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Deutronic battery charger / external power supply with MPC9-control board and nominal 14VDC charging voltage

User manual

- Valid from device firmware version V1.05.0xx -

Suitable for 12VDC vehicle onboard networks /-batteries

Image similar

Important Note

The device is exclusively intended for the specified application by qualified personnel. Please read the user manual carefully and always follow the safety instructions as well as the battery manufacturer's guidelines!

Depending on any customer-specific delivery requirements, the described parameters may differ. If you have questions about the parameterization of your device, please contact Deutronic Elektronik GmbH or one of our global service centers.

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NOTE: The following user manual describes all the functions of the device. Depending on any customer-specific delivery requirements, some functions, particularly the different modes and parameters, may vary. For any questions regarding your configuration, please contact Deutronic Elektronik GmbH or one of our global service partners.

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1. Device Description

Please refer to the installation and safety instructions for the DBL-MPC9 series to ensure proper usage of the devices.

The full compatibility with the onboard power system protects onboard electronics and airbags. Extensive protection and self-protection features, such as short-circuit protection, reverse polarity protection, and reliable spark suppression, minimize risks during handling.

Simple menu navigation, configurable parameters, and communication interfaces enable easy and efficient use of the device.

2. Installation and Safety Instructions

In addition to the operating manual, always observe the specifications provided by the battery manufacturer, the corresponding installation and safety instructions, as well as the device-specific datasheets.

The installation and safety instructions, along with the datasheets, can be found on our website at **www.deutronic.com** under the section ***>> DOWNLOADS <<***.

Alternatively, please contact Deutronic Elektronik GmbH or reach out to one of our global service centers.

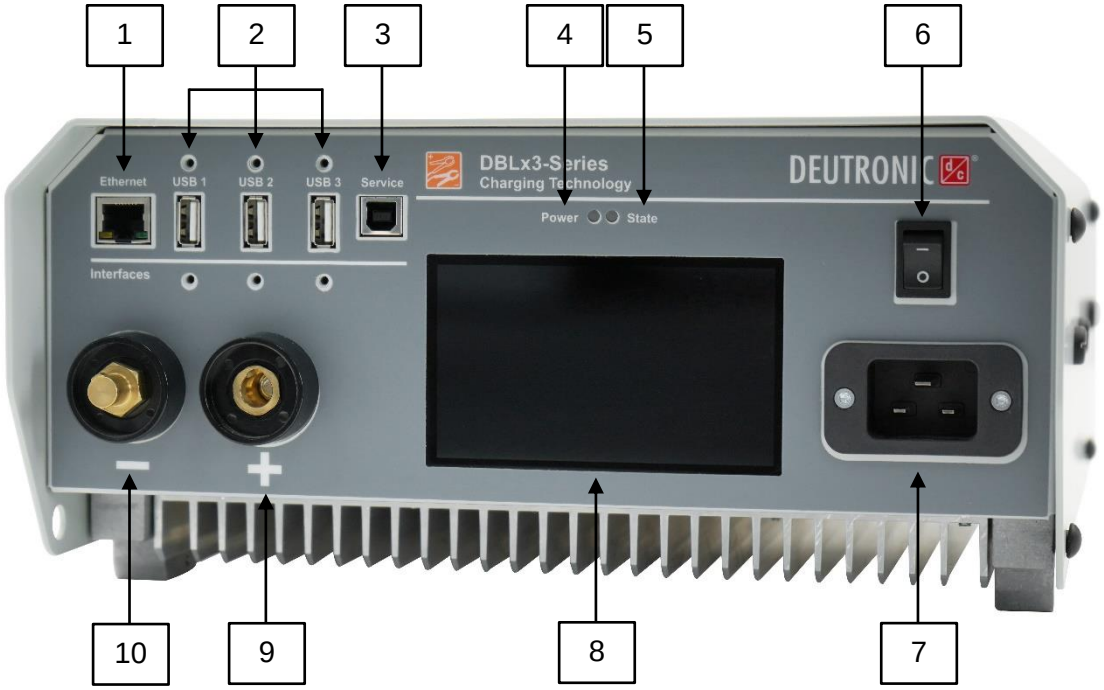
Additional Notes on PS-Mode / Proper Usage

The "Power Supply Mode" (PS-Mode) is used for the constant voltage supply of onboard systems and for buffering during vehicle diagnostics or programming.

In "Power Supply Mode" (PS-Mode) mode, charging batteries is strictly prohibited, as critical monitoring functions are not available.

During conditioning in PS-Mode, it is essential to ensure proper protection of the connected load.

3. Connections and Controls



Nr.	Designation
1	Ethernet-Interface
2	3x USB Host Interface
3	USB-Client Interface (Service Interface)
4	Power-LED (white/red)
5	State-LED (RGB LED)
6	Power Switch
7	Power Cable Connector
8	Touch-Display
9	"+" Charging Cable Connection, Charging Support Point (red clamp)
10	"-" Charging Cable Connection, Ground (black clamp)

Note: If the Power LED (4) lights up red, an internal device error has occurred. Please contact Deutronic Elektronik GmbH or one of our global service centers.

4. Commissioning Assistant

Note: Depending on any customer-specific delivery requirements, the commissioning assistant may be active during initial startup after the device is powered on.

The commissioning assistant supports the setup of the device. Once the setup is successfully completed, the assistant will not be launched again during subsequent device startups. Instead, the main screen will appear directly after the startup screen (see Chapter 6).

The setup process consists of the following steps:

1) Language selection
2) Welcome text
3) Important operating instructions
4) Date and time settings
5) Automatic cable compensation

During the commissioning, the following buttons are available:

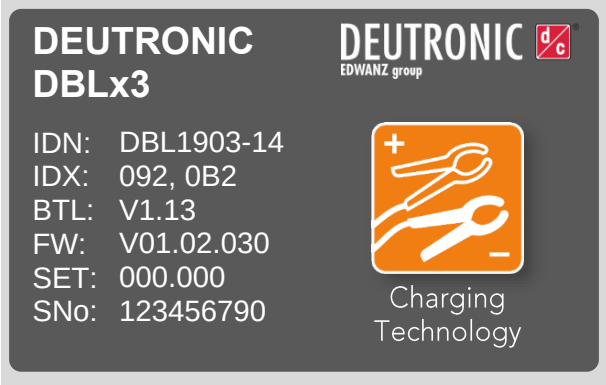
Button	Explanation
	Exit Commissioning Assistant and go to the main screen **Note**: The commissioning assistant will remain active at every device startup until it has been successfully completed or disabled through the menu.
	Proceed to the next step
	Start the automatic cable compensation
	Return to the previous step
	Display QR code to open the operating manual
	Confirm the successful completion of the commissioning assistant

5. Commissioning

Note: Before commissioning, the device and the equipment used, such as power supply lines, charging cables/clamps, and optional accessories (e.g., external signal lamp), should be checked for damage and ensure the correct connection of the cables.

To commission the device, it must be connected to a suitable power supply using the power cable (required data for the specific device can be found on the nameplate or in the corresponding datasheet).

After pressing the standby switch, the startup screen with the device's version information will be displayed on the screen, provided the commissioning assistant is disabled.



Afterward, the system switches to the main screen. The following buttons can be used to start and stop a mode:

Button	Explanation
	The load detection is activated, and depending on the selected mode, the supply or charging process is started when a valid load is detected.
	The supply to the load or the charging process is stopped, and the load detection is deactivated.

If the ***Start*** Parameter is set to ***AUTOSTART***, the device is already in the "load detection active" operating state and automatically begins the supply or charging process.

Note: For more details on the available interface functions and optional software tools from Deutronic for update, parameterization, and diagnostic tasks, please contact Deutronic directly upon request.

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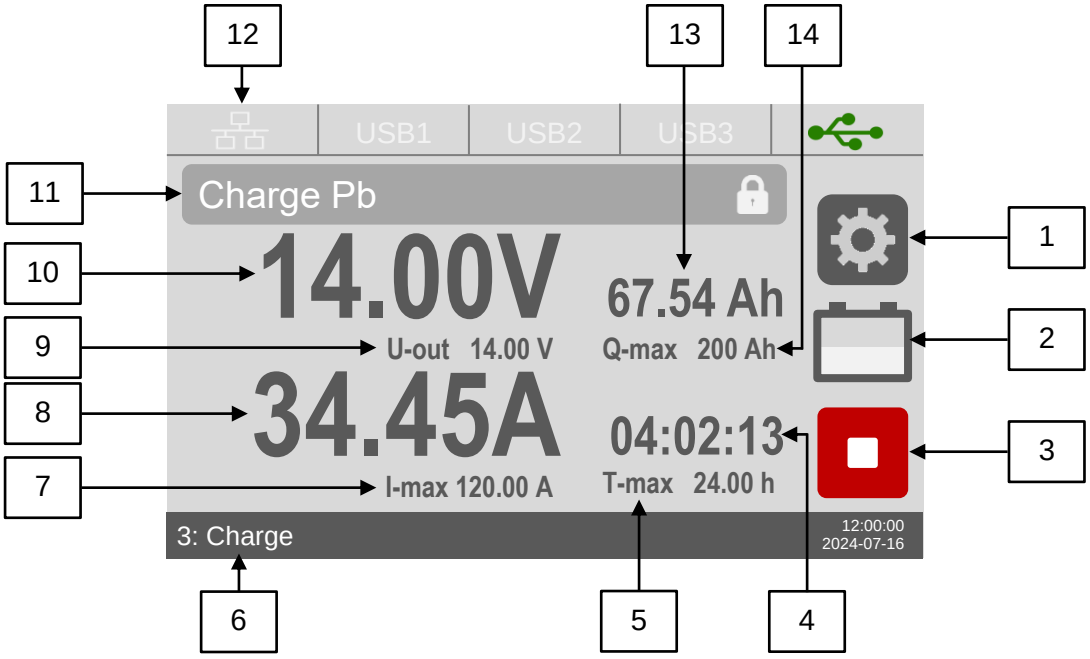
6. Main Screen



Nr.	Designation
1	Access to Configuration Menu
2	Symbol for Current Device State (see Chapter 11)
3	START / STOP - Button
4	Display of Elapsed Charging Time in [hh:mm:ss]
5	Configured Safety Threshold for the Time of the Selected mode in [h]
6	Operating State (see Chapter 12)
7	Configured Current Limit of the Selected mode
8	Current Current Measurement I [A]
9	Target Voltage in [V] (see Chapter 7.3.2)
10	Current Voltage Measurement U [V]
11	Currently Selected mode
12	State Line Indicating Connected Adapters or Communication Interfaces: A green icon represents the "Master" (in this case, the service interface USB)
13	Display of Stored Energy Amount in [Ah]
14	Configured Safety Threshold for Stored Energy of the Selected mode

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Button	Explanation
	The device is in standby mode. The currently selected mode can be started by pressing this button.
	The load detection of the device is active, or the device is in active supply/charging mode. Pressing the button will stop the process.
	Opens the device's configuration menu. **Note**: For safety reasons, the configuration menu cannot be opened during ongoing operation. To change a parameter, the current mode must first be stopped using the  -button.

7. Configuration Menu

The configuration menu contains all the operating parameters for each mode as well as device information. Individual parameters can be changed, or full parameter sets and firmware updates can be performed. Additionally, various communication interfaces or specific adapters can be configured.

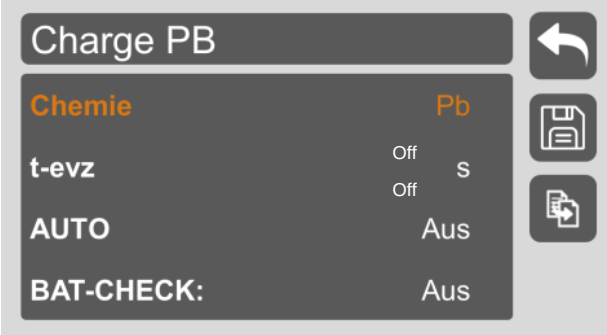
7.1. Change Parameters

To change a parameter, it must be clicked in the parameter list.
The following window will appear:

Note: By pressing the input field, the entire input will be highlighted in orange and can then be deleted.

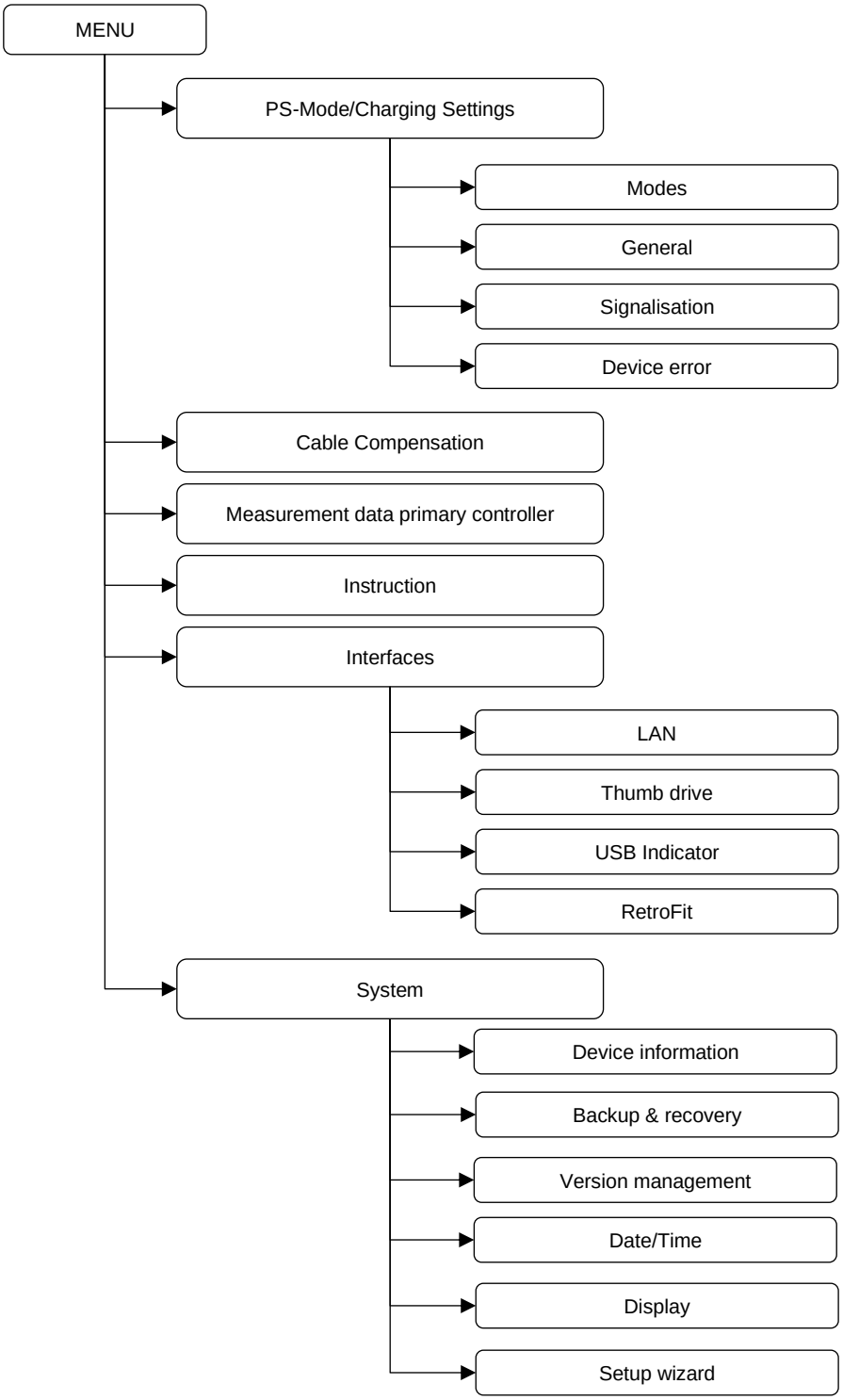
Button	Description
	Deletes the last character.
	Applies the change.
	Discards the change.

The changed parameter will then be highlighted in orange in the parameter list as follows.



Button	Description
	Saves all changes.
	Discards all changes.
	Applies all parameters from a selected charging program.

7.2. Menu Structure



Note: Depending on any customer-specific delivery requirements, the parameters described may vary, or some modes may not be available. If you have any questions regarding your configuration, please contact Deutronic Elektronik GmbH or one of our global service partners.

7.3. PS-Mode/Charging Settings

Note: Depending on any customer-specific delivery requirements, access may be protected by a PIN code. If you have any questions regarding your configuration, please contact Deutronic Elektronik GmbH or one of our global service partners.

This section contains all the operating parameters for PS-Mode, PowerUp, and charging programs. Additionally, new charging programs can be created, or the signaling of individual device states can be configured.

7.3.1. Modes

An overview of all available modes appears:

Mode	Description / Explanation
PS-Mode	Opens the parameter list for the PS-Mode
PowerUp	Opens the parameter list for the PowerUp mode
Charging Program 1 *)	Opens the parameter list for Charging Program 1
Charging Program x *)	Opens the parameter list for Charging Program x

**) Each charging program can receive an individual designation.*

Note: Depending on any customer-specific delivery requirements, some modes may not be available. The number of charging programs available may also vary. If you have any questions regarding your configuration, please contact Deutronic Elektronik GmbH or one of our global service partners.

There is a distinction between read-only, non-read-only and password-protected modes:

Symbol	Explanation
	*Read-only mode* In this mode, all used parameters are displayed. They cannot be changed by the user on the display but can only be modified through device configuration.
	*Non-read-only mode* In this mode, all parameters can be changed. Parameters for specific charging options or functions will only be visible once the option/function has been activated.
	*Password-protected mode* To select such a charging program in the mode line, a password must be entered.

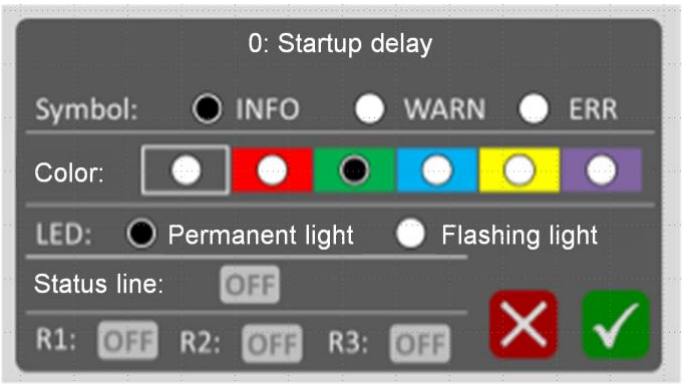
7.3.2. General

Display	Description / Value Range
Password „SETUP“	Password for the configuration menu.
Password „MODI“	Password for selecting a password-protected charging program on the main screen (see Chapter 7.3.1).
Sup-On-Mode	Mode selection during device restart. [Standard mode]: The mode defined in the parameter set (standard mode) is always selected when starting the device. [Las Active mode]: The last active mode is always selected when starting the device.
Initial mode	Standard operating mode.
Start	Startup behavior when the device is powered on. [Manual Start]: The device must be manually started via the START button. [Autostart]: The predefined mode is automatically started upon power return when a load or battery is detected.
ClampOff	Behavior of load detection after disconnecting: [Off]: Load detection is deactivated after disconnection, and the device enters standby mode. [On]: Load detection remains active after disconnection.
Quiescent current	Quiescent current behavior. [Off]: Quiescent current behavior is deactivated. [On]: Quiescent current behavior is activated.
Show U-clamp	Display options for voltage value on the main screen. [Off]: Displays the voltage at the device output. [On]: Displays the clamp voltage at the clamps (calculated value).
Master	Specifies which interface the MPC9 device may control. [DBL]: The MPC9 device is the master. [RetroFit]: The RetroFit adapter is the master. [Ethernet]: The Ethernet interface is the master. **Note**: The device can only be controlled via the selected interface. Control via other interfaces is no longer possible!
SMODE	Use of a universal charging program in networked production systems *(see document „Guide for External Connections“)*. [Off]: Deactivates the SMODE function [On]: Activates the SMODE function **Note**: please refer to the "Guide for External Connection," available on our website at www.deutronic.com under >> DOWNLOADS <<. Alternatively, please contact Deutronic Elektronik GmbH or one of our global service centers.
M-short	Behavior in case of detected short circuit.

Display	Description / Value Range
	[Limiting]: If an overload or short circuit is detected (output voltage drops below the short-circuit threshold voltage ***U-short***), the output current is limited. No reactivation occurs. [Pulsing]: If an overload or short circuit is detected (output voltage drops below the short-circuit threshold voltage ***U-short***), an attempt is made to reactivate after the retry duration ***t-short***.
U-short	Short-Circuit Characteristic Voltage [0 ... 13,9] V If the short-circuit threshold voltage set here is dropped at the output under high current flow, a short circuit is detected, and the device's output relay is opened. **Safety-Notice** The device can automatically detect a short circuit and reduce the output current if a defined voltage threshold ***U-short*** is exceeded at the device output during operation. The short-circuit threshold voltage ***U-short*** parameterized in the menu must be checked considering the maximum voltage drop for the connected charging cables, and if necessary, the influencing factors such as cable resistance and maximum output current of the device must be adjusted accordingly! Note: Charging cables age during operation, which significantly increases their resistance over time—therefore, please ensure an adequate safety margin for the short-circuit threshold voltage! Example for determining the short-circuit threshold voltage „***U-short***“: (1) During the cable compensation, a resistance value of 15.0 mOhm was measured for the connected charging cable. (2) The device's max. output current is 100A. (3) Voltage drop calculation: U = 0.015 Ohm * 100A = 1.5 V (4) Definition of short-circuit threshold voltage: The short-circuit threshold voltage must be configured with an adequate margin to the calculated voltage drop to ensure safe shutdown (e.g., due to cable aging, dirt on the clamps during operation, or high contact resistance at the clamp points). For the given case, a value of ***U-short*** = 5,0V could be configured, for example.
C-short	Connection Attempts [1 ... 10] The number of switch-on attempts after a detected short circuit when the "Pulsing" short-circuit setting is enabled.
t-short	Reconnection Duration [1 ... 120] s The duration until the next switch-on attempt after a detected short circuit when the "M-short / Pulsing" setting is enabled.

7.3.3. Signalisation

In the "Signalisation" menu, the signaling for each individual device state can be configured.



Symbol
Each device state can be classified into three categories.

Category	Symbol
INFO	Mode-specific (e.g., Battery full, Charging battery, Supply, etc.)
WARN	Warning symbol
ERR	User error

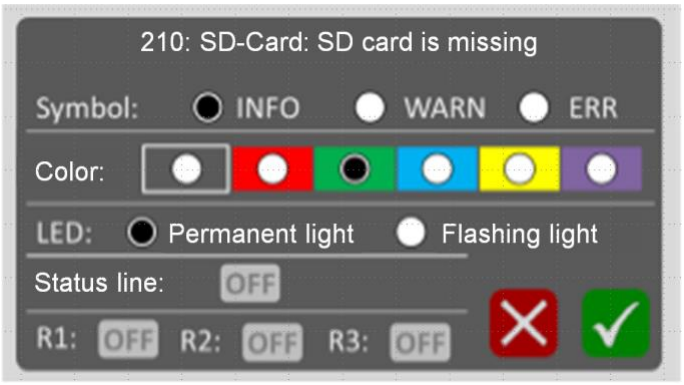
Color and LED
When the device state is reached, the state LED and the optional signal indicator (if connected) light up or blink in the selected color.

State Line
If this setting is active, the state line on the main screen will also be displayed in the selected color.
Note: The "Blinking Light" option does not affect the state line.

Relay Changeover Contacts R1 / R2 / R3 for the Retrofit Adapter (optional accessory)
Display or configuration of the signal relays for state queries via the Retrofit adapter.

7.3.4. Device error

In the "Device error" menu, the signaling for each individual device error can be configured.



Symbol
Each device error can be classified into 3 categories.

Category	Symbol
INFO	A popup will appear on the main screen informing that a device error has occurred. This popup can be closed with the ✓-button. Otherwise, it will automatically close after 5 seconds. The active mode will continue running in the background.
WARN	A popup will appear on the main screen informing that a device error has occurred. This popup must be closed using the ✓-button. The active mode will continue running in the background.
ERR	A popup will appear on the main screen informing that a device error has occurred. This popup cannot be closed. Any running charging program will be stopped, and the output will be switched off. The state LED, signal indicator, and relay signaling will be displayed according to the configuration.

Color and LED
This setting is only available in the ERR category. When the device state is reached, the state LED and the optional signal indicator (if connected) will light up or blink in the selected color.

Relay Changeover Contacts R1 / R2 / R3 for the Retrofit Adapter (optional accessory)
This setting is only available in the ERR category. Display or configuration of the signal relays for state queries via the Retrofit adapter.

7.4. Cable Compensation

The automatic cable compensation serves to measure and compensate for the resistance value of the connected charging cables. This is necessary to offset the voltage drop across the charging cables during battery charging.

Note: If the charging cable is replaced, the cable compensation must always be performed. Even if replaced with a cable of the same type, the cable compensation should be carried out again.

To perform cable compensation, the charging cables used during operation must be connected to the device, and at the free end (without a load), they must be directly short-circuited by contacting the conductive jaws as follows.

The measurement is initiated using the -button. The cable compensation runs for approximately 15 seconds. Once successfully completed, the measured resistance value is displayed. This value is then shown on the display and can either be saved as the new value or discarded. It will remain stored even after the device is powered off.

Note: Depending on specific customer delivery requirements, entering a password may be required to save the resistance value.

Display	Description / Value Range
R-cable	Cable Resistance [0 ... 250] mOhm The procedure for automatic cable compensation is described in Chapter 7.4.

Note: Depending on specific customer delivery requirements, the factory default setting for cable compensation may differ from 0 Ohm!

Dynamic Short-Circuit Detection

If a cable resistance value ***R-Cable >*** 0.00 Ohm is stored, the device automatically activates a dynamic short-circuit detection function in addition to the configuration of ***U-short***.

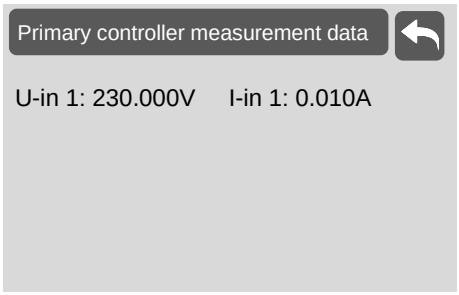
The dynamic short-circuit detection function considers the ***R-Cable*** and the current limit ***I-max*** configured for the active mode. Dynamic short-circuit detection becomes active when the calculated short-circuit voltage ***U-short-dynamic*** exceeds the configured short-circuit voltage ***U-short***.

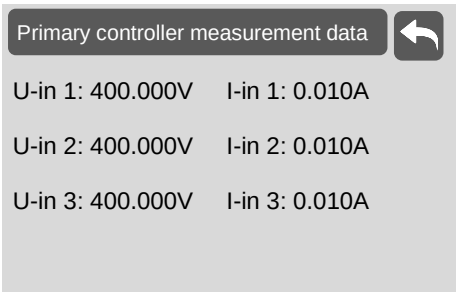
7.5. Primary controller measurement data

The function “Primary controller measurement data” is accessible via the configuration menu. The measured data for the supply voltage and input current are displayed in this menu item.

Depending on the device variant (1AC or 3AC), different measurement data is displayed:

- 1AC device: Input voltage [V] and input current [A]
- 3AC device: Input voltage [V] and input current [A] for phases 1, 2 and 3





If the measured values are outside the defined ranges, they are highlighted in red.

7.6. Interfaces

7.6.1. LAN

Configuration menu for the Ethernet interfaces.

Parameter	Description / Explanation	
IP Adress	IP-Adresse in IPv4 format	
Gateway	Gateway in IPv4 format	
Subnet	Subnet in IPv4 format	
UDP Port	UDP-Port	[0 ... 65535]
TCP Port	TCP-Port	[0 ... 65535]
Timeout	Timeout in seconds	[3 ... 300]

7.6.2. Thumb drive

Note: This Button becomes active only when a Thumb drive is detected

Activity	Description / Explanation
Start Data Recording	Start data recording.
Stop Data Recording	Stops data recording. The file generated on the Thumb drive can then be sent to Deutronic Elektronik GmbH for analysis.
Start “SERVICE” Data Recording	Starts the extended data recording for the Deutronic Elektronik GmbH service.
Download Firmware Version	Opens a list of all firmware files stored on the Thumb drive. Clicking on one of these files allows it to be transferred to the device.
Backup & recovery	See Chapter 7.6.3
Upload Service Information	Creates a file on the Thumb drive with relevant information for servicing purposes.

Note: To ensure that the USB flash drive functions properly, it must be formatted in the FAT32 file format. The exFAT and NTFS formats are not supported.

7.6.3. USB Indicator

Configuration menu for the external USB signal lamp (optional accessory).

Parameter	Description / Explanation
Beeper mode	[Off]: No acoustic signaling. [Red]: Acoustic signaling for red LED signal. [Green]: Acoustic signaling for green LED signal. [Blue]: Acoustic signaling for blue LED signal. [Yellow]: Acoustic signaling for yellow LED signal. [Violet]: Acoustic signaling for violet LED signal. [White]: Acoustic signaling for white LED signal.
Volume	Volume of the beeper [10 ... 100] %
Brightness	Brightness of the LED signal [10 ... 100] %

7.6.4. RetroFit

Note: Please refer to the „Guide for External Connection“ available on our website at www.deutronic.com under the section >> DOWNLOADS <<.

Alternatively, contact Deutronic Elektronik GmbH or one of our global service centers.

7.7. System

7.7.1. Device Information

Displays a list of all device information, such as device name, serial number, bootloader version, firmware version, parameter set number, etc.

7.7.2. Version Control

Note: Depending on specific customer delivery requirements, access may be PIN protected. For questions about your configuration, please contact Deutronic Elektronik GmbH or one of our global service partners.

Note: When using a thumb drive, a maximum of 99 entries per directory are displayed. Any additional entries on the thumb drive will be ignored.

Function	Description / Explanation
Reset Device	Resets the device configuration to factory settings.
Install Firmware Version	Installs a firmware version on the device that has already been downloaded.
Delete Firmware Version	Removes a selected firmware version from the device. The currently installed and previously installed versions cannot be deleted.

If a thumb drive is connected to the device, the following function is also available:

Function	Description / Explanation
Download Firmware Version	Loads a firmware version from the connected thumb drive onto the device.

7.7.3. Backup & Recovery

Note: Depending on specific customer delivery requirements, access may be PIN protected. For questions about your configuration, please contact Deutronic Elektronik GmbH or one of our global service partners.

Note: When using a thumb drive, a maximum of 99 entries per directory are displayed. Any additional entries on the thumb drive will be ignored.

Note: f inactive, the configuration menu will automatically close after three minutes.

If a thumb drive is connected to the device, the following function is also available:

Function	Description / Explanation
Backup parameters	Saves the current device configuration onto the connected thumb drive.
Backup interface parameters	Saves the current network configuration onto the connected thumb drive.
Install parameters	Transfers a device configuration selected from the connected thumb drive onto the device.
Install interface parameters	Transfers a network configuration selected from the connected thumb drive onto the device.

7.7.4. Date/Time

Displays the currently configured time on the device. Once the correct time is set, it must be confirmed using the green button.

7.7.5. Display

Parameter	Description / Explanation
Language	Here, the available language versions for the menu navigation are displayed. By activating the ***LANGUAGE*** menu item, the desired language can be selected and applied. German English Spanish French Italian Arabic Simplified Chinese Traditional Chinese Czech Greek Hungarian Indonesian Japanese Korean Dutch Polish Portuguese Russian Swedish Thai Turkish
Brightness	Display Brightness [10 ... 100] %
Start screen display duration	Duration for how long the startup screen should be displayed 0: OFF [1 ... 30] s The startup screen is displayed for x seconds.
Info text 1	This text is displayed on the first line of the startup screen.
Info text 2	This text is displayed on the second line of the startup screen.

7.7.6. Setup Wizard

Starts the setup wizard to go through it again after the initial commissioning. The exact procedure is described in Chapter 4.

8. Mode: Charging

Note: Depending on specific customer delivery requirements, the described parameters may vary, or some modes may not be available. If you have questions about your configuration, please contact Deutronic Elektronik GmbH or one of our global service partners.

Note: The device has intelligent temperature control. If the charger temperature exceeds a predefined value, the output current will be reduced or the device will be switched off. The charging process can only resume once the internal temperature drops below a certain value.

In this mode, both a battery installed in the vehicle and a "stand-alone" battery (battery disconnected from the vehicle) can be charged. When the device's charging clamps are connected to a battery with a voltage greater than the switch-on voltage ***U-min***, the charging process will start after the switch-on delay ***t-del***. During the charging process, the battery terminals or the charging points of the vehicle will be supplied with the charging voltage ***U-charge***. If the current demand exceeds the maximum output current ***I-max***, the device will switch to current regulation.

During the charging process, special safety timers ***State Q-max*** and ***State t-max*** monitor the charging amount ***Q-max*** and the charging duration ***t-max***. If one of the respective safety thresholds is reached, the device will behave according to the configuration. For example, this may result in the shutdown of the output current, limiting the charging voltage to the maintenance charging voltage ***U-tri***, or no reaction if the parameter has been deactivated. For each charging program, the Q- and T-process timers ***Q-end*** and ***t-end*** can be set separately. When one of these process timers is reached, the device's output will be switched off.

Display	Description / Explanation
Password lock	Password-protected selection in the mode line [Off]: No password lock set [On]: Password lock active
Chemistry	Selection of battery chemistry
Tri-Mode	Type of transition to Tri [Pb]: Transition for PB batteries [LiFePO4]: Transition for LiFePO4 batteries
t-del	Switch-on delay [0 ... 255] seconds The switch-on delay applies both during normal start-up and when started via external control.
U-min	Switch-on voltage *[0 ... **U-tri**] V* Required minimum voltage of the connected battery – defines the voltage threshold that must be exceeded by the battery at the start of the charging process. ⚠ **SAFETY NOTE**: The safety threshold ensures that a technically sound battery is actually connected for the charging process when configured correctly!
t-min	Minimum charging duration *[0 ... 240] Minuten* This time interval must pass before switching from charging mode to maintenance charging.

Display	Description / Explanation
U-charge	Charging voltages *[**U-tri** ... Device-Umax] V* The charging voltage should be chosen so that the connected consumers are sufficiently supplied. **WARNING** - Excessive voltage values may cause damage to the vehicle's onboard network!
U-tri	Minimum maintenance charging voltage *[**U-min** ... **U-charge**] V*
I-max	Maximum charging current *[(**I-tri** + **I-re**) ... Device-Imax] A* The lower limit is dynamic and depends on the configured values ***I-tri*** and ***I-re***. The maximum value depends on the device's power class (further details in the datasheet). **WARNING** - The current limit should be checked and adjusted if necessary for the connected equipment (including charging cables/clamps). **SAFETY NOTE:** Whether the set peak current ***I-max*** can be delivered depends on the operating conditions (load conditions). Note: The actual maximum charging current may be automatically adjusted/reduced through dynamic power and temperature control.
I-tri	Minimum maintenance charging current [0,5 … (***I-max***– ***I-re***)] A Current limit at which the device switches to maintenance charging.
I-re	Recharging current [0,5 ... 30] A Threshold (delta value) over ***I-tri***, at which the device switches back to charging mode.
Q-max	Max./Limit transferred capacity [0 ... 6000] Ah
State Q-max	State Q-max, charging [0]: Off (safety threshold deactivated) [1]: Value recording in (post-)charging mode ACTIVE / Tri mode ACTIVE Limit: Output relay opens [2]: Value recording in (post-)charging mode ACTIVE / Tri mode ACTIVE Limit: Tri [3]: Value recording in (post-)charging mode ACTIVE Limit: Output relay opens [4]: Value recording in (post-)charging mode ACTIVE Limit: Tri
t-max	Max./Limit charging duration [0 ... 255] h
State t-max	State T-max, charging [0]: Off (safety threshold deactivated) [1]: Value recording in (post-)charging mode ACTIVE / Tri mode ACTIVE Limit: Output relay opens [2]: Value recording in (post-)charging mode ACTIVE / Tri mode ACTIVE Limit: Tri

Display	Description / Explanation
	[3]: Value recording in (post-)charging mode ACTIVE Limit: Output relay opens [4]: Value recording in (post-)charging mode ACTIVE Limit: Tri
Q-end	Maximum transferable Ah per process [0 ... 6000] Ah
t-end	Maximum process time [0 ... 255] h

Each charging mode has the following standard functions:

Function	Explanation
BFL	Signals "Battery full" regardless of the maintenance charging parameter.
tp-function	The output current of the device is reduced to a defined value in preset time intervals, depending on the configuration.
Undervoltage monitoring	Monitoring of the output voltage during a charging process.
Overvoltage monitoring	Monitoring of the output voltage during a charging process.

Additionally, the following optional functions can be activated in each charging program. The corresponding symbol will then appear to the right of the charging program name.

Note: Some functions are mutually exclusive. These will be grayed out within a charging program.

Option	Symbol	Explanation
AUTOMODE		The device automatically detects whether it is an resistive load or a battery and activates the respective mode.
HOLD / BUFFER		The device switches to operating state 44: Hold (e.g., due to an active DC/DC converter in the vehicle).
DETECT		The device automatically detects whether the connected battery is a lead-acid (Pb) or lithium iron phosphate (LFP or LiFePO4) battery.
BAT-CHECK		Algorithm to check the battery for possible defects.
LTC		Used for long-term charging and monitoring of vehicles in showrooms with lead-acid (Pb) or Li/LFP starter batteries.

8.1. AUTOMODE

When the ***AUTO*** function is activated, the device automatically detects whether it is a resistive load or a battery. If the result is a battery, the load is supplied with the selected charging mode. If the result is a resistive load, the PS-Mode is activated.

Display	Description / Value Range
AUTO	Activation / Deactivation of automatic detection [Off]: Deactivates the Automode function [On]: Activates the Automode function

8.2. HOLD / BUFFER

When the ***HOLD / BUFFER*** function is activated, the device switches to operating state ***44: Hold*** if the clamp voltage exceeds a certain threshold. These high clamp voltages can, for example, be generated by a DC/DC converter installed in the vehicle.

If the clamp voltage falls below the voltage threshold ***U-buf*** for 10 seconds during ***44: Hold***, the selected charging program will start.

If the high clamp voltage persists for the entire time ***t-wait*** in operating state ***44: Hold***, the device switches to ***45: Buffer mode***, increases the measured voltage by a certain amount, and takes over the supply (Note: If the DC/DC converter installed in the vehicle remains active, the device and the DC/DC converter share the supply depending on the load situation).

The maximum permissible output voltage in buffer mode is limited by the parameter ***U-max-buf***. If the threshold current ***I-buf*** is undershot in buffer mode, the device will either restart in ***44: Hold*** or with the selected charging program, depending on the clamp voltage.

Display	Description / Value Range	
HOLD / BUFFER	Activation / Deactivation of the "HOLD / BUFFER" charging option [Off]: Deactivates the function [On]: Activates the function	
U-buf	Buffer-voltage limit	[0 ... Device-U-max] VDC
U-max-buf	Max-Buffer-voltage	[0 ... Device-U-max] VDC
I-buf	Buffer threshold current	[0 ... ***I-max***] A
t-wait	Total duration for WAIT	[0 ... 60] min

8.3. DETECT – Automatic Pb/Li-Detection

The device independently determines whether it is connected to a resistive load or a battery. If a battery is detected, it automatically differentiates between a lead-acid (Pb) battery and a lithium iron phosphate (LFP or LiFePO4) battery and operates in the appropriate mode.

Note: The battery type detection typically takes between 10 and 30 seconds, depending on the operating conditions.

Warning! During the battery type detection process, the onboard voltage is not stable due to load analysis. No programming operations should be carried out on the vehicle during this time!

Display	Description / Value Range
Detect	Activation/Deactivation of the "Detect" charging function [Off]: Deactivates the function [On]: Activates the function
U-charge2	Charging voltage-2 *[**U-tri** … Device-Umax] V* The charging voltage for the second battery chemistry must be selected to ensure that connected consumers are adequately supplied. **CAUTION** - Excessive voltage may damage the battery or vehicle's onboard system!
U-tri2	Minimum Maintenance Charging Voltage *[**U-min** ... **U-charge**] V*
I-max2	Current limit for charging *[(**I-tri + I-re**) ... **I-max**] A* The lower limit for the second battery chemistry is dynamic and depends on the configured values of ***I-tri*** and ***I-re***. The possible maximum value is determined by the device's performance class (for more details, refer to the datasheet). **CAUTION** - The current limit must be checked for compatibility with the connected equipment (e.g., charging cables/clamps) and adjusted if necessary. **SAFETYNOTE:** O Whether the set peak current (I-max) can be delivered depends on the operating (load) conditions. Note: The actual maximum current during charging may be automatically adjusted or reduced by the dynamic power and temperature management system.
I-tri2	Min. Maintenance Charging Current [0,5 … (***I-max*** – ***I-re***)] A Threshold for the second battery chemistry, at which the device switches to trickle charging.
I-re2	Recharging Current [0,5 ... 30] A Threshold (Delta value) above ***I-tri*** for the second battery chemistry, at which the device switches back to the charging state.
Q-max2	Max./Limit transferred capacity [0 ... 6000] Ah
t-max2	Max./Limit Charging duration [0 ... 255] h

Display	Description / Value Range
tp-Limit2	tp-Current Threshold *[0 ... **I-max**] A* This value is used for the second battery chemistry when Detect is activated.
U-low2	Undervoltage threshold [0 ... Device-U-max] V
U-high2	Overvoltage threshold [0 ... Device-U-max] V
I-bfl2	BFL-current limit [***I-tri*** ... ***I-max***] A BFL signaling occurs when the output current falls below this value.

8.4. BAT-CHECK

Note: To perform the ***BAT-CHECK*** without interference, no significant load should be connected in parallel with the charging battery. Disconnect the battery from the vehicle before performing the battery test!

To detect potentially defective batteries, it is essential to set the maximum ampere-hours ***(Q-max)*** that can be stored in the battery before starting the charging process. The ampere-hour value should not be set lower than the value printed on the battery, as the charging process will be stopped once the set value is reached. It is recommended to set a value that is approximately 10 - 20% higher. For example, for a battery with a nominal capacity of 50 Ah, the ***Q-max*** parameter should be set to 60 Ah.

When ***BAT-CHECK*** is activated, the charging process will be interrupted twice for about 25 seconds. During this time, the device will measure the battery voltage and use an algorithm to check the battery for potential defects.

If a defective battery is detected, the charging process will be aborted, and an error message will be displayed.

Display	Description / Value Range
BAT-CHECK	Activation / Deactivation of the "BAT-CHECK" charging function [Off]: Deactivates the function [On]: Activates the function

8.5. BFL (Battery Full)

When BFL signaling is activated, the "Battery Full" signal will be triggered as soon as the output current drops below ***I-bfl*** and the minimum charging time t-min has elapsed. The BFL signaling can be used as either a latching or a flexible ***BFL*** state display, depending on the BFL- parameter.

Latching BFL State Display - ***BFL*** active
The state display remains active until the connected battery is disconnected. If an error occurs during operation, the latching BFL signal will be reset.

Flexible BFL State Display - ***BFL*** disabled
If the output current rises above ***I-bfl*** again, the BFL signal will be reset.

Display	Description / Value Range
BFL	Activation / Deactivation of the „BFL“ charging function [Off]: Deactivates the function [On]: Activates the function
I-bfl	BFL-Current limit [***I-tri*** ... ***I-max***] A The BFL signal is triggered when the output current drops below this value.
BFL-lock	BFL Signaling Lock [Off]: Deactivates the function [On]: Activates the function
t-bfl	Signal Delay [1 ... 60] s

8.6. Time Periode Function

The time periode function (short: tp function) is used for current monitoring. If the current exceeds the tp current threshold (***tp-limit***), the ***tp-t1*** timer starts. If the current drops below the threshold again, the timer is reset and will only restart once the ***tp-limit*** is exceeded again.
If the current remains above the ***tp-limit*** threshold for the duration of ***tp-t1***, the current will either be limited to the ***tp-limit*** threshold or switched off, depending on the configuration of ***tp-t2***.

Display	Description / Value Range
tp-current monitoring	Activation / Deactivation of the charging function [Off]: Deactivates the function [On]: Activates the function
tp-limit	tp-Current Threshold *[0 ... Device-I-max] A*
tp-t1	tp-Timer1 *[0 ... 1000] s*
tp-t2	tp-Timer2 [0] s OFF [End: OFF, I=0A] [1 ... 1000] s ON

8.7. Undervoltage-Current

When undervoltage monitoring is activated, the voltage is monitored throughout the entire charging process. If the voltage drops below the set undervoltage threshold (***U-low***), the device switches to operating state ***12: Undervoltage at output***.

Display	Description / Value Range
Undervoltage monitoring	Activation / Deactivation of the „Undervoltage monitoring“ charging function [Off]: Deactivates the function [On]: Activates the function
U-low	Undervoltage Threshold *[0 ... Device-U-max] V*

8.8. Overvoltage-Current

When the overvoltage monitoring is activated, the voltage is monitored throughout the entire charging process. If the voltage rises above the set overvoltage threshold (***U-high***), the device switches to operating state ***25: Overvoltage (U-meas > U-high)***.

Display	Description / Value Range
Overvoltage monitoring	Activation / Deactivation of the „Overvoltage monitoring“ charging function [Off]: Deactivates the function [On]: Activates the function
U-high	Overvoltage Threshold *[0 ... Device-U-max] V*

8.9. PowerDown

Note: Depending on any customer-specific delivery requirements, the described parameters may vary or certain modes may not be available. For any questions regarding your configuration, please contact Deutronic Elektronik GmbH or one of our global service partners.

If the PowerDown function is active, the **-** button will be replaced by the P-D-button.

Button	Explenation
P-D	Activates the PowerDown function during ongoing operation.

After activating the function by pressing the P-D-button, the output voltage of the device will be reduced to the battery's terminal voltage level, allowing the battery to be disconnected or the process to be ended using the **-**button.

If the output voltage of the device drops to 11 V due to an open battery disconnect switch (including the cable resistance ***R-cable***), the load will be supplied with 11 V. If the battery disconnects switch then closes, the battery can be disconnected from the device, or the process can be ended using the **-**button.

Display	Description / Value Range
PowerDown	Activation / Deactivation of the „PowerDown“ charging option [Off]: Deactivates the function [On]: Activates the function

8.10. LTC

Note: Depending on any customer-specific delivery requirements, the described parameters may vary, or certain modes may not be available. For questions regarding your configuration, please contact Deutronic Elektronik GmbH or one of our global service partners.

The LTC charging option is used for long-term charging and monitoring of vehicles with lead or Li/LFP starter batteries (e.g., in a showroom). In support mode, the device provides power to the vehicle consumers up to the device's power limit and compensates for any charging deficits of the vehicle battery. The charging process is interrupted at calculated intervals. During these monitoring phases, the battery is analyzed, and the parameters for the next charging interval are calculated.

A full charge is load-dependent and therefore cannot be guaranteed. If no battery is connected to the device, load detection is active.

When the charging clamps of the device are connected to a battery with a voltage within the predefined range, the charging process starts after the power-on delay (***t-del***) has passed. Battery voltages outside the predefined ranges are signaled either as "Battery voltage too low" or "Battery full."

At the end of each charging cycle, the monitoring phase starts. During monitoring, the battery state is signaled. Depending on the duration of a monitoring phase, the parameters for the subsequent charging cycle are calculated.

Display	Description / Value Range
LTC	Activation / Deactivation of the "LTC" Charging Option [Off]: Deactivates the function [On]: Activates the function
Chemistry	Selection of the Battery Chemistry [Pb]: Lead [LiFePO4]: Lithium-Iron-Phosphate
t-del	Power-on Delay *[0 ... 255] sec* The power-on delay applies both during normal startup and when started via an external control.
I-max	LTC-Current Limit *[0 ... Device-I-max] A*
I-min	LTC-Current Limit *[0 ... Device-I-max] A*
Q-check	Maximum Charge Amount per Cycle *[0 ... 50] Ah*
t-check	Maximum Charging Time per Cycle *[0 ... 7200] sec*
U-max	Maximum Battery Voltage *[10,0 ... 14,8] V*
U-min	Minimum Battery Voltage *[0,0 ... 14,8] V*
U-out1	Charging Voltage 1 *[10,0 ... 14,8] V*
U-out2	Charging Voltage 2 *[10,0 ... 14,8] V*
U-checkbase1	Reconnection Voltage 1 after the monitoring Phase *[10,0 ... 14,8] V*
U-checkbase2	Reconnection Voltage 2 after the monitoring Phase *[10,0 ... 14,8] V*
Undervoltage monitoring	Activation/Deactivation of the „Undervoltage monitoring“ charging function [Off]: Deactivates the function [On]: Activates the function
U-low	Undervoltage Threshold *[0 ... Device-U-max] V*
Overvoltage monitoring	Activation/Deactivation of the „Overvoltage monitoring“ charging function [Off]: Deactivates the function [On]: Activates the function
U-high	Overvoltage Threshold *[0 ... Device-U-max] V*

9. Mode: PS

The „PS-Mode“ („Power Supply mode“) is used for supplying power to vehicle electrical systems when the vehicle's starter battery is disconnected. This means the device takes over the supply of vehicle consumers in backup operation up to the device's power limit.

If no valid load is detected, the device is in load detection mode. When a valid voltage or load is detected for several seconds (on-delay time ***t-del***), the power supply begins.

During the supply, special safety timers, ***State t-max*** and ***State Q-max***, monitor the supply amount ***Q-max*** and the supply time ***t-max***. If one of the safety thresholds is reached, the device behaves according to the configuration. For example, this could cause the output current to be switched off (or no reaction 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.

Display	Description / Value Range
Password lock	Password-protected selection in the mode line [Off]: No password lock set [On]: Password lock active
t-del	Power-on delay [0 ... 255] sec The power-on delay applies both during normal start and when starting via an external control.
U-out	PS-Mode-Voltage [0 ... Device-U-max] V
I-max	PS-Mode-Current limit [0 ... Device-I-max] A
State t-max	State t-max, PS-Mode [Off]: Safety limit disabled [On]: [End: OFF, I=0A]
t-max	Max. Charging time [0 ... 255] h
State Q-max	State Q-max, PS-Mode [Off]: Safety limit disabled [On]: [End: OFF, I=0A]
Q-max	Max. transferred capacity [0 … 6000] Ah

Note: The device features intelligent temperature regulation. If the charger temperature exceeds a predefined value, the output current will be reduced or the device may be shut down.

9.1. Time Periode Function

The time periode function (short: tp function) is used for current monitoring. If the current exceeds the tp current threshold (***tp-limit***), the timer ***tp-t1*** is started. If the current falls back below the threshold, the timer is reset and will only restart when the ***tp-limit*** threshold is exceeded again.

If the current remains above the ***tp-limit*** threshold for the duration of ***tp-t1***, the current will either be limited to the ***tp-limit*** threshold or turned off, depending on the configuration of ***tp-t2***.

Display	Description / Value Range
tp-Current monitoring	Activation / Deactivation of the "tp current monitoring" option [Off]: Deactivates the function [On]: Activates the function
tp-limit	tp-current Threshold [0 ... ***I-max***] A
tp-t1	tp-timer1 [0 ... 1000] s
tp-t2	tp-timer2 [0] s OFF [Ende: OFF, I=0A] [1...1000] s ON

9.2. dP-Lock-Function

For output currents greater than the monitoring limit ***I-limit*** set by the dP-Lock function, an energy equivalent is calculated. When the continuously calculated value reaches the shutdown threshold, the device switches to operational state ***49: dP-Lock reached***. Depending on the ***reset*** parameter, the safety shutdown can be cleared.

Display	Description / Value Range
dP-lock Function	Activation / Deactivation of the dp-Lock Function [Off]: Deactivates the function [On]: Activates the function
Reset	Reset of the dP-Critical Safety Shutdown [0]: No reset (Default) [1]: Reset on Remote On/Off [2]: Reset on disconnection, Start/Stop button, Remote On/Off, and via command OUT:RUN,0
t-dP-Lock	Time value dP-Lock shutdown threshold *[1 … 300] s* Used for the calculation of the dP-Lock shutdown threshold.
I-limit	Limit Current value *[0 … **I-max**] A* Current value at which the counter of the dP-Lock function starts incrementing.

9.3. Undervoltage Monitoring

When the undervoltage monitoring is activated, the voltage is monitored throughout the entire supply. If the voltage falls below the set undervoltage threshold ***U-low***, the device switches to operating state ***12: Undervoltage at the output***.

Display	Description / Value Range
Undervoltage monitoring	Activation/Deactivation of the „Undervoltage monitoring“ charging function [Off]: Deactivates the function [On]: Activates the function
U-low	Undervoltage threshold [0 ... Device-I-max] *V*

9.4. Overvoltage Monitoring

When the overvoltage monitoring is activated, the voltage is monitored throughout the supply process. If the voltage exceeds the set overvoltage threshold ***U-high***, the device switches to operating state ***25: Overvoltage (U-meas > U-High)***.

Display	Description / Value Range
Overvoltage monitoring	Activation/Deactivation of the „Overvoltage monitoring“ charging function [Off]: Deactivates the function [On]: Activates the function
U-high	Overvoltage threshold [0 ... Device-I-max] V

10. Mode: PowerUp

Note: Depending on any customer-specific delivery requirements, the described parameters may vary or some modes may not be available. If you have questions about your configuration, please contact Deutronic Elektronik GmbH or one of our global service partners.

The PowerUp is a time-limited process that attempts to raise batteries with terminal voltages below the turn-on voltage ***U-min*** to a terminal voltage greater than the turn-on voltage ***U-min***. After a successful PowerUp, the terminal voltage of the battery is higher than the customer-specific defined turn-on voltage ***U-min***, allowing one of the charging programs to be used.

Furthermore, in the case of lithium iron phosphate (LiFePO4) batteries, it may occur under certain circumstances (e.g., deep discharge, etc.) that the battery's integrated battery management system opens a disconnect switch to protect the battery. The PowerUp function can be used to close the disconnect switch again, restoring the functionality of the battery (provided that the internal battery electronics allow it).

In the first PowerUp phase, the battery is supplied with the PowerUp voltage ***U-out*** for the duration of ***t-check***. During this period, output currents below the minimum current limit ***I-min*** are allowed. If the measured current falls below the minimum current intake ***I-min*** after the load test ***t-check***, or if the measured clamp voltage is smaller than ***U-sup-min***, the PowerUp process is aborted and an error message is displayed.

Subsequently, the actual PowerUp takes place. During the charging time ***t-sup***, the current must not drop below the minimum current limit ***I-min***.

Finally, the battery terminal voltage is monitored for approximately 30 seconds without power from the device and compared to the target voltage ***U-mon***. If the test is successful, the device switches to operating state ***07: Ready/Standby*** or into a defined charging program, depending on the ***AutoCharge*** parameter.

Display	Description / Value Range
Password lock	Password-protected selection in the mode line [Off]: No password lock set [On]: Password lock active
AutoCharge	Behavior after PowerUp [0] Transition to Standby [x] Switch to one of the charging programs
t-del	Power-on delay [0 ... 255] sec The power-on delay applies both during normal start and when starting via an external control.
t-check	Duration of Load Test [30 … 120] s After this duration, a voltage and current test will take place.
U-sup-min	Minimal Voltage limit [0 ... 15,5] V Required minimum voltage of the connected battery – defines the voltage threshold that must be exceeded by the battery after the load test.

Display	Description / Value Range
U-min	Target Voltage Limit [0 ... 15,5] V Required minimum voltage of the connected battery – defines the voltage threshold that must be exceeded by the battery after the supply time.
U-out	PowerUp-Voltage [***U-min_pwu*** ... 15,5] V The output voltage level should be selected such that any connected consumers can be adequately supplied.
I-min	Minimal Current Limit [0 … *Device-I-max*] A If the current value drops below this value after the load test, an error will be signaled and the PowerUp will be aborted.
I-max	Current Limit [***I-min*** ... *Device-I-max*] A The maximum possible value depends on the power class of the device (for more details, see the datasheet).
t-sup	Maximum supply time [60 … 3600] s The duration for the supply time of the PowerUp.

Note: During the PowerUp, all parallel consumers of the vehicle (ignition, low beam, etc.) must be deactivated. If deactivating the parallel consumers is not possible, the PowerUp should be performed in stand-alone operation (disconnect the battery from the vehicle).

Warning: For safety reasons, the PowerUp should not be performed consecutively on the same battery.

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11. Symbol Overview

Note: Depending on any customer-specific delivery requirements, the parameters described may vary or certain modes may not be available. For questions regarding your configuration, please contact Deutronic Elektronik GmbH or one of our global service partners.

General

Symbol	Meaning	Note / Resolution
	User error	Pay attention to the state bar on the main screen! See Chapter 12.
	Warning	Pay attention to the state bar on the main screen! See Chapter 12.
	Overtemperature	The device detects overheating during operation – dynamic power and temperature control is active. The device operates with reduced power.

PS-Mode

Symbol	Meaning	Note / Resolution
	PS-Mode active	PS-Mode is active.

Charging program

Symbol	Meaning	Note / Resolution
	Battery is being charged	The selected charging program is active.
	Maintenance charging active	The selected charging program is in the maintenance charging state.

Charging program – LTC (See Chapter 8.10)

Symbol	Meaning	Note / Resolution
	Battery empty	Battery state during the LTC test.
	Battery half full	Battery state during the LTC test.
	Battery full	Battery state during the LTC test.

12. Operating States

Note: Depending on any customer-specific delivery requirements, the described parameters may differ or some modes may not be available. For questions about your configuration, please contact Deutronic Elektronik GmbH or one of our worldwide service partners.

00: Startup delay	
Meaning	A valid load has been detected
Reaction / Remediation	The supply or charging process is being prepared.

01: Cable compensation	
Meaning	The cable compensation has started.
Reaction / Remediation	The determination of the cable compensation is active.

03: Pb Charge	
Meaning	The charging process for Pb batteries is active.
Reaction / Remediation	A Pb battery is being charged.

04: Pb Trickle charge	
Meaning	The output current is lower than the maintenance charging current ***I-tri***.
Reaction / Remediation	The charging process is complete, and the output voltage is reduced. The battery can be removed.

05: Pb Recharge	
Meaning	If, in operating state ***04: Pb-Trickle Charge***, the consumer draws a current greater than the recharge threshold (***I-tri + I-re***), the device will be switched back to (re)charging operation.
Reaction / Remediation	The output voltage will be set back to the charging voltage ***U-charge***. If necessary, any additional consumers (e.g., lights, ignition, turn signals, etc.) must be turned off.

06: Supply	
Meaning	The PS-Mode (Power Supply Mode) is active.
Reaction / Remediation	A resistive load (e.g., vehicle electrical system, etc.) is supplied with the output voltage ***U-out*** and up to a maximum current ***I-max***.

07: Ready/Standby	
Meaning	The device is in standby (ready) mode.
Reaction / Remediation	By selecting the -button, the mode selected on the main screen is activated.

08: Charge limit (Q-max)	
Meaning	The charging process was canceled after the set limit ***Q-max*** was reached.
Reaction / Remediation	The device has interrupted the power supply to the connected battery and is in an error state.

08: Charge limit (Q-max)	
	It is possible that too low a value was set for the battery capacity. To fully charge the battery, the ***Q-max*** threshold for the charging process should be set approximately 20% higher than the nominal battery capacity specified by the manufacturer. The cause for reaching the safety threshold may also be additional parallel loads (e.g., lights, ignition, navigation/multimedia systems, etc.). If the ***Q-max*** threshold is correctly set and no parallel loads are active, the battery should be checked, as a defect may be present.

09: Check battery	
Meaning	After the second ***BAT-CHECK***, the charging process was interrupted.
Reaction / Remediation	The device has stopped supplying power to the connected battery and is in an error state. The cause for reaching the safety threshold may be additional parallel loads (e.g., lights, ignition, navigation/multimedia systems, etc.). If no parallel loads are active, the battery should be checked, as a defect may be present.

10: Maximum charge time (t-max)	
Meaning	The charging process was interrupted after the set threshold ***t-max*** was reached.
Reaction / Remediation	Was a wrong mode or a too low threshold ***t-max*** chosen? The cause for reaching the safety threshold could be additional parallel consumers (e.g. lights, ignition, navigation/multimedia systems, etc.). If no parallel consumers are active, the battery should be checked, as it may be defective.

11: tp-timer limit	
Meaning	The charging process was interrupted after the current exceeded ***tp-limit*** over the period of ***tp-t1*** with the tp function activated.
Reaction / Remediation	The cause for reaching the safety threshold could be additional parallel consumers (e.g., lights, ignition, navigation/multimedia systems, etc.). If no parallel consumers are active, the battery should be checked as there may be a defect.

12: Low output voltage detected (U-meas < U-low)	
Meaning	The charging process was interrupted after the measured output voltage dropped below ***U-low*** with ***undervoltage monitoring*** activated.

12: Low output voltage detected (U-meas < U-low)	
Reaction / Remediation	All connected consumers should be checked for faults. Additionally, it should be verified whether the voltage threshold ***U-low*** and the battery type ***Chemistry*** have been correctly selected.

13: No load detected	
Meaning	The device checks for the connection of a battery or resistive load. The selected mode has been started, or the battery or resistive load has been disconnected. The automatic load detection is active.
Reaction / Remediation	To start the selected mode, a battery or load must be connected. All connected consumers should be checked for faults. Is an external power source connected, or has the wrong battery type been parameterized? Additionally, the output cables should be checked for defects (connection to the load/battery).

14: Wrong Polarity detected	
Meaning	A battery was connected to the device with reversed polarity.
Reaction / Remediation	The battery should be disconnected again. Then, the black clamp should be connected to the negative (ground) terminal, and the red clamp to the positive (charging point) terminal.

15: Relay-voltage not adjusted	
Meaning	The internal voltage could not be adjusted to the external voltage.
Reaction / Remediation	Contact Service.

16: External Voltage too high (U-meas > Uout + 1V)	
Meaning	The device measures a voltage at the output that is at least 1 volt higher than the predefined value for the respective mode.
Reaction / Remediation	Check the connected consumers for faults (e.g., wrong battery type or external power source). Select STOP on the main screen – in standby mode, the externally applied voltage will be measured and displayed.

17: Batterie voltage too low (U-meas < U-min)	
Meaning	The applied voltage is below the configured switch-on voltage ***U-min*** of the selected charging mode.
Reaction / Remediation	Was a wrong mode or too low a switch-on voltage ***U-min*** selected? The cause for reaching the safety threshold may also be additional parallel consumers (e.g., lights, ignition, navigation/multimedia systems, etc.). If no parallel consumers are active, the battery should be checked, as it may be defective.

18: Short circuit	
Meaning	The output current has exceeded the respective maximum current.
Reaction / Remediation	The load and output cables should be checked for damage.

19: RemoteOff	
Meaning	The charging or supply process has been interrupted by RemoteOFF.
Reaction / Remediation	This state will remain until the RemoteOFF command is reversed.

20: BAT-CHECK active	
Meaning	The charging process was interrupted with the ***BAT-CHECK*** option activated, and the battery check has started.
Reaction / Remediation	The connected battery is being tested. After a maximum of 30 seconds, the charging process will continue.

23: Trickle charge Pb after Ah limit	
Meaning	The charging process was interrupted, and the transition to maintenance charging was made (reduced charging voltage ***U-tri***) after the pre-set limit ***Q-max*** was reached.
Reaction / Remediation	It is possible that too low a value was set for the battery capacity. To fully charge the battery, the ***Q-max*** limit for the charging process should be set about 20% higher than the nominal battery capacity specified by the manufacturer. The cause for reaching the safety threshold could be additional parallel consumers (e.g., lights, ignition, navigation/multimedia systems, etc.). If no parallel consumers are active, the battery should be checked, as there may be a defect.

24: Trickle charge Pb after Tmax limit	
Meaning	The charging process was interrupted, and the transition to maintenance charging (reduced charging voltage ***U-tri***) was made after the preset threshold ***t-max*** was reached.
Reaction / Remediation	The cause for reaching the safety threshold could be additional parallel consumers (e.g., lights, ignition, navigation/multimedia systems, etc.). If no parallel consumers are active, the battery should be checked as there may be a defect.

25: External Voltage too high (U-meas > U-High)	
Meaning	The charging process was aborted after the measured voltage at the output exceeded the limit ***U-high*** with the ***overvoltage monitoring*** activated.
Reaction / Remediation	All connected consumers should be checked for errors. Is an external power source connected? Additionally, verify if the voltage threshold ***U-high*** and the battery type ***Chemistry*** are correctly selected.

26: Battery charged (LTC)	
Meaning	The end of a charging cycle has been reached.
Reaction / Remediation	The battery monitoring has started. During the monitoring, the battery state is indicated. Depending on the duration of a monitoring phase, the parameters for the subsequent charging cycle are calculated.

29: Li-Charge	
Meaning	The charging process for Li batteries is active.
Reaction / Remediation	The connected Li battery is being charged.

30: Li-Trickle charge	
Meaning	The output current is lower than the maintenance charge current ***I-tri***.
Reaction / Remediation	The charging process is complete, and the output voltage is reduced. The battery can be removed.

31: Li-Recharge	
Meaning	In operating state ***30: Li-Maintenance Charging***, if the consumer draws a current greater than the recharge threshold (***I-tri + I-re***), the device will return to the (re-)charging operation.
Reaction / Remediation	The output voltage will be reset to the charging voltage ***U-charge***. If necessary, any additional consumers (e.g., lights, ignition, turn signals, etc.) should be turned off.

34: PowerUp	
Meaning	The „ PowerUp“ has been started.
Reaction / Remediation	The PowerUp is active.

35: Battery detect	
Meaning	A charging program with activated ***Detect*** has been started.
Reaction / Remediation	The automatic battery detection is active.

44: Hold mode	
Meaning	With the ***HOLD / BUFFER*** option activated, a voltage greater than the buffer limit voltage ***U-buf*** was applied.
Reaction / Remediation	The HOLD time has elapsed, followed by a buffer attempt or voltage reduction.

45: Buffer-Mode	
Meaning	If, during the operation state ***44: Hold***, a voltage greater than the buffer limit voltage ***U-buf*** is applied for the entire duration ***t-wait***, the device switches to this operating state and takes over the supply.

45: Buffer-Mode	
Reaction / Remediation	If the limit current ***I-buf*** is undershot, the device will restart, depending on the terminal voltage, either with ***44: Hold*** or the selected charging program.

46: Charge limit (Q-max) buffer-mode	
Meaning	The charging process was interrupted during operation state ***45: Buffer mode*** after the set limit value *Q-max* was reached.
Reaction / Remediation	The device has interrupted the power supply and is in an error state. It is possible that a too low value has been set for the battery capacity. For a full charge of the battery, the ***Q-max*** limit for the charging process should be set approximately 20% higher than the manufacturer's nominal battery capacity. The cause for reaching the safety threshold could also be additional parallel consumers (e.g., lights, ignition, navigation/multimedia systems, etc.). If the ***Q-max*** limit is correctly set and no parallel consumers are active, the battery should be checked, as there may be a defect.

47: Maximum charge time (t-max) buffer-mode	
Meaning	The charging process was interrupted during operating state ***45: Buffer mode*** after the set limit ***t-max*** was reached.
Reaction / Remediation	Was a wrong mode or too low a limit ***t-max*** selected? The cause for reaching the safety threshold could be additional parallel consumers (e.g., lights, ignition, navigation/multimedia systems, etc.). If no parallel consumers are active, the battery should be checked as it may be defective.

48: Iout < I-min	
Meaning	The PowerUp was aborted because the minimum current ***I-min*** was not reached.
Reaction / Remediation	The connected battery has only drawn current below the predefined limit. One of the charging programs should be selected for a possible full charge.

49: dP-Lock	
Meaning	The output current was above the parameterized current limit ***I-limit*** for a corresponding time with the ***dP-lock function*** enabled.
Reaction / Remediation	Depending on the ***reset*** configuration, this operating state can be reset.

49: dP-Lock	
	The cause for reaching the safety threshold could be additional parallel consumers (e.g., lights, ignition, navigation/multimedia systems, etc.).

50: Process end after exceeding QEND	
Meaning	The charging process was aborted after the set threshold ***Q-end*** was reached.
Reaction / Remediation	Was a wrong mode or a too low threshold ***Q-end*** selected? The battery capacity might have been set too low. For a complete charge of the battery, the threshold ***Q-end*** should be set about 30% higher than the value specified by the manufacturer for the nominal battery capacity. The cause for reaching the safety threshold may also be additional parallel consumers (e.g., lights, ignition, navigation/multimedia systems, etc.). If no parallel consumers are active, the battery should be checked, as there may be a defect.

51: Process end after exceeding TEND	
Meaning	The charging process was interrupted after the set threshold ***t-end*** was reached.
Reaction / Remediation	Was a wrong mode or a too low threshold ***t-end*** selected? The cause for reaching the safety threshold could be additional parallel consumers (e.g., lights, ignition, navigation/multimedia systems, etc.). If no parallel consumers are active, the battery should be checked, as a defect may be present.

59: Switch-off after charge limit supply (Q-max)	
Meaning	The supply was interrupted after the set threshold ***Q-max*** was reached.
Reaction / Remediation	Was a too low threshold ***Q-max*** chosen? The cause for reaching the safety threshold could be additional parallel consumers (e.g., lights, ignition, navigation/multimedia systems, etc.).

60: Switch-off after time limit supply (t-max)	
Meaning	The supply was interrupted after the set limit ***t-max*** was reached.
Reaction / Remediation	Was a too low limit ***t-max*** selected?

60: Switch-off after time limit supply (t-max)	
	The cause for reaching the safety threshold could be additional parallel consumers (e.g., lights, ignition, navigation/multimedia systems, etc.).

61: Pb charge mode (LTC)	
Meaning	A charging program with the activated charging option ***LTC*** and battery chemistry Pb has been started.
Reaction / Remediation	The battery to be monitored is being supplied.

62: U-clamp < U-sup-min	
Meaning	The PowerUp was aborted because the measured voltage after the load test is below the set minimum voltage ***U-sup-min*** (Note: The duration of the test depends on the parameter setting ***t-check***).
Reaction / Remediation	The cause for reaching this could be additional parallel consumers (e.g., lights, ignition, navigation/multimedia systems, etc.). **Note**: During the PowerUp, all parallel consumers of the vehicle must be deactivated. If deactivation of the parallel consumers is not possible, the PowerUp should be carried out in standalone operation (disconnect the battery from the vehicle). If no parallel consumers are active, the battery should be checked, as there may be a defect.

63: U-meas < U-pwu-mon	
Meaning	The PowerUp was aborted because the measured voltage after the supply time was below the set minimum voltage ***U-mon*** (Note: The supply duration depends on the ***t-sup*** parameterization).
Reaction / Remediation	The cause for reaching the threshold could be additional parallel consumers (e.g., lights, ignition, navigation/multimedia systems, etc.). **Note**: During the PowerUp, all parallel consumers of the vehicle must be deactivated. If deactivation of the parallel consumers is not possible, the PowerUp should be performed in stand-alone mode (disconnect the battery from the vehicle). If no parallel consumers are active, the battery should be checked, as there may be a defect.

64: Pulsed short circuit active	
Meaning	With the pulsing short-circuit limitation ***U-Short*** set, the supply was interrupted after the output voltage dropped below ***U-Short***.
Reaction / Remediation	The load and output cables should be checked for damage.

64: Pulsed short circuit active	
	After the time interval ***t-Short***, a new connection attempt ***C-Short*** will be made to check whether the load can be supplied or if the short-circuit/overload condition persists.

65: Battery charged	
Meaning	With the active charging function ***BFL***, the output current has fallen below the BFL current limit ***I-bfl***.
Reaction / Remediation	The connected battery continues to be charged.

66: Bat-Monitoring (LTC) - Pb – battery discharged	
Meaning	The LTC charging Pb was interrupted for a battery test. Based on the current voltage level, the battery is considered discharged.
Reaction / Remediation	The next charging cycle is currently being prepared.

67: Bat-Monitoring (LTC) - Pb – battery semi charged	
Meaning	The LTC charging for Pb has been interrupted for a battery check. According to the current voltage level, the battery is half full.
Reaction / Remediation	The next charging cycle is currently being prepared.

68: Bat-Monitoring (LTC) - Pb – battery charged	
Meaning	The LTC charging for Pb has been interrupted for a battery check. According to the current voltage level, the battery is full.
Reaction / Remediation	The next charging cycle is currently being prepared.

69: Power-Down Active	
Meaning	The PowerDown button was pressed while the ***PowerDown*** charging option was activated.
Reaction / Remediation	The PowerDown is active.

70: Power-Down End	
Meaning	The PowerDown is finished.
Reaction / Remediation	The connected battery can be disconnected, or the STOP button can be pressed.

71: Li charge mode (LTC)	
Meaning	A charging program with the activated charging option LTC and battery chemistry LiFePO4 has been started.
Reaction / Remediation	The battery being monitored is being supplied.

72: Bat-Monitoring (LTC) - Li – battery discharged	
Meaning	The LTC-charging-Li was interrupted for a battery check. According to the current voltage, the battery is considered empty.
Reaction / Remediation	The next charging cycle is being prepared.

73: Bat-Monitoring (LTC) - Li – battery semi charged	
Meaning	The LTC-charging-Li has been interrupted for a battery check. Based on the current voltage level, the battery is half full.
Reaction / Remediation	The next charging cycle is currently being prepared.

74: Bat-Monitoring (LTC) - Li – battery charged	
Meaning	The LTC-charging-Li has been interrupted for a battery check. According to the current voltage level, the battery is considered full.
Reaction / Remediation	The next charging cycle is being prepared.

75: Standard-Mode-Charging	
Meaning	The charging program defined as SMODE has been started (SMODE active).
Reaction / Remediation	The charging process is active.

76: Standard-Mode-Maintenance Charging	
Meaning	The output current in standard mode is lower than the maintenance charging current ***I-tri***.
Reaction / Remediation	The charging process is complete, and the output voltage has been reduced. The battery can be removed.

77: Standard-Mode-Recharging	
Meaning	If the consumer draws a current greater than the recharge threshold (***I-tri + I-re***), the device will switch back to the charging mode.
Reaction / Remediation	The output voltage is reset to the charging voltage (***U-charge***). If necessary, any additional consumers (e.g., lights, ignition, turn signals, etc.) should be switched off.

78: Uhigh detect	
Meaning	During the Detect phase, the output voltage exceeded a safety threshold.
Reaction / Remediation	All connected consumers should be checked for faults. Is an external power source connected?

79: Automode active	
Meaning	The ***Automode*** function is active.
Reaction / Remediation	The device automatically detects whether it is a resistive load or a battery.

80: Initialization	
Meaning	The MPC9 device is currently being initialized.
Reaction / Remediation	The device is performing an internal check after power-up.

85: Setup wizard	
Meaning	The startup assistant is active.

85: Setup wizard	
Reaction / Remediation	The startup assistant supports the device setup (see Chapter 4).

13. Device Error

13.1. Error Code [200 – 209] EEPROM

Note: If any of these errors occur with your device, please contact Deutronic Elektronik GmbH or one of our global service partners.

13.2. Error Code [210 – 229] SD-card

Note: If any of these errors occur with your device, please contact Deutronic Elektronik GmbH or one of our global service partners.

13.3. Error Code [230 – 239] Bootloader

Note: If any of these errors occur with your device, please contact Deutronic Elektronik GmbH or one of our global service partners.

13.4. Error Code [240 – 249] Initialization

Note: If any of these errors occur with your device, please contact Deutronic Elektronik GmbH or one of our global service partners.

13.5. Error Code [250 – 259] Power stage

Note: If any of these errors occur with your device, please contact Deutronic Elektronik GmbH or one of our global service partners.

13.6. Error Code [260 – 269] Ethernet / WLAN

260 ETH / WLAN: Ethernet / WLAN timeout	
Meaning	The timeout period during communication with the interface has been exceeded.
Reaction / Remediation	If an INFO or WARNING message appears, close it. The communication with the interface will be automatically restarted. If the error persists, please contact Deutronic Elektronik GmbH or one of our global service partners.

261 ETH / WLAN: Ethernet / WLAN interface is Master – Master error	
Meaning	The interface is in an error state.
Reaction / Remediation	If only an INFO or WARNING appears, close it. The communication with the interface will automatically restart afterwards. If the error persists, please contact Deutronic Elektronik GmbH or one of our global service partners.

13.7. [270 – 279] USB-A

270 USB-A: Overcurrent	
Meaning	An overload of the USB interface has been detected
Reaction / Remediation	Ports USB1 and USB2 supply a maximum of 500 mA. USB3 port supplies a maximum of 1000 mA. If an INFO or WARNING appears, close it. In case of an error, restart the device with the connected adapter. If the error persists, please contact Deutronic Elektronik GmbH or one of our global service partners.

271 Write error Meas-Diag	
Meaning	A data recording error occurred on the thumb drive.
Reaction / Remediation	Stop the data recording and restart it. If the error persists, please contact Deutronic Elektronik GmbH or one of our global service partners.

Note: If any of these errors occur with your device, please contact Deutronic Elektronik GmbH or one of our global service partners.

13.8. [280 – 289] RetroFit

280 RetroFit-Adaptor: communication problem - watchdog timeout	
Meaning	The timeout period during communication with the RetroFit adapter has been exceeded.
Reaction / Remediation	If an INFO or WARNING appears, close it. Communication with the RetroFit adapter will then automatically restart. If the error persists, please contact Deutronic Elektronik GmbH or one of our global service partners.

281 RetroFit-Adaptor: RetroFit-Adapter is master – error of the master	
Meaning	The RetroFit adapter is in a fault state.
Reaction / Remediation	If only an INFO or WARNING appears, close it. Communication with the RetroFit adapter will then automatically restart. If the error persists, please contact Deutronic Elektronik GmbH or one of our global service partners.

282 RetroFit-Adaptor: Adapter is connected to the wrong USB Port	
Meaning	The adapter was connected to the wrong port.
Reaction / Remediation	Remove the RetroFit adapter and connect it to the designated USB 3 port.

284 RetroFit-Adaptor: Master Retrofit-Adaptor is missing.	
Meaning	The MPC9 device expects a RetroFit adapter as the controlling adapter (Master).

284 RetroFit-Adaptor: Master Retrofit-Adaptor is missing.	
Reaction / Remediation	Attach the RetroFit adapter to the device or select a different master via the configuration menu. If a RetroFit adapter is already connected but not recognized, please contact Deutronic Elektronik GmbH or one of our global service partners.

285 RetroFit-Adapter: INIT error	
Meaning	An error occurred during the initialization of the RetroFit adapter.
Reaction / Remediation	If only an INFO or WARNING appears, close it. Communication with the RetroFit adapter will automatically restart afterward. If the error persists, please contact Deutronic Elektronik GmbH or one of our global service partners.

286 RetroFit-Adapter: communication error with RetroFit (RetroFit is not the Master)	
Meaning	The RetroFit adapter is in an error state.
Reaction / Remediation	If an INFO or WARNING appears, close it. The communication with the RetroFit adapter will automatically restart afterward. If the error persists, please contact Deutronic Elektronik GmbH or one of our worldwide service partners.

13.9. [290 – 299] Signal indicator

290 Signal Indicator: communication problem - watchdog timeout	
Meaning	The timeout period during communication with the signal indicator has been exceeded.
Reaction / Remediation	If only an INFO or WARNING appears, close it. The communication with the signal indicator will then automatically restart. If the error persists, please contact Deutronic Elektronik GmbH or one of our global service partners.

291 Signal Indicator: More than one signal indicator detected.	
Meaning	More than one signal indicator has been connected to the MPC9 device.
Reaction / Remediation	Please remove the newly connected signal indicator.

292 Signal Indicator: INIT error	
Meaning	An error occurred during the initialization of the signal indicator.
Reaction / Remediation	If only an INFO or WARNING appears, close it. The communication with the signal indicator will be automatically restarted. If the error persists, please contact Deutronic Elektronik GmbH or one of our global service partners.

293 Signal Indicator: State error	
Meaning	The signal indicator has detected an internal error.
Reaction / Remediation	If only an INFO or WARNING appears, close it. The communication with the signal indicator will be automatically restarted. If the error persists, please contact Deutronic Elektronik GmbH or one of our global service partners.

14. Service Center / Repairs

Please observe the following notes:

- Do not open the device!
- All connections and adjustment elements required for operation are accessible from the outside.

To ensure a quick and smooth processing, a completed repair return form (*Return Service Scripture*) must be included with each device sent in. The form should contain detailed relevant information (e.g., address, contact person's name, phone number, etc.), as well as a detailed description of the issue.

You can find the required repair return form and the addresses of our global service partners on our website at **www.deutronic.com** under the section **>> SERVICE & SUPPORT <<**

15. DISCLAIMER

The customer is responsible for the proper use of the device. Deutronic cannot be held liable for damages of any kind resulting from its use.

16. CONTACT INFORMATION

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