ELTEK VALERE
always on

DC Controller
UPC4 Master

USER MANUAL

UM_UPC4_V2.00_E_R1.1_2011-01-04

Notes to this manual

ATTENTION! Read this manual carefully before installing and commissioning the specified unit. This manual is a part of the delivered unit. Familiarity with the contents of this manual is required for installing and operating the specified unit.
The rules for prevention of accidents for the specific country and the general safety rules in accordance with IEC 364 must be observed.

The function description in this manual corresponds to the date of publishing.
Technical changes and changes in form and content can be made at any time by the manufacturer without notice. There are no obligations to update the manual continually.

The unit is manufactured in accordance with applicable DIN and VDE standards such as VDE 0106 (part 100) and VDE 0100 (part 410). The CE marking on the unit confirms compliance with EU standards 2006-95-EG (low voltage) and 2004-108-EG (electromagnetic compatibility) if the installation and operation instructions are followed.

Supplier:

	ELTEK VALERE DEUTSCHLAND GmbH
	GB Industrial
	Schillerstraße 16
	D-32052 Herford
☎	+ 49 (0) 5221 1708-210
FAX	+ 49 (0) 5221 1708-222
Email	Info.industrial@eltekvalere.com
Internet	http://www.eltekvalere.com

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Changes and errors excepted.

The current revision status of this user manual is the following:

Revision: 1.1

Date: 2010-01-04

Revision	Description of change	Writer	Date
0.0	Translation of the German version; proofreading version	RTH	2010-12-02
1.0	First edition according to the development status of 2010-12-09	RTH	2010-12-09
1.1	Photos replaced, minor text modifications	RTH	2011-01-04

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1 Safety instructions & notes to electronic waste disposal

WARNING!

Because several components of operating electric devices are charged by dangerous voltage, the improper handling of electric devices may cause accidents involving electrocution, injury, or material damages.

- Operation and maintenance of electrical devices must be performed by qualified skilled personnel such as electricians in accordance with EN 50110-1 or IEC 60950.
- Install the device only in areas with limited access to unskilled personnel.
- Before starting work, the device must be disconnected from mains. Make sure that the device is earthed.
- Only spare parts approved by the manufacturer must be used.

The correct disposal of electronic waste is the responsibility to recycle discarded electronic equipment and is necessary to achieve the chosen level to protect human health and the environment.

In the case of waste disposal of your discarded equipment we recommend to contact a professional waste management company.

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2 General description

The new DC controller **UPC4 Master** is an integrated unit for control, monitoring and signaling of battery-backed DC power supply systems. The unit is easy to use and programmable via display panel or RS232/Ethernet interface in combination with PC software. On the basis of a free programmable signal matrix, the customer is able to configure several alarms to groups and which of all the signaling outputs are to be used.

The UPC4 Master is the communication centre of the modular UPC4 structure. The control of the rectifier modules is realized via CAN communication bus. Due to the system wide CAN communication concept each of our power modules such as DC/DC converters, inverters and static bypass switches can additionally be monitored by the UPC4 Master. Additional input and output CAN modules, such as Mains Monitoring Board, Fuse Monitoring Board, Digital Input Board, Relay Board etc. are available. All these extensions are configurable and controlled by the UPC4 Master.

As a special extension module the **Basic-Unit** (BU) is available. It can be placed as close as possible to the measurement point and transmits the measured values digitally via CAN. Due to this, no long measurement wires are necessary. The UPC4 Master is able to support up to eight Basic-Units in the same system.

For remote control PC connection, external modem, SNMP or Modbus (Profibus is planned) can be used.

For the proprietary communication protocol special PC software (Multi Management Tool) for remote monitoring, controlling and parameter setting is available.

For detailed technical data please see section 9 Technical Data UPC4.
For a list of available options please see section 9.1 “Options”.

3 Technical description

3.1 Structure of a modular UPC4 system/block diagram

The following picture schematically shows the structure in principle of a modular CAN bus based UPC4 system.

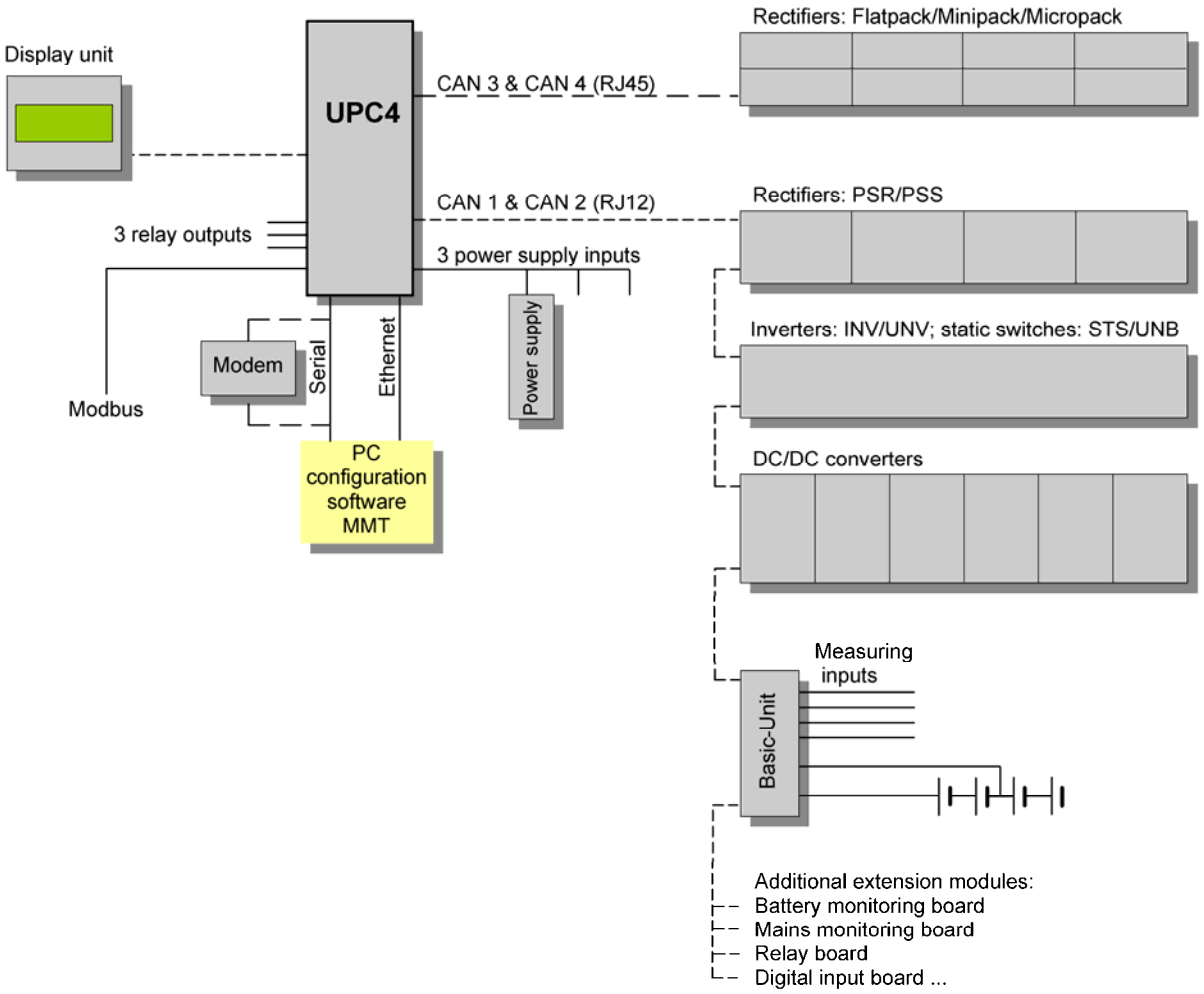


Figure 1. UPC4 system, block diagram

IMPORTANT!	**Rectifiers of series PSR and PSS cannot be operated in combination with rectifiers of series Flatpack, Minipack, Micropack, and Powerpack.**

3.2 Electrical connectors & operating elements

3.2.1 CAN connectors & Ethernet connector

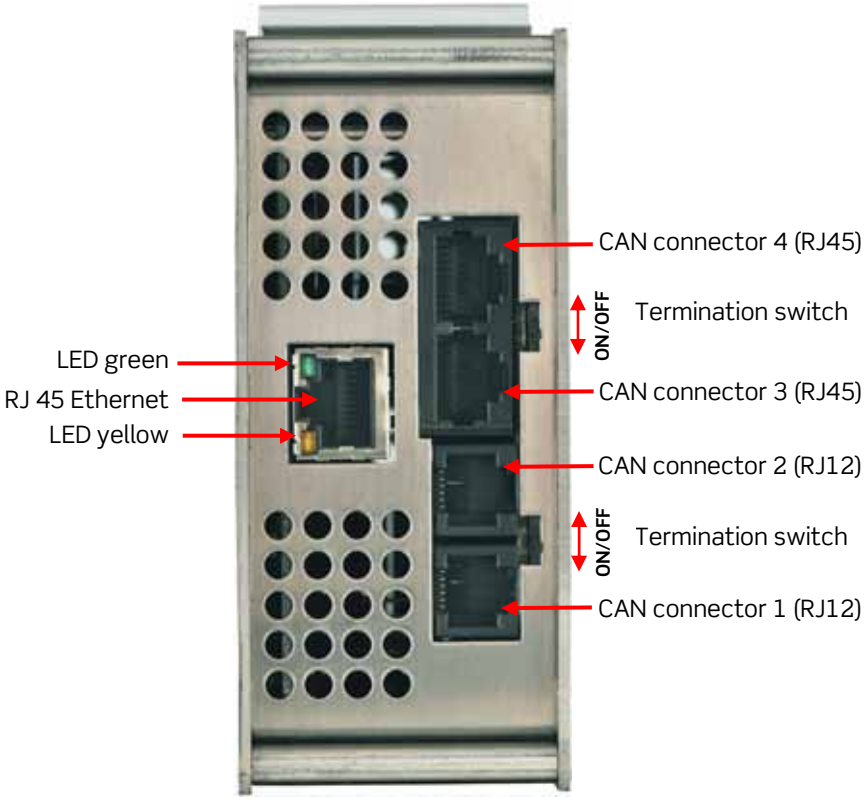


Figure 2. CAN connectors & Ethernet connector

3.2.1.1 Ethernet connector

The UPC4 Master provides one Ethernet connector RJ45 10/100 Mbit.

- LED green: The LED is ON if contact is available.
- LED yellow: The LED is flickering at communication.

IMPORTANT!	***To connect the UPC4 Master to a PC a cross cable must be used.***	☜

INFORMATION:	***For details regarding IP address please see section 5.6 "IP address/network settings".***	☜

3.2.1.2 CAN connectors

(see also section 4.2 "Rectifier monitoring")

The UPC4 Master provides two different CAN bus systems (see also Figure 1.). CAN bus connectors as described in the following are available:

1. **100 kbit/proprietary protocol → two CAN connectors RJ12 (CAN 1 & CAN 2).**

CAN 1 & CAN 2 are designed to connect the following CAN devices (modules):

- Inverters INV & UNV
- Static bypass switches STS & UNB
- Rectifiers PSR & PSS
- DC/DC converters PSC
- Remote control panels RDP & RDD
- Extension modules such as UPC4 Basic Unit BUI, battery monitoring board BMB, mains monitoring board MMB, fuse monitoring board FMB, digital input board DI8, relay board RLB, universal measurement devices UMA & UMB.

2. **125 kbit/proprietary protocol → two CAN connectors RJ45 (CAN 3 & CAN 4).**

CAN 3 & CAN 4 are designed to connect rectifiers of type "Flatpack", "Minipack", "Micropack", and "Powerpack".

3.2.1.3 Termination switches

Both CAN bus systems CAN 1 & 2 and CAN 3 & 4 as well are equipped with CAN bus termination switches as shown in Figure 2.

The CAN-Bus of the system must be terminated at both ends. If the UPC4 Master is used as final CAN node within the system (in this case only one of the CAN connectors CAN 1 or CAN 2 are connected), the termination resistor must be enabled by moving the slide switch (Termination ON/OFF) to ON position.
If the unit is connected between two CAN nodes, the termination resistor must be disabled by moving the slide switch to OFF position.

The same is valid for CAN 3 and CAN 4.

NOTE:	***Missing terminations or too many terminations within the system may disturb the CAN-Bus communication.***	☜

3.2.2 Modem connector/Fieldbus connector/SD card slot/LED indications

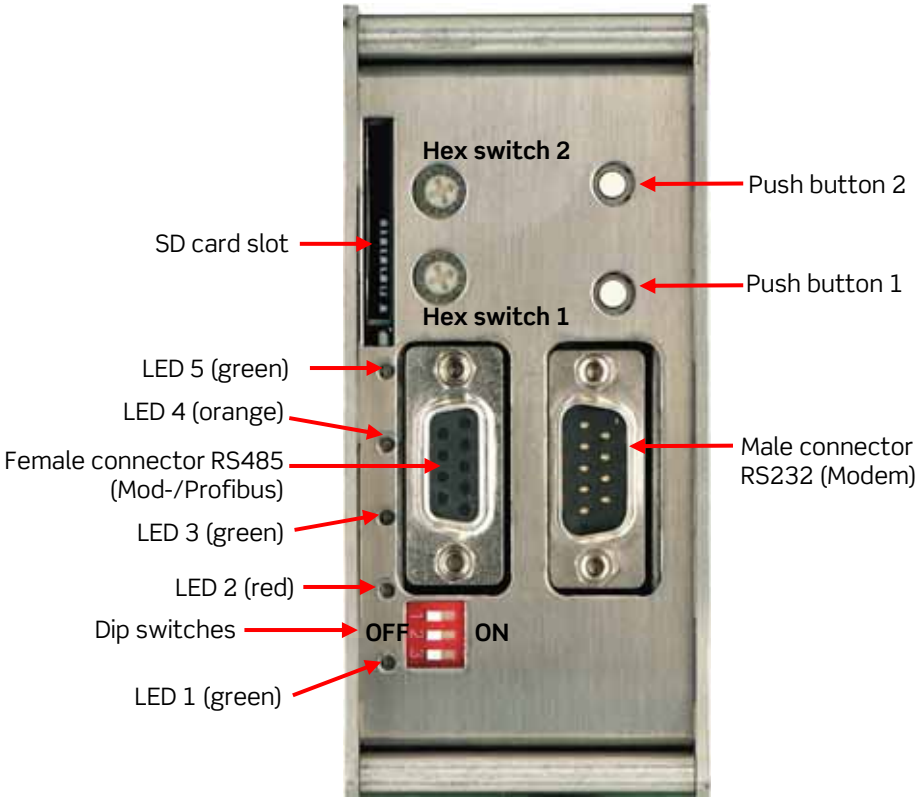


Figure 3. Modem connector/Fieldbus connector/SD card slot/LED indications

3.2.2.1 SD card slot

REMARK: This functionality is not available at version 2.12.

The SD card slot is designed for future extensions.

3.2.2.2 Push buttons 1 & 2

Push button 1

Pressing push button 1 causes release of the SD card (when the SD functionality is supported in the future).

Push button 2 (→ is designed for future use).

3.2.2.3 LED indication

LED 1 to LED 5 (see figure 3.) indicates the status of the UPC4 Master according to the table below.

LED	Colour	Indication of:	
1	green	Operation status OK	During power up procedure of the UPC4 unit the status of LED 1 & 2 is the following: During booting procedure the red LED is ON. After finishing power up the red LED "ALARM" is OFF; the green LED "Operation status OK" is ON.
2	red	ALARM	
3	green	CAN communication (LED is flickering)	
4	orange	Field bus active (LED is flickering)	
5	green	SD card active	

3.2.2.4 Fieldbus connectors

The UPC4 Master provides two different fieldbus connectors:

1.) Fieldbus connector RS485

The female connector RS485 (see Figure 3.) is designed to connect Modbus (Profibus is not available at version 2.12).

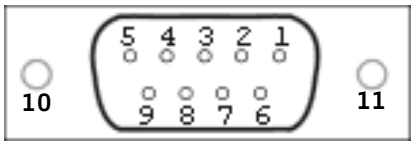


Figure 4. Fieldbus female connector RS485

Pin assignment of the RS485 connector:

Connector	Pin	Function
RS485	1	SHIELD
	2	Not used
	3	LINE B
	4	RTS
	5	GND
	6	+5V
	7	Not used
	8	Line A
	9	Not used
	10 & 11	SHIELD

2.) Fieldbus connector MSTBO 2.5 (X8)

In addition the fieldbus can be also connected to the MSTBO 2.5 connector **(X8)** as shown in Figure 5.
Pin assignment of the MSTB connector:

Connector	Pin	Function
X8 (Modbus)	1	Corresponds to RS485 SHIELD
	2	Corresponds to RS485 LINE A
	3	Corresponds to RS485 LINE B
	4	Corresponds to RS485 GND

3.2.2.5 Hex switch 1 & Hex switch 2

If the field bus address is set to “0“ by software, the field bus address (that is a hexadecimal number) must be set using hex switch 1 & 2. Switch 2 refers to the more significant nibble, whereas switch 1 refers to the lower significant nibble.

EXAMPLE: Address “18” = 0x12

Hexswitch 1 = 2
Hexswitch 2 = 1

3.2.2.6 Function of the dip switches

The dip switches (see Figure 3.) are designed to terminate the field bus.
By switching **switch 1** to ON position the termination resistor of 120 Ω is enabled. That is necessary if the UPC4 master is one end of the field bus. In this case the field bus is either connected to the RS485 connector or to the MSTB connector.
If both connectors are used or e.g. a Y-cable is connected to the RS485 connector the UPC4 master is between two field bus nodes. In this case the termination resistor must be switched OFF by switch 1.

In order to enforce the idle level on the bus system at the period of time when no data transmitter is active, LINE B can be switched via a resistor of 1 kΩ to ground by **switch 2**. LINE A can be switched via a resistor of 1 kΩ to VCC by **switch 3**. Whether this functionality is used or not depends on the bus architecture as well on what the user wants. The enforced idle level should be carried out on the bus once only.

3.2.2.7 Connector RS232 (Modem)

In addition to the Ethernet connector the UPC4 Master can be configured via RS232. In this case a "Null Modem Cable" must be used for the connection to the configuration software MMT.

Furthermore a modem can be connected to the RS232 connector (see Figure 3.).

REMARK: The modem functionality is not supported at version 2.12.

For details please see section 6.1.1 "Configuration of UPC systems..." and section 5.4.6 "control function modem" as well.

3.2.3 Power supply inputs/Relay outputs/MSTB Modbus connection

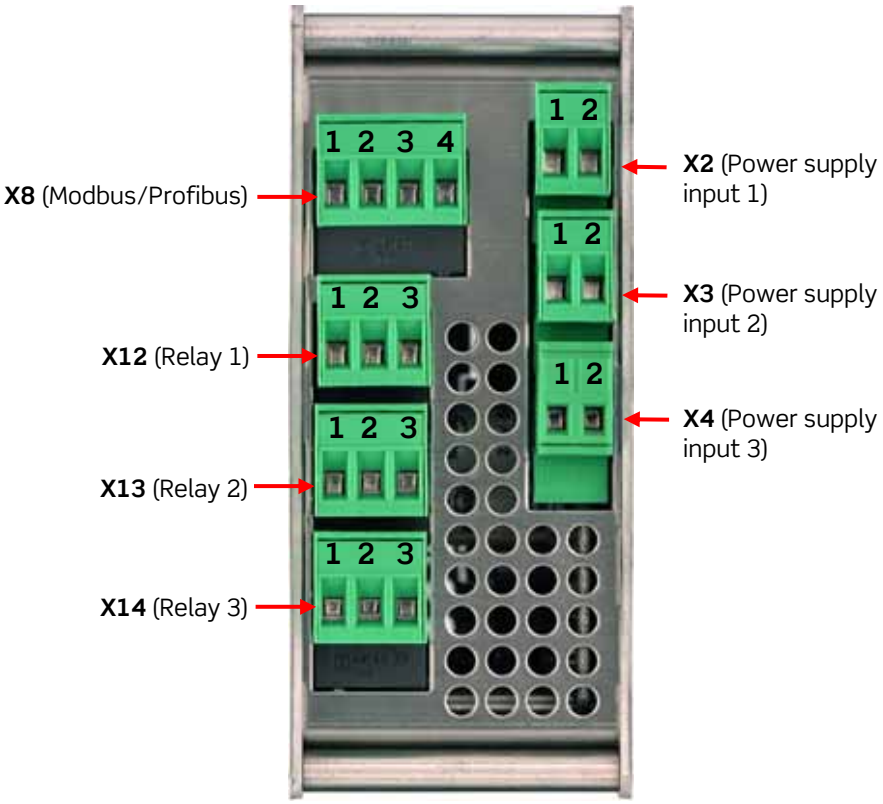


Figure 5. Power supply inputs/Relay outputs/MSTB Modbus connection

3.2.3.1 Power supply

Three power supply inputs are available (see Figure 5.). The UPC4 must be supplied by 24 VDC ±10% by external power supply units AC/DC or DC/DC. We recommend using not less than two (n + 1 redundancy) power supplies which are fed by save DC of the system.

Depending on the system (high voltage or low voltage) we provide DC/DC converters as power supply for the UPC4 Master as listed below:

Article code	Designation
302-UP4-DCDC.LV	Power supply, DIN rail mounting, Vi=18-75 VDC; Vo=24 VDC, Imax=2.5 A
302-UP4-DCDC.HV	Power supply, DIN rail mounting, Vi=85-375 VDC; Vo=24 VDC, Imax=2.5 A

The power supplies have to be connected to the inputs X2, X3, X4 according to the following table.

Connector type: MSTBO 2.5, two-pole.

Pin assignment of the power supply inputs:

Connector	Pin	Function
X2 (Input 1)	1	positive terminal (**+**)
	2	negative terminal (**-**)
X3 (Input 2)	1	positive terminal (**+**)
	2	negative terminal (**-**)
X4 (Input 3)	1	positive terminal (**+**)
	2	negative terminal (**-**)

3.2.3.2 Relay outputs X12/X13/X14

The UPC4 Master provides three isolated relay outputs.

- Switching capacity of the relays: max. 0.5 A at 60 VDC

Connector type: MSTBO 2.5, three-pole

Pin assignment of the relay outputs:

Connector	Pin	Function
X12 (Relay 1)	1	COM
	2	NC
	3	NO
X13 (Relay 2)	1	COM
	2	NC
	3	NO
X14 (Relay 3)	1	COM
	2	NC
	3	NO

4 The concept

4.1 General

The UPC4 is a central control unit for the purpose of controlling the power system. The unit collects the data of CAN bus connected modules such as voltages, electric current values measured by basic units (BU), digital status information (via digital input board DCC-Di8) and status messages/values of the power modules (rectifiers, DC/DC converters, DC/AC inverters, static bypass switch (STS) etc.

The data are analyzed by the UPC4 and the system is controlled according to the settings such as rectifier output voltage, alarm messages etc. corresponding to the configuration.

In addition the information is provided via SNMP and Modbus as well. (Profibus is planned).

4.2 Rectifier monitoring

The Controller UPC4 is able to support two entirely different groups of rectifiers:
On the one hand rectifiers of type PSR/PSS on the other hand rectifiers of type Flatpack, Minipack, Micropack, and Powerpack. It has to be observed that both different groups have to be connected to different CAN bus connectors:

1. Rectifiers of type PSR/PSS >>**CAN 1 & CAN 2 (RJ12 connectors)** have to be used.
2. Rectifiers of type Flatpack, Minipack, Micropack, and Powerpack >>**CAN 3 & CAN 4 (RJ45 connectors)** have to be used.

(see also section 3.2.1.2 “CAN connectors”)

Both different rectifier groups are specified by the configuration software in the area "CAN Devices Cnt" (see section 6.4.2) as well as in the measurement value area of the RD.
But the configuration data of the rectifiers such as e.g. nominal voltage are related to "rectifier" in general. That means that it dos'nt matter whether it's a question of rectifiers of series PSR, PSS or Flatpack, Minipack, Micropack, or Powerpack.

IMPORTANT!	**Rectifiers of series PSR and PSS cannot be operated in combination with rectifiers of series Flatpack, Minipack, Micropack, and Powerpack.**	☜

4.2.1 Rectifiers of the PSR/PSS group

The UPC4 supports all rectifiers of the PSR/PSS group at its first CAN bus port "**CAN 1 & CAN 2" (RJ12 connectors)**.
If more than one **PSR backplane** (rack) is used, the CAN address of the rack has to be set by DIP or HEX switch at the rack. (For details, please see the user manuals of the specific rack.) Whereas the module slots within the rack are firmly encoded. Due to this each of the module slot has a definite CAN ID which is transmitted to the respective rectifier after it is switched ON. Using this address the rectifier logs on at the UPC4 and is integrated in the system and controlled via this address.

Because cassette modules such as **PSS** rectifiers have no automatic log on functionality, the CAN addresses have to be **manually set at the units** and additionally they have to be set at the UPC4 using the configuration software MMT.

(For more information please see section 6.4.2 CAN Devices Cnt).

4.2.2 Rectifiers of the Flat-, Mini-, Micro-, and Powerpack group

The UPC4 supports all rectifiers of the Flat-, Mini-, Micro-, and Powerpack group at its second CAN bus port "**CAN 3 & CAN 4" (RJ45 connectors)**.

Compared to the PSR rectifiers (see section 4.2.1 Rectifiers of the PSR/PSS group) the slots of the xxpack rectifiers have no fixed CAN addresses. Therefore the log on procedure between UPC4 and these types of rectifiers is different.
If a rectifier is plugged to a backplane slot, the rectifier logs automatically on to the UPC4 transmitting its **serial number**. After it has logged on the rectifier is controlled by the UPC4. The communication between UPC4 and rectifier takes place using the **serial number**.

(For details please see section 6.4.2 CAN Devices Cnt).

4.2.3 Monitoring of load sharing of the rectifiers

With the assistance of this functionality it is possible to monitor the load utilization of each individual rectifier (REC). For this a changeable threshold (in percent) has to be set at the menu item "System parameters" (section 6.4.5).

The UPC calculates the percentages of the difference of the maximum current of a rectifier and the minimum current of one rectifier compared to the maximum current of one rectifier.

If the settable percentaged value is exceeded, the UPC generates the event "RECLoadDistrib".

For details please see "System parameters" (section 6.4.5).

4.2.4 Monitoring of rectifier load

If the power system is equipped with more rectifiers as necessary (redundancy), these spare rectifiers can be configured as redundant.
All rectifiers within the power system remain operating; merely the signalling is changed in the case of a unit failure.

At the menu "CAN Devices Cnt" (section 6.4.2) two types of signaling concerning redundancy are settable.

1. Modus “Redundancy type 1”
   (Redundancy event is active as soon as redundancy is not available).

Example: Four rectifiers are fitted, two rectifiers are set as redundant.

- If one rectifier failes, the UPC4 generates the event "REC No CAN".
- If two rectifiers fail, the events "REC No CAN" as well as "REC Redundant" are generated.

2. Modus “Redundancy type 2”
   (Redundancy event is active as soon as the redundant rectifiers and additional at least one more are failed).

Example: Four rectifiers are fitted; two rectifiers are set as redundant.

- If two rectifier failes, the UPC4 generates only the alarm messages "REC No CAN".
- If three rectifiers faile, the UPC4 generates the alarm messages "REC No CAN" and "REC Redundant" as well.

For details please see section 6.4.5 "System parameters".

4.3 Battery backup systems

4.3.1 Temperature controlled output voltage

(Float charge of batteries in backup systems)

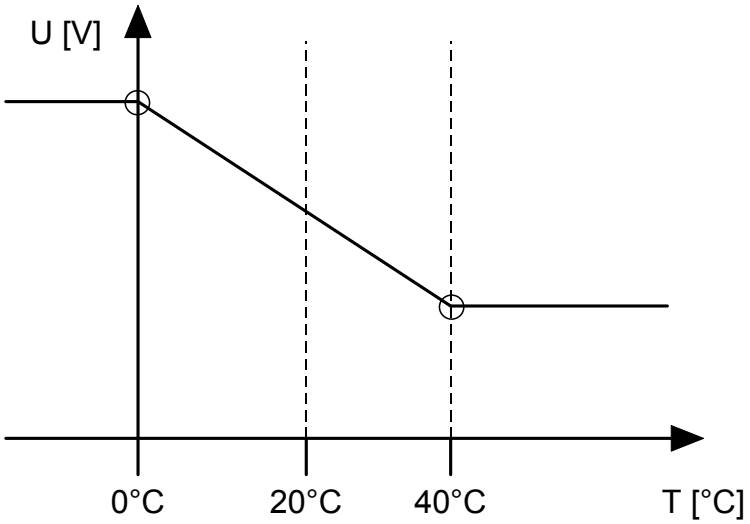


Figure 6. Diagram "Output voltage depending on temperature"

For this operation mode a temperature sensor of type KTY 81- 220 which is connected to a Basic-Unit BU is necessary.
The temperature information provided by the temperature sensor is analyzed by the UPC4 according to the voltage/temperature characteristic line. The output voltage for the CAN-Bus connected rectifiers are controlled accordingly. This characteristic line linearly proceeds in an adjustable range (e.g. 0°C...40°C) and is constant beyond this range (see illustration). The steepness of the characteristic line is adjustable as the charge voltage difference, related to one battery cell and one degree C is changed. The charge voltage difference of a lead acid battery is -2mV per cell and per °C by default.
(For details please see section 6.4.6 Battery)

4.3.2 Charge current limitation

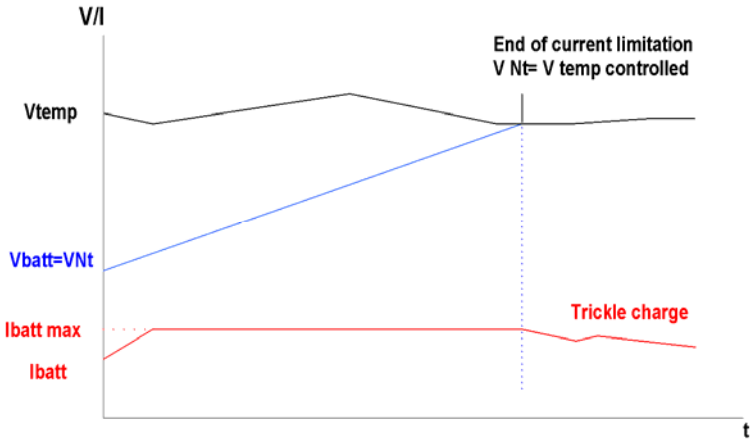


Figure 7. Diagram "Charge current limitation"

Discharged batteries, e.g. after backup operation, are charged with an adjustable maximum current until the value of the temperature-controlled trickle charge voltage is reached. The battery voltage is measured at the beginning of the battery charging. Commencing with this battery voltage, the output voltage of the rectifiers is increased accordingly so that the set maximum of the battery charging current is reached. This process is retained as long as the output voltage has reached the value of the trickle charge voltage (temperature-controlled).

(For details please see section 6.4.3 Charge Control).

4.3.3 Autarkic rectifier operation

(Emergency operation)

If the rectifiers do not receive a control signal, e.g. because of

- breakdown of the UPC4,
- breakdown of the CAN-Bus connection (e.g. cable break),

the rectifiers self-acting return to a constant output voltage as default.

Example: Rectifiers of a 48 VDC system return to default voltage value of 54.5 V (factory preset).
At battery backed systems this operating mode should be seen as an emergency operation.

4.3.4 PLD function (Power Load Disconnect)

The PLD function makes it possible to disconnect inferior priority loads during battery backed operation. Due to this the backup time of more important loads is extended.

There is the possibility to configure up to two consumer load levels (inferior priority loads) independently of each other.

The following criteria for PLD recognition are available:

- PLD recognition at under-run of an adjustable voltage threshold, reset after exceeding the adjusted voltage threshold.
- PLD recognition at detection of battery operation after expiration of an adjustable time delay, reset after ending of battery operation.

- PLD recognition at detection of mains failure (requires MMB) after expiration of an adjustable time delay, reset after ending of mains failure.

(For details please see section 6.8 LVD/PLD/Drop diode).

4.3.5 LVD function (total discharge protection)

The LVD (Low Voltage Disconnection) function makes it possible to protect the batteries against total discharge.

The following criteria for LV recognition are available:

- LVD recognition at under-run of an adjustable voltage threshold, reset after exceeding the adjusted voltage threshold.
- LVD recognition at detection of battery operation after expiration of an adjustable time delay, reset after ending of battery operation.
- LVD recognition at detection of mains failure (requires MMB) after expiration of an adjustable time delay, reset after ending of mains failure.

(For details please see section 6.8 LVD/PLD/Drop diode).

4.3.6 Battery asymmetry

It is possible to monitor the battery symmetry voltage in order to locate faulty batteries within a battery string. Therefore, a voltage (symmetry voltage) is measured at a tap point of the battery string and compared with the total battery string voltage.
If the batteries are okay, the measured symmetry voltage is equal to the symmetry voltage as expected.
If the measured symmetry voltage differs from the (adjustable) value, the event "Unsymmetry" is generated.

(For details please see section 6.4.6 Battery).

4.3.7 Battery test

The battery test serves for the inspection of the batteries as well as for the inspection of the faultless connection to the batteries.

This test can be executed by the following manners:

- manually at the display (an external remote display RDD, RDP is required)
- automatically by date and time
- automatic repetition at selectable days
- externally via MMT software, SNMP, Modbus
- via digital input

Furthermore it is possible to suppress the battery test via digital input.
(For details please see section 6.4.4 Service/Enable).

The rectifiers' voltages are reduced to an adjustable voltage value during the battery test.

ATTENTION!	This voltage value should be greater than the voltage threshold of the LVD/PLD function. Otherwise the load supply could be disconnected during the battery test if the batteries are faulty.	☜

Thereby the batteries supply the connected load and consequently are discharged.
Following criteria finish a battery test:

- achievement of test duration
- under-running of a battery voltage value
- maximum discharge battery capacity (%)

The battery test is assessed as faulty and a respective event is generated, if the minimum test voltage has been achieved within the test duration or the maximal battery capacity has been withdrawn.
After finishing the test duration or after an identification of a faulty battery the rectifiers are set back to the default value considering the battery charging current limitation.
An activated alarm message "battery test failure" manually can be cancelled at battery test menu, via reset of the UPC4 or via an anew execution and faultless completion of the battery test.

(For details please see section 4.3.7 Battery test).

4.3.8 Battery test data memory

By the assistance of the data memory the data are recorded during a battery test and later the data can be readout via the PC program MMT (Multi Management Tool).

The following is automatically recorded during any battery test:

- Start- und stop time of the battery tests
- Duration of the battery tests
- Starting of the battery tests (manually or automatically)
- The withdrawn capacity during the battery tests and the measured battery voltage at the end of the test
- The data of the battery type, date of the battery installation and the nominal battery capacity

These data are retrieved from the entered data in the main menu.

The data as described above are each saved for the last 16 battery tests.

Additionally the collection of the following data of the last battery test is saved:

- Number of the generated data set
- The elapsed time of the battery test (hours, minutes, seconds)
- The particular battery voltage and battery symmetry voltage
- The particular battery current
- The particular battery temperature

Due to this fact, detailed information about the run of the test is available after the test is finished.

4.3.9 Equalize charge

At equalize charge (compensating charge) the battery is charged using an increased charge voltage which effects a recirculation of the battery acid and therefore cleaning of the battery plates. This increases the battery lifetime (depending on the battery type).
Equalize charge can be started in different ways:

- manually at the display (an external remote display RDD, RDP is required)
- automatically by date and time
- automatic repetition at selectable days
- externally via MMT software, SNMP, Modbus or Profibus (planned) alternatively
- via digital input

Furthermore it is possible to suppress equalize charge via digital input.

(For details please see section 6.4.4 Service/Enable).

During equalize charge the charge voltage is increased compared to the trickle charge voltage. Furthermore this charging mode is current-limited by a settable value.

After the end-of-charge voltage is reached for a period of 40 minutes or a settable max. time value is reached, equalize charging is finished.

(For details please see section 5.4.3 Equalize charge).

4.3.10 Boost charge

For rapid recharge of the battery (only ventilated batteries) a boost charge mode is available. Boost charge can be started in different ways:

- manually at the display (an external remote display RDD, RDP is required)
- at under-run of a settable voltage value
- at battery operation or mains failure
- automatically by date and time
- automatic repetition at selectable days
- externally via MMT software, SNMP, Modbus or Profibus (planned) alternatively
- via digital input
- via different parameters depending of the capacity calculator

Furthermore it is possible to suppress boost charge via digital input.

(For details please see section 6.4.4 Service/Enable).

During boost charge mode is running the battery voltage is increased to a greater value than the trickle charge voltage. Furthermore a considerably greater battery charge current is defined for the duration of the boost charge mode. If the defined charge voltage value is reached, a follow up charge duration starts. After the expiration the boost charge voltage is automatically decreased to the value of the trickle charge voltage.

Boost charge is not temperature-compensated.

(For details please see section 5.4.2 Boost charge).

4.4 Isolation monitoring

Each BU is able to enable isolation monitoring. The resistance value (or several resistance values) is transmitted to the UPC4. The UPC4 detects "Isolation failure" according to the set threshold values. Isolation monitoring can be suppressed via digital input. Due to this further systems are coupleable (Master/Slave).

(For details please see section 6.4.4 Service/Enable).

4.5 Monitoring of general measured values

Voltage, current and temperature values can be monitored within a particular range by configuring the respective threshold values. If the measuring value leaves the range which is defined by thresholds, an event is generated by the the UPC4. By allocating the event to an alarm output (configuration), e.g. over and under voltage alarms can be realized.

4.6 DC/AC inverters/static bypass switch)

If inverters (with or without static bypass switch STS) are intergrated in the system, the status and failure messages respectively are provided by the UPC4 such as for the most of the other CAN devices.

ATTENTION!	***If a system is combined <u>with</u> an STS, there is the following difference: compared to a system <u>without</u> STS the UPC4 is only sniffing for inverter values via CAN bus because the inverters get their threshold values by the STS. That means that in this case the configuration of the inverters have to be done at the STS.***	☜

But nevertheless monitoring is done by the UPC4; "Event No Can" and miscellaneous failures respectively are provided by the UPC4 in the same way as for a system without STS.

For mains monitoring additionell measuring modules are available. E.g. the mains monitoring board (MMB) measures AC voltages and currents as well in order to provide the values to the UPC4. These values also can be monitored by the UPC4.

4.7 Virtual measured values system

In the virtual measured values system to each input the source can be freely allocated.
Example: To the input "Vload" the source "BU1_V2" or e.g. a voltage input of a BMB can be allocated. That means that the freely allocated measuring input complies with the load voltage (Vload).

(For details please see section 6.5.1 Assignment measured values).

4.8 Signal concept/alarm signalling/event list

Within the UPC4 different events such as e.g. "V> Vload", "Battery operation", "INV no CAN", "Digital input1" are stored. These events can be freely allocated to each available output.
If one of the events is active, the allocated output is set.

Please consider that outputs also can be inverted at configuration.

(For details please see section 6.7.3 Signals Sw mode).

Following outputs are available:

- Disable Signals
- Error state
- Event history
- Modem/Traps
- Seven LEDs
- 12 relays

4.8.1 Error state (alarm signaling)

All events which are allocated to that output generate an alarm.

Within the failure list all existing alarms are provided with a clear event number and failure name (recallable respectively displayable by RDD, RDP, MMT, SNMP).

If a failure (alarm) is not active anymore it is not shown any longer in the failure list.

REMARK: Existing alarms can be cancelled only by remedy of the cause of the alarm.

If an RDD or RDP is used, the red LED "ALARM" blinks as long as a minimum of one alarm is existend.

4.8.2 Event history

All events which are allocated to this output are written into the event history list. They are there recorded including information such as start and stop of the event, date, and time.

Attention: With leaving the event list the system requests whether the list shall be deleted or not. If the list shall be deleted, the system asks for a log-in if the actual user has no privilege for “delete event list” or if no log-in has been done before.

If the memory is full (500 entries), the first failure is deleted and the last one is added.

(For details please see section 6.7.2 Signals enable).

4.9 Safety concept/authorization

A configurable user administration is implemented in the UPC4. The safety settings show, which parameters can be seen or changed by the user or which privileges are available for him (e.g. “delete event history”).
If an user wants to carry out a protected operation at the unit, he has to authorize via login. The log out automatically is carried out after 10 minutes inactivity time of the control keys.

4.9.1 Default User and Password

In order to differentiate between different user levels there are eight different user available. For the user "Factory" only access by the factory is available.

ATTENTION	**The password for „user1“ to “user7“ is „user“ (factory-preset).**	☜

4.10 Automatic log on of rectifiers, inverters, DC/DC converters

The following product families log automatically on at the UPC4:

- Rectifiers PSR, Flatpack 2, Micropack, Minipack, and Power Pack
- DC/DC converters of PSC series
- Inverters of INV series

If one of those modules are plugged to a backplane, it logs automatically on to the UPC4 and therefore is controlled by the UPC4.

If subsequently a module is removed or fails, an event is generated, e.g. "INV alarm", "INV no CAN", "DCC alarm" etc.

If the current system status is okay, that means that the number of the modules is okay, you are able to set this status to "OK" using the function "Status default ok".

For details please see section 5.5.2 "Status default ok".

Due to this the available modules are defined as "OK" and previous events "...no CAN" are deleted.

5 The menu (display operation)

Operation of the UPC4 takes place using a CAN bus-connected remote display (as option) or via remote control using the PC software Multi Management Tool (MMT) alternatively.

As a standard four menu blocks are available as described as follows:

1. Measured values
2. Control functions
3. Operating status
4. System menu

Section 5.4.7 "Log in" describes how to log-in at the UPC4. An authorization is necessary if you want to get access to a secured area.

5.1.1 Changing the display (leafing)

Leafing through the displays takes place by pressing the buttons "↑" or "↓". Endless leafing in both directions is possible.

5.1.2 Changing the menu

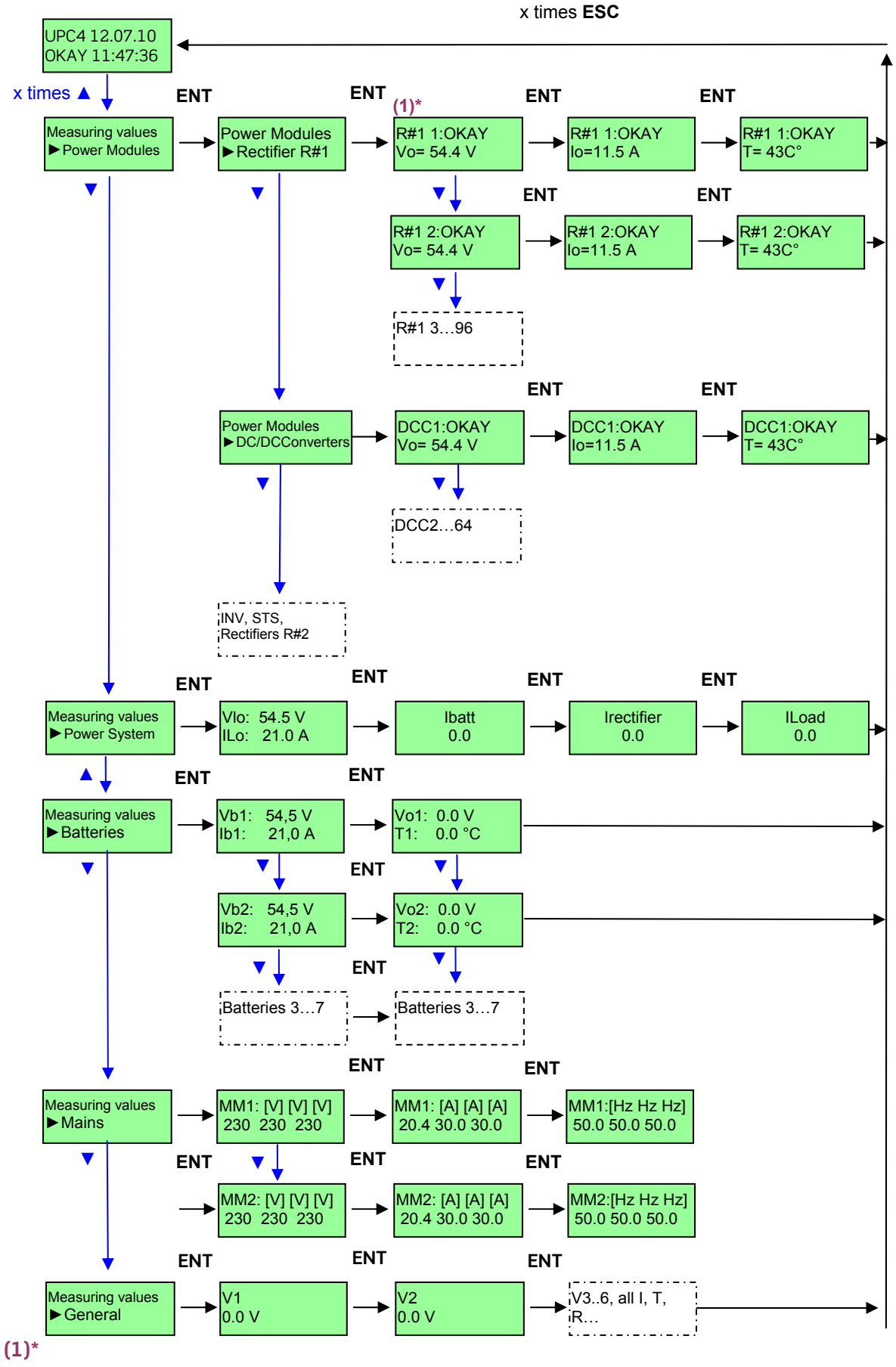
Displays which include a selectable submenu are marked with the symbol „→". By pressing the "**ENT**" button you get the submenu. Return to the superordinated menu takes place by pressing the "**ESC**" button.

5.2 Measured values

In this menu block the measured data of the system is displayed according to the configuration of the system.

Measured values:

- *General*: 6 x current, 6 x temperature, 6 x resistors, and 6 x voltages
- *Mains*: Voltage, current and frequency (only systems equipped with mains monitoring (MM) board)
- *Power modules*: REC#1→(PSR, PSS), REC#2→(Micro-, Mini-, Flat- Powerpack), DC/DC converters, inverters, static bypass switch (e.g. output voltage, output current, temperature)
- *Power system*: System voltage/-current, earth fault measurement (if activated), and the calculated battery-, rectifier- and consumer load currents.
- *Batteries*: Battery voltage, -current, center tapping voltage of the battery, and battery temperature.


x times ESC
UPC4 12.07.10
OKAY 11:47:36
x times ▲
ENT
(1)*
Measuring values
▶Power Modules
Power Modules
▶Rectifier R#1
R#1 1:OKAY
Vo= 54.4 V
R#1 1:OKAY
Io=11.5 A
R#1 1:OKAY
T= 43C°
R#1 2:OKAY
Vo= 54.4 V
R#1 2:OKAY
Io=11.5 A
R#1 2:OKAY
T= 43C°
R#1 3…96
Power Modules
▶DC/DCConverters
DCC1:OKAY
Vo= 54.4 V
DCC1:OKAY
Io=11.5 A
DCC1:OKAY
T= 43C°
DCC2…64
INV, STS,
Rectifiers R#2
Measuring values
▶Power System
Vlo: 54.5 V
ILo: 21.0 A
Ibatt
0.0
Irectifier
0.0
ILoad
0.0
Measuring values
▶Batteries
Vb1: 54,5 V
Ib1: 21,0 A
Vo1: 0.0 V
T1: 0.0 °C
Vb2: 54,5 V
Ib2: 21,0 A
Vo2: 0.0 V
T2: 0.0 °C
Batteries 3…7
Batteries 3…7
Measuring values
▶Mains
MM1: [V] [V] [V]
230 230 230
MM1: [A] [A] [A]
20.4 30.0 30.0
MM1:[Hz Hz Hz]
50.0 50.0 50.0
MM2: [V] [V] [V]
230 230 230
MM2: [A] [A] [A]
20.4 30.0 30.0
MM2:[Hz Hz Hz]
50.0 50.0 50.0
Measuring values
▶General
V1
0.0 V
V2
0.0 V
V3..6, all I, T,
iR…
(1)*

Rectifiers of the series PSR & PSS are in the group "R#1". The abbreviation for those rectifiers is "R#1". Rectifiers of the series Micro-, Mini-, Flat-, and Powerpack are in the group "R#2". The abbreviation for those rectifiers is "R#2".

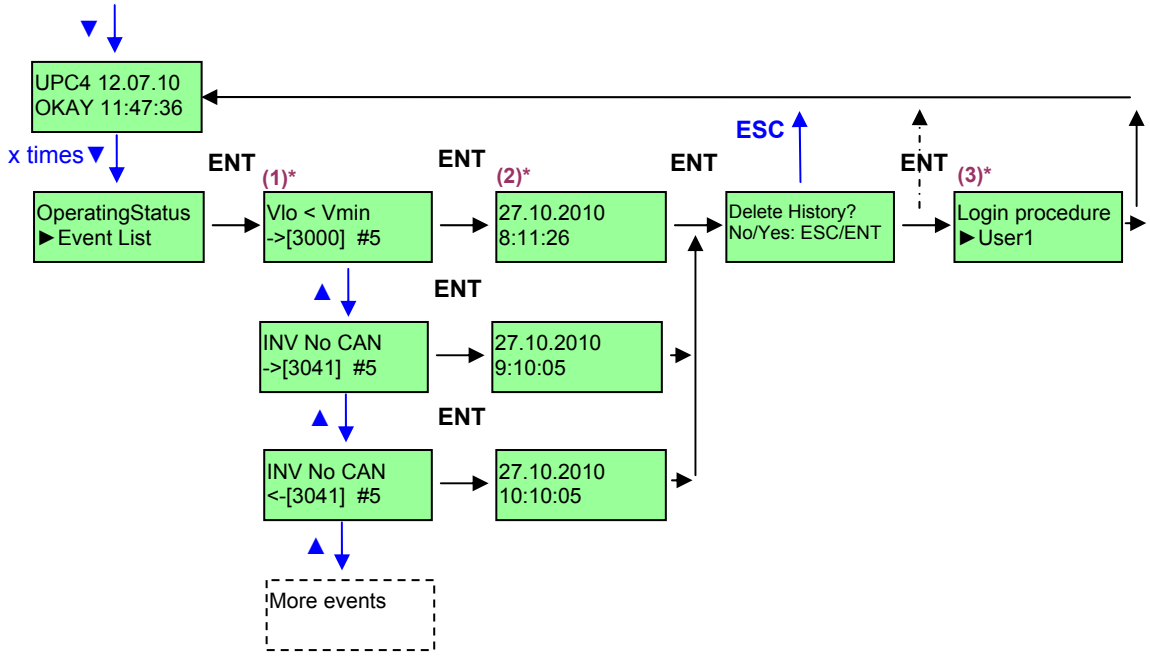
5.3 Operating status

In this menu block information about the actual operating status of the system can be queried.

Operating status:

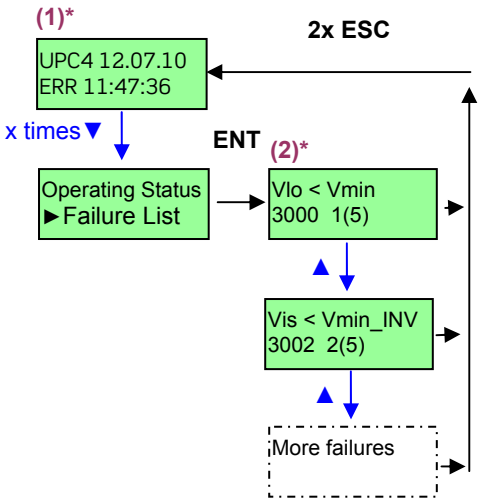
- *Digital inputs*: Status active/inactive of the digital inputs (digital extension modules are required).
- *Relay outputs*: Status of the relays: active/inactive.
- *FM board*: Status active/inactive of the fuse monitoring board.
- *Failure list*: The failure list shows the active alarms.
- *Event list*: The event list shows all stored events (date/time, appearance/disappearance).
- *Fan racks*: Show „Okay“ or „Failure“ of each of the connected fan racks.
- *Battery test*: Battery test active = '*', inactive = ' -'. Furthermore the withdrawn capacity (Ah) is shown.
- *Capacity calculator*: Shows the available capacity of the complete system or of individual battery strings.
- *Data memory*: Shows whether data currently are stored or not. ' OFF/ON'
- *Boost charge*: Boost charge active = '*', inactive = ' -'
- *Equalize charge*: Compensating charge.
- *Manual operation*: Manual charge of the batteries.
- *System test*: Test of the system.
- *Modem*: Shows the initialisation status of the external or internal modem.

5.3.1 Event list



(1)* The appeared event is shown. Within the squared bracked the ecplicit event number is shown. The numeral behind "#" indicates the quantity of the events. " ->" indicates that the event is active, "<-" indicates that the event is inactive.
(2)* Indicates the date of the recorded event.
(3)* If the event list is to be deleated, a log in could be necessary, see section 5.4.7 Log in.

5.3.2 Failure list

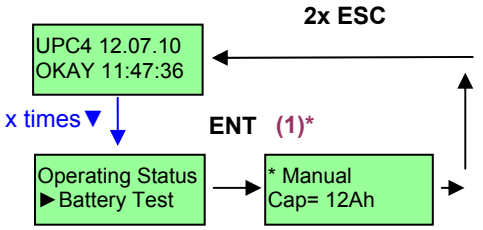


(1)* "The failure LED at the RDP or RDD is active"; **"ERR"** at the display indicates that one or more failures (alarms) are existing.

(2)* Shows the active failure. The first number (e.g. 3000 as shown in the example above) indicates the explicit event number. The second number indicates the position within the failure list. The number within the brackets indicates the total quantity of failures.

5.3.3 Operating status "Battery test"

(Only available if „manual battery test“ is enabled).

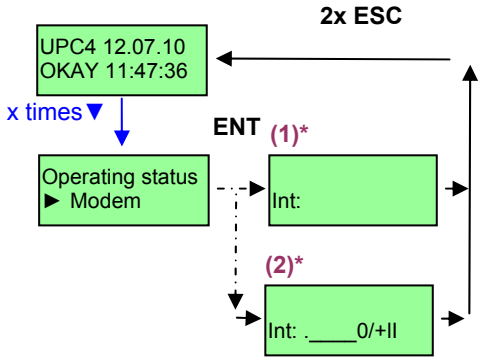


(1)* Shows the withdrawn capacity during running battery test.

5.3.4 Operating status "Modem"

(Only available if „enable modem“ is configured).

1. Modem configured. Modem status is stopped. Direct communication via RS232 is possible. Modem operation not possible.
2. Modem configured. Modem status is started. Direct communication via RS232 is not possible. Exclusively modem operation is possible.



(1)* Status A) Modem status is stopped.
No character string beside **Int** respectively **Ext** (see figure above).
Direct communication is possible. Modem operation is not possible.
For starting the modem please see section 5.4.6 Control function modem.

(2)* Status B) Modem status is started.
There is a character string beside **Int** respectively **Ext** (see figure above). Direct communication is not possible. Only modem operation is possible.
For stopping the modem please see section 5.4.6 Control function modem.

Explanation of the modem status string:

* _ _ _ _ 0 = + I I
. c a e o 1 / ! ? i
C A E O 2 1 > W
3 2 w
4 3
5 4
6 5
7 6
8 7
9
#
^

Important is the first and the final character.
Meaning of the first character:

"*"= UPC3 communicates with the modem (e.g. sending of the initial string).
"."= no communication with the modem
Meaning of the final character:

"**I**"= initialised
"**i**"= not initialised

During starting the UPC4 and during starting initialisation, the first character is "*****", the final character is "i".

After a time period the first character is "**.**", the final character is "I". This indicates a successful initialisation.

5.4 Control function

UPC4 functions which are enabled can be executed in this menu block.

Control function:

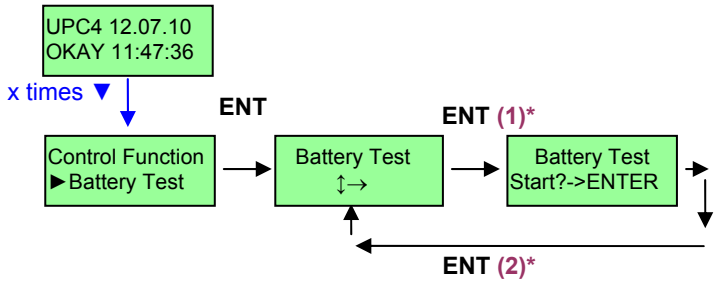
- *Battery* Test: Start/stop battery test, deleting of battery test failures.*****
- *Data memory*: Manual start/stop of the data memory.
- *Boost charge*: Start/stop boost charge.*****
- *Equalize charge*: Start/stop equalize charge.*****
- *Manual operation*: Start/stop manual charge.*****
- *System test*: Start/stop system test.*****
- *Modem external*: Start/stop external modem operation.
- *Second menu*: Further system sub menus.
- *LAN Parameter*: Shows (only shows!) the current IP configuration.

The items, marked with "*****" must be enabled by configuration.

5.4.1 Control function battery test

(Only available if "enable manual battery test" is configured).

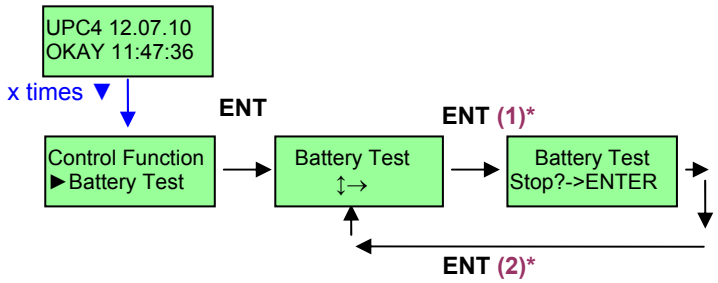
- **Manual start**



(1)* "Log in" could be necessary, see section 5.4.7 Log in.

(2)* Battery test is started.

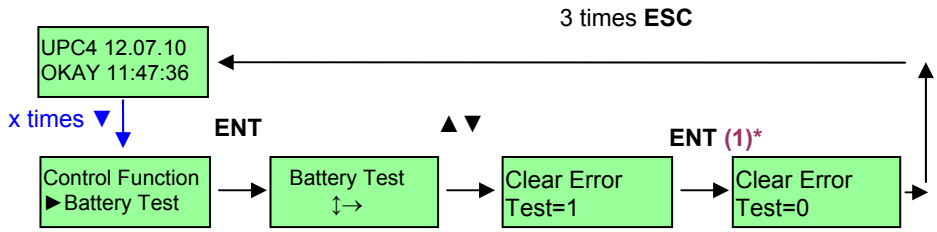
- **Manual stop**



(1)* "Log in" could be necessary, see section 5.4.7 Log in.

(2)* Battery test is stopped.

- **Clear battery test error**

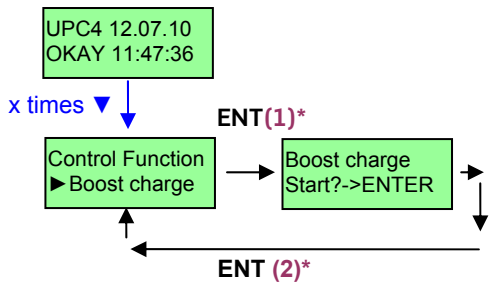


(1)* Battery test error is cleared.

5.4.2 Control function "boost charge"

(Only available if "boost charge" is enabled).

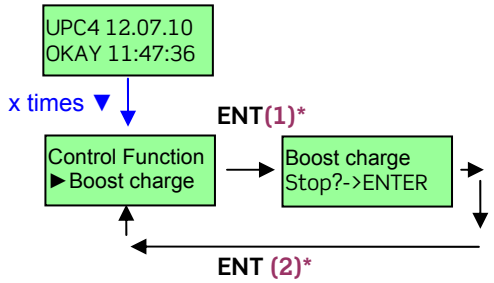
- **Start**



(1)* "Log in" could be necessary, see section 5.4.7 Log in.

(2)* Boost charge is started.

- **Stop**



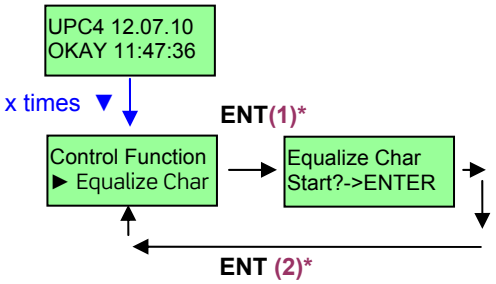
(1)* "Log in" could be necessary, see section 5.4.7 Log in.

(2)* Boost charge is stopped.

5.4.3 Control function "equalize charge"

(Only available if "equalize charge" is enabled).

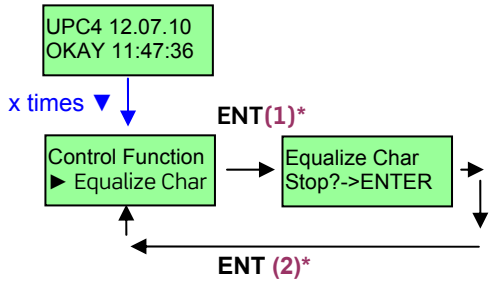
- **Start**



(1)* "Log in" could be necessary, see section 5.4.7 Log in.

(2)* Equalize charge is started.

- **Stop**

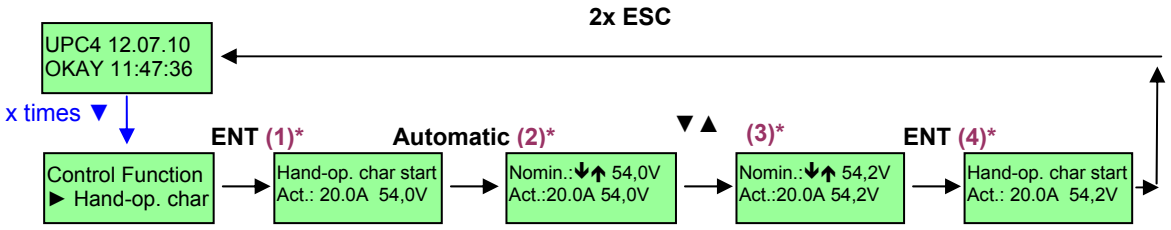


(1)* "Log in" could be necessary, see section 5.4.7 Log in.

(2)* Equalize charge is stopped.

5.4.4 Control function "Hand-op. charge"

(Only available if "Hand-op. charge" is enabled).



(1)* "Log in" could be necessary, see section 5.4.7 Log in.

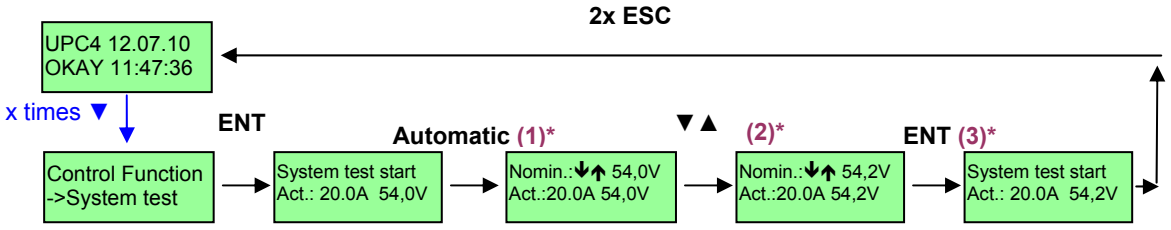
(2)* The screen automatically changes to the next.
In the top line the default voltage of the rectifiers is shown.
In the second line the present measured values are shown.

(3)* By pressing the arrow keys the default voltage value of the rectifiers is changed.

(4)* At this position hand operation charge is stopped.

5.4.5 Control function "System test"

(Only available if "System test" is enabled).



(1)* The screen automatically changes to the next.
In the top line the default voltage of the rectifiers is shown.
In the second line the measured values are shown.

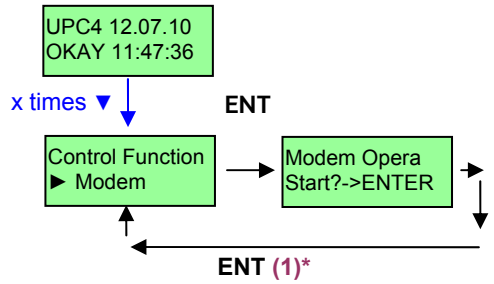
(2)* By pressing the arrow keys the default voltage value of the rectifiers is changed.

(3)* At this position system test is stopped.

5.4.6 Control function "modem"

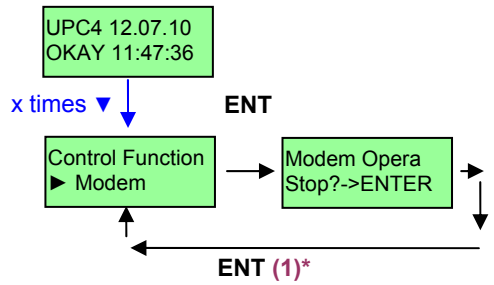
(Only available if "modem" is enabled).

- **Start**



(1)* Modem is started, i. e. the UPC4 operates in the modem mode.

- **Stop**

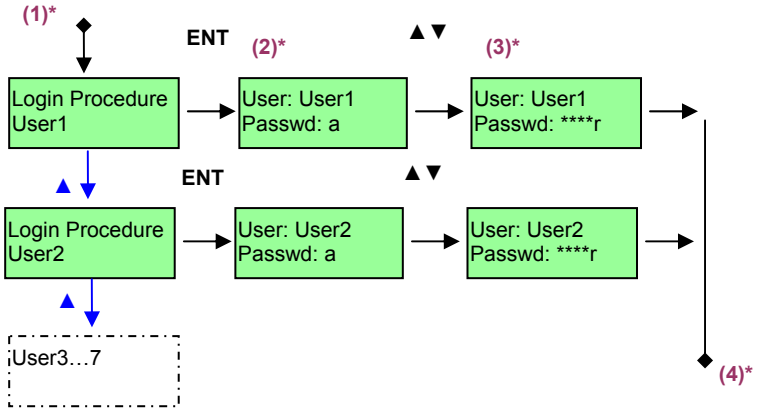


(1)* Modem is stopped, i. e. the UPC4 dos not operate in the modem mode.

REMARK: The status of the modem is indicated at "Operating status modem", see section 5.3.4 please.

ATTENTION!	*If the UPC4 is used with a modem, it is necessary for direct configuration via RS232 to deactivate the modem mode using the function as described above. Otherwise, communication is not possible.* *After the configuration is finished "modem operation" must be switched ON again, and additionally the plug must be plugged in again.*	☜

5.4.7 Log in



(1)*
If within the menue an action is to be carried out which requires expanded access right (such as e.g. delete Event list , see section 5.3.1), the log in procedure is automatically called.

(2)*
Select user

At first the user has to be selected using the arrow keys.

(3)*
Password entry

Using the arrow keys the alphabet, figures and additional characters are passed trough. The required character is selected by pressing "**ENT**". After this, the cursor jumps to the next digit, overtakes the previous character as proposal and sets "*" as placeholder for the previous character.
If the password consists of two consecutive equal characters (e.g. the password "C**oo**peration"), please note: After keying in "C**o**", first select another character using the arrow keys. Following, go back to the character "**o**" and press **ENT**.

Finishing password entry

In order to finish "password entry" after you have entered the final character please press „**ENT**" for two times without changing to another character by pressing the arrow keys.

(4)*
After finishing password entry the menu skips to the entry point, see **(1)*** and from there to the following place, e.g. delete Event list (see section 5.3.1).

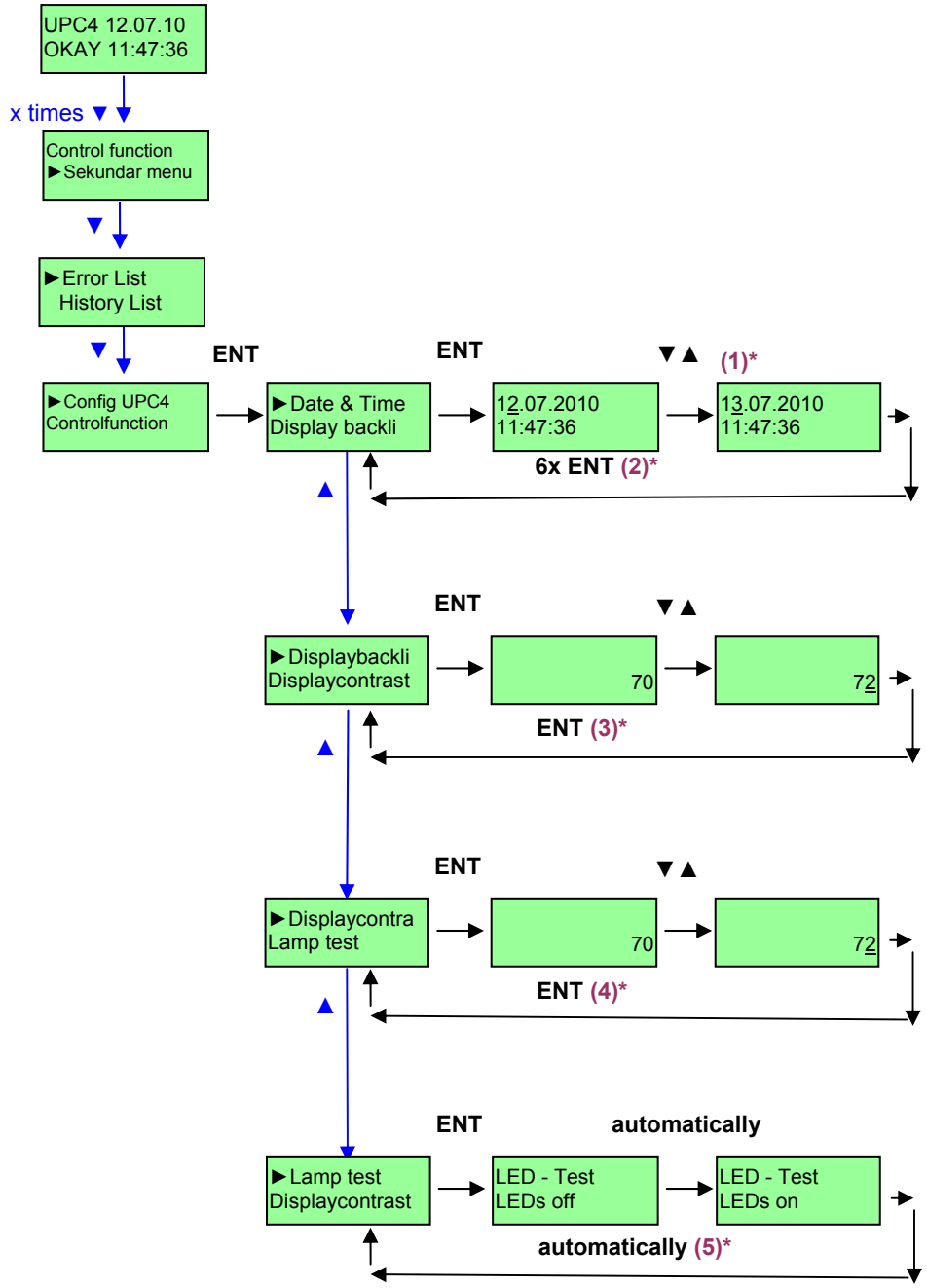
5.5 Secondary menu

Using the secondary menu, the status and the configuration parameters of the UPC4 are visible and can be changed after authorization, see section 5.5.3 Configuring at the display/MMT.

Control Function→2nd Menu:

- Error list: All present errors (failures)
- History list: The last 500 incoming and outgoing failures/events
- Information menu
  - Indicator measuring param.: Shows all available measuring objects
- Config. UPC4: Configuration of the UPC4 hardware
  - Date & Time
  - Display backlight
  - Display contrast
  - Lamp test
  - Delete, Restart
- Control function.: Control functions of the UPC4
  - Status default OK. Current CAN device number determining as default
  - Rectifiers flashing
  - Rectifiers RESET
  - RESET capacity calculator: up to date calculated capacity is cancelled
- System parameter: displaying respectively processing of the UPC4 configuration parameters
- Factory menu: Protected area
- Aut./User/Login: Explicit login/logout at the unit

5.5.1 Date, time, illumination, contrast, and lamp test



(1)* Day, month, hours, minutes, and seconds are individually set. The element indicated by curser can be set by pressing the arrow keys. Skipping to the next element takes place by pressing the ENTER key. A log in could be necessary, see section 5.4.7 Log in.

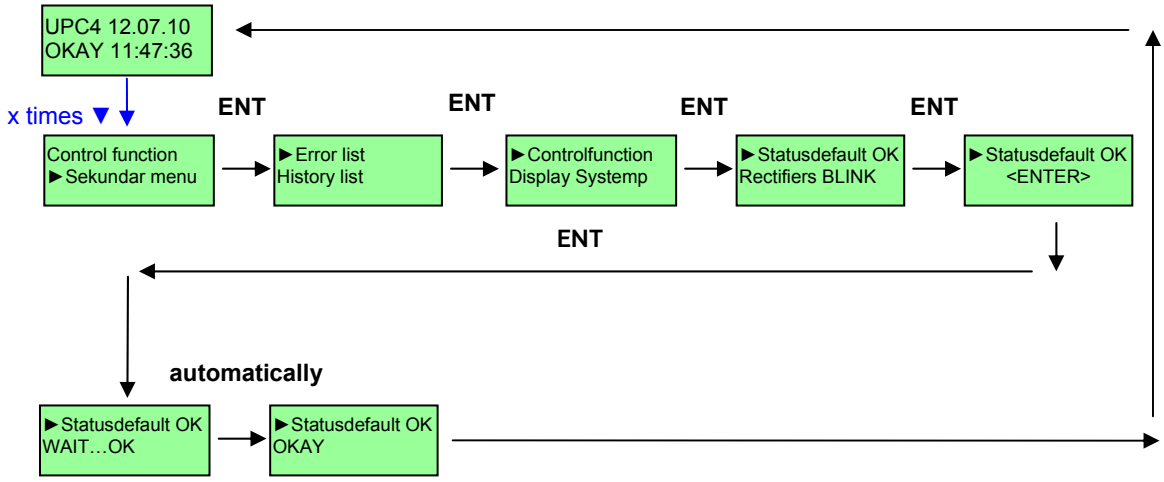
(2)* As described at (1)*, the curser changes from day to month to year, etc. by pressing the ENTER key. If the curser has reached "seconds" and therefore has reached the final block, the set date/time is stored by pressing "ENTER".

(3)* The set backlight is stored.

(4)* The set contrast is stored.

(5)* Lamp test is finished.

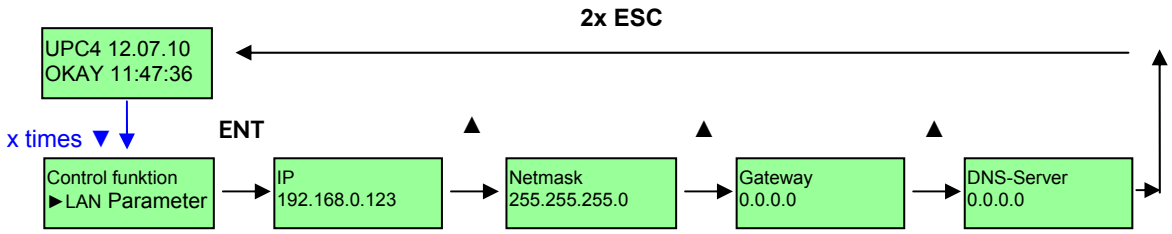
5.5.2 Status “Default OK”



5.5.3 Configuring at the display/MMT

The menu navigation and parameterizing of the UPC4 is very extensive. In addition: not all of the parameters are available at the display (e.g. network settings, see section 5.6). Consequently we recommend to configure the UPC4 using the configuration tool "Multi Management Tool" (MMT). The various configuration areas are well-arranged in the MMT. Furthermore, not enabled areas are hidden. Consequently for clarity only the modules which are to be configured are displayed.
The MMT can be connected to the UPC4 via modem, network or serial by using a null modem cable.

5.6 IP address/network settings



IP address and other network settings as well cannot be set at the display. Either they can be configured by MMT or by the use of the software "Eltek Valere Network Utility".
This software enables you to find out all available UPC4 units within the network if you don't know their IP addresses.

ATTENTION!	**Default IP address of a brand-new UPC4: 192.168.0.123**	☜

6 Configuration – UPC4

6.1 General Information

Because direct configuration at the UPC4 control unit (display panel) is not practice-oriented (see section 5.5.3) please use the PC software "Multi Management Tool" (MMT) free of charge.
The UPC4 provides an Ethernet interface (RJ45), a serial interface RS232 and optional a connection via modem is possible as well.
The configuration software (MMT) works in combination with the system software Windows® 2000/XP/2003/Vista/7. The user manual for the dial-up and general operation of this software is optionally available (MMT user manual).

REMARK: This user manual is related to the configuration parameters which are available for "**user 1**" as default. But the configuration parameters are freely customizable.

6.1.1 Configuration of UPC systems by external modem via RS232

The UPC4 controls a connected modem via modem specific commands (AT commands). The user data are “framed” by the AT commands. Due to this the communication via Null modem cable at **direct configuration** is constrained. Consequently the operation mode “modem” has to be temporary disabled.
Both of the two possible operation modes of the modem (“started” or “stopped”) can be changed in the menu “control function modem”.

1) Modem has been started.
Dialing in the system is possible. The system can be configured via modem. In this case a configuration directly via serial interface is not possible.

2) Modem has been stopped.
Dialing in the system via modem is not possible. The modem specific commands are deactivated. Configuration via a serial interface is possible.

Basically please note the following order:

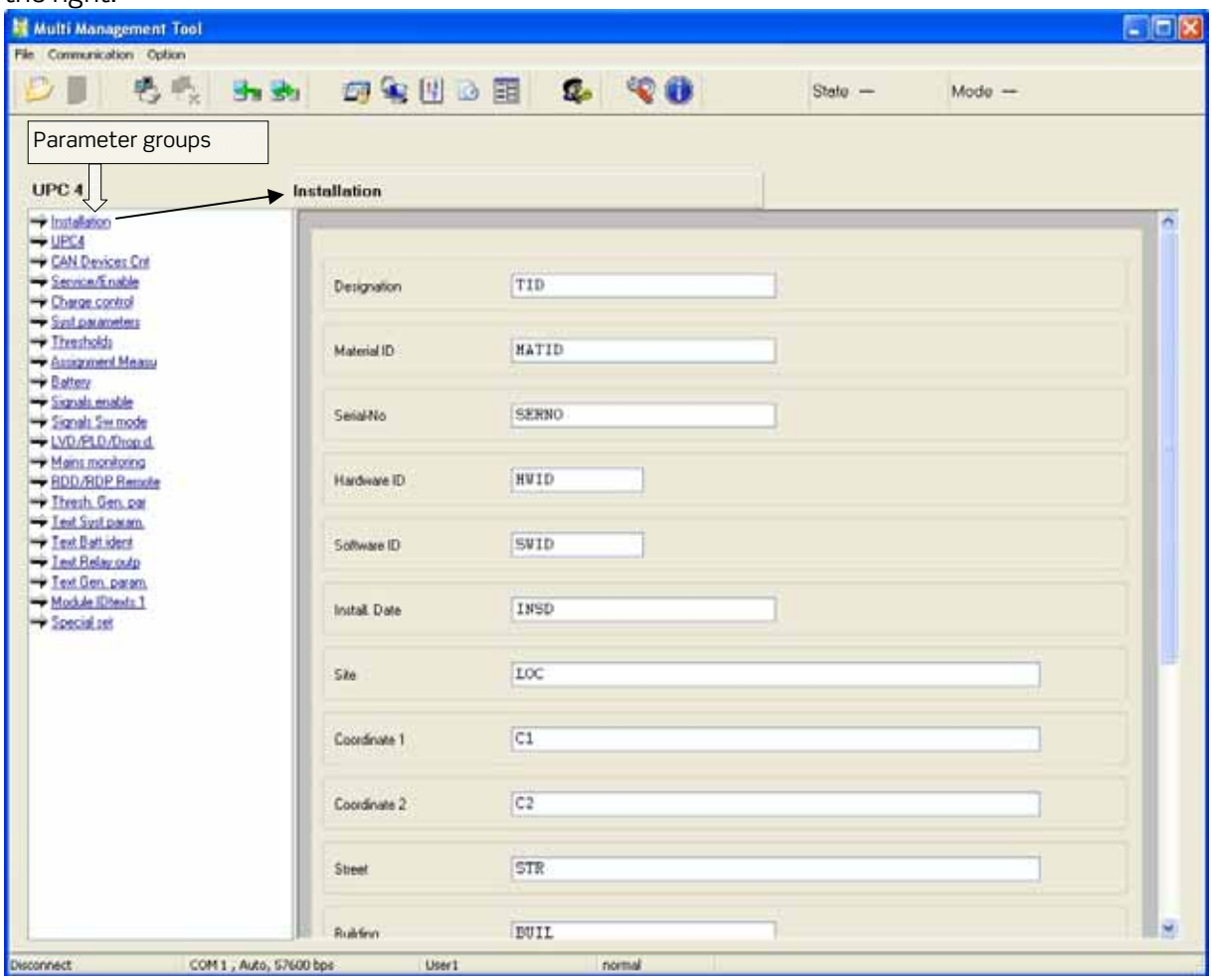
1. Stop the external modem
2. Check whether the external modem has been stopped.
3. Disconnect the serial cable of the modem from the RS232 interface. Connect the PC via Null Modem Cable to the UPC4.
4. Configuring of the system
5. Disconnect the Null Modem Cable, connect the serial cable to the modem.
6. Start the external modem
7. Check whether the external modem has been started/initialised

For information how to start and stop the modem, please see section 5.4.6 „Control function modem“.
For information about the modem status please see section 5.3.4 „Operating status modem“.

6.1.2 UPC4 parameter groups

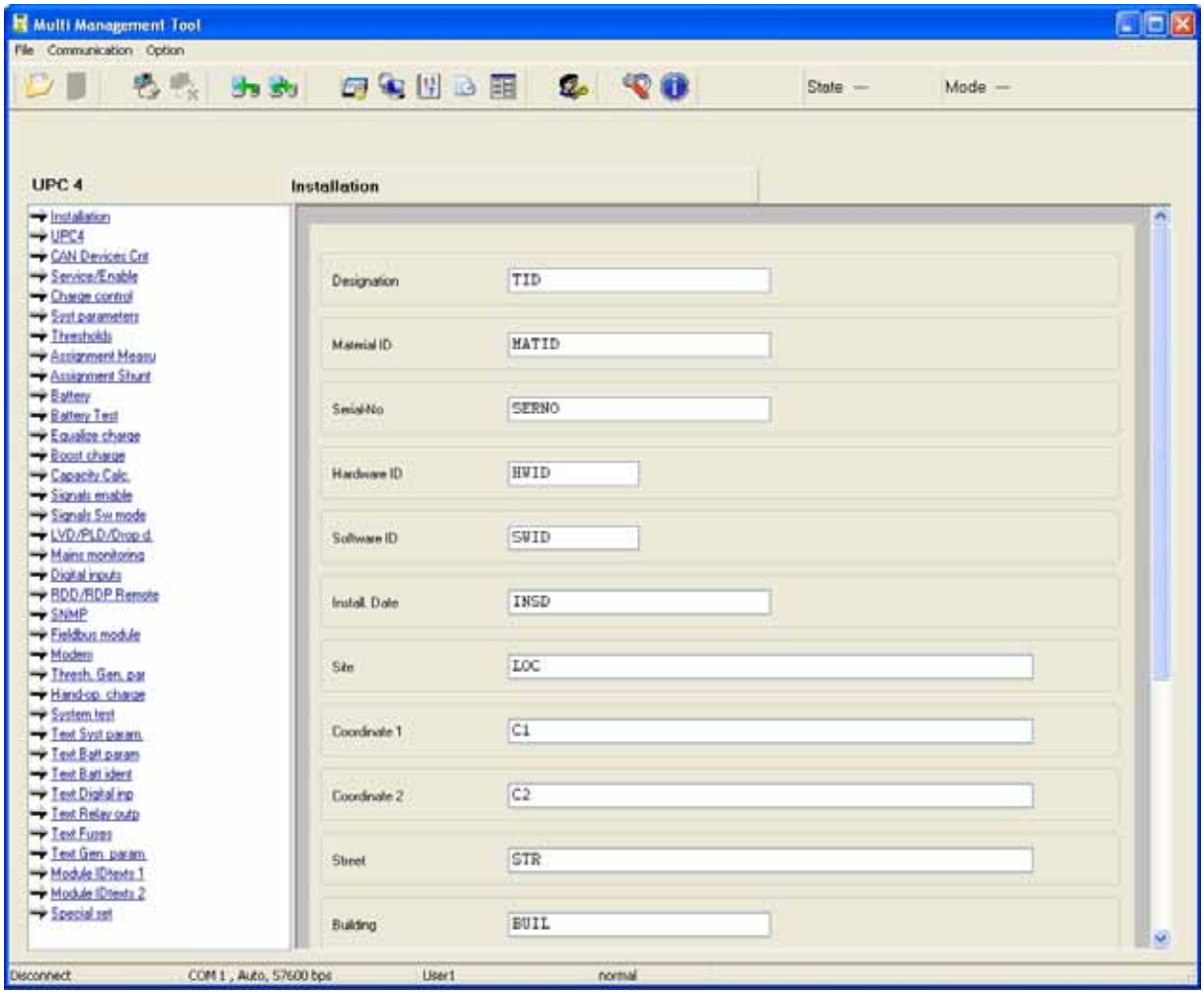
REMARK: The pictures shown in the following are screenshots of the configuration software MMT. The "hide function" is enabled for the following picture (see also the following page).

After successful readout/start of a configuration a register of the parameter groups is shown to the left of the screen (MMT configurator). A selected group (via left mouse button) is shown to the right.

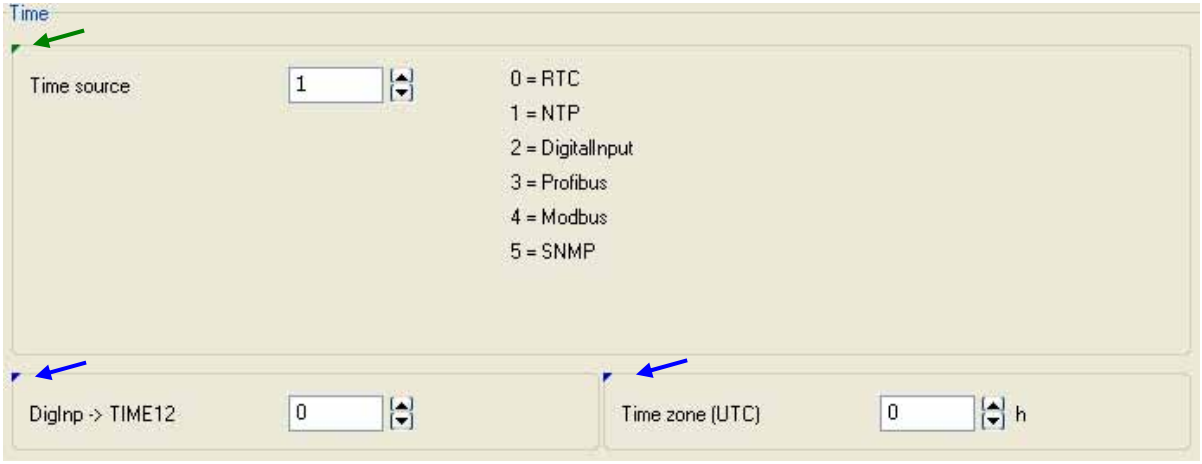


6.1.3 Parameter, hide function

To make the operation comfortable for the end-user, MMT configuration areas which are not used according to the configuration are hidden. For the sake of completeness the following picture as example shows a screenshot of a system in which all areas are used and therefore are visible. The hide function can be manually enabled/disabled using the MMT software tool. For details please read the specific section in the MMT manual.



Parameters which **effect** that other areas are hidden/unhidden are marked green.
Those parameters which can be hidden due to this are marked blue (see the following picture please).



The concerned parameters are represented in this manual by a number followed by a superscripted "N" or a star (*) and a superscripted number in addition.

Example 1: "**1.10)**$^{*1.6}$**"**: That means that the parameter **1.6** must be **enabled** in order to make parameter **1.10** visible (see 6.4 "Basic setting UPC4").

Example 2: **(2.18)** $^{N*2.19}$: That means that the parameter **2.19** must **not** be enabled in order to make parameter **2.18** visible (see section 6.4.2 „CAN Devices Cnt").

6.2 Table "Overview of the configuration items"

The configuration items are divided in several groups for clarity as shown in the table as follows:

Basic settings of the UPC4 (section 6.4)	
UPC4 (section 6.4.1)	Serial number, firmware version, configuration date/person, IP, time server, language selection
CAN devices Cnt (section 6.4.2)	Number of the CAN bus connected modules such as rectifiers, analog measurement inputs (UMD2), fan racks etc.
Charge control (section 6.4.3)	Settings of the battery charge controller
Service/Enable (section 6.4.4)	Enabling of services, e.g. battery test, boost charge, equalize charge, system test, insulation measurement, SNMP, ModBus, etc.
Syst parameters (section 6.4.5)	Default values (voltage/current) of the rectifier modules
Battery (section 6.4.6)	Battery values, battery fuses, asymmetric measurement, temperature compensation
Measurement system (section 6.5)	
Assignment Measu (section 6.5.1)	Affords the assignment of measuring channels to measuring objects
Assignment Shunt* (section 6.5.2)	Assignment of shunt values to current measuring inputs (*BU is required)
Tresholds (section 6.6)	
Thresholds (section 6.6.1)	Threshold values of: battery over/under voltage, over/under temperature, battery operation
Thres. Gen. par (section 6.6.2)	Threshold values of general parameters e.g. UMD2 analog measuring inputs
Outputs/Alarm signaling (section 6.7)	

Digital inputs* (section 6.7.1)	Inversion and/or time delay of digital inputs DIB (*DIB is required)
Signals enable (section 6.7.2)	Configuration of events, LEDs, and relays
Signals Sw mode (section 6.7.3)	inverting/delaying of output signals

LVD/PLD/Drop diode (section 6.8)	
LVD/PLD/Drop d.	Setting of LVD/PLD & drop diode functions

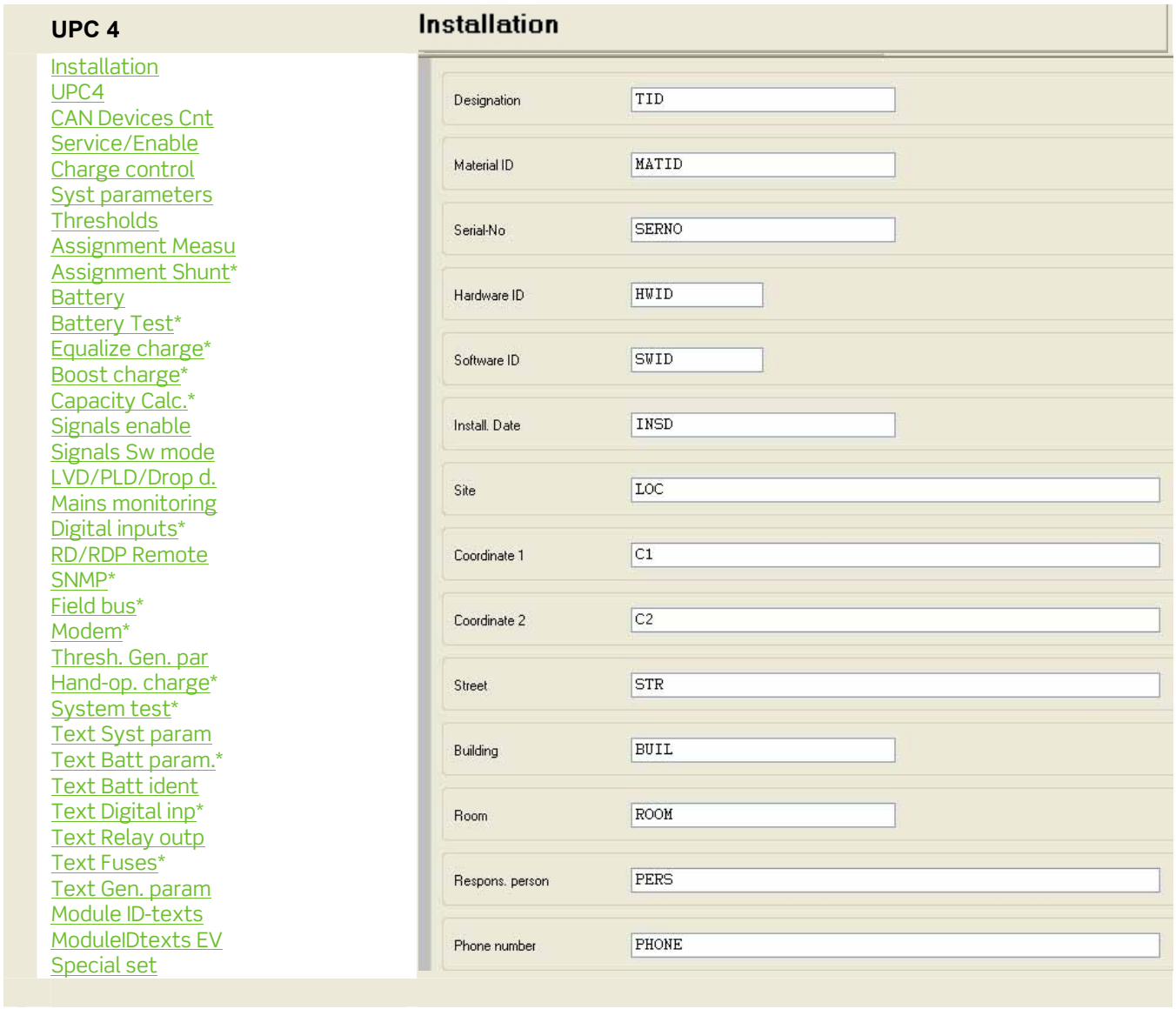
Remotedisplay (section 6.9)	
RD/RDP Remote	Settings for "Remote Door Display" (RDD) and extended settings for „Remote Display Panel“ (RDP*) respectively (*RDP enabled is required)

Additional functions (section 6.10)	
Service/Enable (section 6.4.4)	The services/functions which are enabled in the section "Service/Enable" can be configured as described in the following:
Battery Test* (section 6.10.1)	The switch off conditions of a running battery test can be configured as well as the start date of an automatic battery test (requires the enabled service "battery test").
Equalize charge* (section 6.10.2)	The start and switch off conditions of an equalize charge can be configured (* requires the enabled service "equalize charge").
Boost charge* (section 6.10.3)	The start conditions of automatic boost charge and the conditions of "follow up charge" (follow up charge time, voltage threshold) can be configured (*requires the enabled service "boost charge").
Capacity Calc* (section 6.10.4)	The capacity calculator can be configured. It calculates the expected battery capacity (only of lead acid batteries). (*requires the enabled capacity calculator)
SNMP* (section 6.10.5)	SNMP settings (*SNMP enabled required)
Modem* (section 6.10.6)	Modem configuration (*modem enabled is required)
Field bus* (section 6.10.7)	ModBus/ ProfiBus configurations (*field bus enabled is required)
Mains monitoring (section 6.10.8)	Configuration of external mains monitoring units or MMB board* (*MMB enabled is required)
Hand-op. charge* (section 6.10.9)	Manual charge of the batteries (*Hand-op. charge enabled is required)
System test* (section 6.10.10)	Manual control of the rectifiers to test the system (*System test enabled is required)

REMARK: Texts have no direct effect to system functions.

UPC4 Text (section 6.11)	
Installation (section 6.11.1)	Location, service no., contact person, etc.
Text Syst param (section 6.11.2)	Display text for system measuring values
Text Battery* (section 6.11.3)	Display text e for battery measuring values (*battery enabled is required)
Text Batt ident (section 6.11.4)	Text of the used battery
Text Digital inp* (section 6.11.5)	Text for digital inputs of the UPC4. Appears e.g. in the failure list (* DIB enabled is required)
Text Relay outp (section 6.11.6)	Text for relay output of the UPC4. Only for the display.
Text Fuses* (section 6.11.7)	Text for the monitorable fuses (* FMB enabled is required)
Texte Gen. param. (section 6.11.8)	Display text for general measuring values
Module ID-text (section 6.11.9)	Text of the CAN modules are read out.
Module ID text EV (section 6.11.10	Text of the CAN modules are read out.

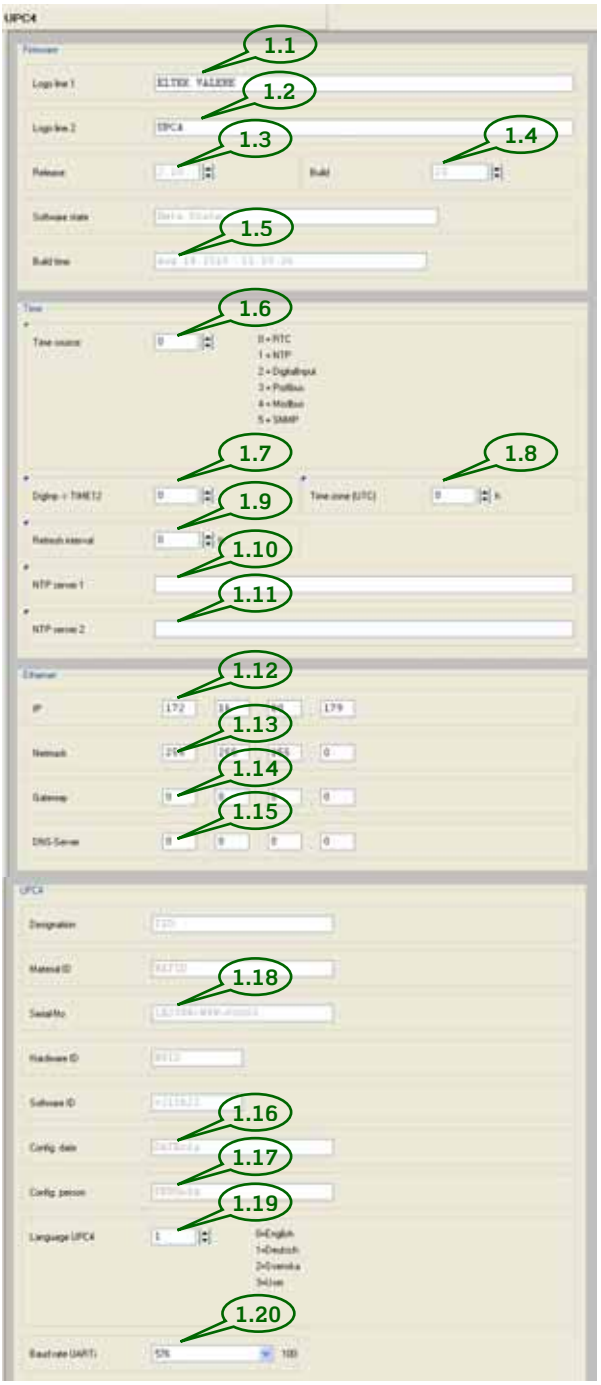
6.3 Overview by screenshot



For the meaning of the stars (*), please see section 6.1.3 Parameter, hide function.

6.4 Basic settings of the UPC4

6.4.1 UPC4



The text, which is entered in Logo line 1 **(1.1)** and Logo line 2 **(1.2)** appears as text for information at the display of the unit.

Information about the firmware version is indicated by the fields **(1.3)**, **(1.4)**, **(1.5)**. (Only to read).

At "Time source" **(1.6)** can be choosen, wherefrom the internal clock shall be synchronized.

At **(1.7)*1.6** a digital input can be choosen which shall set the time to 12:00. The value "0" means inactive.

Time zone and refresh interval are set at **(1.8)*1.6** and **(1.9)*1.6**.

At **(1.10)*1.6** and **(1.11)*1.6** NTP time servers can be entered.

Network settings of the UPC4 can be done at **(1.12)**, **(1.13)**, **(1.14)** and **(1.15)**.

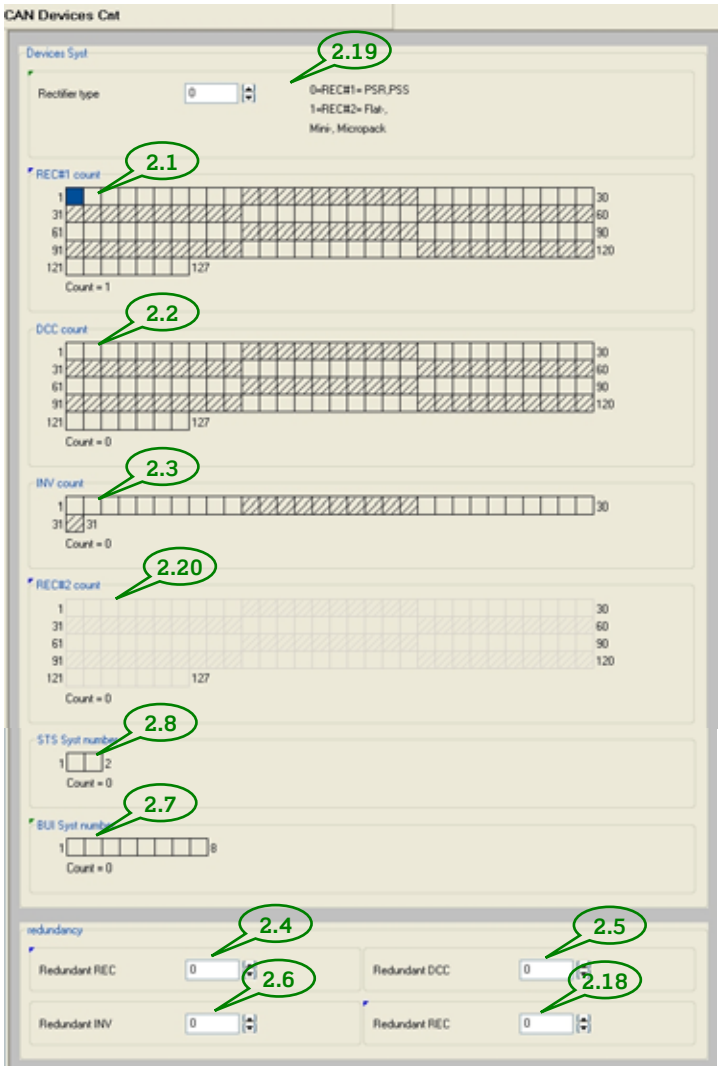
In the fields "Config. Date" **(1.16)** and "Config. Person" **(1.17)** it automatically is entered the date and the person who has done the last configuration change. (Only to read).

Information about the hardware such as e.g. serial number **(1.18)** is indicated in this area. (Only to read).

At "Language UPC4" **(1.19)** you can choose the language which shall be used in the UPC4. Three languages are available as standard. At "User" an additional language will be available via SD card in the future.

At **(1.20)** the baudrate of the serial interface can be set.

6.4.2 CAN Devices Cnt



A multitude of devices (modules) can be connected to the UPC4 via CAN bus.

The number of the used rectifiers **(2.1)** & **(2.20)**, DC/DC converters **(2.2)**, and inverters **(2.3)** can vary in the different power supply systems. The most of the modules automatically log on themselves at the UPC4 and need'nt to be manually configured.

Rectifiers of series PSS **(2.1)**, DC/DC-converters PSC **(2.2)**, and inverters of series UNV **(2.3)** are excepted because they have no automatic log on functionality.

Each of the marked fields correspond to the CAN address of one registered module **(2.1)**, **(2.2)**, **(2.3)**, **(2.20)**. Due to the fact that not all of the slots must be equipped, gaps within the sequence can occur.

Two different rectifier families can be controlled by the UPC4:

- "REC#1": **(2.1)**$^{*2.19}$ that are modules of series **PSR** and **PSS**.
- "REC#2": **(2.20)**$^{N*2.19}$ that are modules of series **Flat**-, **Mini**-, **Micro-,** and **Powerpack**.

The rectifier family which is used in the UPC4-controlled system has to be set at parameter **(2.19)**.

ATTENTION!	Either rectifiers of type according to "REC#1" or rectifiers of type according to "REC#2" are allowed to be used within one system.	☜

The interpretation of parameter REC#2 compared to the parameters REC#1, INV, DCC is different. As described above, REC#1 **(2.1)**$^{*2.19}$, INV **(2.3)**, DCC **(2.2)** have an automatic log on functionality. Therefore each of the backplane slots have an explicid CAN address which results from the number of the slot of the backplane in combination with the set CAN address of the backplane. That means that each of the plugged modules can explicitely be allocated. As shown in the picture above as example, REC#1, No. 1, is configured. That means that at the first slot of the first backplane a module is expected.

This is not possible for REC#2. No allocation of **(2.20)** $^{N*2.19}$ to the slots of the backplane is available. The numbers of **(2.20)** $^{N*2.19}$ result from the temporal order of the plugged modules.

Redundancy:

At Systems with redundant rectifiers, DC/DC converters or inverters additional events can be generated by setting the parameters **(2.4)** $^{*2.19}$, **(2.5)**, **(2.6)**, and **(2.18)** $^{N*2.19}$.

Parameter **(2.4)** $^{*2.19}$ is allocated to REC#1 **(2.1)** $^{2.19}$ whereas parameter **(2.18)** $^{N*2.19}$ is allocated to

REC#2 **(2.20)** N *2.19 .

Two modes are available for the evaluation of the redundancy which can be set in the menu Special set, see section 6.12.1.

The following example relates to rectifiers REC#1 but is valid for rectifiers REC#2, DC/DC converters, and inverters as well.

Redundancy mode= UPC3/MU2000 (see item 35.3 at section 6.12.1).

Redundancy event is active as soon as no redundancy is existent.

Example: System with seven registered rectifiers **(2.1)**, parameter "Redundant REC" **(2.4)** is set to "two".

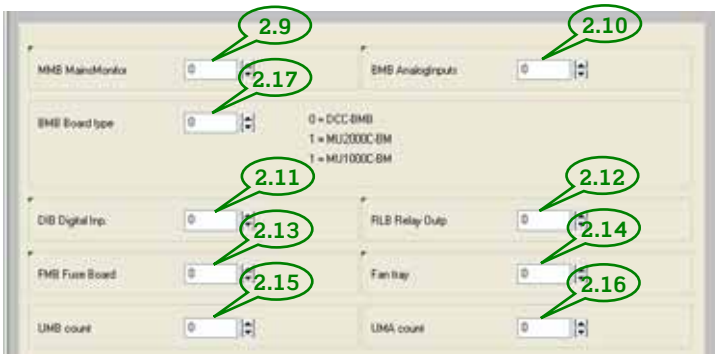
Breakdown of one REC#1: Event "REC#1 no CAN" is active. Redundancy still is available.
Breakdown of two REC#1: Event "REC#1 no CAN" and "REC#1 redundancy" is active. Redundancy is'nt existant anymore.

Redundancy mode= MU1000 (see item 35.3 at section 6.12.1).

Redundancy event is active as soon as the redundant rectifiers and additionally at least one more have been broken down.

Example: System with seven registered rectifiers **(2.1)**, parameter "Redundant REC" **(2.4)** is set to "two".

Breakdown of one or two REC#1: Event "REC#1 no CAN" is active. Redundancy still is available.
Breakdown of three REC#1: The events "REC#1 no CAN" as well as "REC#1 redundancy" are active. Redundancy is'nt existant anymore.



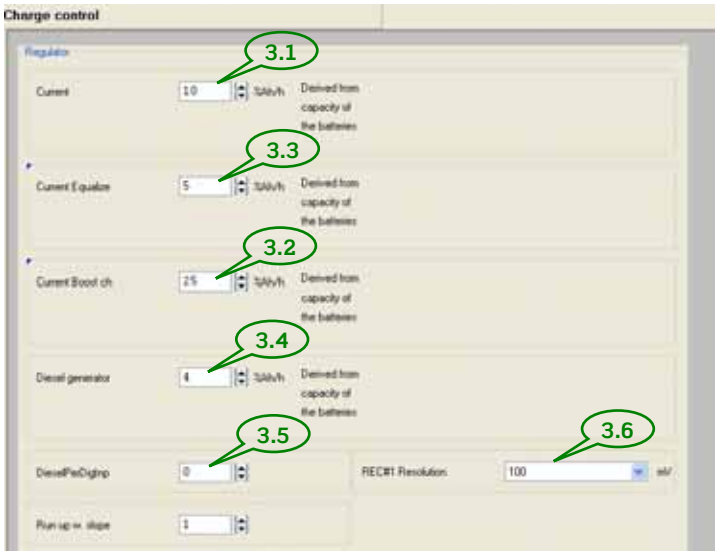
The CAN modules which are listed in the following table "Optional CAN devices (modules)" are not automatically registered at the UPC4. The particular numbers have to be set at **(2.7)** up to **(2.16)**.

REMARK: Three different types of battery monitoring boards (BMB) **(2.10)** are available. The used type has to be set at **(2.17)**.

Optional CAN devices (modules):

CAN device	item	Comment
BU Basic Unit	(2.7)	Modular measuring board. E.g. for battery monitoring
STS Bypass	(2.8)	Active Static Bypass Switch (mains <—> inverter)
MMB MainsMonitor	(2.9)	Mains monitoring (AC input)
BMB AnalogInputs	(2.10)	Extension of the measuring inputs for battery monitoring
DIB Digital Input	(2.11)	Extension of the digital inputs
RLB Relais Outp	(2.12)	Extension of the relays
FMB Fuse Board	(2.13)	Extension of fuse monitoring
FAN tray	(2.14)	Active fan tablet
UMB	(2.15)	Extension measuring control (only used for CONB03)
UMA	(2.16)	Extension measuring control (only used for CONB03)

6.4.3 Charge control

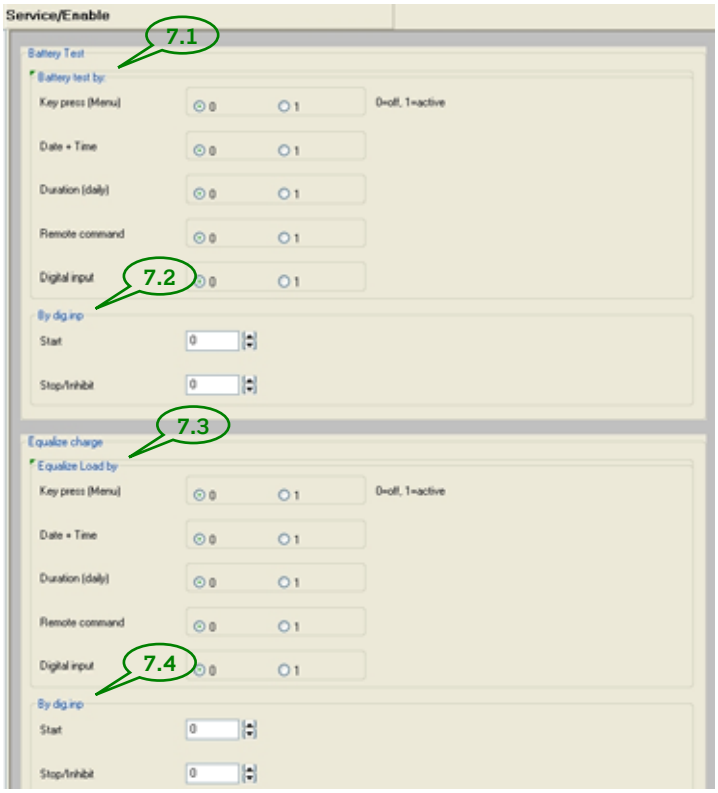


The main function of the UPC4 is, to deliver a voltage default value to the rectifiers, in order to charge batteries or to keep them under good charge conditions.
This regulator (see the picture on the left) provides several additional functions. After a restart, the system overtakes the measured voltage as start voltage for the regulator.
Every second the voltage default value is controlled (up/down) at the value (3.6) if deviations of the current default value exist.
For trickle charge the adjusted relative current default value (3.1) is used.
For an activated boost charge and equalize charge respectively the raised charge current (3.2)*8.1 and (3.3)*7.3 respectively is used.

If a diesel generator is used for power supply, the default value (3.4) is used. The digital input (3.5) indicates a working diesel generator. This function is disabled, if the digital input is set to “0”.

The configured value of the norminal battery capacity (see item (5.2) at section 6.4.6) is used as point of reference for the relative charge currents.

6.4.4 Service/Enable



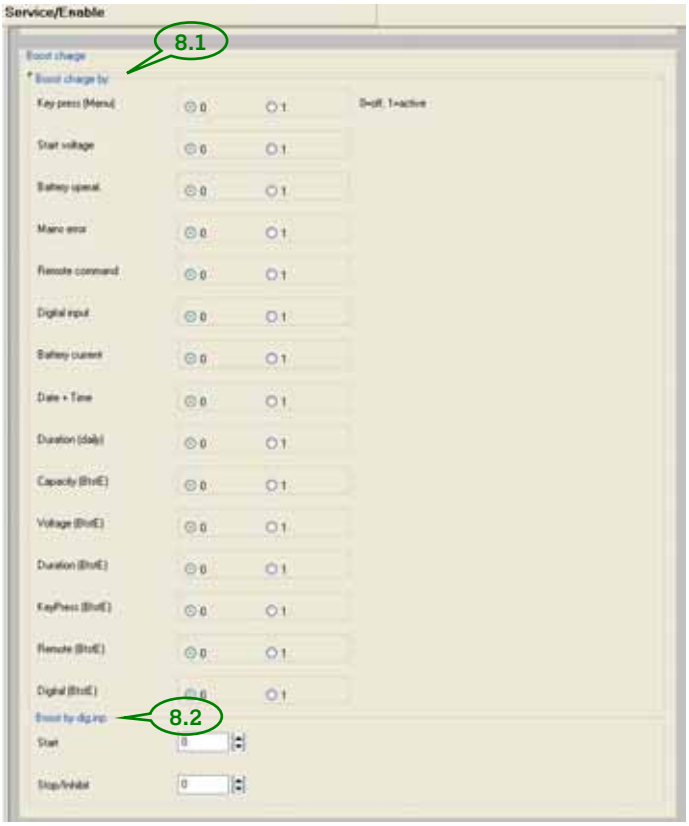
In the area „Service/Enable“, additional functions can be enabled at the UPC3.

If a parameter is set to „0“, the function is disabled. If a parameter is set to “1” or greater, the function is enabled.

A **battery test** (7.1) can be started/stopped in different ways at the UPC4:

-Start/stop via buttons of a display panel/menu of the UPC4
- Start depending on date & time
- Start day to day
- Start/stop by an external command e.g. configuration software
- Start/stop by digital input (7.2)

The settings regarding starting/stopping of **"Equalize charge"** (7.3) are identical to the battery test as described above.



For "**Boost charge**" (8.1) additional conditions for starting & stopping are possible:

- Start/stop via front buttons of a display panel/menu of the UPC4
- Start if the battery voltage falls below the value which is set at "Boost charge" (see section 6.10.3)
- Start after battery operation. If current is withdrawn from the Battery and the value is greater than the value which is set at "Thresholds" (see section 6.6.1), the UPC detects battery operation
- Start after mains error (optional, MMB is required)
- Start/stop by an external command e.g. configuration software
- Start/stop by digital input
- Start/stop by battery current
- Start after battery test end (BtstE) by declaration of the final criteria
- Start depending on date & time, for details please see "Boost charge"

Duration time. Repetition interval (day(s)), please see "Boost charge"

"Battery test", "Equalize charge" and "Boost charge" can be started/stopped via digital inputs (7.2),

(7.4) and **(8.2)**. At "Start" the digital input to start the function is set, at "Stop/Inhibit" the digital input to stop/inhibit the function is set. DIB extension module(s) are necessary.

By enabling the parameter „Hand-op. charge" **(9.1)** a manual control of the default voltage of the rectifiers is possible.
Enabling "System test" **(9.2)**: For the configuration please see the menu "System test" (section 6.10.10).
Enabling „Energy balance" **(9.3)**: The current which is flown into the battery respectively is withdrawn from the battery is accumulated, the value (Ah) is shown on the display.

Measurement of the isolation resistance:

If the measurement of the insulation resistance "Isolat. measure" **(9.4)** is enabled, the measuring source is used which is defined as BU input at "Assignment Measu" (see section 6.5.1), subitem "Isolation". Additionally the UPC4 causes, that the assigned BU connects the half of the voltage value V1 via a high-resistance resistive voltage divider by relay to the DIN rail. By differential measurement to this voltage it is detected whether an insulation failure is present or not.

By parameter "Isol. by dig.inp" **(9.5)** isolation measurement can be disabled. That could be necessary if isolation measurement must not happened due to an external action for a certain time (e.g. alternative measurement enabled, system is maintained).

ATTENTION!	**It is only permitted that only one BU measures per each ground. Otherwise an inherent isolation error is generated.**	☜

Modem:

For the automatic initialization of an external modem, parameter **(9.6)** has to be set to „1". The modem settings have to be done at "Modem" (see section 6.10.6).

SNMP:
Parameter "SNMP Enable" **(9.7)** fades in the SNMP setting options which are enabled by this at the MMT. Parameter **(9.11)** is not used to enable SNMP physically. SNMP is continuously enabled in the background.

Lamp test: At **(9.8)** it is possible to enable a lamp test by digital input.

Capacity calculator:
Parameter "CapacityCal enab" **(9.9)** enables the capacity calculator. For detailed information please see "Capacity calculator" (section 6.10.4).

Field bus:
At "Fieldbus" **(9.10)** a field bus (Modbus) can be enabled. ProfiBus is currently not implemented.

6.4.5 System parameters

"REC Nom. voltage" **(4.1)** is the **float charge voltage**. In systems in which no batteries are used it simply is the default voltage of the rectifiers.

"REC Boost chge V" **(4.2)**[*8.1] is the **boost charge voltage**, whereas "REC Equalize Vol" is the **equalize charge voltage (4.3)**[*7.3].

These values indicate how the maximum default voltage value should be set by the regulator in case of float/boost/equalize charge.

For boost charge no temperature balancing is available. If temperature sensors are used, the other default voltage values are corrected depending on temperature.

Parameter "REC Batt test V." **(4.4)** indicates to which voltage value the rectifiers shall be set during **battery test**. This value must be below nominal battery voltage in order to withdraw current out of the batteries.

"REC Nom. current" **(4.5)** is sent as default via CAN bus to the rectifiers. Normally the value according to the type plate of the rectifier is keyed in.

"REC load limit" **(4.6)** is associated to the set "REC Nom. current".
The measured current of all rectifiers is compared to the maximum possible current ("Rec count" multiplied by "REC Nom. current" **(4.5)**)".
Parameter **(4.7)** and **(4.8)** enable the monitoring of **rectifier load distribution**. This feature is only applicable in systems with more than one rectifier.
If the percentage of the difference of maximum and minimum rectifier current to maximum rectifier current is more than the value **(4.7)** for more than **(4.8)** seconds, the event bit "RECLoadDist" is set.

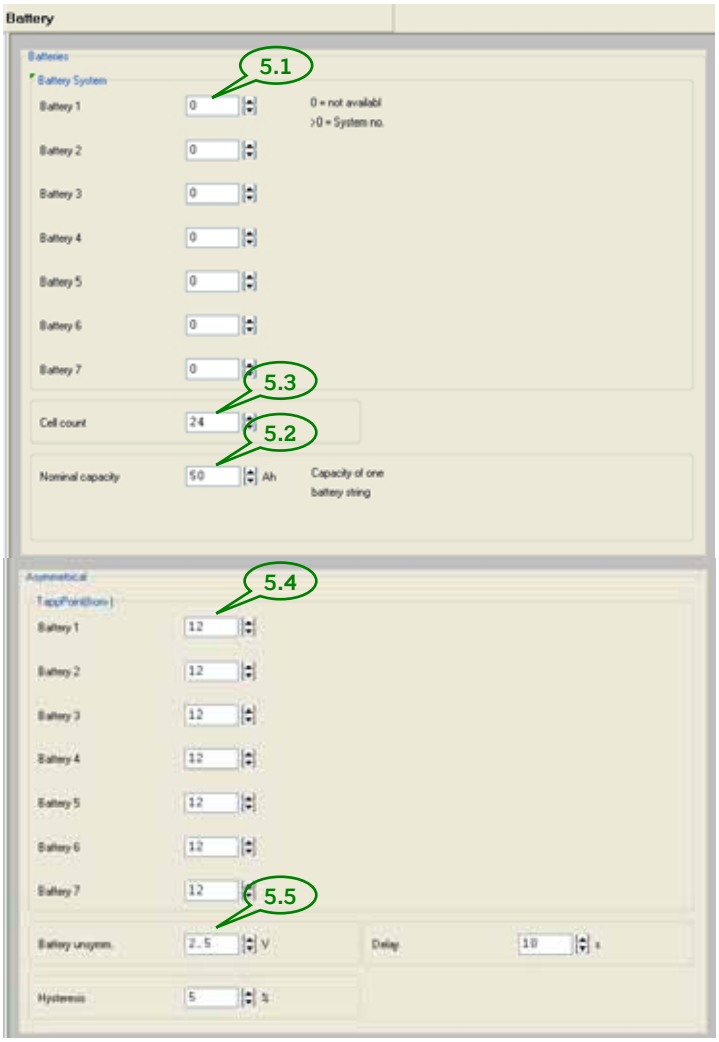
$$\frac{(\mathrm{Rec\,Im}ax - \mathrm{Rec\,Im}in) * 100\%}{\mathrm{Rec\,Im}ax} = LoadDis$$

The load distribution usually is worse at low system load. So the monitoring of the load distribution is only active, if the percentage of the rectifier which delivers the current with the greatest value compared to the nominal current exceeds the value **(4.9)** for more than **(4.10)** seconds.

In systems with inverters but without static bypass switch (STS/UNB) the nominal **inverter output voltage** value "INV nom. voltage" **(4.11)** is sent by the UPC4 via CAN-Bus to the inverters.

In section 6.4.3 "Charge control" (Regulator) the **control process** for battery charging is described.

6.4.6 Battery



In this menu the battery relevant settings are done.

Battery count respectively available batteries are set at **(5.1)**. "0"= not available, "1"= available.

At **(5.2)** the nominal capacity value of the battery, at **(5.3)** the number of the battery cells (cell count) is set.

Furthermore in this section temperature and fuse monitoring, asymmetrical as well as additionell battery relevant settings are described.

For the analysis of the **battery asymmetry** the battery tapping point is set at **(5.4)**. The number of the cells up to the tapped point is counted from the minus pole ($-V_{bat}$) of the battery. If the difference of the measured and calculated asymmetry voltage value exceeds the value of the set „Battery unsymm." **(5.5)**, an event is generated.

If the tapping point is equal to the half of the number of cells of the battery, the calculation according to item a), see the following page, is done.
Otherwise the missing voltage value $+V_{bat}$ which relates to the tapping point is calculated considering a correction factor according to item b).

Legend:

Vtapp	=	Measured tapped voltage value against (–)
Vbatt	=	Measured battery voltage
Batc	=	Number of batteries (value has to be set)
Ctapp	=	Tapping point counted from (-), value has to be set
Vplus	=	Calculated tapped voltage value against (+)

(a) Asymmetry calculation with tapping point at the center of the battery:

$$Diff = Vbatt - 2xVtapp$$

If the difference (without consideration of sign) is greater than **(5.5)**, asymmetry is indicated then.

(b) Asymmetry calculation with tapping point not at the center of the battery:

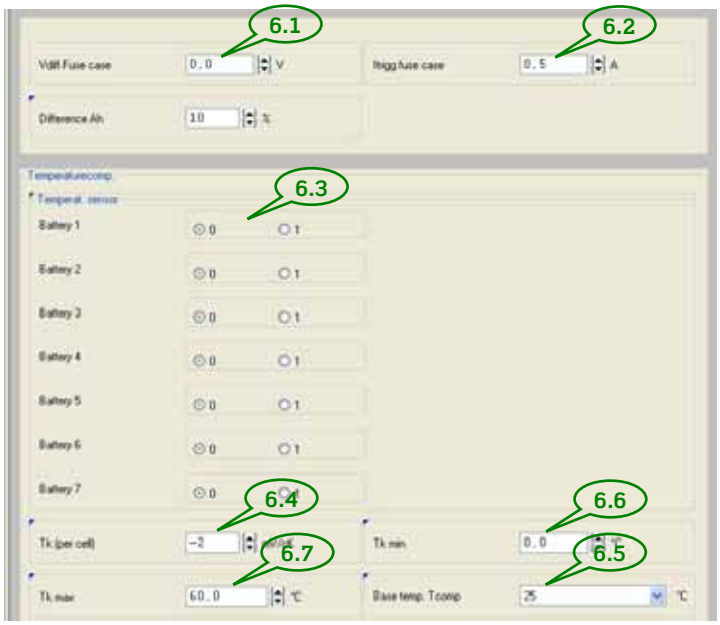
$$Vtapp2 = (Vbatt - Vtapp) + \frac{Vbatt}{Batc} * (Ctapp - (Batc - Ctapp))$$

Vtapp2 is the battery tapping voltage against (+), calculated with consideration of a correction factor.

$$Diff = Vtapp - Vtapp2$$

If the difference (without consideration of sign) is greater than **(5.5)**, asymmetry is indicated then.

NOTE:	***If "Battery Unsymm." (5.5) e.g. is set to 2V, the measured value may differ at +/- 1V related to the calculated unsymmetry voltage.***	☜



The detection of an opened/**tripped battery fuse** is only possible if the battery tap is located behind the battery fuse. If the difference between system- and battery voltage is greater than parameter "Vdiff Fuse case" **(6.1)** and the battery current less than parameter "Itrigg fuse case" **(6.2)**, the event "Fuse open" is activated.

For the **temperature compensation** of the charge voltage the temperature sensor **(6.3)** of a battery has to be activated first, e.g. "Batt1".

The temperature coefficient "Tk (per cell)" **(6.4)** and "Base temp. Tcomp" **(6.5)** depend on the battery and have to be asked at the manufacturer.

Example:

$$V_{load} = V_{nom} + Tk * N_{cell} * \Delta t$$

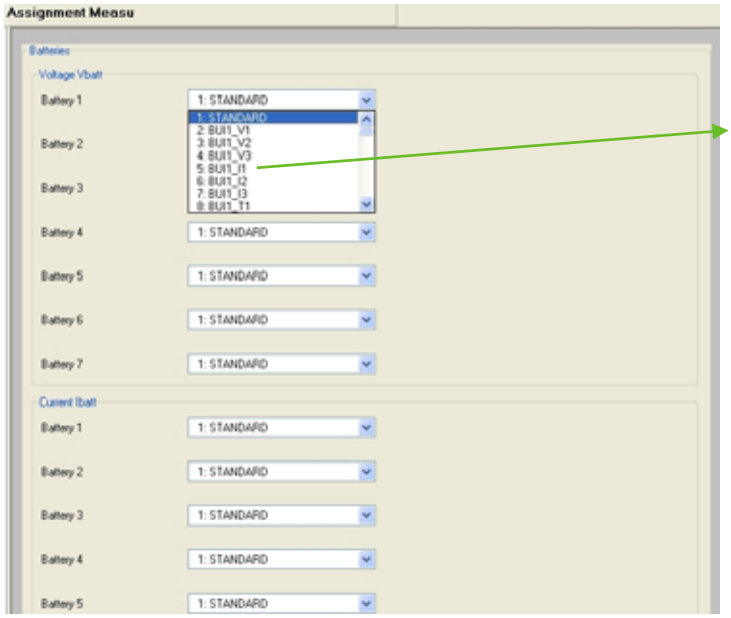
(Tk = -4mV/cK; Ncell=24; Δt=+5°K are used for this example).

$$V_{load} = 54{,}3V + (-0{,}004) * 24 * 5$$
$$V_{load} = 53{,}8V \ at \ 30°C$$

If the currently measured temperature value is below **(6.6)**, then this value is used for temperature compensation. If the currently measured temperature value is above **(6.7)**, then this value is used for temperature compensation.

6.5 Measuring system

6.5.1 Assignment measured values



In this menu it is possible to assign an user-defined input parameter to each individual measurement value of the UPC4. For example: Battery current = input BU1 I1.

Please see the following examples:

1. example: Three batteries are used, but only one measuring line from terminal V1 of the BU is connected to battery 1 for voltage monitoring.

In this case at “Voltage Vbatt”, "Battery 1" and "Battery2" you can assign the same measurement source as for "Battery1".

Voltage Battery 1= BU1_V1
Voltage Battery 2= BU1_V1
Voltage Battery 3= BU1_V1

2. example: Two batteries are available but only one battery shunt is connected.

2a) The battery shunt is series connected to both batteries. It is connected to input I1 of the first Basic-Unit (BU1).
In this case the measured current is the total battery current.
Current Ibatt, battery 1= BU1_I1
Current Ibatt, battery 2= undefined

2b) The battery shunt is connected within one battery string.
In this case the measured current is the current of Battery 1. But the same input can be assigned to battery 2 because it is assumed that the same current is withdrawn from battery 2.
Current Ibatt, battery 1= BU1_I1
Current Ibatt, battery 2= BU1_I1

Explanation of the measuring values:

(**Important default assignments** are listed below. For a list of all **available measurement sources** see Section 7 please).

Batteries:
"Voltage Vbatt", "Tapp voltage Vtapp", "Current Ibatt", "Battery temperat.":

At this menu items the measurement sources concerning battery measurements have to be assigned. A maximum of seven batteries can be monitored by the UPC4. For batteries which are available respectively which are configured but without battery shunt, the measurement source must be set to "UNDEFINED". For details please see above.

DC System:
"Voltage Vload", "Current Iload":

At this menu items the measurement sources concerning load voltage as well as load current have to be assigned.

"Insulat. resist.", "Insulat voltage":

(Basic-Unit BU is necessary). At this menu items the BU which is provided for isolation measurement has to be assigned. Enabling of the isolation measurement takes place at Service/Enable (see section 6.4.4).

General:
"General voltage", "General current", General temp.", "Isolation":
At this menu items the measurement sources of the general measurement have to be assigned.

LVD / PLD:
"LVD voltages":
Reference voltages for LVD/PLD circuit.

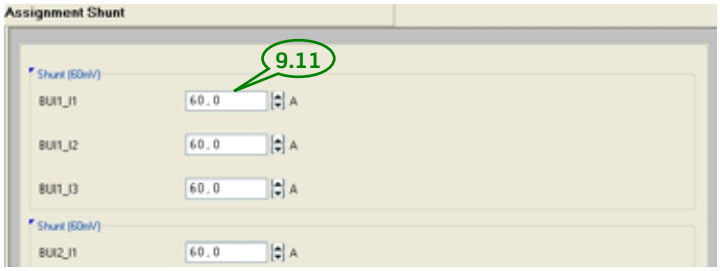
Digital Inputs & Mains:
Factory set, please do not change.

Important default assignments: (Basic-Unit (BU) is necessary).

BU1_V1	=	Battery voltage
BU1_V2	=	System voltage
BU1_V3	=	Unsymmetry voltage
BU1_I1	=	Battery current
BU1_I2	=	Load current
BU1_I3	=	General measurement value I1
BU1_T1	=	Temperature sensor T1 (battery compensation)
BU1_T2	=	General measurement value T1

REMARK: For a list of all **available measurement sources** see Section 7 please.

6.5.2 Assignment Shunt*



(*2.7 or 2.10 is required)

In this menu the values of the connected shunts are configured. The value of 60 A (see the left-hand picture) means: If a voltage value of 60mV falls at the shunt it is interpreted as a current flow of 60 A.

The current values of the Basic-Units (BU) are set at **(9.11)**[*2.7].

The current values of the Battery Monitoring Boards (BMB) are set at **(9.12)**[*2.10].

6.6 Thresholds

6.6.1 Thresholds

With the exception of **(10.4)**, **(10.20)** and **(10.21)** all settings in this group serve for generating events.

Battery

Exceeding the threshold of battery over voltage "Vmax" **(10.1)** or falling below the threshold of battery under voltage "Vmin" **(10.2)** respectively battery warning voltage "Vwarn" **(10.3)** activates the related event in the signal matrix.

Parameter **(10.4)** definines the over voltage threshold at which the rectifiers (REC) are switched OFF. 0= no REC switch OFF.

At **(10.1)** and **(10.4)** hysteresis **(10.7)** and delay **(10.5)** is used.

At **(10.2)** hysteresis **(10.8)** and delay **(10.6)** is used.

At parameter **(10.3)** also hysteresis according to **(10.8)** is used but no delay.

Battery temp.

"Temperature high" **(10.9)**[*5.1] relates to all of the used temperature sensors. Enabling of the individual sensors takes place in the main menu "Battery". Parameter **(10.11)**[*5.1] defines hysteresis whereas parameter **(10.10)**[*5.1] defines delay.

Battery operation

Battery operation **(10.12)** is detected by negative battery current flow. Because of measuring inaccuracy the threshold should be ≥5% of the shunt value. At **(10.14)** hysteresis and at **(10.13)** delay is to be set.

Isolation measuring

Enabling as well as assignment is set in these menus. At this place the threshold for detecting isolation error is defined.

Isolation error measuring **(10.15)** is only possible at ungrounded systems. The setting should relate to the nominal voltage of the system, e.g. 48V system → 48kΩ Riso. At **(10.17)** hysteresis and at **(10.16)** delay is to be set.

Load

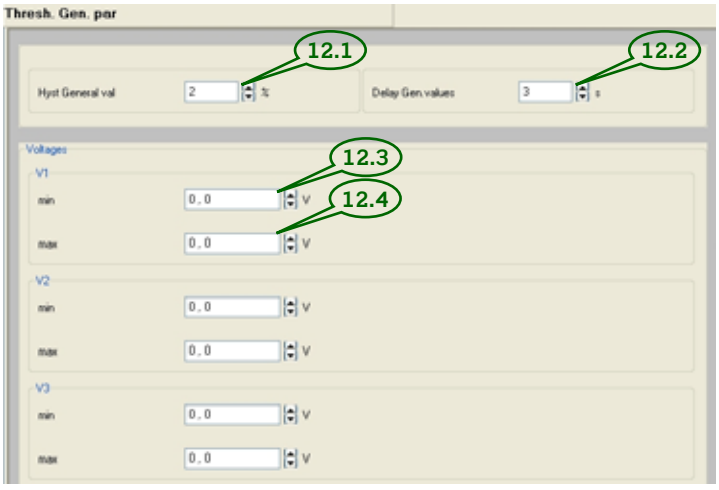
For monitoring of the system voltage also Vmax **(10.18)** as well as Vmin **(10.19)** values can be set.

Parameter **(10.20)** and **(10.21)** define the thresholds of under voltage at which the inverters and DC/DC converters respectively are switched OFF. At **(10.23)** hysteresis and at **(10.22)** delay is to be set.

Parameter **(10.24)** defines a threshold for the maximum load current. If this value is exceeded, an accordant event is generated.

ATTENTION!	***If the battery voltage exceeds the limit at (10.4), all rectifiers get an OFF command via CAN bus.***	☜
ATTENTION!	***In Systems without static bypass switch (STS/UNB) all inverters get an OFF command via CAN bus if the voltage value falls below the threshold (10.20). But if a static bypass is used, it controls the inverters.***	☜
ATTENTION!	***If the voltage value falls below the threshold (10.21) all DC/DC converters get an OFF command via CAN bus.***	☜

6.6.2 Thresh. Gen. par



The UPC4 provides the following general measurement channels:

6 x voltage

6 x current

6 x temperature

6 x isolation resistance

The measurement sources are assigned at "Assignment Measu" (see section 6.5.1).

The respective general parameter is used by the UPC after the text has been configured, please see section 6.11.8 "Text Gen. Param.".

For each individual parameter a "min" **(12.3)** and "max" **(12.4)** threshold is available. If they are exceeded/falled below a respective signal is generated. Hysteresis **(12.1)** and delay **(12.2)** are valid for all general measuring values.

6.7 Outputs/Alarm signaling

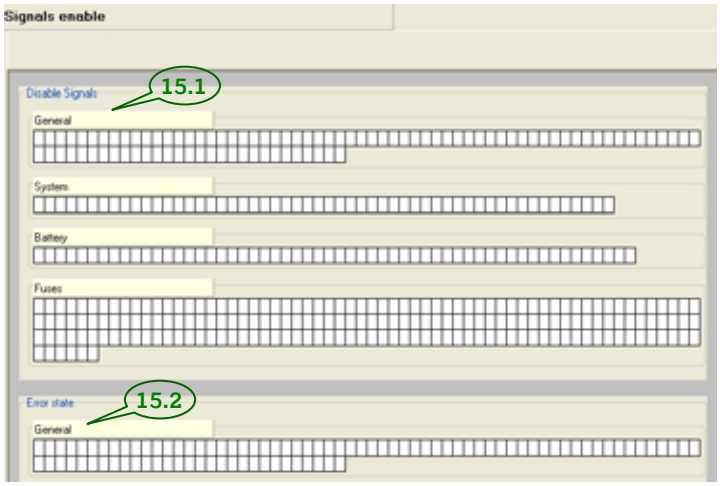
6.7.1 Digital inputs*

(*2.11 is required)

At "Digital inputs" a maximum up to 16 external digital inputs can be configured. Parameter **(14.1)**[*2.11] and **(14.2)**[*2.11] are for the first digital input board (DIB), parameter **(14.3)**[*2.11] and **(14.4)**[*2.11] are for the second DIB.

At **(14.1)**[*2.11] and **(14.3)**[*2.11] the individual inputs can be inverted, at **(14.2)**[*2.11] and **(14.4)**[*2.11] the delay values are set.

6.7.2 Signals enable



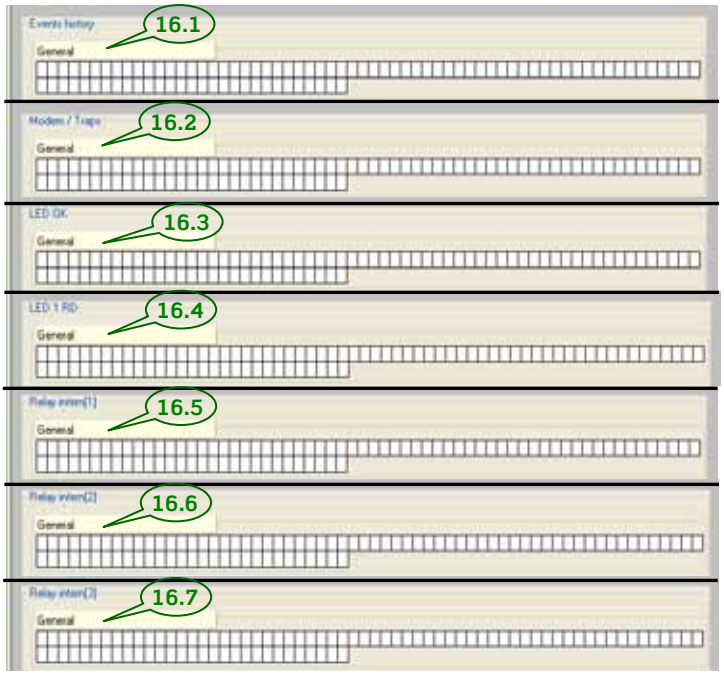
In the area „Signals enable“, all external and internal failures and events respectively can be enabled to an output. Thereby e.g. relays or SNMP traps can be activated.

The events are grouped into the groups **General**, **System**, **Battery**, and **Fuses**. They are available to each output.

You can find a list of all individual failures and events as well at section 7 "Event list UPC4 (failure list)".

"Error state" **(15.2)** is of particular importance. If an event of this list is active, the red LED "ALARM" of the optional RDD and RDP respectively starts blinking.

Events which are active at "Event history" and "Modem/Traps" as well **(16.2)** are signaled via SNMP. At "Disable Signals" **(15.1)** several events can be disabled for all other lists.



All events which have been activated in the list „Events history“**(16.1)** end up on the history memory of the UPC4. The history memory contains of maximum 500 messages and stores appeared as well as disappeared events. Readout and reset of this list takes place either directly at the RDD and RDP respectively or via configuration software.

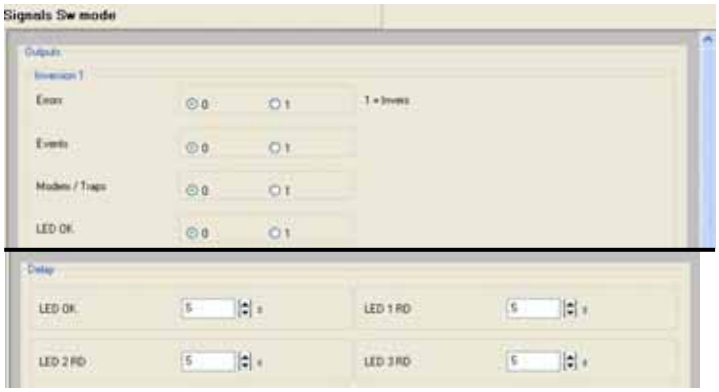
The three available internal relays of the UPC4 are configured at **(16.5)**, **(16.6)**, and **(16.7)**.

The red LED "Alarm" at the front of the RD panel blinks if events of the list "Error state" **(15.2)** are active. The green LED "✓" of the RD panel has to be parameterized at the matrix "LED OK" **(16.3)**. "Error state" and "LED OK" have the same content as default ex factory. But "LED OK" is inverted at "Signals switch mode" (see section 6.7.3). In this area **(16.4)** the six configurable LEDs of the RDP "LED 1 RD" to "LED 6 RD" are configured.

The relays of the Basic-Units (BU) are configured at **(17.1)**.

The relays of the optional available relay boards (RLB) are configured at **(17.2)**.

6.7.3 Signals Sw mode



In the area „Signals Sw mode“, the configured lists can be inverted at their outputs. Additional a time delay can be set. It is common practice to let a relay operate at failure free condition so that a cable break can be recognised as failure. Due to this fact, the relay output is inverted, e.g.

„Relay 1.1 = 1“.

If the green LED (✓) shall glow if **no** failure occurs, the LED must be inverted too.

6.8 LVD/PLD/Drop diode

LVD = Low Voltage Disconnect. This function is mainly used to protect batteries against total discharge. If the set under voltage limit is reached, the battery is disconnected from the system by contactor.
PLD = Priority Load Disconnect. By this function it is possible to early disconnect “unimportant” loads at battery operation if the battery voltage under-runs voltage limit values. Consequently the backup time of prioritized loads is increased.

Because the three areas for LVD, PLD1 and PLD2 are nearly identical, in the following the areas exemplarily are explained on the basis of the LVD function.

Parameter „**Source select**“ **(20.4)** decides on the general LVD/PLD functionality.

Explanation of the figures:	
0	(OFF) disabled
1-6	The measuring sources which are assigned at "Assignment measured values" are used as reference. The thresholds "Low limit OFF" **(20.1)** and "Low limit ON" **(20.2)** for detection refer to that measuring value. These thresholds are used only at this configuration.
7	Switches the LVD/PLD function depending on "battery operation" (see section 6.6.1 "Thresholds").
8	(Mains error) only makes sense in conjunction with the connection of an external Mains Monitoring Board (MMB), optional.

At recognition of LVD, PLD1, PLD2 respectively an event is generated which can be assigned to any output (relay) at “Signals enable” (see section 6.7.2).

"LVD":

Selection source V1 (default battery voltage) as well as event “LVD active” is assigned to the LVD relay (e.g. K1).

The LVD contactor (energized by relay) switches off as soon as the battery voltage drops below the limit „Low limit OFF“ **(20.1)** and additionally "Drop delay" **(20.5)** has been elapsed.
Reactivation of the contactor takes place if „Low limit ON“ **(20.2)** has been exceeded.

"PLD":

The PLD contactor (energized by relay) switches off as soon as the battery voltage drops below the limit „Low limit OFF“ **(20.6)** and additionally "Drop delay" **(20.7)** has been elapsed.
Reactivation of the contactor takes place if „Low limit ON“ **(20.9)** and the set "Connect delay"**(20.10)** as well has been exceeded.

PLD2 has the same setting options as PLD1.

ATTENTION!	***Because the battery voltage directly increases after power load disconnection, the switch-on voltage "Low limit ON" (20.2) should be set to a value great enough to avoid direct activation of the contactors.***	☜

Drop diodes in UPS systems are used to protect the consumer load against overvoltage, e.g. during boost charge. First of all the voltage reference **(21.1)** (1=Vbatt; 2=Vtapp; 3=Vload) and following the ON **(21.2)** and OFF **(21.3)** threshold is set for drop diode 1 as well as for drop diode 2 if applicable.

6.9 Remote Display

In this area general settings can be made concerning RD and RDP as well. At **(22.1)** LCD contrast, at **(22.2)** ilumination is set.

In the area "**Alternate Display**" it can be set what should be displayed first on the display:

It is possible to display element 1 = Status + time, element 2 = load values (voltage/current) or element 3 = LOGO and/or element 4 = battery remaining time. It is also possible to let the display of the three elements chronologically change. The intervals can be set at **(22.3)**. If only one of the three values is set >0, than it will be displayed continuously. The other values are hidden then.

The battery remaining time is only displayed if the battery is discharged with a current greater than 1 A.

In the area "**Batteries**" **(22.4)**[*5.1] can be set whether battery measuring values should be hidden or not at the display.

In the area "**Syst**" it is similarly valid for load values **(22.5)**.

In the areas "**CAN DeviceArrays**" **(22.6)** and "**General**" **(22.7)** as well it can be set that CAN devices and other modules according to the list are hidden at the display.

For **RDP** only:

On the Remote Display Panel definite block diagrams are used. For detailed information please see the specific user manual of the RDP.

By parameter "Enable RDP" **(23.1)** the RDP can be enabled.

At "StartUP action" **(23.2)**[*23.1] it is set how the UPC4 system should act after a restart.

„0 = none“ >> no command to the CAN devices. The present condition “ON” respectively “OFF” persists.

“1 = CAN devices ON“ >> CAN devices explicitly get the ON command.

“2 = CAN devices OFF“ >> CAN devices explicitly get the OFF command.

Parameter **(23.3)**[*23.1] and **(23.4)**[*23.1] enables the CAN modules and digital inputs as well which should be used on the RDP.

For more information about the RDP configuration please read the RDP user manual.

6.10 Additional functions

6.10.1 Battery Test*

(*requires 7.1), see section 6.4.4.

Battery Test can be started by several options, please see section 6.4.4 Service/Enable.

For an automatic battery test date and time **(26.4)**[*7.1] are to be set.

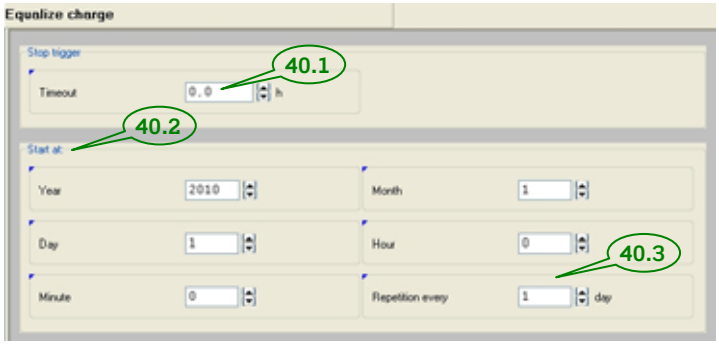
Via parameter **(26.5)**[*7.1] the battery test can regularly be repeated according to the set interval (day(s)).

A running battery test either can be stopped manually or automatically by exceeding a break-off criterion.

The automatic break-off criteria “Max DischargeCap“ **(26.1)**[*7.1] (e.g. 80% of the battery capacity is discharged) and “Max Test-durat.“ **(26.2)**[*7.1] (e.g. 240 min battery operation kept up) stop the battery test error-free, whereas the under-run of the minimum discharge voltage “MinDischarge vt” **(26.3)**[*7.1] stops the test with error.

If the battery test has been stopped with error, the battery error event can be reset by restarting the unit, deleting using the control keys of a remote display or by a successfully completed battery test.

6.10.2 Equalize Charge*

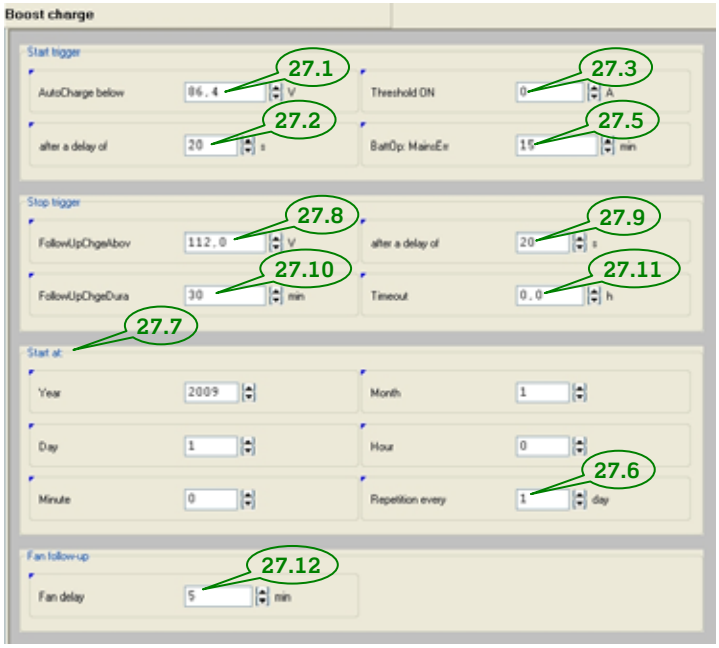


(*requires 7.3), see section 6.4.4.

Enabling "Equalize charge" in general is already described at Service/Enable.
In this menu the duration of "Equalize charge" **(40.1)**[*7.3] has to be set.

Furthermore it is possible to start "Equalize charge" at a definite time **(40.2)**[*7.3]. Via parameter **(40.3)**[*7.3] it can regularly be repeated according to the set interval (day(s)). Enabling has to be set at Service/Enable.

6.10.3 Boost charge*



(* requires 8.1), see section 6.4.4.
In general the enabling of the boost charge function is described in section Service/Enable. At the area "Boost charge" the threshold values for start of an automatic boost charge have to be set.

If the battery voltage falls below the value **(27.1)**[*8.1], boost charge will run after a delay of **(27.2)**[*8.1] seconds.
(Requires enabling “Boost charge by Start voltage“, see Service/Enable). If the battery charge current exceeds the value "Threshold ON" **(27.3)**[*8.1], boost charge will run after a delay of **(27.2)**[*8.1] seconds.
(Requires enabling “Boost charge by battery current“, see Service/Enable). If battery operation is detected for more than **(27.5)**[*8.1] minutes, boost charge will run. (Requires enabling “Boost charge by battery operation", see Service/Enable).

Boost charge can be automatically started at a set date/time **(27.7)**.
(Requires enabling by "Date + Time", see Service/Enable).

The parameter **(27.6)**[*8.1] defines the repetition interval in days.
Example: Start boost charge at 1.1.2009 at 8:05
Repetition every 3 days
Consequently boost charge is executed at:
1.1.2009 at 8:05, 4.1.2009 at 8:05, 7.1.2009 at 8:05, a. s. o.
(Enabling of “Boost charge by Duration (daily) is additionally required, see Service/Enable).

If only “Boost charge over Duration (daily)” is set and not “Boost charge over Date + Time”, the UPC

ignores the date and boost charge will start at the time as set. In the following boost charge will be executed according to the interval as set.
Boost charge runs as long as the battery voltage has exceeded the parameter **(27.8)**[*8.1] over **(27.9)**[*8.1] seconds plus the "Follow up charge duration" as set **(27.10)**[*8.1].

Boost charge time can be additionally limited according to parameter "Timeout" **(27.11)**[*8.1].

If an optional fan rack is used, the fans run on for additional time **(27.12)**[*8.1] after finishing boost charge.

6.10.4 Capacity Calculator*

(*requires 9.9), see section 6.4.4.

In this area the configuration of the capacity calculator is done.

NOTE: The capacity calculator works exclusively with lead acid batteries.

The capacity calculator calculates the expected available capacity of the batteries (on the basis of a fully charged battery). A fully charged battery is detected by the UPC4 if the battery charge voltage ≥ the charging end voltage for a minimum of 150 seconds. This voltage results from the parameters System parameters **(28.1)**[*9.9], see section 6.4.5. At this condition the percentages of the set nominal capacity **(28.2)**[*9.9] is assumed as available capacity (see section 6.4.6 Battery).

Subsequently the charge current is permanently estimated and resulting from that the still available capacity is calculated. The estimation of the discharge/charge current relates to the current I10. I10 is the 10th part of the current related to the nominal battery capacity.
Example: Nominal capacity= 50Ah >> I10= 5A.

The capacity calculation is based on an estimation of the charge current and discharge current respectively because the behaviour of the available capacity is not linear to the battery currents.

Parameter p = 50% is factory preset as default for the estimation of the current.

Calculation: (Default 50 relates to factor=1), see the table below. The table shows the dependency of the parameter p (%) to the factor F. This table is valid for *battery current Ib = current I10*.

Factor *F* is calculated according to the formula as follows:

$$F = \frac{ib * (130 - p)}{i10 * (30 + p)}$$

P= Parameter 50 %
Ib= measured battery current
I10 (A)= Nominal capacity (Ah)/ 10 h

The following table is valid for *Ib= I10*:

Parameter	0	5	10	30	**50**	70	90	95	100	%
Faktor	4.33	3.57	3.00	1.66	**1.00**	0.60	0.33	0.28	0.23	1

Estimation of the discharge current

Calculation (example):
Battery 50 Ah
Nominal capacity 95% (5.2), see section 6.4.6.
Capacity= 47,5 Ah

Example: 20A are withdrawn from the fully charged battery for more than one minute.
For the calculation of factor *F* the accordant current values are used.

$$F = \frac{20A * (130 - 50\%)}{5A * (30 + 50\%)}$$
$$F = 4$$

$$Iest = Ib * F$$

$$Iest = 20 * 4$$
$$Iest = 80$$

$$47{,}5\ \text{Ah} * 3600 - 60 * 80/3600 = 46{,}166\ \text{Ah}$$

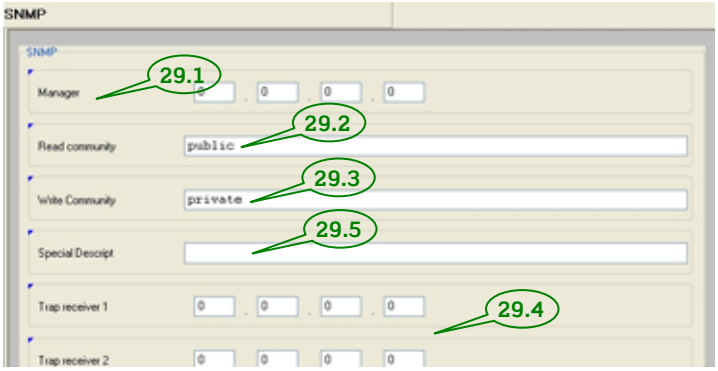
Estimation of the charge current

At charging the estimation is the other way round.
P= 50%

$$F = \frac{ib * (130 - p)}{i10 * (30 + p)}$$
$$Fl = \frac{9 - F}{8}$$
$$Iest = Ib * Fl * (Ch\arg eEfficiency / 100)$$

Additional, parameter **(28.5)**[*9.9] (ChargeEfficiency) is introduced, because more energy is necessary to charge a battery.
If the parameters **(28.6)**[*9.9], **(28.7)**[*9.9] are under-run, in each case an event is generated.

6.10.5 SNMP*



(* requires 9.7), see section 6.4.4.

In this menu the SNMP relevant settings are done.

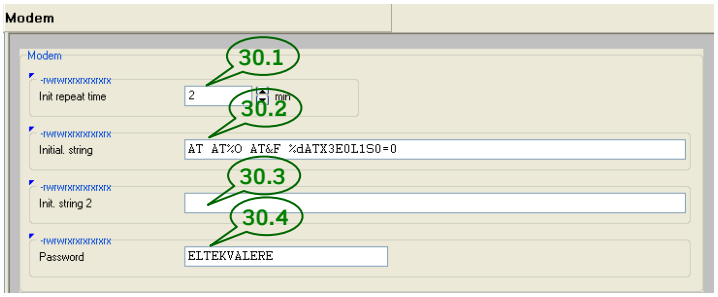
Parameter "Manager" **(29.1)**[*9.7] is a possibility to restrict the SNMP access to the UPC4. If an IP is configured, it is only possible to get access to the UPC4 by this PC and by all configured trap receivers via SNMP. Whereupon the manager is the only one with write authorisation.

If IP = "0.0.0.0", this function is disabled.

If **(29.5)**[*9.7] is empty, an SNMP requiry to Sysdescription iso(1).org(3).dod(6).internet(1).mgmt(2).mib-

2(1).system(1).sysDescr(1) is answered with „UPC4 Application“. But if a text is typed in, this text is used.
The password for SNMP read authorisation has to be set at **(29.2)**[*9.7], the password for SNMP write authorisation has to be set at **(29.3)**[*9.7]. Up to ten trap receivers **(29.4)**[*9.7] can be configured. All IPs unequal to "0.0.0.0" are used.

6.10.6 Modem*



(* requires 9.6), see section 6.4.4.

For remote control the UPC4 can be extended by an external modem. It is operated via serial interface.

Modem operation can be enabled at "Service/Enable".

If no connection exits, the external modem is initialized according to the “Init repeat time” as set at parameter **(30.1)**[*9.6]. For that the initial string **(30.2** & **30.3)** [*9.6] is used.

Modem password **(30.4)**[*9.6] is required to make a dial-up from an external modem to the UPC4.

Initial string:

The initial string consists of **(30.2)**[*9.6] & **(30.3)**[*9.6]. If the field **(30.2)**[*9.6] is too small, the initial string can be continued in the field **(30.3)**[*9.6].

AT AT%O AT&F %dATX3E0L1S0=0

This is set in the configuration of the UPC4. This instruction set is executed from the left to the right and transferred to the modem. Specific features are the tokens “%” (e.g. %O, %d). Those are not transferred but are commands which are executed via the UPC4.

Either a blank or the end of the string effects the transfer of a CR LF (ENTER KEY at PC).

The Initial.string (see above) works nearly with all standard modems and should be changed only in exceptional cases. For the AT commands which are understood from your modem please see the attendant manual.

IMPORTANT:	***The modem must not answer self acting (ATS0=0), otherwise pass word polling is avoided.***	☜

Token (UPC4 commands)

%m Sending without \r\n and waiting for answer from the modem
%d 1 s pause
%p 0.25 s pause
%t40 Timeout 40 s Default 5 s (1-99 s)
%t Timeout 320 ms min = 320 ms
%t0 ditto
%t100 ditto
%t400 Timeout 400 ms 320 .. 999 ms
%O Waiting for OK\r\n modem message
%C Waiting for CONNECT\r\n ditto
%0 Waiting without check Default
%% results in % as normal character

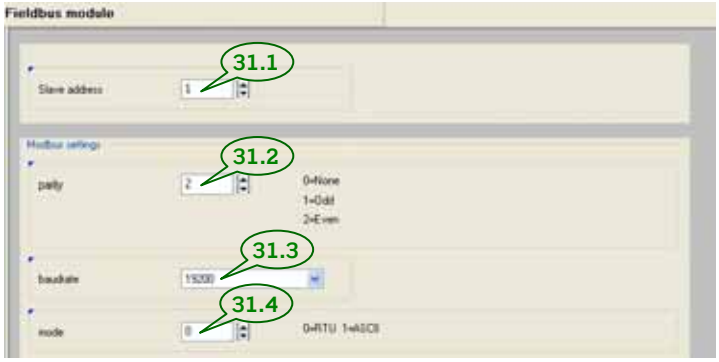
Communication operation of the string AT AT%O AT&F %dATX3E0L1S0=0
(/r/n = carriage return line feed)

Explanation of the AT commands:

AT → &F= Factory setting
X3= Do not wait for dial tone
E0= 0 Deactivates echo of sent bytes
L1= Loudspeaker active, sound level 1
S0=0 Modem answers not self acting

At section 5.3.4 Operating status „Modem“ the status of the modem is shown.

6.10.7 Fieldbus*



(* requires 9.10), see section 6.4.2.

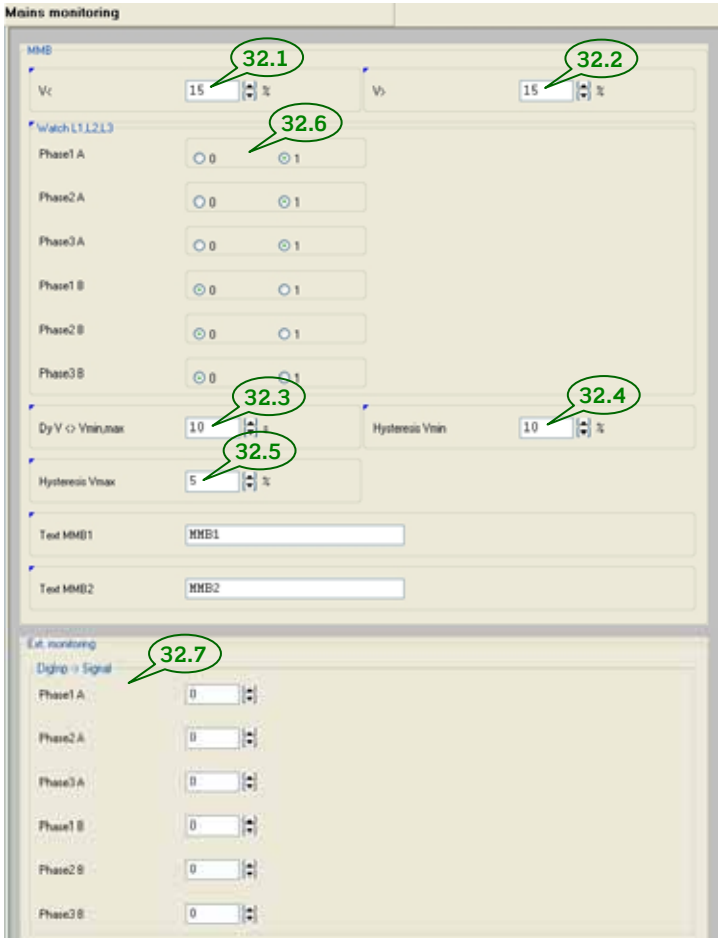
As fieldbus currently Modbus or (probably in the near future) ProfiBus can be enabled at Service/Enable.

The slave address of Modbus or ProfiBus respectively can be set at **(31.1)**[*9.10] .

Modbus parameters

These parameters are only relevant for Modbus operation. Serial settings such as parity **(31.2)**[*9.10], baudrate **(31.3)**[*9.10], and mode **(31.4)**[*9.10] have to be set accordingly.

6.10.8 MMB*/Mains monitoring



MMB* (requires 2.9), see section 6.4.2.

In connection with an optional available Mains Monitoring Board (MMB) the UPC4 is able to detect mains failure or phase break down. The mains failure is available as event and can also be used as source for „PLD/LVD“ function, see section 6.8.

By the use of mains monitoring boards the voltages of each phase are measured.

The threshold values V< **(32.1)**[*2.9] and V> **(32.2)**[*2.9] are related to the nominal voltage of the inverters, which is set in the area "System parameters".

A mains failure is detected if these values are exceeded/under-run, with inclusion of the parameters **(32.3)**[*2.9], **(32.4)**[*2.9], and **(32.5)**[*2.9].

The monitoring of single phases can be enabled/disabled by parameter **(32.6)**[*2.9]. The phases 1A to 3A belong to the MM board A, the phases 1B to 3B belong to the MM board B.

If an **external mains monitoring module** is used: The digital input which is connected to the external mains monitoring module can be defined by parameter **(32.7)**.

6.10.9 Hand operation charge*

Enabling of "Hand operation charge" has to be set at Service/Enable (*requires 9.1), see section 6.4.4.

During hand operation charge the automatic control of the rectifiers is invalid and therefore it is possible to charge the batteries manually using the RDD and RDP as well. In this case the user has to set the charge voltage value manually at the RDD/RDP.

The last used voltage value of the trickle charge is assumed by the UPC4 as minimum voltage value for hand operation charge. This value can be set up to a maximum of parameter "Max. charge volt" **(33.6)**. If the actual measured battery voltage value is greater about **(33.3)** than the manually set voltage, the hand operation charge is interrupted immediately. If **(33.1)** is set to "0", the following listed events are inhibited during hand operation charge and delayed according to parameter **(33.4)** after hand operation charge is finished: "Vbatt > Vmax", "Vload > Vlmax", "Vtapp > Vomax".

During hand operation charge the nominal current value of the rectifiers can be reduced manually by parameter **(33.5)**. But if this value exceeds the maximum possible current of the module, it has no effect. This value is valid per each rectifier.

6.10.10 System test*

(* requires 9.2), see section 6.4.4.

During "system test" the automatic control of the rectifiers is invalid and therefore it is possible to control the rectifier voltage manually using the RDD: The user is able to set the rectifier voltage value manually at the RDD within the thresholds **(34.5)**, **(34.6)** in order to test the system.

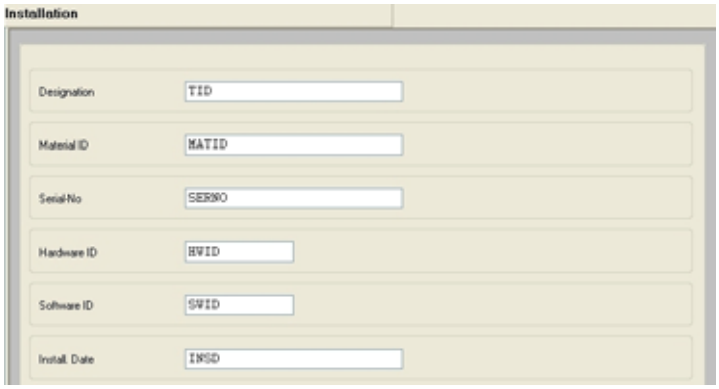
If **(34.1)** is set to "0", the following listed events are inhibited during system test is running and delayed according to parameter **(34.3)** after system test is finished:

"Vbatt < Vmin", "Vbatt > Vmax", "Vload < Vlmin", "Vload > Vlmax", "Vtapp < Vomin", "Vtapp > Vomax".

During system test the nominal current value of the rectifiers can be reduced manually by parameter **(34.4)**. But if this value exceeds the maximum possible current of the module, it has no effect. This value is valid per each rectifier.

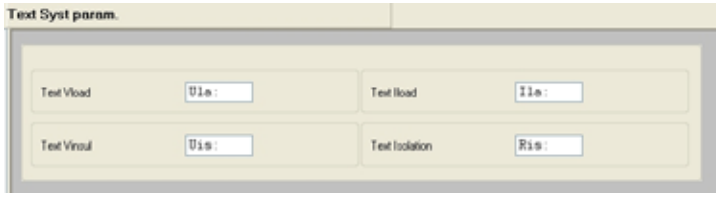
6.11 UPC4 Text

6.11.1 Installation



In this menu the texts which describe the system ("Installation") can be changed.

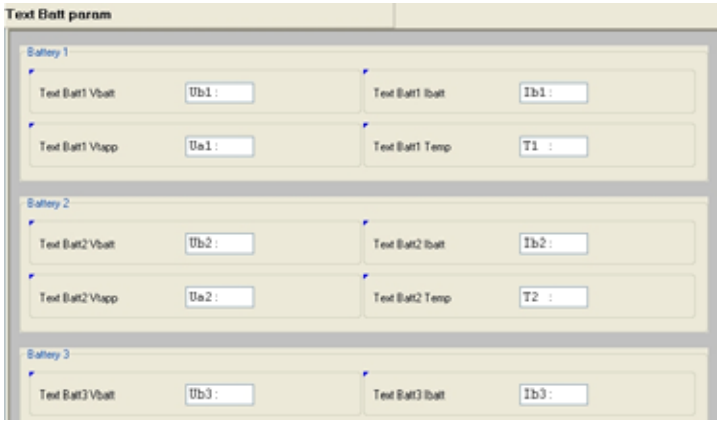
6.11.2 Text System parameter



Self-defined texts which are used for the system and load respectively.

These user-specified texts are also displayed according to the related measuring values at the RD display.

6.11.3 Text battery parameter*

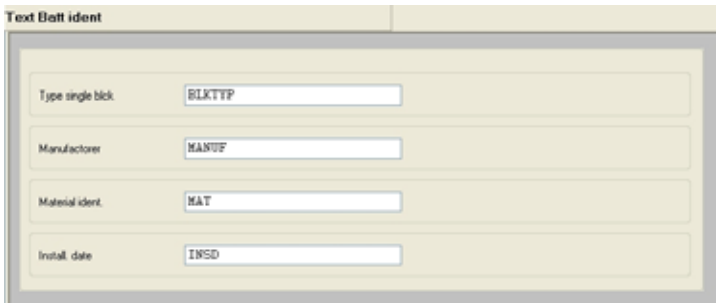


(*requires 5.1), see section 6.4.6.

Self-defined texts which are used for the batteries.

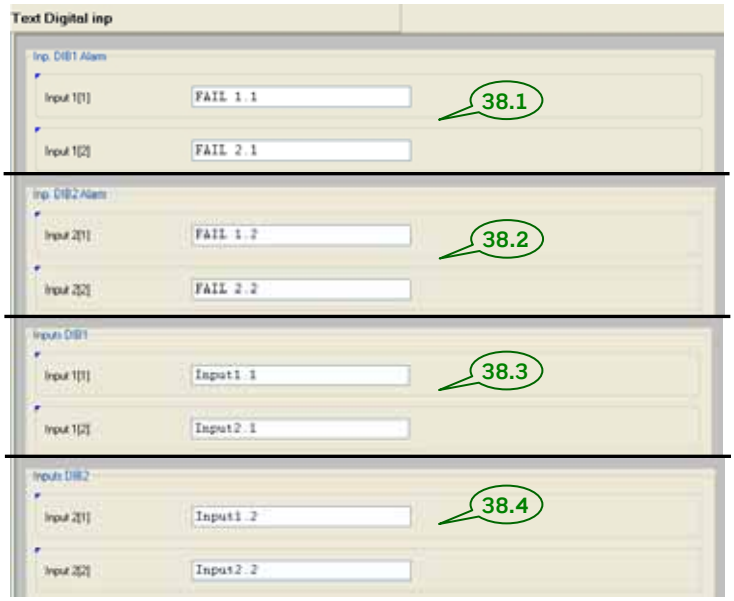
These user-specified texts are also displayed according to the related measuring values at the RD display.

6.11.4 Text Batt ident



Additional information text regarding batteries.

6.11.5 Text Digital input*



(* requires 2.11), see section 6.4.2.

If digital input boards (DI8) are used, it is possible to assign individual texts to the digital inputs. These texts then also appear in the failure/event list.

For each individual digital input two texts are available. Text 1 is used if an event is active, text 2 is used if an event is inactive.

The texts **(38.1)**[*2.11], **(38.3)**[*2.11] are related to the digital inputs of the first DI8, the texts **(38.2)**[*2.11], **(38.4)**[*2.11] are related to the digital inputs of the second DI8.

Example 1:

A switch (normally open contact) is connected to the digital input 1.1; the input is not inverted by configuration.
First case: The switch is not activated.
>No event is generated; status text input 1.1 of **(38.3)** is used.
Second case: The switch is activated
>An event is generated; status text fail input 1.1 of **(38.1)** is used.

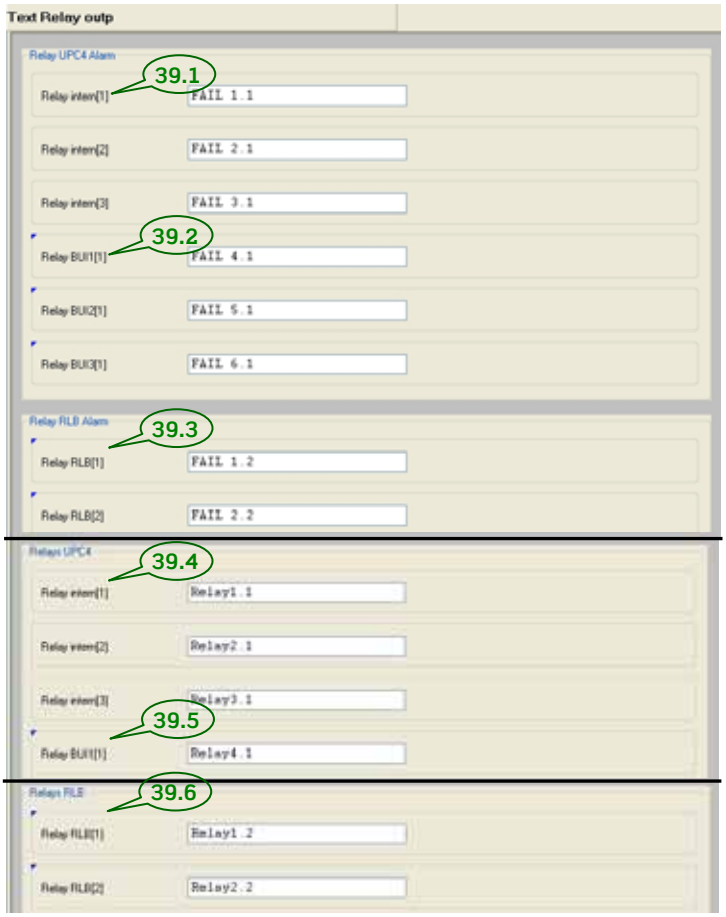
Example 2:

A switch (normally closed contact) is connected to the digital input 1.2; the input is not inverted by configuration.
First case: The switch is not activated.
>An event is generated; status text fail input 1.2 of **(38.1)** is used.
Second case: The switch is activated.
>No event is generated; status text input 1.2 of **(38.3)** is used.

Example 3:

A switch (normally closed contact) is connected to the digital input 1.3; the input is inverted by configuration.
First case: The switch is not activated.
>An event is not generated; status text input 1.3 of **(38.3)** is used.
Second case: The switch is activated.
>An event is generated; status text fail input 1.3 of **(38.1)** is used.

6.11.6 Text Relay output



The texts are used in the menu "Relay Status" of the UPC4. The parameters **(39.1)**, **(39.4)** are used for the internal relays of the UPC4.

The texts of the relays of the optional BU(s) are set at **(39.2)**[*2.7], **(39.5)**[*2.7].

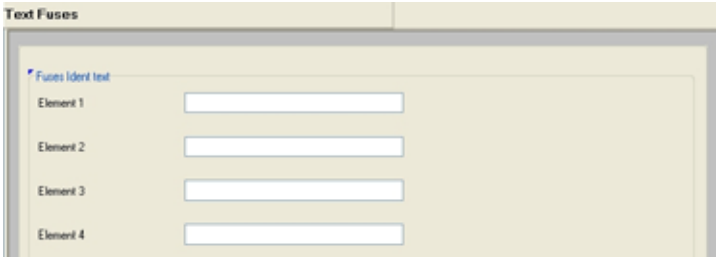
The texts of the optional relay boards (RB6) are set at **(39.3)**[*2.12], **(39.6)**[*2.12].

If the event (e.g. relay 1.1) is active, the related fail texts **(39.1)**, **(39.2)**[*2.7], **(39.3)**[*2.12] are used.

If the event is inactive, then the texts **(39.4)**, **(39.5)**[*2.7], **(39.6)**[*2.12] are used.

Either the event can be directly used for the relay or it can be inverted, see "Signals switch mode".

6.11.7 Text Fuses*



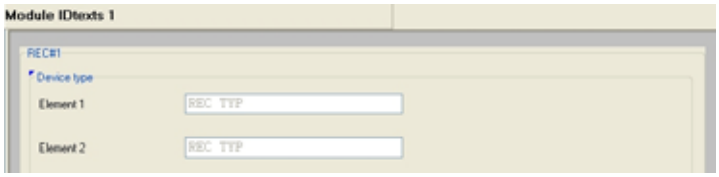
(*requires 2.13), see section 6.4.2.
These texts are used in combination with fuse monitoring boards (FMB).

6.11.8 Text General parameters

>>User defined texts, which are used for general measuring values.

ATTENTION!	***If no text is keyed in, the measuring value is disabled and is not used in the UPC4.***	☜

6.11.9 Module IDtexts 1



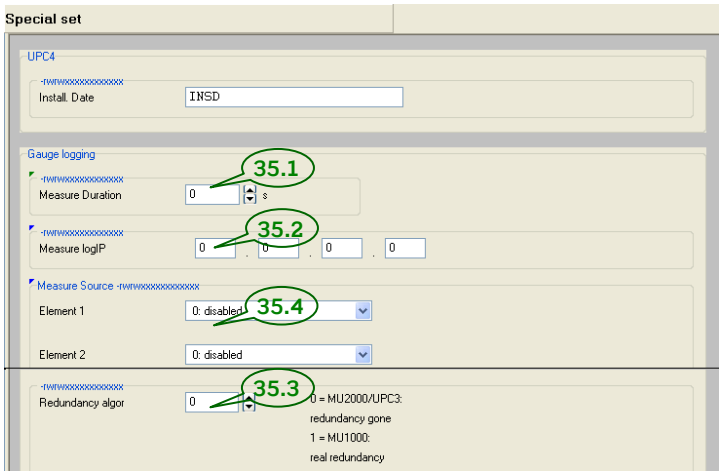
>> All texts are for information only and can not be changed. The UPC4 receives the texts from the connected modules automatically. These texts are received from power modules such as PSR rectifiers, PSC, INV etc.

6.11.10 Module IDtexts 2

>> All texts are for information only and can not be changed. The UPC4 receives the texts from the connected modules automatically. These texts are received from rectifiers of series FLATPACK, MINIPACK, MICROPACK, POWERPACK.

6.12 Miscellaneous parameters

6.12.1 Special Set



Logging of measurement data

Via Syslog Protocol UDP Port 514 measuring values can permanently be sent to a Syslog Server **(35.2)** *35.1.

At **(35.1)** the cycle (seconds) is set. At **(35.4)***35.1 the measuring sources are specified.

Redundancy mode

At **(35.3)** the redundancy mode is set. For details please see CAN Devices Cnt, see section 6.4.2.

7 List of all available measurement sources

NOTE: "X" in the table elements means that these parameters/elements are not factory default-assigned.

Index	Name of the source	Factory default assignment		Location of the source	Description
		Parameter	Element		
0	UNDEFINED				disabled
1	STANDARD	Inexistent (Inex.)			If „Standard“ manually is assigned, the individual default value (see table column on the left) namely is used internally by the UPC4 but “Standard” is shown instead of an explicit assignation. Therefore it is recommended not to use the value “Standard” but to use an explicit assignation.
2	BU1_V1	Voltage Vbatt	Battery 1	BU 1	Voltage terminal V1
		LVD voltages	V1		
3	BU1_V2	Voltage Vload		BU 1	Voltage terminal V2
		LVD voltages	V2		
4	BU1_V3	Tapp volt. Vtapp	Battery 1	BU 1	Voltage terminal V3
		LVD voltages	V3		
5	BU1_I1	Current Ibatt	Battery 1	BU 1	Current terminal I1
6	BU1_I2	Current Iload		BU 1	Current terminal I2
7	BU1_I3	X	X	BU 1	Current terminal I3
8	BU1_T1	Battery temperat	Battery 1	BU 1	Temperature sensor terminal T1
9	BU1_T2	General temp.	T1	BU 1	Temperature sensor terminal T2
10	Zero value	X	X	X	
11	BU1_Risol	Insulat. resist.		BU 1	Resistance value of the isolation monitoring
12	BU1_Visol	Insulat. voltage		BU 1	Measured voltage of the isolation monitoring
13	Zero value	X	X	X	
14	BU2_V1	Voltage Vbatt	Battery 2	BU 2	Voltage terminal V1
		LVD voltages	U4		
15	BU2_V2	LVD voltages	U2	BU 2	Voltage terminal V2
16	BU2_V3	Tapp volt. Vtapp	Battery 2	BU 2	Voltage terminal V3
		LVD voltages	U1		
17	BU2_I1	Current Ibatt	Battery 2	BU 2	Current terminal I1
18	BU2_I2	X	X	BU 2	Current terminal I2
19	BU2_I3	X	X	BU 2	Current terminal I3
20	BU2_T1	Battery temperat	Battery 2	BU 2	Temperature sensor terminal T1
21	BU2_T2	X	X	BU 2	Temperature sensor terminal T2
22	Zero value	X	X	X	
23	BU2_Risol	X	X	BU 2	Resistance value of the isolation monitoring
24	BU2_Visol	X	X	BU 2	Measured voltage of the isolation monitoring
25	Zero value	Inex.			
26	BU3_V1	Voltage Vbatt	Battery 3	BU 3	Voltage terminal V1
27	BU3_V2			BU 3	Voltage terminal V2
28	BU3_V3	Tapp volt. Vtapp	Battery 3	BU 3	Voltage terminal V3
		General voltage	U1		
29	BU3_I1	Current Ibatt	Battery 3	BU 3	Current terminal I1

30	BU3_I2	General current	I1	BU 3	Current terminal I2
31	BU3_I3	X	X	BU 3	Current terminal I3
32	BU3_T1	Battery temperat	Battery 3	BU 3	Temperature sensor terminal T1
33	BU3_T2	General temp.	T1	BU 3	Temperature sensor terminal T2
34	Zero value	X	X	X	
35	BU3_Risol	Isolation	R1	BU 3	Resistance value of the isolation monitoring
36	BU3_Visol	X	X	BU 3	Measured voltage of the isolation monitoring
37	Zero value	Inex.			
38	BU4_V1	Voltage Vbatt	Battery 4	BU 4	Voltage terminal V1
39	BU4_V2			BU 4	Voltage terminal V2
40	BU4_V3	Tapp volt. Vtapp General voltage	Battery 4 U2	BU 4	Voltage terminal V3
41	BU4_I1	Current Ibatt	Battery 4	BU 4	Current terminal I1
42	BU4_I2	General current	I2	BU 4	Current terminal I2
43	BU4_I3	X	X	BU 4	Current terminal I3
44	BU4_T1	Battery temperat	Battery 4	BU 4	Temperature sensor terminal T1
45	BU4_T2	General temp.	T2	BU 4	Temperature sensor terminal T2
46	Zero value	X	X	X	
47	BU4_Risol	Isolation	R2	BU 4	Resistance value of the isolation monitoring
48	BU4_Visol	X	X	BU 4	Measured voltage of the isolation monitoring
49	Zero value	Inex.			
50	BU5_V1	Voltage Vbatt	Battery 5	BU 5	Voltage terminal V1
51	BU5_V2	X	X	BU 5	Voltage terminal V2
52	BU5_V3	Tapp volt. Vtapp General voltage	Battery 5 U3	BU 5	Voltage terminal V3
53	BU5_I1	Current Ibatt	Battery 5	BU 5	Current terminal I1
54	BU5_I2	General current	I3	BU 5	Current terminal I2
55	BU5_I3	X	X	BU 5	Current terminal I3
56	BU5_T1	Battery temperat	Battery 5	BU 5	Temperature sensor terminal T1
57	BU5_T2	General temp.	T3	BU 5	Temperature sensor terminal T2
58	Zero value	X	X		
59	BU5_Risol	Isolation	R3	BU 5	Resistance value of the isolation monitoring
60	BU5_Visol	X	X	BU 5	Measured voltage of the isolation monitoring
61	Zero value	X		X	
62	BU6_V1	Voltage Vbatt	Battery 6	BU 6	Voltage terminal V1
63	BU6_V2	X	X	BU 6	Voltage terminal V2
64	BU6_V3	Tapp volt. Vtapp General voltage	Battery 6 U4	BU 6	Voltage terminal V3
65	BU6_I1	Current Ibatt	Battery 6	BU 6	Current terminal I1
66	BU6_I2	General current	I4	BU6	Current terminal I2
67	BU6_I3	X	X	BU 6	Current terminal I3
68	BU6_T1	Battery temperat	Battery 6	BU 6	Temperature sensor terminal T1
69	BU6_T2	General temp.	T4	BU 6	Temperature sensor terminal T2
70	Zero value	X	X	X	
71	BU6_Risol	Isolation	R4	BU 6	Resistance value of the isolation monitoring
72	BU6_Visol	X	X	BU 6	Measured voltage of the isolation monitoring
73	Zero value				
74	BU7_V1	Voltage Vbatt	Battery 7	BU 7	Voltage terminal V1

75	BU7_V2			BU 7	Voltage terminal V2
76	BU7_V3	Tapp volt. Vtapp	Battery 7	BU 7	Voltage terminal V3
		General voltage	U5		
77	BU7_I1	Current Ibatt	Battery 7	BU 7	Current terminal I1
78	BU7_I2	General current	I5	BU 7	Current terminal I2
79	BU7_I3	X	X	BU 7	Current terminal I3
80	BU7_T1	Battery temperat	Battery 7	BU 7	Temperature sensor terminal T1
81	BU7_T2	General temp.	T5	BU 7	Temperature sensor terminal T2
82	Zero value	X	X	X	
83	BU7_Risol	Isolation	R5	BU 7	Resistance value of the isolation monitoring
84	BU7_Visol	X	X	BU 7	Measured voltage of the isolation monitoring
85	Zero value				
86	BU8_V1	Voltage Vbatt	Battery 8	BU 8	Voltage terminal V1
87	BU8_V2			BU 8	Voltage terminal V2
88	BU8_V3	Tapp volt. Vtapp	Battery 8	BU 8	Voltage terminal V3
		General voltage	U6		
89	BU8_I1	Current Ibatt	Battery 8	BU 8	Current terminal I1
90	BU8_I2	General current	I6	BU 8	Current terminal I2
91	BU8_I3	X	X	BU 8	Current terminal I3
92	BU8_T1	Battery temperat	Battery 8	BU 8	Temperature sensor terminal T1
93	BU8_T2	General temp.	T6	BU 8	Temperature sensor terminal T2
94	Zero value				
95	BU8_Risol	Isolation	R6		Resistance value of the isolation monitoring
96	BU8_Uisol	X	X		Measured voltage of the isolation monitoring
97	Zero value	X			
98	STS1_1 (St)	Inex.		STS	
99	STS1_2 (Vm)	Inex.		STS	
100	STS1_3 (Va)	Inex.		STS	
101	STS1_4 (Io)	Inex.		STS	
102	STS1_5 (Vb)	Inex.		STS	
103	STS1_6 (fm)	Inex.		STS	
104	STS1_7 (fa)	Inex.		STS	
105	STS1_8 (Th)	Inex.		STS	
106	MMB1_VL1	Mains voltages	Phase1 A	MMB 1	
107	MMB1_VL2	Mains voltages	Phase2 A	MMB 1	
108	MMB1_VL3	Mains voltages	Phase3 A	MMB 1	
109	MMB1_FLx	Mains frequence	Phase1A, 2A, 3A	MMB 1	
110	MMB1_IL1	Mains currents	Phase1 A	MMB 1	
111	MMB1_IL2	Mains currents	Phase2 A	MMB 1	
112	MMB1_IL3	Mains currents	Phase3 A	MMB 1	
113	Not defin.	Inex.			
114	MMB2_VL1	Mains voltages	Phase1 B	MMB 2	
115	MMB2_VL2	Mains voltages	Phase2 B	MMB 2	
116	MMB2_VL3	Mains voltages	Phase3 B	MMB 2	
117	MMB2_FLx	Inex.	Phase1B, 2B, 3B	MMB 2	
118	MMB2_IL1	Mains currents	Phase1 B	MMB 2	

119	MMB2_IL2	Mains currents	Phase2 B	MMB 2	
120	MMB2_IL3	Mains currents	Phase3 B	MMB 2	
121	Not defin.	Inex.			
122	DEB1_stat	X		DIB 1	
123	DEB1_2	Digital Input1		DIB 1	Digital inputs 1
124	DEB1_3	X		DIB 1	
125	DEB1_4	X		DIB 1	
126	DEB2_stat	X		DIB 2	
127	DEB2_2	Digital Input2		DIB 2	Digital inputs 2
128	DEB2_3	X		DIB 2	
129	DEB2_4	X		DIB 2	
130	RLB1_stat	X			
131	RLB1_2	X			
132	RLB1_3	X			
133	RLB1_4	X			
134	RLB2_stat	X			
135	RLB2_2	X			
136	RLB2_3	X			
137	RLB2_4	X			
138	BMB1_Vbatt	X		BMB1	Battery monitoring terminal Vbatt
139	BMB1_Vtapp	X		BMB1	Terminal Vtapp
140	BMB1_I	X		BMB1	Terminal I
141	BMB1_T	X		BMB1	Terminal T
142	BMB2_Vbatt	X		BMB2	Terminal Vbatt
143	BMB2_Vtapp	X		BMB2	Terminal Vtapp
144	BMB2_I	X		BMB2	Terminal I
145	BMB2_T	X		BMB2	Terminal T
146	BMB3_Vbatt	X		BMB3	Terminal Vbatt
147	BMB3_Vtapp	X		BMB3	Terminal Vtapp
148	BMB3_I	X		BMB3	Terminal I
149	BMB3_T	X		BMB3	Terminal T
150	BMB4_Vbatt	X		BMB4	Terminal Vbatt
151	BMB4_Vtapp	X		BMB4	Terminal Vtapp
152	BMB4_I	X		BMB4	Terminal I
153	BMB4_T	X		BMB4	Terminal T
154	BMB5_Vbatt	X		BMB5	Terminal Vbatt
155	BMB5_Vtapp	X		BMB5	Terminal Vtapp
156	BMB5_I	X		BMB5	Terminal I
157	BMB5_T	X		BMB5	Terminal T
158	BMB6_Vbatt	X		BMB6	Terminal Vbatt
159	BMB6_Vtapp	X		BMB6	Terminal Vtapp
160	BMB6_I	X		BMB6	Terminal I
161	BMB6_T	X		BMB6	Terminal T
162	BMB7_Vbatt	X		BMB7	Terminal Vbatt
163	BMB7_Vtapp	X		BMB7	Terminal Vtapp
164	BMB7_I	X		BMB7	Terminal I
165	BMB7_T	X		BMB7	Terminal T
166	BMB8_Vbatt	X		BMB8	Terminal Vbatt
167	BMB8_Vtapp	X		BMB8	Terminal Vtapp
168	BMB8_I	X		BMB8	Terminal I
169	BMB8_T	X		BMB8	Terminal T

170	UMB1_1	Inex.			Universal measurement controller, device 1. It has been designed for universal usage. But it is currently not used.
.	.				
.	.				
.	.				
.	UMB4_4				
.	UMA1_1	Inex.			Universal measurement controller, device 2. It has been designed for universal usage. But it is currently not used.
.	.				
.	.				
.	.				
249	UMA16_4				
250	SystIbatt 1				Calculated battery current. Result= SystIrect. - load current
251	SystIrect 1				Total current of all rectifiers
252	SystIload 1				Calculated load current. Result= SystIrect. - battery current

8 Event list UPC4 (failure list)

8.1 General

Event-no.	Event text	Reference to parameter	Description
2000	Dig. input 1[1]	**(14.1), (14.2), (14.3), (14.4)**	This event is active if the 1. digital input of the 1. digital input board (DI8) is active. An adjustable delay of activation and dropout as well takes effect. The active status is invertible (break contact functionality).
2001	Dig. input 1[2]	see event no. 2000 above	2. digital input of 1. DIB/DI8), for details please see event no. 2000
2002	Dig. input 1[3]	see event no. 2000 above	3. digital input of 1. DIB/DI8), for details please see event no. 2000
2003	Dig. input 1[4]	see event no. 2000 above	4. digital input of 1. DIB/DI8), for details please see event no. 2000
2004	Dig. input 1[5]	see event no. 2000 above	5. digital input of 1. DIB/DI8), for details please see event no. 2000
2005	Dig. input 1[6]	see event no. 2000 above	6. digital input of 1. DIB/DI8), for details please see event no. 2000
2006	Dig. input 1[7]	see event no. 2000 above	7. digital input of 1. DIB/DI8), for details please see event no. 2000
2007	Dig. input 1[8]	see event no. 2000 above	8. digital input of 1. DIB/DI8), for details please see event no. 2000
2008	Dig. input 2[1]	see event no. 2000 above	1. digital input of 2. DIB/DI8), for details please see event no. 2000
2009	Dig. input 2[2]	see event no. 2000 above	2. digital input of 2. DIB/DI8), for details please see event no. 2000
2010	Dig. input 2[3]	see event no. 2000 above	3. digital input of 2. DIB/DI8), for details please see event no. 2000
2011	Dig. input 2[4]	see event no. 2000 above	4. digital input of 2. DIB/DI8), for details please see event no. 2000
2012	Dig. input 2[5]	see event no. 2000 above	5. digital input of 2. DIB/DI8), for details please see event no. 2000
2013	Dig. input 2[6]	see event no. 2000 above	6. digital input of 2. DIB/DI8), for details please see event no. 2000
2014	Dig. input 2[7]	see event no. 2000 above	7. digital input of 2. DIB/DI8), for details please see event no. 2000
2015	Dig. input 2[8]	see event no. 2000 above	8. digital input of 2. DIB/DI8), for details please see event no. 2000
2070	V1 <> Vmin/max1	see Tresh. Gen. Par.	Voltage 1 of general parameters. This event is active if the assigned value is less than the adjustable min. value and greater than the adjustable max. value as well. A configurable delay and hysteresis as well which is valid for all general parameters is available.
2071	V2 <> Vmin/max2	see event no. 2070 above	Voltage 2 of general parameters, for details please see event no. 2070.
2072	V3 <> Vmin/max3	see event no. 2070 above	Voltage 3 of general parameters, for details please see event no. 2070.
2073	V4 <> Vmin/max4	see event no. 2070 above	Voltage 4 of general parameters, for details please see event no. 2070.

2074	V5 <> Vmin/max5	see event no. 2070 above	Voltage 5 of general parameters, for details please see event no. 2070.
2075	V6 <> Vmin/max6	see event no. 2070 above	Voltage 6 of general parameters, for details please see event no. 2070.
2080	I1 <> Imin/max1	see event no. 2070 above	Current I1 of general parameters, for details please see event no. 2070.
2081	I2 <> Imin/max2	see event no. 2070 above	Current I2 of general parameters, for details please see event no. 2070.
2082	I3 <> Imin/max3	see event no. 2070 above	Current I3 of general parameters, for details please see event no. 2070.
2083	I4 <> Imin/max4	see event no. 2070 above	Current I4 of general parameters, for details please see event no. 2070.
2084	I5 <> Imin/max5	see event no. 2070 above	Current I5 of general parameters, for details please see event no. 2070.
2085	I6 <> Imin/max6	see event no. 2070 above	Current I6 of general parameters, for details please see event no. 2070.
2090	T1 <> Tmin/max1	see event no. 2070 above	Temperature 1 of general parameters, for details please see event no. 2070.
2091	T2 <> Tmin/max2	see event no. 2070 above	Temperature 2 of general parameters, for details please see event no. 2070.
2092	T3 <> Tmin/max3	see event no. 2070 above	Temperature 3 of general parameters, for details please see event no. 2070.
2093	T4 <> Tmin/max4	see event no. 2070 above	Temperature 4 of general parameters, for details please see event no. 2070.
2094	T5 <> Tmin/max5	see event no. 2070 above	Temperature 5 of general parameters, for details please see event no. 2070.
2095	T6 <> Tmin/max6	see event no. 2070 above	Temperature 6 of general parameters, for details please see event no. 2070.
2100	R1 <> Rmin/max1	see event no. 2070 above	Isolation 1 (earth fault) of general parameters, for details please see event no. 2070.
2101	R2 <> Rmin/max2	see event no. 2070 above	Isolation 2 (earth fault) of general parameters, for details please see event no. 2070.
2102	R3 <> Rmin/max3	see event no. 2070 above	Isolation 3 (earth fault) of general parameters, for details please see event no. 2070.
2103	R4 <> Rmin/max4	see event no. 2070 above	Isolation 4 (earth fault) of general parameters, for details please see event no. 2070.
2104	R5 <> Rmin/max5	see event no. 2070 above	Isolation 5 (earth fault) of general parameters, for details please see event no. 2070.
2105	R6 <> Rmin/max6	see event no. 2070 above	Isolation 6 (earth fault) of general parameters, for details please see event no. 2070.
2128	Relay1.Q	n/a	Virtual relay 1, normally open contact (Q). This relay can externally be set via SNMP (in the future).
2129	Relay1.Q'	n/a	Virtual relay 1, normally closed contact (Q'). This relay can externally be set via SNMP (in the future).
2130	Relay2.Q	n/a	Virtual relay 2, normally open contact (Q). For details please see event no. 2128
2131	Relay2.Q'	n/a	Virtual relay 2, normally closed contact (Q'). For details please see event no. 2129
2132	Relay3.Q	n/a	Virtual relay 3, normally open contact (Q). For details please see event no. 2128
2133	Relay3.Q'	n/a	Virtual relay 3, normally closed contact (Q'). For details please see event no. 2129

2134	Relay4.Q	n/a	Virtual relay 4, normally open contact (Q). For details please see event no. 2128
2135	Relay4.Q'	n/a	Virtual relay 4, normally closed contact (Q'). For details please see event no. 2129
2160	LVD active	see LVD/PLD/Drop diode	It signals, whether the LVD opto coupler is active or not. Settable via SNMP in the future.
2161	PLD1 active	see LVD/PLD/Drop diode	It signals, whether the PLD 1 opto coupler is active or not. Settable via SNMP in the future.
2162	PLD2 active	see LVD/PLD/Drop diode	It signals, whether the PLD 2 opto coupler is active or not. Settable via SNMP in the future.
2163	Tsensor limit		This event is active if one of the temperatures of the general parameters has a temperature value which is less than -50°C or greater than +150°C.
2164	Fan Rack: Error	see CAN devices	This event is active if one of the six fans of the up to 16 possible fan tablets (FAN) signals an error.
2165	Fan Rack: No CAN	see CAN devices	This event is active if one of the up to 16 possible fan tablets (FAN) has no CAN connection.
2166	BUI: Error state	see CAN devices	This event is active if one of the up to eight possible Basic-Units (BU) signals an error.
2167	BUI: No CAN	see CAN devices	This event is active if one of the up to eight possible Basic-Units (BU) has no CAN connection.
2168	STS: Error state	see CAN devices	This event is active if an STS signals an error.
2169	STS: No CAN	see CAN devices	This event is active if an STS has no CAN connection.
2170	MMB: Error state	see CAN devices	This event is active if an MMB signals an error.
2171	MMB: No CAN	see CAN devices	This event is active if an MMB has no CAN connection.
2172	BMB: Error state	see CAN devices	This event is active if a BMB signals an error.
2173	BMB: No CAN	see CAN devices	This event is active if a BMB has no CAN connection.
2174	DIB: Error state	see CAN devices	This event is active if a DI8 signals an error.
2175	DIB: No CAN	see CAN devices	This event is active if a DI8 has no CAN connection.
2176	RLB: Error state	see CAN devices	This event is active if an RLB signals an error.
2177	RLB: No CAN	see CAN devices	This event is active if an RLB has no CAN connection.
2178	FMB: Error state	see CAN devices	This event is active if an FMB signals an error.
2179	FMB: No CAN	see CAN devices	This event is active if an FMB has no CAN connection.
2180	UMB: ErrorState	see CAN devices	This event is active if an UMB signals an error.
2181	UMB: No CAN	see CAN devices	This event is active if an UMB has no CAN connection.
2182	UMA: ErrorState	see CAN devices	This event is active if an UMA signals an error.
2183	UMA: No CAN	see CAN devices	This event is active if an UMA has no CAN connection.
2184	RDX: Error state		This event is active if an RD signals an error.
2185	RDX: No CAN		This event is active if an RD has no CAN connection. This CAN device is not stated at the configuration. If no RD/RDP Display is connected to the CAN bus, the signal "RDX: No CAN" will always be active.
2186	RDP: Error state	see Remote Display	This event is active if an RDP signals an error.
2187	RDP: No CAN	see Remote Display	This event is active if an RDP has no CAN connection.

2188	1.L1 V<>Vmin,max	see Mains monitoring	This event is active if AC voltage of the 1. phase of mains 1 is less than the minimum voltage or greater than the maximum voltage. One common delay and one hysteresis of the min. and one hysteresis of the max. voltage are available. The min. and max. voltage values as well are built using the nominal mains voltage with the help of two settable tolerance values. In order to set this event it is necessary that "set via digital input" is disabled, monitoring of this phase is enabled, and the assigned mains monitoring board (MMB) is enabled as well. Furthermore this event can be directly set via digital input.
2189	1.L2 V<>Vmin,max	see Mains monitoring	2. phase of mains 1, for details please see event no. 2188.
2190	1.L3 V<>Vmin,max	see Mains monitoring	3. phase of mains 1, for details please see event no. 2188.
2191	2.L1 V<>Vmin,max	see Mains monitoring	1. phase of mains 2, for details please see event no. 2188.
2192	2.L2 V<>Vmin,max	see Mains monitoring	2. phase of mains 2, for details please see event no. 2188.
2193	2.L3 V<>Vmin,max	see Mains monitoring	3. phase of mains 2, for details please see event no. 2188.
2194	error bool seq.	see Signals enable	This event is active if there is a syntax error in the configured bool sequence.
2195	combined Error 1	see Signals enable	Boolean expression 1 is active. Currently not available for the common user.
2196	combined Error 2	see Signals enable	Boolean expression 2 is active. Currently not available for the common user.
2197	combined Error 3	see Signals enable	Boolean expression 3 is active. Currently not available for the common user.
2198	combined Error 4	see Signals enable	Boolean expression 4 is active. Currently not available for the common user.
2199	combined Error 5	see Signals enable	Boolean expression 5 is active. Currently not available for the common user.
2200	UPC Supply 1 Err		This event is active if the first internal power supply signals an error.
2201	UPC Supply 2 Err		This event is active if the second internal power supply signals an error.
2202	UPC Supply 3 Err		This event is active if the third internal power supply signals an error.

8.2 System

Event-no.	Event text	Reference to parameter	Description
3000	Vload < Vmin	see Thresholds	This event is active if the load voltage of the system is less or equal to the minimum load voltage "Vmin". A configurable delay and hysteresis as well is available. In order to activate this signal, the parameter *alarm at over voltage - system test of system [1]* has to be set to "1" or *alarm delay - system test of system [1]* is elapsed. Additionally no *battery test of system [1]* may be active.
3001	Vload > Vmax	see Thresholds	Load voltage > Vmax. Detail s. Event no. 3000
3002	Vload < Vmin_INV	see Thresholds	Load voltage < Vmin_INV. Detail s. Event no. 3000
3003	Vload < Vmin_DCC	see Thresholds	Load voltage < Vmin_DCC. Detail s. Event no. 3000
3010	REC#1 Error		REC signals error
3011	REC#1 No CAN		One or more REC have no CAN connection
3012	REC#1 Redundancy	see CAN devices	REC redundancy error
3013	REC#1 Load		REC load limit exceeded
3014	REC#1 Load distrib		REC load distribution not ok
3020	REC#2 Error		REC signals error
3021	REC#2 No CAN		One or more REC have no CAN connection
3022	REC#2 Redundancy	see CAN devices	REC redundancy error
3023	REC#2 Load		REC load limit exceeded
3024	REC#2 Load distrib		REC load distribution not ok
3030	Lim Load current		
3035	DCC Error		DC/DC converter signals error
3036	DCC No CAN		One or more DC/DC converter(s) have no CAN connection
3037	DCC Redundancy	see CAN devices	DC/DC converter redundancy error
3040	INV Error		Inverter signals error
3041	INV No CAN		One or more inverter(s) have no CAN connection
3042	INV Redundancy	see CAN devices	Inverter redundancy error
3043	Equalize charge	s. Equalize charge	Equalize charge is running
3044	Equal.ch.Timeout	s. Equalize charge	Equalize charge time limit is reached
3045	Boost charge	s. Boost charge	Boost charge is running
3046	Boost ch Timeout	s. Boost charge	Boost charge time limit is reached
3047	Fan (boost chge)		Fan boost charge is active
3051	Insulation err P	s. Thresholds	Insulation error against plus
3052	Insulation err M	s. Thresholds	Insulation error against minus
3053	Isol. meas. runs	s. Thresholds	Isolation measurement is active
3056	Battery test	s. Battery test	Battery test is running
3057	Battery test err	s. Battery test	The last battery test has been finished faultily
3060	Drop diode 1	s. LVD/PLD/Drop d.	Drop diode 1 is active
3061	Drop diode 2	s. LVD/PLD/Drop d.	Drop diode 2 is active
3064	Difference Ah	**(9.3)**	This event ist active if the service "energy balance" detects a difference of the capacity (Ah) of the batteries of system [1] compared with the set value at parameter "Difference Ah".

3067	Capacity low A	s. Capacity Calc.	This event is active if the capacity of the batteries of system [1] which is calculated by the capacity calculator is less than threshold A (%). This signal is a warning signal.
3068	Capacity low B	s. Capacity Calc.	Detail s. Event no. 3067
3070	Tsensor lim Batt		This event is active if one of the battery temperatures of system [1] has a value less than -50 °C or greater than +150 °C. At measuring value assignment the measuring source parameter must not be "0" (UNDEFINED). The related battery temperature measurement must be enabled.
3073	diesel operation	s. Charge control	Diesel operation is active. This event status is taken in consideration at "Charge control" and "boost charge" as well.
3075	STS: Error state		STS signals error
3076	STS: No CAN	see CAN devices	STS has lost the CAN connection
3077	STS Err source 1		STS source 1 error
3078	STS Err source 2		STS source 2 error
3079	STS Sync error		STS synchronization error
3080	STS Inverter err		STS signals inverter error
3081	STS T. heat sink		STS temperature to high
3082	STS Current high		STS current to high
3083	STS DC volt. low		STS DC voltage is low
3084	STS DC volt.high		STS DC voltage is high
3085	STS DC v. low Wa		STS warning DC voltage is low
3086	STS DC v.high Wa		STS warning DC voltage is high
3087	STS Mains prior.		STS mains priority
3088	STS Relay active		STS Relay is active
3089	STS Load on INV		STS Load on inverter(s)
3090	STS Coll. alarm		STS collective alarm is active

8.3 Battery

Event-no.	Event text	Reference to parameter	Description
4100	Vbatt < Vmin(B1)	s. Thresholds	Battery 1 Voltage < Vmin
4101	Vbatt > Vmax(B1)	s. Thresholds	Battery 1 Voltage > Vmax
4102	Vbat < Vwarn(B1)	s. Thresholds	Battery 1 Voltage > Vmax
4103	Vbat > VmaxR(B1)	s. Thresholds	Battery 1 Voltage > VmaxREC
4107	T > Tmax(B1)	s. Battery	Battery 1 Temperature > Tmax
4108	Asymmetrical(B1)	s. Battery	Battery 1 asymmetrical
4109	Fuse open(B1)	s. Battery	Battery 1 Fuse open
4110	Battery oper(B1)	s. Thresholds	The event is active, if the battery 1 current is negative and less than the negative value of the configurable battery operation current parameter of the related system. (The battery current is negative if current is withdrawn from the battery). For enabling no battery test of the related system may be active. A configurable delay and hysteresis as well is available.
4200	Vbatt < Vmin(B2)	s. Event no. 4100	Battery 2, detail s. Event no. 4100
4201	Vbatt > Vmax(B2)	s. Event no. 4101	Battery 2, detail s. Event no. 4101
4202	Vbat < Vwarn(B2)	s. Event no. 4102	Battery 2, detail s. Event no. 4102
4203	Vbat > VmaxR(B2)	s. Event no. 4103	Battery 2, detail s. Event no. 4103
4207	T > Tmax(B2)	s. Event no. 4107	Battery 2, detail s. Event no. 4107
4208	Asymmetrical(B2)	s. Event no. 4108	Battery 2, detail s. Event no. 4108
4209	Fuse open(B2)	s. Event no. 4109	Battery 2, detail s. Event no. 4109
4210	Battery oper(B2)	s. Event no. 4110	Battery 2, detail s. Event no. 4110
4300	Vbatt < Vmin(B3)	s. Event no. 4100	Battery 3, detail s. Event no. 4100
4301	Vbatt > Vmax(B3)	s. Event no. 4101	Battery 3, detail s. Event no. 4101
4302	Vbat < Vwarn(B3)	s. Event no. 4102	Battery 3, detail s. Event no. 4102
4303	Vbat > VmaxR(B3)	s. Event no. 4103	Battery 3, detail s. Event no. 4103
4304	T > Tmax(B3)	s. Event no. 4107	Battery 3, detail s. Event no. 4107
4305	Asymmetrical(B3)	s. Event no. 4108	Battery 3, detail s. Event no. 4108
4306	Fuse open(B3)	s. Event no. 4109	Battery 3, detail s. Event no. 4109
4307	Battery oper(B3)	s. Event no. 4110	Battery 3, detail s. Event no. 4110
4400	Vbatt < Vmin(B4)	s. Event no. 4100	Battery 4, detail s. Event no. 4100
4401	Vbatt > Vmax(B4)	s. Event no. 4101	Battery 4, detail s. Event no. 4101
4402	Vbat < Vwarn(B4)	s. Event no. 4102	Battery 4, detail s. Event no. 4102
4403	Vbat > VmaxR(B4)	s. Event no. 4103	Battery 4, detail s. Event no. 4103
4407	T > Tmax(B4)	s. Event no. 4107	Battery 4, detail s. Event no.4107
4408	Asymmetrical(B4)	s. Event no. 4108	Battery 4, detail s. Event no. 4108
4409	Fuse open(B4)	s. Event no. 4109	Battery 4, detail s. Event no. 4109
4410	Battery oper(B4)	s. Event no. 4110	Battery 4, detail s. Event no. 4110
4500	Vbatt < Vmin(B5)	s. Event no. 4100	Battery 5, detail s. Event no. 4100
4501	Vbatt > Vmax(B5)	s. Event no. 4101	Battery 5, detail s. Event no. 4101
4502	Vbat < Vwarn(B5)	s. Event no. 4102	Battery 5, detail s. Event no. 4102
4503	Vbat > VmaxR(B5)	s. Event no. 4103	Battery 5, detail s. Event no. 4103
4507	T > Tmax(B5)	s. Event no. 4107	Battery 5, detail s. Event no. 4107
4508	Asymmetrical(B5)	s. Event no. 4108	Battery 5, detail s. Event no. 4108
4509	Fuse open(B5)	s. Event no. 4109	Battery 5, detail s. Event no. 4109
4510	Battery oper(B5)	s. Event no. 4110	Battery 5, detail s. Event no. 4110

4600	Vbatt < Vmin(B6)	s. Event no. 4100	Battery 6, detail s. Event no. 4100
4601	Vbatt > Vmax(B6)	s. Event no. 4101	Battery 6, detail s. Event no. 4101
4602	Vbat < Vwarn(B6)	s. Event no. 4102	Battery 6, detail s. Event no. 4102
4603	Vbat > VmaxR(B6)	s. Event no. 4103	Battery 6, detail s. Event no. 4103
4607	T > Tmax(B6)	s. Event no. 4107	Battery 6, detail s. Event no. 4107
4608	Asymmetrical(B6)	s. Event no. 4108	Battery 6, detail s. Event no. 4108
4609	Fuse open(B6)	s. Event no. 4109	Battery 6, detail s. Event no. 4109
4610	Battery oper(B6)	s. Event no. 4110	Battery 6, detail s. Event no. 4110
4700	Vbatt < Vmin(B7)	s. Event no. 4100	Battery 7, detail s. Event no. 4100
4701	Vbatt > Vmax(B7)	s. Event no. 4101	Battery 7, detail s. Event no. 4101
4702	Vbat < Vwarn(B7)	s. Event no. 4102	Battery 7, detail s. Event no. 4102
4703	Vbat > VmaxR(B7)	s. Event no. 4103	Battery 7, detail s. Event no. 4103
4707	T > Tmax(B7)	s. Event no. 4107	Battery 7, detail s. Event no. 4107
4708	Asymmetrical(B7)	s. Event no. 4108	Battery 7, detail s. Event no. 4108
4709	Fuse open(B7)	s. Event no. 4109	Battery 7, detail s. Event no. 4109
4710	Battery oper(B7)	s. Event no. 4110	Battery 7, detail s. Event no. 4110

8.4 Fuses

Event-no.	Event text	Reference to parameter	Description
6000	Fuse 1	see CAN devices	Fuse error, signalled by the FMB. Strictly counted on the order of the FMBs and on their extension cards: x= number of the used fuses of FMB CAN1 (settable at the FMB). y= number of the used fuses of FMB CAN2 (settable at the FMB). Fuse 1= first fuse of FMB CAN1 Fuse x= last fuse of FMB CAN1 Fuse x+1= first fuse of FMB CAN2. Fuse x+y= last fuse of FMB CAN2, etc. For details about the FMB settings, please see the FMB manual.
6001	Fuse 2	see CAN devices	Fuse error, signalled by FMB.
6002	Fuse 3	see CAN devices	Fuse error, signalled by FMB.
6003	Fuse 4	see CAN devices	Fuse error, signalled by FMB.
6004	Fuse 5	see CAN devices	Fuse error, signalled by FMB.
6005	Fuse 6	see CAN devices	Fuse error, signalled by FMB.
6006	Fuse 7	see CAN devices	Fuse error, signalled by FMB.
6007	Fuse 8	see CAN devices	Fuse error, signalled by FMB.
6008	Fuse 9	see CAN devices	Fuse error, signalled by FMB.
6009	Fuse 10	see CAN devices	Fuse error, signalled by FMB.
6010	Fuse 11	see CAN devices	Fuse error, signalled by FMB.
6011	Fuse 12	see CAN devices	Fuse error, signalled by FMB.
6012	Fuse 13	see CAN devices	Fuse error, signalled by FMB.
6013	Fuse 14	see CAN devices	Fuse error, signalled by FMB.
6014	Fuse 15	see CAN devices	Fuse error, signalled by FMB.
6015	Fuse 16	see CAN devices	Fuse error, signalled by FMB.
6016	Fuse 17	see CAN devices	Fuse error, signalled by FMB.
6017	Fuse 18	see CAN devices	Fuse error, signalled by FMB.
6018	Fuse 19	see CAN devices	Fuse error, signalled by FMB.
6019	Fuse 20	see CAN devices	Fuse error, signalled by FMB.
6020	Fuse 21	see CAN devices	Fuse error, signalled by FMB.

6021	Fuse 22	see CAN devices	Fuse error, signalled by FMB.
6022	Fuse 23	see CAN devices	Fuse error, signalled by FMB.
6023	Fuse 24	see CAN devices	Fuse error, signalled by FMB.
6024	Fuse 25	see CAN devices	Fuse error, signalled by FMB.
6025	Fuse 26	see CAN devices	Fuse error, signalled by FMB.
6026	Fuse 27	see CAN devices	Fuse error, signalled by FMB.
6027	Fuse 28	see CAN devices	Fuse error, signalled by FMB.
6028	Fuse 29	see CAN devices	Fuse error, signalled by FMB.
6029	Fuse 30	see CAN devices	Fuse error, signalled by FMB.
6030	Fuse 31	see CAN devices	Fuse error, signalled by FMB.
6031	Fuse 32	see CAN devices	Fuse error, signalled by FMB.
6032	Fuse 33	see CAN devices	Fuse error, signalled by FMB.
6033	Fuse 34	see CAN devices	Fuse error, signalled by FMB.
6034	Fuse 35	see CAN devices	Fuse error, signalled by FMB.
6035	Fuse 36	see CAN devices	Fuse error, signalled by FMB.
6036	Fuse 37	see CAN devices	Fuse error, signalled by FMB.
6037	Fuse 38	see CAN devices	Fuse error, signalled by FMB.
6038	Fuse 39	see CAN devices	Fuse error, signalled by FMB.
6039	Fuse 40	see CAN devices	Fuse error, signalled by FMB.
6040	Fuse 41	see CAN devices	Fuse error, signalled by FMB.
6041	Fuse 42	see CAN devices	Fuse error, signalled by FMB.
6042	Fuse 43	see CAN devices	Fuse error, signalled by FMB.
6043	Fuse 44	see CAN devices	Fuse error, signalled by FMB.
6044	Fuse 45	see CAN devices	Fuse error, signalled by FMB.
6045	Fuse 46	see CAN devices	Fuse error, signalled by FMB.
6046	Fuse 47	see CAN devices	Fuse error, signalled by FMB.
6047	Fuse 48	see CAN devices	Fuse error, signalled by FMB.
6048	Fuse 49	see CAN devices	Fuse error, signalled by FMB.
6049	Fuse 50	see CAN devices	Fuse error, signalled by FMB.
6050	Fuse 51	see CAN devices	Fuse error, signalled by FMB.
6051	Fuse 52	see CAN devices	Fuse error, signalled by FMB.
6052	Fuse 53	see CAN devices	Fuse error, signalled by FMB.
6053	Fuse 54	see CAN devices	Fuse error, signalled by FMB.
6054	Fuse 55	see CAN devices	Fuse error, signalled by FMB.
6055	Fuse 56	see CAN devices	Fuse error, signalled by FMB.
6056	Fuse 57	see CAN devices	Fuse error, signalled by FMB.
6057	Fuse 58	see CAN devices	Fuse error, signalled by FMB.
6058	Fuse 59	see CAN devices	Fuse error, signalled by FMB.
6059	Fuse 60	see CAN devices	Fuse error, signalled by FMB.
6060	Fuse 61	see CAN devices	Fuse error, signalled by FMB.
6061	Fuse 62	see CAN devices	Fuse error, signalled by FMB.
6062	Fuse 63	see CAN devices	Fuse error, signalled by FMB.
6063	Fuse 64	see CAN devices	Fuse error, signalled by FMB.
6064	Fuse 65	see CAN devices	Fuse error, signalled by FMB.
6065	Fuse 66	see CAN devices	Fuse error, signalled by FMB.
6066	Fuse 67	see CAN devices	Fuse error, signalled by FMB.
6067	Fuse 68	see CAN devices	Fuse error, signalled by FMB.
6068	Fuse 69	see CAN devices	Fuse error, signalled by FMB.
6069	Fuse 70	see CAN devices	Fuse error, signalled by FMB.
6070	Fuse 71	see CAN devices	Fuse error, signalled by FMB.
6071	Fuse 72	see CAN devices	Fuse error, signalled by FMB.
6072	Fuse 73	see CAN devices	Fuse error, signalled by FMB.
6073	Fuse 74	see CAN devices	Fuse error, signalled by FMB.

6074	Fuse 75	see CAN devices	Fuse error, signalled by FMB.
6075	Fuse 76	see CAN devices	Fuse error, signalled by FMB.
6076	Fuse 77	see CAN devices	Fuse error, signalled by FMB.
6077	Fuse 78	see CAN devices	Fuse error, signalled by FMB.
6078	Fuse 79	see CAN devices	Fuse error, signalled by FMB.
6079	Fuse 80	see CAN devices	Fuse error, signalled by FMB.
6080	Fuse 81	see CAN devices	Fuse error, signalled by FMB.
6081	Fuse 82	see CAN devices	Fuse error, signalled by FMB.
6082	Fuse 83	see CAN devices	Fuse error, signalled by FMB.
6083	Fuse 84	see CAN devices	Fuse error, signalled by FMB.
6084	Fuse 85	see CAN devices	Fuse error, signalled by FMB.
6085	Fuse 86	see CAN devices	Fuse error, signalled by FMB.
6086	Fuse 87	see CAN devices	Fuse error, signalled by FMB.
6087	Fuse 88	see CAN devices	Fuse error, signalled by FMB.
6088	Fuse 89	see CAN devices	Fuse error, signalled by FMB.
6089	Fuse 90	see CAN devices	Fuse error, signalled by FMB.
6090	Fuse 91	see CAN devices	Fuse error, signalled by FMB.
6091	Fuse 92	see CAN devices	Fuse error, signalled by FMB.
6092	Fuse 93	see CAN devices	Fuse error, signalled by FMB.
6093	Fuse 94	see CAN devices	Fuse error, signalled by FMB.
6094	Fuse 95	see CAN devices	Fuse error, signalled by FMB.
6095	Fuse 96	see CAN devices	Fuse error, signalled by FMB.
6096	Fuse 97	see CAN devices	Fuse error, signalled by FMB.
6097	Fuse 98	see CAN devices	Fuse error, signalled by FMB.
6098	Fuse 99	see CAN devices	Fuse error, signalled by FMB.
6099	Fuse 100	see CAN devices	Fuse error, signalled by FMB.
6100	Fuse 101	see CAN devices	Fuse error, signalled by FMB.
6101	Fuse 102	see CAN devices	Fuse error, signalled by FMB.
6102	Fuse 103	see CAN devices	Fuse error, signalled by FMB.
6103	Fuse 104	see CAN devices	Fuse error, signalled by FMB.
6104	Fuse 105	see CAN devices	Fuse error, signalled by FMB.
6105	Fuse 106	see CAN devices	Fuse error, signalled by FMB.
6106	Fuse 107	see CAN devices	Fuse error, signalled by FMB.
6107	Fuse 108	see CAN devices	Fuse error, signalled by FMB.
6108	Fuse 109	see CAN devices	Fuse error, signalled by FMB.
6109	Fuse 110	see CAN devices	Fuse error, signalled by FMB.
6110	Fuse 111	see CAN devices	Fuse error, signalled by FMB.
6111	Fuse 112	see CAN devices	Fuse error, signalled by FMB.
6112	Fuse 113	see CAN devices	Fuse error, signalled by FMB.
6113	Fuse 114	see CAN devices	Fuse error, signalled by FMB.
6114	Fuse 115	see CAN devices	Fuse error, signalled by FMB.
6115	Fuse 116	see CAN devices	Fuse error, signalled by FMB.
6116	Fuse 117	see CAN devices	Fuse error, signalled by FMB.
6117	Fuse 118	see CAN devices	Fuse error, signalled by FMB.
6118	Fuse 119	see CAN devices	Fuse error, signalled by FMB.
6119	Fuse 120	see CAN devices	Fuse error, signalled by FMB.
6120	Fuse 121	see CAN devices	Fuse error, signalled by FMB.
6121	Fuse 122	see CAN devices	Fuse error, signalled by FMB.
6122	Fuse 123	see CAN devices	Fuse error, signalled by FMB.
6123	Fuse 124	see CAN devices	Fuse error, signalled by FMB.
6124	Fuse 125	see CAN devices	Fuse error, signalled by FMB.
6125	Fuse 126	see CAN devices	Fuse error, signalled by FMB.
6126	Fuse 127	see CAN devices	Fuse error, signalled by FMB.

6127	Fuse 128	see CAN devices	Fuse error, signalled by FMB.
6128	Fuse 129	see CAN devices	Fuse error, signalled by FMB.
6129	Fuse 130	see CAN devices	Fuse error, signalled by FMB.
6130	Fuse 131	see CAN devices	Fuse error, signalled by FMB.
6131	Fuse 132	see CAN devices	Fuse error, signalled by FMB.
6132	Fuse 133	see CAN devices	Fuse error, signalled by FMB.
6133	Fuse 134	see CAN devices	Fuse error, signalled by FMB.
6134	Fuse 135	see CAN devices	Fuse error, signalled by FMB.
6135	Fuse 136	see CAN devices	Fuse error, signalled by FMB.
6136	Fuse 137	see CAN devices	Fuse error, signalled by FMB.
6137	Fuse 138	see CAN devices	Fuse error, signalled by FMB.
6138	Fuse 139	see CAN devices	Fuse error, signalled by FMB.
6139	Fuse 140	see CAN devices	Fuse error, signalled by FMB.
6140	Fuse 141	see CAN devices	Fuse error, signalled by FMB.
6141	Fuse 142	see CAN devices	Fuse error, signalled by FMB.
6142	Fuse 143	see CAN devices	Fuse error, signalled by FMB.
6143	Fuse 144	see CAN devices	Fuse error, signalled by FMB.
6144	Fuse 145	see CAN devices	Fuse error, signalled by FMB.
6145	Fuse 146	see CAN devices	Fuse error, signalled by FMB.
6146	Fuse 147	see CAN devices	Fuse error, signalled by FMB.
6147	Fuse 148	see CAN devices	Fuse error, signalled by FMB.
6148	Fuse 149	see CAN devices	Fuse error, signalled by FMB.
6149	Fuse 150	see CAN devices	Fuse error, signalled by FMB.
6150	Fuse 151	see CAN devices	Fuse error, signalled by FMB.
6151	Fuse 152	see CAN devices	Fuse error, signalled by FMB.
6152	Fuse 153	see CAN devices	Fuse error, signalled by FMB.
6153	Fuse 154	see CAN devices	Fuse error, signalled by FMB.
6154	Fuse 155	see CAN devices	Fuse error, signalled by FMB.
6155	Fuse 156	see CAN devices	Fuse error, signalled by FMB.
6156	Fuse 157	see CAN devices	Fuse error, signalled by FMB.
6157	Fuse 158	see CAN devices	Fuse error, signalled by FMB.
6158	Fuse 159	see CAN devices	Fuse error, signalled by FMB.
6159	Fuse 160	see CAN devices	Fuse error, signalled by FMB.
6160	Fuse 161	see CAN devices	Fuse error, signalled by FMB.
6161	Fuse 162	see CAN devices	Fuse error, signalled by FMB.
6162	Fuse 163	see CAN devices	Fuse error, signalled by FMB.
6163	Fuse 164	see CAN devices	Fuse error, signalled by FMB.
6164	Fuse 165	see CAN devices	Fuse error, signalled by FMB.
6165	Fuse 166	see CAN devices	Fuse error, signalled by FMB.
6166	Fuse 167	see CAN devices	Fuse error, signalled by FMB.
6167	Fuse 168	see CAN devices	Fuse error, signalled by FMB.
6168	Fuse 169	see CAN devices	Fuse error, signalled by FMB.
6169	Fuse 170	see CAN devices	Fuse error, signalled by FMB.
6170	Fuse 171	see CAN devices	Fuse error, signalled by FMB.
6171	Fuse 172	see CAN devices	Fuse error, signalled by FMB.
6172	Fuse 173	see CAN devices	Fuse error, signalled by FMB.
6173	Fuse 174	see CAN devices	Fuse error, signalled by FMB.
6174	Fuse 175	see CAN devices	Fuse error, signalled by FMB.
6175	Fuse 176	see CAN devices	Fuse error, signalled by FMB.
6176	Fuse 177	see CAN devices	Fuse error, signalled by FMB.
6177	Fuse 178	see CAN devices	Fuse error, signalled by FMB.
6178	Fuse 179	see CAN devices	Fuse error, signalled by FMB.
6179	Fuse 180	see CAN devices	Fuse error, signalled by FMB.

6180	Fuse 181	see CAN devices	Fuse error, signalled by FMB.
6181	Fuse 182	see CAN devices	Fuse error, signalled by FMB.
6182	Fuse 183	see CAN devices	Fuse error, signalled by FMB.
6183	Fuse 184	see CAN devices	Fuse error, signalled by FMB.
6184	Fuse 185	see CAN devices	Fuse error, signalled by FMB.
6185	Fuse 186	see CAN devices	Fuse error, signalled by FMB.
6186	Fuse 187	see CAN devices	Fuse error, signalled by FMB.
6187	Fuse 188	see CAN devices	Fuse error, signalled by FMB.
6188	Fuse 189	see CAN devices	Fuse error, signalled by FMB.
6189	Fuse 190	see CAN devices	Fuse error, signalled by FMB.
6190	Fuse 191	see CAN devices	Fuse error, signalled by FMB.
6191	Fuse 192	see CAN devices	Fuse error, signalled by FMB.

9 Technical Data UPC4

Type	DC Controller UPC4 Master
Article code	301-004-395.00
Supply voltage	3 x redundant power supply inputs 24 VDC ±10 % by external power supplies DC/DC or AC/DC
Voltage measuring range	0-320 VDC by Basic-Unit
Current measuring range	±0-60 mV (shunt value programmable) by Basic-Unit
Power consumption	Max. 25 W
LED indications	5 LEDs
Relay outputs	3 (isolated; max. 0.5 A @ 60 VDC), plus 1 per Basic-Unit (isolated; max. 0.1 A @ 300 VDC)
Optocoupler output	One LVD optocoupler control output per Basic-Unit
Interfaces:	
Ethernet	RJ45 10/100 Mbit
CAN interface	2 x RJ12 (100 kbit) and 2 x RJ45 (125 kbit); proprietary CAN protocol
Modem connection (not supported yet)	9-pole SUB-D male RS232 (modem optional, analogue, ISDN or GPRS/GSM)
Fieldbus (Modbus) connection	4-pole MSTB, 5 mm or 9-pole SUB-D female RS485
Controller functions	Temperature compensated float charge, equalize charge, boost charge, battery test; boost charge automatic (power, voltage and time related), LVD control, PLD control; time controlled battery test; charge current limitation; drop diode control (double-stage)
Monitoring functions	Battery voltage, battery tap voltage, battery charge current, battery operation; isolation fault, battery voltage low, battery voltage high, CAN-Bus status, CAN-connected module status; external alarm loops, internally switchable isolation measurement, six general voltages, six general currents, six general resistors, six general temperatures
Event history function	Text message of active faults; stack memory for the last 500 faults/events; stacking “coming/going” with time stamp (permanent)
Battery test memory	Storage of the last three battery test results; storage of the last battery test curve
RTC with time and date	Yes
Control buttons	Two; 1 x release of SD card, 1 x not decided
Languages	German, English, Swedish; other versions loadable on demand
Ambient temperature	Operation: -20 °C to +45 °C; non condensing; storage: -40 °C to +85 °C
Cooling	Convection cooling
Max. installation altitude	1500 m
Audible noise	<30 dBA
Type of construction	DIN Rail mounting
Dimensions (W/H/D)	47/103/110 mm
Weight	approx. 0.8 kg
Type of enclosure / Protection class	IP20/III
Surfaces	Stainless steel, brush-finished, neutral, black print RAL 9005
CE conformity	yes
Compliance to safety standards	EN60950-1; EN50178; EN60146
Compliance to EMC standards	EN55011/22 class “B“; EN61000-4 T2-5

9.1 Options

Article code	Designation
302-UP4-DCDC.LV	Power supply, DIN rail mounting, Vi=18-75 VDC; Vo=24 VDC, Imax=2.5 A
302-UP4-DCDC.HV	Power supply, DIN rail mounting, Vi=85-375 VDC; Vo=24 VDC, Imax=2.5 A
301-004-395.10	Basic-Unit (BU), 3 x voltage (0-300 V), 3 x current (60 mV shunt), 2 x temperature, one output relay, one LVD optocoupler control output
302-UP3-MMT.00	Configuration software “Multi Management Tool” (MMT)
302-003-RDD.00	Remote display for door mounting; connection via CAN interface
302-003-RDMD.00	Remote display for door mounting with mimic diagram; connection via CAN interface
302-DCC-0MM.00	Mains monitoring board 1/3 phase; DIN rail module; connection via CAN interface
302-DCC-0BM.00	Battery monitoring board DCC-BMB (for one additional battery string; V, V/2, I, T); DIN rail module; max. six modules DCC-BMB applicable
302-DCC-DI8.00	Signalling board with 8 digital alarm inputs; DIN rail module; connected via CAN interface
302-DCC-0RB.00	Relay board with 6 isolated signalling outputs; DIN rail module; connected via CAN interface
302-DCC-0FM.00	Fuse monitoring board (20 fuses, 24-60 VDC, 1-pole); open frame
302-UP3-0SW.02	SNMP monitoring software (Win)
TBD	Analog modem, GSM, DIN rail, VDC

9.2 Dimensional drawing

Figure 8. Module dimensions

Supplier:

✉	ELTEK VALERE DEUTSCHLAND GmbH GB Industrial Schillerstraße 16 D-32052 Herford
☎	+ 49 (0) 5221 1708-210
FAX	+ 49 (0) 5221 1708-222
Email	Info.industrial@eltekvalere.com
Internet	http://www.eltekvalere.com

Changes and errors excepted.