds if the output voltage drops below U_{srt} . After that time period a new switch-on will be attempted for proofing if the load can be supplied or the short circuit (or situation of overload) is still present. In total, the DBL emits three pulses – in case the overload or the short circuit is still present no more attempts are made until disconnection of the load or reset of the device.

[7] CABLE - REFERENCE TO THE CABLE COMPENSATION:



Before the cable compensation can be started first select STOP in the main menu!

To perform the cable compensation the charging cables have to be connected with the device and furthermore the charging cables have to be shorted on the free ends (without load) with direct contact at the current-carrying clamp shoe.

In order to perform the resistance measurement please navigate to the DEVICE MENU / CABLE, select START item and press the ENTER button - 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 button. The value can be modified with the arrow buttons and finally selected with the ENTER button.

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 regarding the cable compensation can differ from 0 Ohm!
- If a cable resistance value is disposed the DBL 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} from the selected operation mode and will be activated as soon as the calculated $U_{srt-dynamic} > U_{srt}$.

7. Operation Mode / Status / Error Messages

Display	Meaning / Reasons	Correction
Ah LIMIT	Charging process stopped after the predefined limiting value (ampere hours [Ah]) has been exceeded.	<ul style="list-style-type: none"> - Maybe the battery capacity was adjusted to low in the setup? Indication for complete charging 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 - Were possibly parallel consumers activated during the charging process? - The battery might be defective?
CABLE COMP	Cable compensation mode is activated.	<ul style="list-style-type: none"> - See chapter 6.5.6 Device Menu
CELLCHECK	The cell test is running (only with activated short-cell detection)	<ul style="list-style-type: none"> - See chapter 8 Short Cell Detection - instructions for application
CHARGE	The DBL is in operation mode battery charge.	<ul style="list-style-type: none"> - Battery is charged
CONTACT (flashing)	Automatic load detection is activated (the DBL checks if a battery or a resistive load is connected).	<ul style="list-style-type: none"> - Connect battery or load to the charger - Check the connected consumers on any errors (wrong kind of battery or external voltage source) - As the case may be there is a defective cable (check connection to the load or battery)
DISCHARGED	The voltage of the connected battery is below U_{min} .	<ul style="list-style-type: none"> - Check battery if it is defective? - Check the operation mode and the starting voltage U_{min} - see chapter 6.5.4 Charge Menu (parameters for the CHARGEMODE)
EXT.STOP	Operation interrupted via the Remote OFF signal line.	<ul style="list-style-type: none"> - Detach GND connection at PIN 25 (Remote OFF)

EXT.VOLT.	Overvoltage on the output (in SUPPLY / CHARGEMODE): The device measures a voltage which is at least 1 V higher than the preset output voltage for the selected operation mode.	<ol style="list-style-type: none"> 1. Check connected consumers for errors (wrong battery or external voltage source). 2. Press STOP in the main menu - see chapter 6.3 - in the standby mode the external voltage will be measured and displayed.
HIGH TEMP.	During operation the DBL detects over temperature - the dynamic power and temperature control is activated (device is running with reduced output power).	<ul style="list-style-type: none"> - 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.
MAX.TIME	Stop after the preset limit value (maximum charging time) is reached.	<ul style="list-style-type: none"> - Check battery / load - there might be a defect. 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.	<ul style="list-style-type: none"> - Please contact the service station
POLARITY	Battery is connected with wrong polarity to the charger.	<ul style="list-style-type: none"> - 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 ($I_{tri}+I_{re}$), then the DBL is reset into CHARGEMODE	<ul style="list-style-type: none"> - Switch off any additional consumers (e.g. light, ignition etc.)
RELAY VOLT	Voltage adjustment failed.	<ul style="list-style-type: none"> - Please contact the service station
SHORT CELL	With activated short cell detection (see 6.5.5 Charge Menu / Features) and a defective or very bad battery the charging process stops and an error message will be displayed.	<ul style="list-style-type: none"> - Any parallel load active? - Battery possibly defective. - Replace battery. - See chapter 8 Short Cell Detection - instructions for application

SHORTED	Short circuit (!) detected at the output.	<ul style="list-style-type: none"> - Check load and cables for any damages - To continue supply process after error is removed, release clamps and connect the load again
STANDBY	The device is in sleep mode (standby).	<ul style="list-style-type: none"> - Start the charging / supply process with choosing 'START'. - Please consider the configurations MAN.START or AUTOSTART (see chapter 6.5.6 Device Menu).
STARTUP	Switch on delay time is active, the supply starts after the predefined waiting time.	<ul style="list-style-type: none"> - Parameterisation of the switch on delay time - see chapter 6.5.6 Device Menu
SUPPLY	Operation in SUPPLYMODE is active (external power supply)	
TRICKLE	The device is in operation mode trickle charge.	<ul style="list-style-type: none"> - Charging process is completed and battery can be removed.

8. Short Cell Detection - instructions for application

To run the short cell detection failure-free, no relevant load may be connected in parallel to the charged battery.

Disconnect the battery from the vehicle before starting the short cell check!

For a reliable detection of defective batteries with shorted cells it is absolutely necessary to pre-set the maximum amp-hour for the battery before the charging operation starts. The adjusted ampere-hours should not be less than the written value on the battery nameplate because battery charging stops at the configured value (it is recommended to adjust the amp-hours 10 to 20% higher). For example with a batteries nominal capacity of 50 Ah the Q_{max} parameter should be pre-set to 60 Ah.

In any case the amp-hour value should be pre-adjusted in the chargers menu (also with deactivated "CELLCHECK"), because the ampere-hour pre-set limits the charge process and avoids extreme over-charging. If the "CELLCHECK" is active, the charge process stops twice for 30 seconds automatically. During that time the charger measures the battery voltage and an internal algorithm determines if the connected battery is defective. In case of a battery with shorted cells the charging process stops and "SHORT CELL" error message is displayed.

9. Signalling / LED and Signal Lamp

With the following chart you can visualize the DBL operating state by choosing between the signal variants "0..9":

Indication	SIGNAL '0'		SIGNAL '1'		SIGNAL '2'	
	Status		Status		Status	
	CHARGE MODE	SUPPLY MODE	CHARGE MODE	SUPPLY MODE	CHARGE MODE	SUPPLY MODE
Green (permanently on)	TRICKLE / BFL	Supply	TRICKLE / BFL	---	TRICKLE / BFL	Supply
Green (blink)	---	---	---	---	---	---
Yellow (permanently on)	Charge / Recharge	---	Charge / Recharge	Supply	Charge / Recharge	---
Yellow (blink)	Load Detect active ('Contact' blink) / Application Error		Load Detect active ('Contact' blink)		Load Detect active ('Contact' blink)	
Red (permanently on)	Device Error (Fan, NTC etc.)		Application Error		Application Error	
Red (blink)	---	---	Device Error (Fan, NTC etc.)		Device Error (Fan, NTC etc.)	
Off	Ext. OFF / Standby		Ext. OFF / Standby		Ext. OFF / Standby	

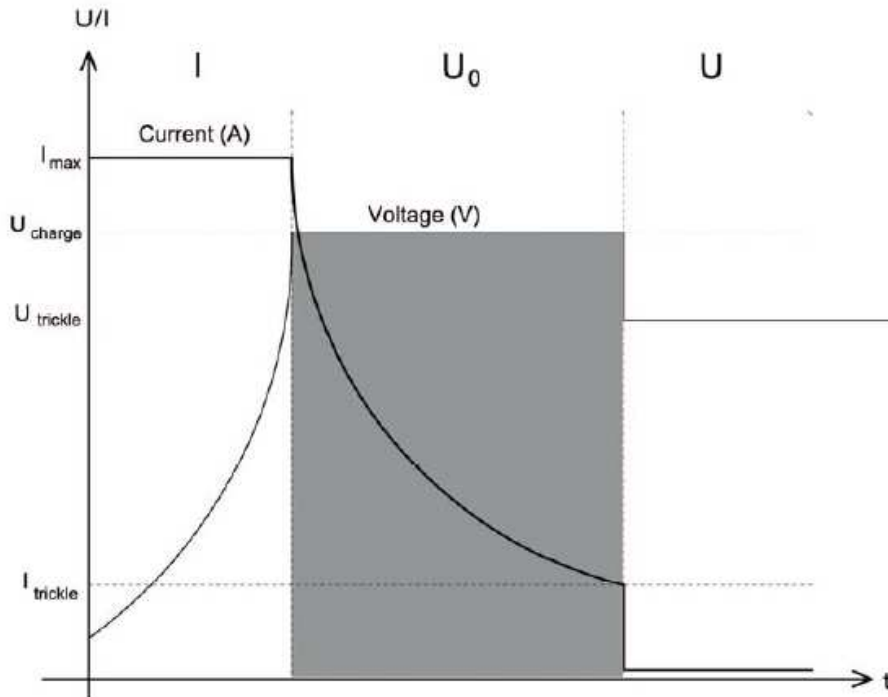
Indication	SIGNAL '3' (V1.28 and later)		SIGNAL '4' (V1.30 and later)		SIGNAL '5' (V1.30 and later)	
	Status		Status		Status	
	CHARGE MODE	SUPPLY MODE	CHARGE MODE	SUPPLY MODE	CHARGE MODE	SUPPLY MODE
Green (permanently on)	TRICKLE / BFL	Supply	TRICKLE / BFL	Supply	TRICKLE / BFL	Supply
Green (blink)	---	---	---	---	---	---
Yellow (permanently on)	Charge / Recharge	---	Charge / Recharge	---	Charge / Recharge	---
Yellow (blink)	Load Detect active ('Contact' blink)		---	---	---	---
Red (permanently on)	(*) Application Error		Device Error (Fan, NTC etc.) / Application Error		Application Error	
Red (blink)	Device Error (Fan, NTC etc.) / (*) BAT deep discharged		---	---	Device Error (Fan, NTC etc.)	
Off	Ext. OFF / Standby		Ext. OFF / Standby / Load Detect active ('Contact' blink)		Ext. OFF / Standby / Load Detect active ('Contact' blink)	

Indication	SIGNAL '6' (V1.35 and later) (Command Mode)		SIGNAL '7' (V1.37 and later)		SIGNAL '8' (V1.37 and later)	
	Status		Status		Status	
	CHARGE MODE	SUPPLY MODE	CHARGE MODE	SUPPLY MODE	CHARGE MODE	SUPPLY MODE
Green (permanently on)	User defined (via Command)		TRICKLE / BFL	Supply	TRICKLE / BFL; (*)Q-/T-max- State = 2 or 4 [Uout=Tr]	Supply
Green (blink)	---	---	---	---	---	---
Yellow (permanently on)	User defined (via Command)		Charge / Recharge	---	Charge / Recharge	---
Yellow (blink)	---	---	---	---	Load Detect active ('Contact' blink)	
Red (permanently on)	User defined (via Command)		Ext. OFF / Standby / Load Detect active ('Contact' blink)		(*) Application Error	
Red (blink)	---	---	Device (Fan,NTC etc) / Application Error (e.g.Battery)		Device Error (Fan, NTC etc.)	
Off	Standard / User defined (via Command)		Device OFF (Mains Supply OFF)		Ext. OFF / Standby	

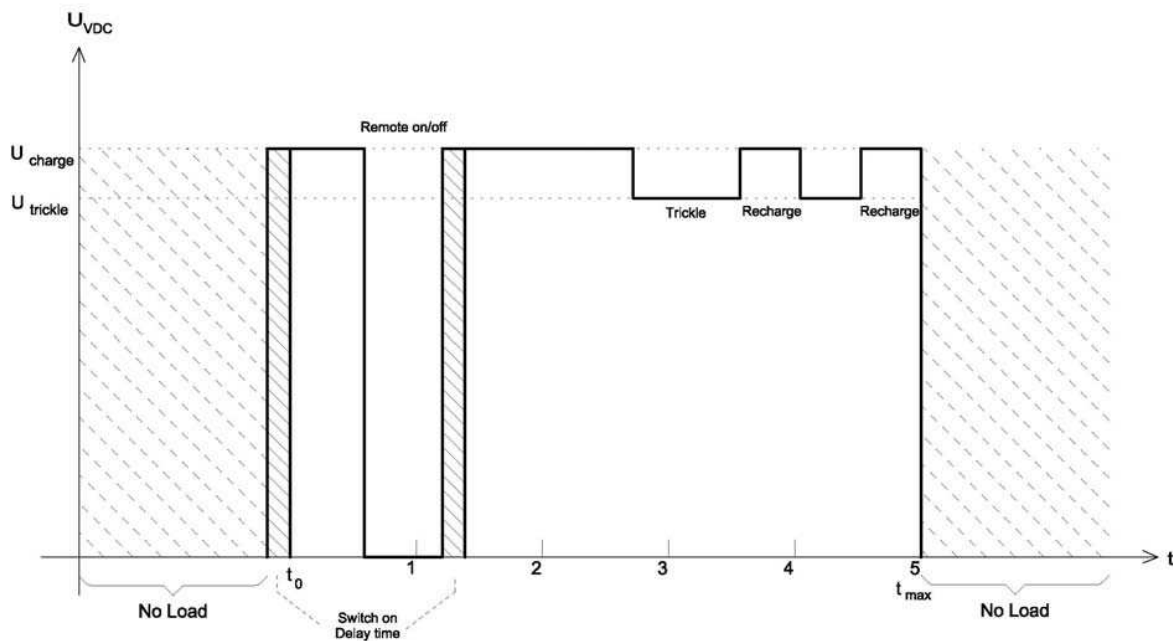
Indication	SIGNAL '9' (V1.41.205 and later)					
	Status		Status		Status	
	CHARGE MODE	SUPPLY MODE	CHARGE MODE	SUPPLY MODE	CHARGE MODE	SUPPLY MODE
Green (permanently on)	TRICKLE / BFL	---				
Green (blink)	---	---				
Yellow (permanently on)	Charge / Recharge	Supply				
Yellow (blink)	Load Detect active ('Contact' blink)					
Red (permanently on)	Device Error (Fan, NTC etc.)					
Red (blink)	Application Error					
Off	Ext. OFF / Standby					

10. Characteristic Curves

- Charging characteristic I-Uo-U:



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



11. 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: Don't damage the warning signs on the device with 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.

12. Service Centre / Repairs

Please observe the following points:

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** 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.

Information: Deutronic does not take over warranty repairs on devices with mechanical damage or damage due to transport.

13. 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.

14. Contact

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