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Manual

DBL1200HV-60

Important note: *Do not use the device in applications for which it was not originally designed! Only for use by qualified electrical personnel. Read operating instructions carefully and always refer to the guidelines of the battery manufacturer!*

Contents

1. Safety Instructions

- The device contains components which are likely to generate electric arcs and sparks, thus the device has to be placed in a special housing or in a room provided for this purpose during operating.
- Warning: When charging batteries explosive gases may occur. Therefore, fire naked lights and sparks should be avoided.
- Charge the batteries only in well ventilated rooms.
- The device is only for professional use by motor vehicle manufactureres and repair workshops.
- The device is exclusively for the use on the specified applications.
- Charging non-rechargeable batteries with this device is not possible and is also not allowed.
- Charging of defective batteries is explicitly forbidden.
- In all case refer to the specification supplied by the battery manufacturer!
- Mains cables must always be in a proper condition. Defective cables need to be replaced immediately.
- The device should not be opened because the test certification as well as the warranty will become null and void.
- Only spearately approved and short circuit protected battery cells shall be connected to the device.

Important safety instructions:

Please read the following safety instructions carefully and follow them in every case. This manual contains important safety and operating instructions. These operating instructions of the device must be kept at the site of operation. Additional to these safety instructions, the internal accident prevention regulations must be observed.

General:

- The device is designed according to all relevant safety regulations. Nevertheless, the health of the operator, the health of the operator, the functionality of the device and the integrity of property and buildings may be endangered if the provisions set down in this manual are disregarded.
- Commissioning and operation of the device may only be conducted by trained and qualified personnel, who are conversant with current safety regulations, the internal operating guidelines as well as the present manual.
- The safety instructions and warnings on the equipment must be clearly legible at all times. They may not be damaged, covered, painted over or removed.
- If safety-relevant defects are identified, they must be rectified prior to operation.

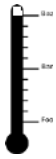
Intended use:

The device is to be used exclusively for the intended purpose. Any other use or usage beyond this scope is regarded as improper. The manufacturer accepts no liability for any resulting damage caused, as well as defective or faulty work results.

This also includes:

- Following all rules and regulations of the manual.
- Following all rules and regulations of the battery manufacturer.

Environmental conditions:



Please refer to the manual for the rules regarding the environmental conditions governing the operation or storage of the device such as humidity, temperature, contamination and cooling. By disregarding the listed, parameters, the manufacturer assumes no liability.

Site requirements:

- The supply, charging and sensor cables should be positioned so that the risk of damage to the bonnet, doors, or moving engine parts is minimized.
- Maintaining distance from fans / rotor blades, V-belts, V-belt pulleys and any other parts that can cause personal injury.
- Never place the device directly above or below the battery which is being charged; gases or liquids from the battery would corrode and damage the device. Install the device as far away from the battery as the charging cable allows.
- Use the device only in well ventilated rooms. Never prevent or limit the ventilation. Do not use the device outdoors.
- Position the device so that the operation of the mains isolating device is not impeded.
- Under no circumstances should the ventilation fan of the device be covered. When positioning the device, make sure that both outputs of the ventilation fan have at least 10cm distance from the wall.

Instruction regarding mains connection

When using devices above a certain power, some points must be observed. In order to protect the mains supply from faults and failure.

- Restrictions of the number of connected devices.
- Provisions relating to the power factor of the device.
- Requirements relating to the minimum required short-circuit power.

If any of these points exceeds the applicable guidelines, the operator of the device must consult the responsible energy short-circuit power.

Instruction regarding DC connection:

- To reduce the risk of damage to the device and health risks of the operator and other persons present some safety points that need to be observed when connecting the device to a battery:
- The battery clamps should only be connected or disconnected after ensuring that the device has been set to the “OFF” position.
- The battery clamps must be connected to the same module as the measurement connections (ZKS).
- Check the polarity of battery connections.

Electrical hazards:

- When working on electrical equipement, disregarding the safety instructions may result in the risk of electric shock and damage to implants such as pacemakers due to strong electric fields. This can cause serious injury or even lead to death.

- To prevent this, live elements in and outside of the device including the battery terminals should **not** be touched. Furthermore, short-circuiting the battery connecting cable is strictly prohibited.
- In case of damaged, exposed, under-sized or stripped wires or cables, the device must be repaired immediately by trained personnel.

Chemical hazards:

Batteries contain harmful acids that cause severe skin and eye injury when coming in contact with them. Furthermore, vapors and gases which may cause respiratory injuries and explosions can arise during operation. Therefore, some rules have to be observed when working with batteries:

- Have plenty of fresh water and soap nearby in case battery acid contacts skin, clothing or eyes.
- Wear a closed eye protection and protective clothing. Don't touch your eyes while working near the battery.
- If battery acid contacts skin or clothing, it has to be washed off with soap and water immediately. If acid gets into the eyes, immediately flush them with cold water for at least 10 minutes and undertake a medical examination without delay.

- Never smoke near the battery or machine and do not allow open flames or sparks.
- Only work with batteries in well ventilated areas.
- Do not put tools and electrically conductive objects on top of the battery to prevent short circuits.
- Gases and fumes must not be inhaled.
- Do not disconnect the device from the battery during charging.

Working with batteries:

- Protect batteries against thermal and mechanical stresses.
- Stop operation immediately if:

  a) Undue temperature increase.
  b) Other indications of a technical defect.

Self and operator protection:

- During operation all unnecessary persons should be removed from the danger area, the remaining people should be informed about the possible dangers and risks (acid, gases, electrical currents, temperatures).

- Use protective clothing and goggles.
- Ensure first aid for possible injured.
- Ensure fire safety.
- Before leaving the work area ensure that even after leaving the workplace no damage to persons and property can occur.

Safety instructions during operation:

- To reduce the risk of damaging the mains plug and cord while disconnecting the device, always pull on the plug – not on the cord.

- An extension cord should only be used when absolutely necessary. The use of an improper extension cord leads to an increased risk of fire and electric shock. If an extension cord must be used, the following has to be considered:

  a) The pins on the connector of the extension cord must have the same number, size and shape as those on the device.

  b) The extension cord has to be wired properly and in a good condition.

  c) If an extension cord is used the correct cable cross section must be selected according to the following table.

Table – Recommended minimum AWG/mm size for the extension cords

Cord length [feet]	25	50	75	100	150
AWG size of cord	18	15	13	12	10
Wire cross section [mm²]	0,75	1,5	2,5	4,0	6,0

- The device has to be operated within the limits of the IP-Code listed in the data sheet.

- Do not use the device when it has suffered damage from a heavy blow, fall or any other damage. In this case take it to a qualified service technician.

- Ensure that cooling air can freely enter and escape from the cooling slots provided.

- Safety devices should never be bypassed or put out of operation.

Disposal:

The disposal of electrical devices in the household garbage is forbidden. The consumer is obliged to dispose the device in the local collection and return systems in accordance with the municipality.

Firefighting measures:

- Due to the fact that there is no metallic lithium in a lithium-ion battery normally, common extinguishing agents (ABC powder extinguisher, CO2 extinguisher or water) can be used. However, the use of the extinguishing agent depends on the burning material (oil, plastic, etc.).
- If possible, remove the batteries from the vicinity of the fire.
- During firefighting, wear heavy-duty breathing protection and full-body protective clothing.
- Combustile products contain amongst other things also hydrogen fluoride, carbon monoxide and carbon dioxide.
- In-house fire safety regulations must always be observed.

First aid:

In case of contact with released electrolytes, gases or combustion by-products of a lithium-ion battery, the following first aid measured are to be observed:

- After contact, immediately rinse the eye for at least 15 minutes with water. Make sure that the eye lids are open during the complete flushing process.
- Take off contaminated clothes and rinse the skin for at least 15 minutes under cold water.
- After injury of the respiratory system ensure a supply of fresh air. If necessary, perform first aid measures.
- Subsequently, a doctor should be consulted in any case.

Maintenance, service, repair:

- The device must not be opened. If a service or repair is required, the unit must be sent to a qualified service technician. Incorrect installation may result in an electric shock or fire.
- The use of accessories that are not sold or recommended by the manufacturer may result in a risk of fire, electric shock or personal injury.
- To reduce the risk of electric shock, the unit must be disconnected from the mains before any maintenance or cleaning. Just switching off the device does not reduce the risk.

Warranty / Liability:

If damage to the unit can be traced back to one or more of the following causes, the manufacturer cannot accept any warranty:

- The use of the device outside of the stated electrical, mechanical and thermal limits stated in the data sheet.
- Opening of the unit by unauthorized personnel.
- Force majeure or disaster.

2. Device Information

2.1. Device Description and Scope of Supply

This device is a conditioning and diagnostic system for single modules for a high-voltage vehicle battery. The device is used to adjust the voltage of **individual modules** in a high-voltage battery which is installed in a vehicle. To achieve this, the device charges the newly added module to the voltage level of the modules that are already installed in the vehicle or it lowers the voltage by discharging to the existing voltage level. The actual voltage of the modules contained in the vehicle must be entered manually on the device. Then the device adjusts the voltage of the module to the entered value. To charge or discharge the modules only the appropriate battery charging cables are to be used. **The battery charging cables are not included in the scope of the delivery of the device and must be purchased separately.** The used battery charging cables must be tested separately and be suitable for the intended use. The battery charger can be optionally used on a trolley or placed on a workbench.

Scope of delivery:

- Battery conditioning
- Manual

Separate accessories (not included):

- Battery charging cables
- Trolley

2.2. Technical Data

2.2.1. Input

Input voltage range, Frequency range	100-240VAC, 50-60Hz
Inrush current	30A at 264VAC, temperature independent Automatic circuit breaker: 16A slow (for example characteristic B)
Input Current at nominal load	10A (115V) / 5A (230V)
Power factor	Typ. 0,98
Current harmonics	EN61000-3-2

2.2.2. Output

Output voltage range	max. 65,6 VDC
Operation	Before charging, a target voltage within the tolerance range has to be set.
Charging current limit	Depending on the module type, the device sets the maximum charging current. The max. achievable charging current is 20A.
Efficiency	>92%
Protection	Short circuit, overvoltage, reverse-polarity and transient overvoltage protection

2.2.3. Environmental Requirements

Storage temperature	-25°C up to +80°C / +13°F up to +176°F
Operating temperature (environment)	-20°C up to +40°C / -4°F up to +104°F
Protection	IP20 (for indoor use only)
Pollution degree	2 (EN50178)
Humidity	95% (no condensation allowed)
Maximum operation altitude	2.000m
Cooling	Convection cooled and active cooling by internal fan
Weight	Approx. 8,3kg / 18.5 lbs
Dimensions (wxdxh)	Approx. 340 x 295 x 145,5mm Approx. 13.4 x 11.6 x 5.7 inch

2.3. Unpacking

2.3.1. Checking for completeness and transport damage

The delivery must be checked immediately after receipt for possible damage in transit. If necessary, this must be immediately reported to the transport company. If it is assumed that transport damage could impair proper operation, commissioning may not be undertaken.

2.3.2. Warning notices used on the housing

Indication to read the manual

Warning of hot surfaces

2.3.3. Disposal of the packing material

If possible, put the used packing materials aside for a possible reuse. Ensure proper and environmentally friendly disposal of all packing material with due consideration of prevailing environmental guidelines.

2.3.4. Storage

Due to incorrect or improper storage the device could get damaged for example due to humidity and pollution.

- Protect the device during storage against humidity, extreme temperatures and dirt.
- After a storage period of more than one year check the functionality of the device before the use.

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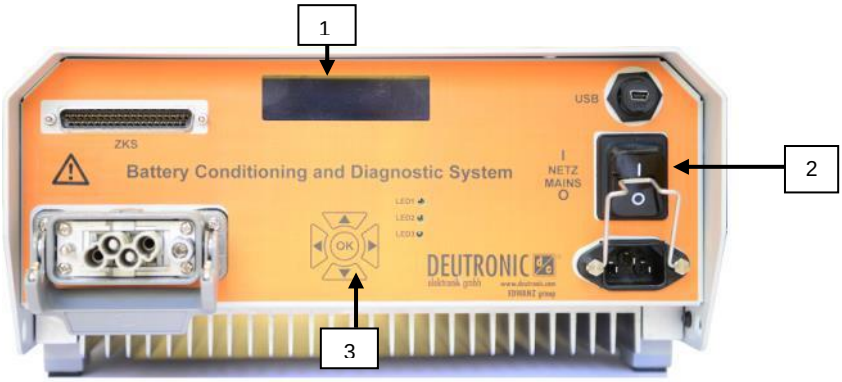
3. Connections

1	**Electrical supply:** A mains supply is required to power the device. Use a mains input connector of type IEC60320/C14. This battery charging device is intended for use in networks with more than 100 Volts and is equipped by the manufacturer with a special mains cable with a compatible plug that allows connection to corresponding mains supply. Ensure that the device is connected to a power outlet which has the same design as the plug (adapters must not be used in conjunction with this device).
2	**D-SUB Interface (ZKS connection):** The connection of the 37-pin D-SUB interface is used to monitor the individual cell voltages and temperatures of the connected battery modules.
3	**Serial signal interface:** Firmware updates are possible using the serial signal interface (Mini USB / type B)
4	**Power output:** A charging cable is used to connect the module connector of the device to the battery. Check the polarity of the battery terminals and only connect the battery module by using the connecting cables exclusively designed for the purpose.

4. Control Elements



1	Display
2	Power switch
3	Menu navigation buttons

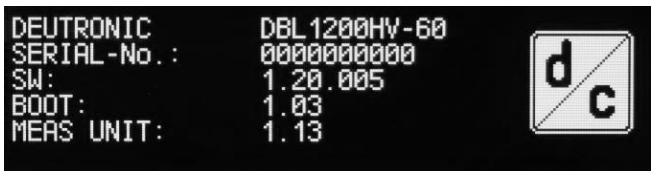
5. Indicators

To display the current operating mode three LED lamps are provided on the front of the device. They are interpreted as follows:

Red continuous	Error occurred
Gelb flashing	Stand-by mode
Gelb flashing	Operating mode
Green continuous	Process finished → charging or discharging complete

6. Commissioning

After pressing the power switch, a screen with the actual software versions is displayed for a short time. By pressing the “OK” button, the screen can be frozen for 20 seconds.



When no battery is connected, the status “Battery module not connected” appears on the display.
All setting and diagnostic menus are accessible at all times via the MENU field.

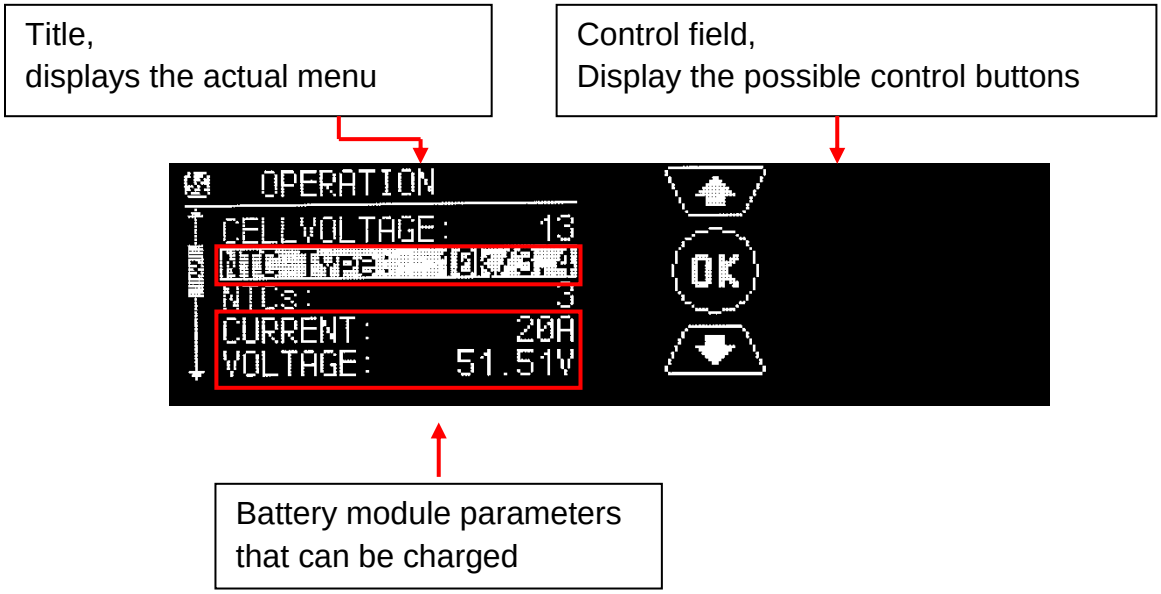
To connect the battery module, the charging cable plug is guided with slight pressure into the module connector. Due to its design an accidental swapping of the contacts (reverse polarity) is rendered impossible. In order to prevent the connector from disconnecting, the locking clamp is swiveled over the connector until it clicks.

To monitor the battery regarding the voltage and the temperature the ZKS plug must be connected to the 37-pole D-SUB interface. For stability the plug should be fixed using the screws provided.

If one of the connectors is not inserted, the respective message will appear in the display. To enable access to the conditioning operation menu, the missing connector must be inserted.

7. Conditioning Operation

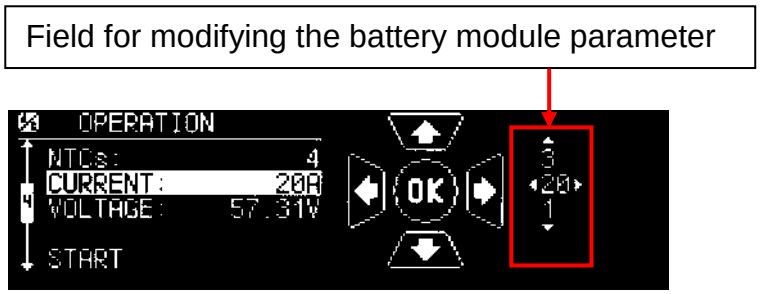
After a battery module is completely connected, the “OPERATION” menu appears automatically in the display. This is used for conditioning the connected battery. In this window the parameters of the connected battery as well as the required target voltage must be entered.



7.1. Charging Current

The maximum charging current is 20A. If the connected battery is charged using a low current, the current limit can be reduced using the menu item “CURRENT”. To reduce the charging current limit press “OK” button. On the right side of the display a field appears where the charging current limit can be modified. Using the arrow keys the desired value can be entered. The required value must be confirmed using the “OK” button.

Possible setting range for the charging current limit: 1A – 20A
Increment: 1A



Note:
If the battery connecting cable includes a resistor to limit the maximum charging current, this will be automatically recognized. In this instance the “CURRENT” is not changeable.
If the temperature is between Tu and Tvu or TVo and To, then the charging current will be adjusted depending on the temperature.

The Tu, Tvu, TVo and To parameters can be set from the SUPERUSER menu. (see chapter 8.4)

7.2. Module – Target Voltage

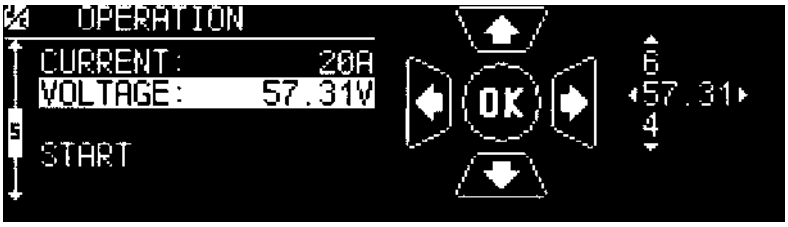
The target value for the voltage of the connected battery can be entered under the menu item “VOLTAGE”. The default value will always be the current voltage of the connected battery module. The limiting values for the adjustable target voltage are as follows:

<u>Minimum limiting value module target voltage:</u>

Number of measurable cell voltages x minimum cell voltage* (UZoE)
Example: 16 cell voltages x 2,8V = 44,8V

<u>Maximal limiting value module target voltage:</u>

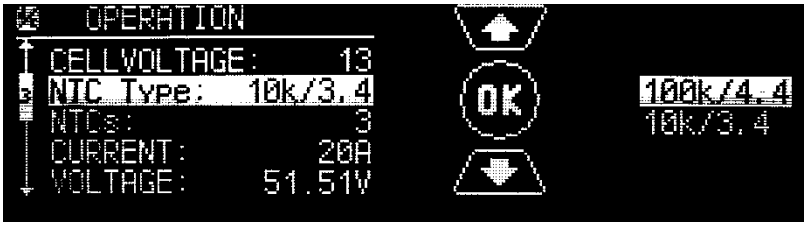
Number of measurable cell voltages x maximum cell voltage* (UZoL)
Example: 16 cell voltages x 4,1V= 65,6V



*The minimum and maximum cell voltages can only be changed in the password protected SuperUser menu

7.3. NTC Type

The NTC variant installed in the connected battery module can be set under the menu item "NTC type".



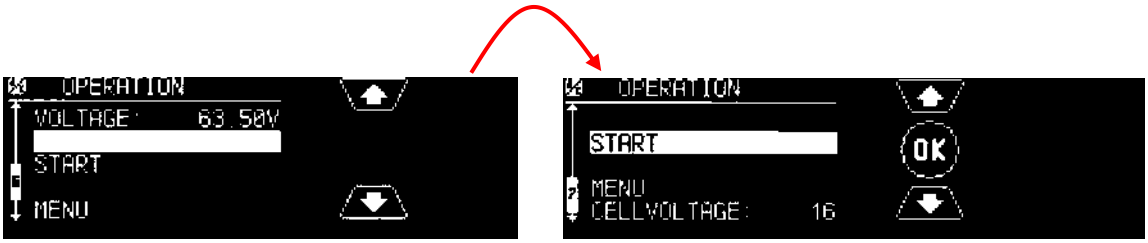
Two NTC types are available:

100k/4,4: NTC properties: R_{25} : 100kΩ (25°C) $B_{25/85}$: 4,405K
10k/3,4: NTC properties: R_{25} : 10kΩ (25°C) $B_{25/85}$: 3,435K

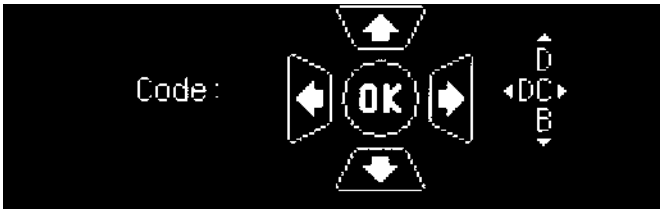
7.4. Starting the Conditioning Process

After the complete and correct entry of the battery module parameters and the required target voltages the “START“ field must be selected and confirmed using the „OK“ button.

Skip the empty line
Select “START“ and confirm by selecting “OK“



After selecting “START“, the user must enter a security code *. The security code serves to enable use of the device only to authorized users.



After entering the security code* the entered parameters are checked and subsequently a plausibility check is carried out using the actual data measured on the connected battery module. If the entered data matches the measured values and a correct security code is entered, the conditioning process will be automatically started. If the measured values do not correspond with the entered parameters or an incorrect security code* is entered, the message “Input Implausible” appears in the display and the data necessary for the conditioning process must be re- entered. To prevent unauthorized use the security code should be changed by the SuperUser immediately after the initially commissioning the device or after updating the software version to include the range of functions available in this manual

* The security code can only be changed in the password protected SuperUser menu.

The following is displayed after entering an incorrect battery module parameter or an incorrect security code:

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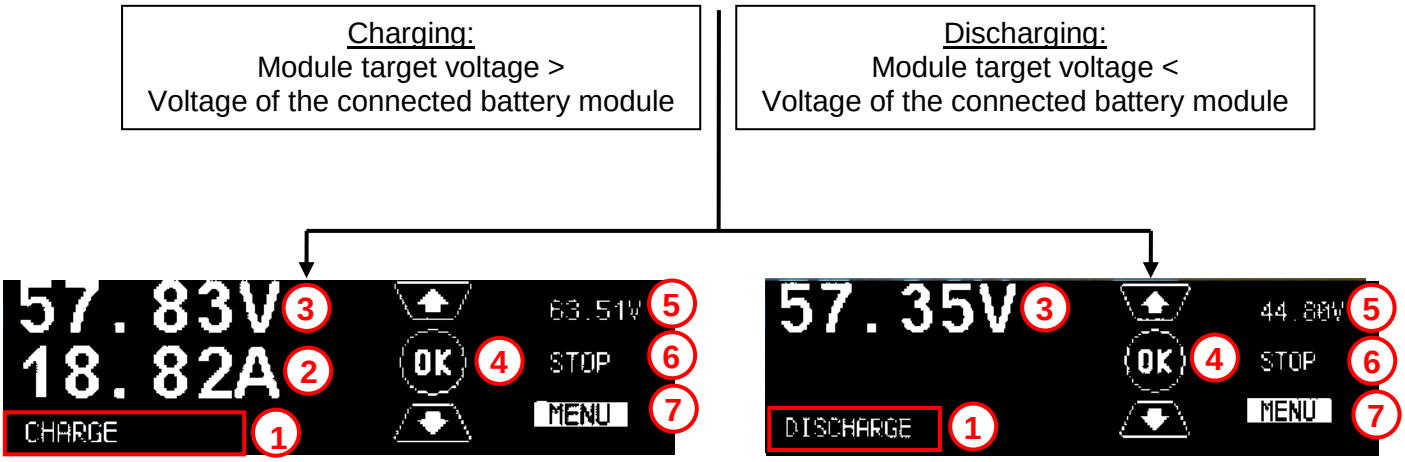
7.5. Operating Screen

If the battery parameters and security code are both correctly entered, the conditioning process will begin. The device decides automatically whether a charge or discharge operation will be started, depending on whether the entered module target voltage values are greater or smaller than the actual values of the connected battery.



1	Operating
2	Actual current
3	Actual module voltage
4	Selection buttons
5	Target module voltage
6	STOP – Select to discontinue the conditioning process
7	MENU – Enter the user and diagnosis menu

8. MENU

The item “MENU” is selectable during all operational modes of the device. After selecting the item “MENU” the user reaches the main menu of the device. This is divided into the following user and diagnostic menus.

1	LANGUAGE select a language
2	DIAGNOSIS window: View of the battery parameters
3	NTC Type select one of two types
4	SUPERUSER-menu: Password protected security menu
5	VERSION: View of the device software status

8.1. Language

To select the desired language, select the menu item “LANGUAGE” in the above mentioned main menu and confirm using the “OK” button. On the right side of the display a field appears with the selectable languages. The following five languages are available:

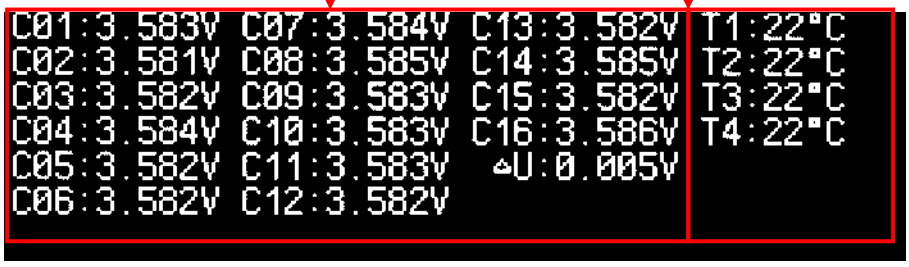
1	German
2	Englisch
3	Spanish
4	French
5	Italian

8.2. Diagnosis

To display the individual values of the connected battery module, select the menu item “DIAGNOSIS” in the above mentioned main menu and confirm using the “OK” button.

In this window, up to 16 cell voltages and max. six temperature measurement points (NTCs) can be displayed. The voltage difference (ΔU) between the maximal and minimal voltage difference can be visualized by the cell differences. The window is constructed as follows:

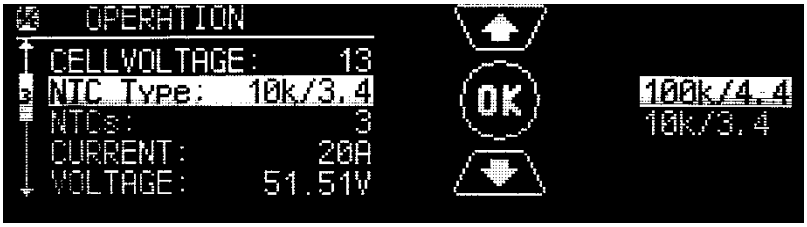
Measured cell voltages of the battery module – C01: … C16:	Temperature measurement points built into the battery module (NTCs) – T1: … T6:



By pressing the “OK” button, it is possible to exit the DIAGNOSIS menu.

8.3. NTC Type

The NTC variant installed in the connected battery module can be set under the menu item "NTC type".



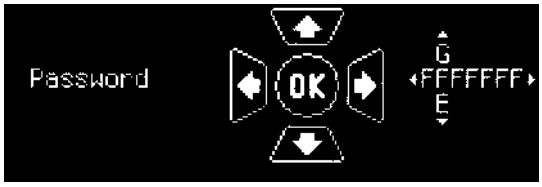
Two NTC types are available:

100k/4,4: NTC properties: R_{25} : 100kΩ (25°C) $B_{25/85}$: 4,405K

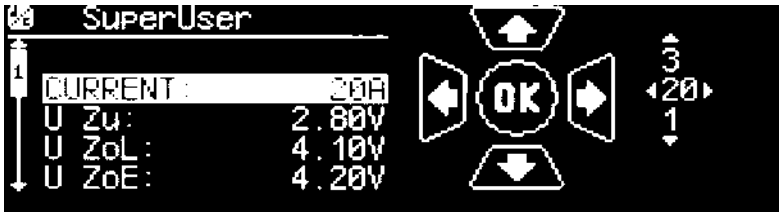
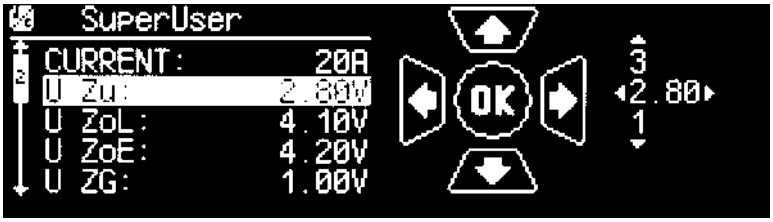
10k/3,4: NTC properties: R_{25} : 10kΩ (25°C) $B_{25/85}$: 3,435K

8.4. SUPERUSER – Menu

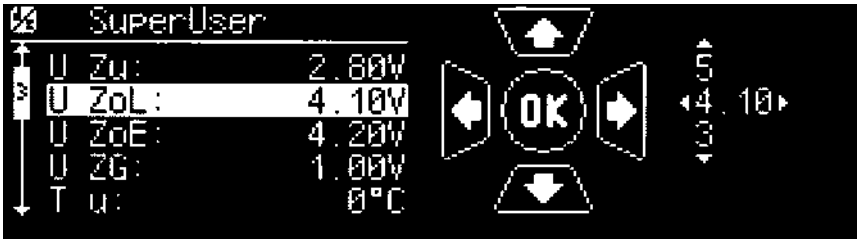
Battery module limiting values and safety parameters can only be changed using the “SUPERUSER” menu. To enter this menu a password is necessary. After selecting and confirming the sub-menu the following widow to enter the password is displayed:



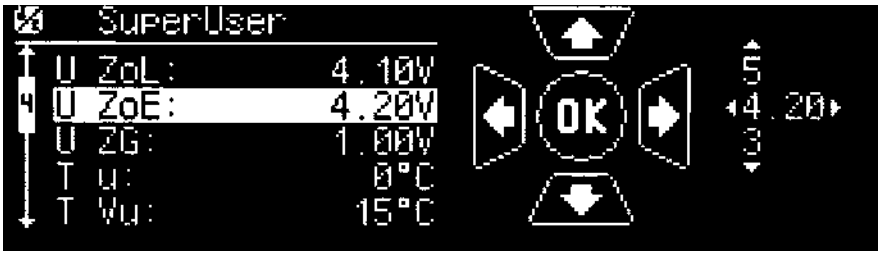
After entering the correct password, the user enters the SuperUser menu, where he can configure the following limiting and security parameters:

Display	Description	Setting range	Increment
Current	Current will be displayed on the display in [A]	1-20	Δ = 1
			
U Zu	Minimum cell tension [V]	2,8 … 3,4	Δ = 0,01
			

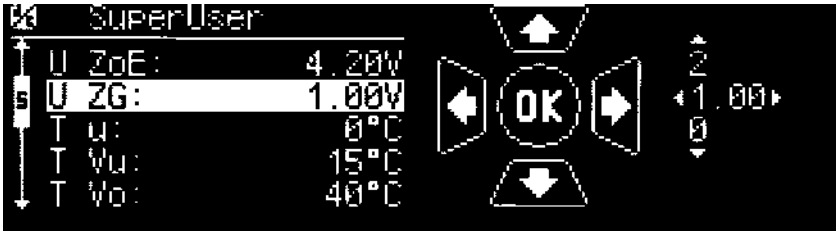
U ZoL	Maximal cell tension limit Charging [V]	3,5 … 4,2	Δ = 0,01



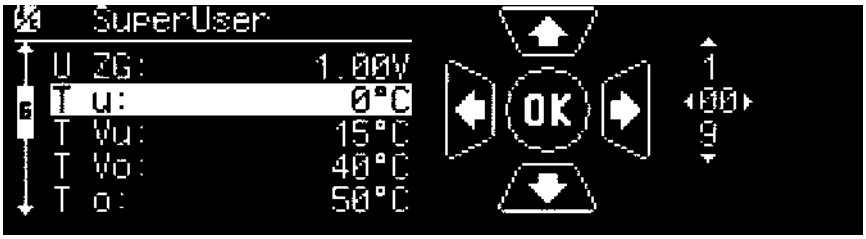
U ZoE	Maximal cell tension limit discharging [V]	3,5 … 4,2	Δ = 0,01



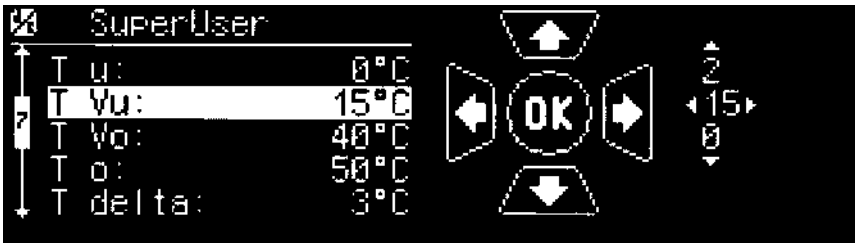
U ZG	Maximal cell tension difference	0,0 … 1,0	Δ = 0,01



T u	Minimal temperature limit battery module [°C]	0…10	Δ = 1



T Vu	Minimal temperature limit for max. charging current [°C]	11 … 20	Δ = 1



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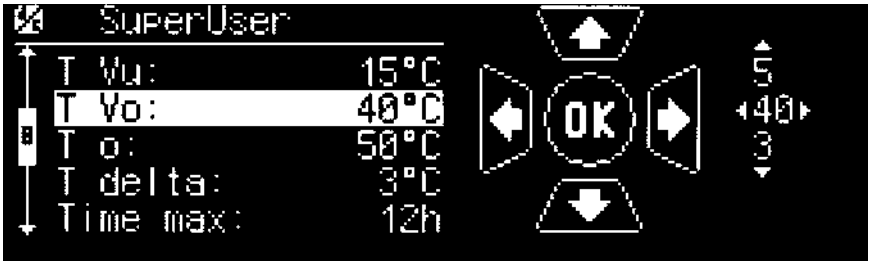
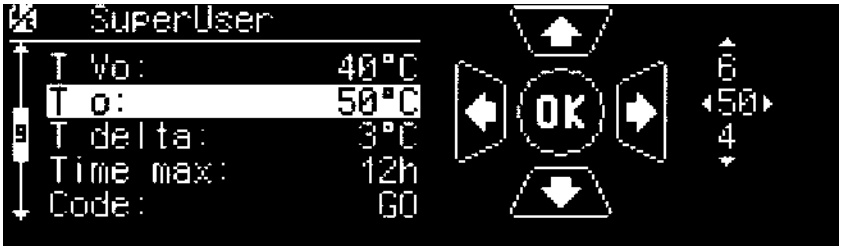
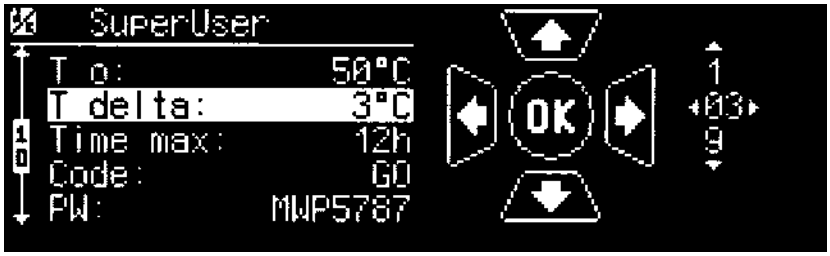
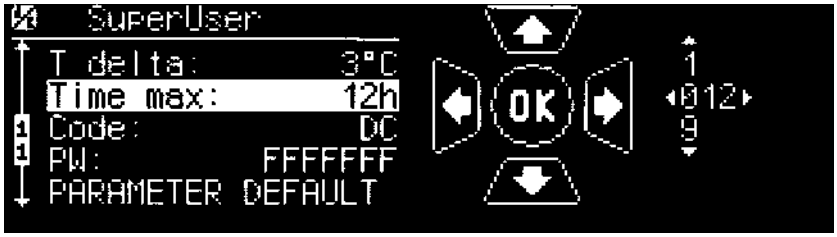
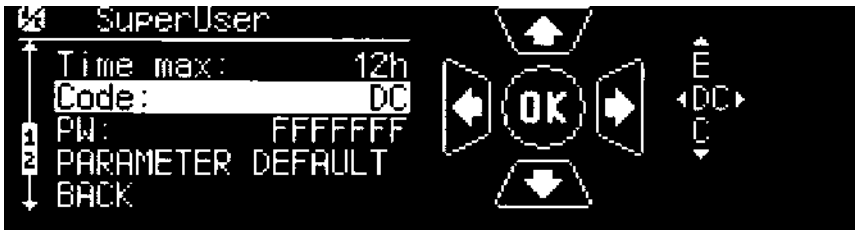
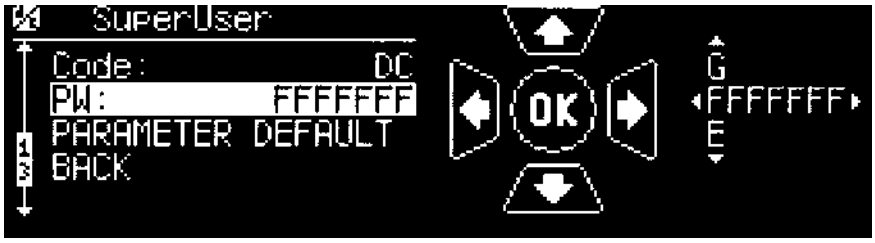
<table>
<tr><td>T Vo</td><td>Maximal temperature limit for max. current [°C]</td><td>35 … 44</td><td>Δ = 1</td></tr>
<tr><td colspan="4"> 
</td></tr>
<tr><td>T o</td><td>Maximal temperature limit battery module [°C]</td><td>45 … 55</td><td>Δ = 1</td></tr>
<tr><td colspan="4"> 
</td></tr>
<tr><td>T delta</td><td>Max. temperature-delta between two NTCs [K]</td><td>1…10</td><td>Δ = 1</td></tr>
<tr><td colspan="4"> 
</td></tr>
<tr><td>Time max</td><td>Safety-timer maximum charging time [h]</td><td>1…100</td><td>Δ = 1</td></tr>
<tr><td colspan="4"> 
</td></tr>
</table>

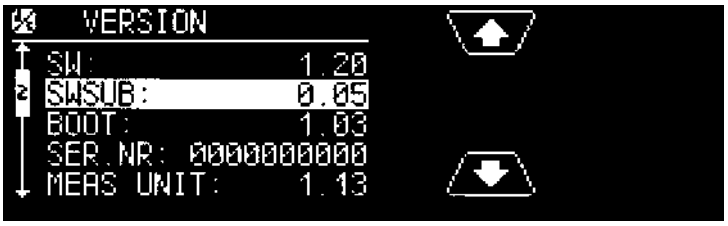
Code	Inquiry to start the conditioning	43 characters	
			
PW	Password for SuperUser menu	43 characters	
			

To reset all the limit and safety parameters to the factory settings, the menu item “PARAMETER DEFAULT” should be selected and confirmed using “YES”. The passwords “Code” and “PW” are not influenced by this reset.

In order to exit the SuperUser menu select “BACK”. The user then returns to the main menu.

9. Version

By selecting the menu item “VERSION” it is possible to display the current version of the software. The scope of the functions described in this document is available commencing SW: 1.20. A simple update does not require the internal boot loader (BOOT:) to be changed. If it is necessary to change the boot loader, this can only be carried out at an authorised Deutronic Service Centre. To exit the window select the menu item “BACK “.



10. Status Messages

Error codes:

Display	Meaning / Cause
Cell overvoltage	The voltage is too high on one or more cells
Cell low voltage	The voltage is too low on one or more cells
Over temperature	The temperature is too high on one or more cells
Under temperature	The temperature is too low on one or more cells
Temperature distribution	The temperature difference between two arbitrary cells is too great.
Voltage implausible	The voltage of the module is different to the sum of the individual cell voltages.
Module low voltage	The module voltage is too small
Module overvoltage	The module voltage is too large
Max. charge time	The maximum operating time has been reached (charing mode)
Contact loss	During the charging or discharging a cable has loosened itself
Delta cell tension	The difference between the cell tensions is too big
Delta Zellspannung	Die Differenz der Zellspannungen zueinander ist zu groß

*Module overvoltage is different, when charging: cell tension * U_{ZoL}, when discharging: cell tension * U_{ZoE}

An error will for example be displayed like this:

If there is no mistake prevailing, “OK” will appear in the display. By pressing “OK”, it is possible to display the mistake and to start the conditioning process.

Operating status:

Display	Bedeutung / Ursache
CHARGE	Charging process running.
DISCHARGE	Discharging process running.
MEASURE	The cell voltages are being read.
OPERATION COMPLETED	The process is completed.

For example an operational status will for example be displayed like this:

11. Maintenance instructions

The DBL1200HV will operate reliably for years with a minimum of maintenance. Consider the following points to maintain the device in the optimal condition:

- Clean the housing of the device with a soft cloth. BEWARE: The warning notices on the housing must not be damaged by the cleaning.
- To prevent damage to the battery connecting cables, they should be loosely coiled when not in use.

12. Factory settings

Operating Mode	Automatic charging and discharging according to the settings and battery condition.
MODULE – target voltage	Actual voltage level of the module as default.
Charging current	20A
Min. cell tension (U Zu)	2,80V
Max. cell tension charging (U ZoL)	4,10V
Max. cell tension difference discharging (U ZoE)	4,20V
Max. cell tension difference (U ZG)	1,00V
Min. temperature limit (T u)	0 °C
Min. temperature limit for max. charging current (T Vu)	15°C
Max. temperature limit for max. charging current (T Vo)	40°C
Max. temperature limit (T o)	50°C
Max. temperature delta (T delta)	3°C
Max. charging time (Time max)	12h
Start – Code	‚GO‘

13. Service Centre / Repairs

Instructions

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

The necessary return service form as well as the worldwide service partner addresses can be found on our website www.deutronic.com in the “service worldwide” menu.

In order to assert warranty claims within the warranty period it is essential that the device sent for repair is packed safely for transport, if possible using the original packing or in an equivalent safe packing.

Important note: Deutronic accepts no warranty repairs on devices with mechanical damages / transport damages.

No liability:

The customer is responsible for the correct use of the device according to the specifications. Deutronic is not liable for any damage whatsoever incurred through the use of the device.

14. Contact Data

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