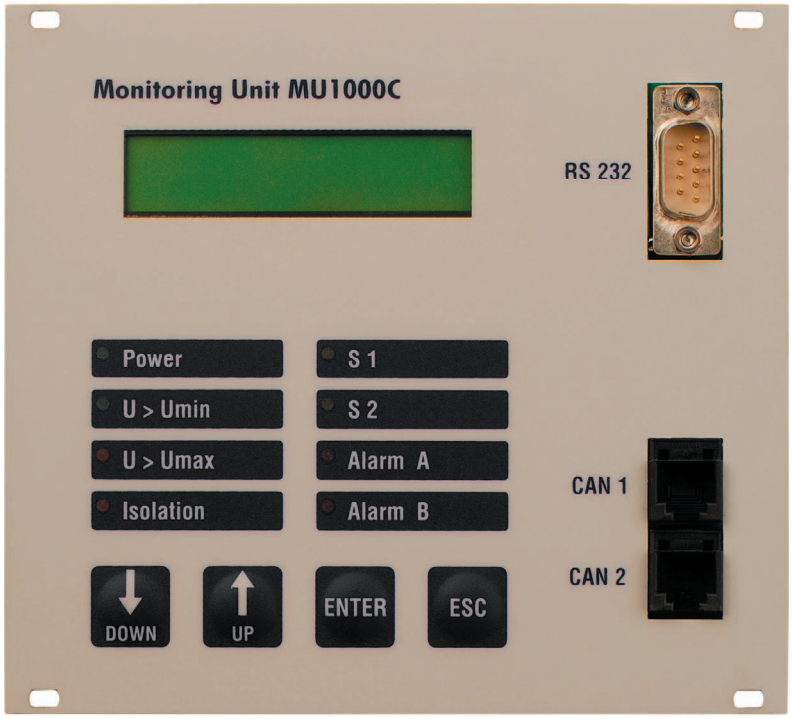
ELTEK VALERE
always on

DC-CONTROLLER

MU1000C Language

USER MANUAL

(Firmware version: V2.08)



UM_MU1000C_Language_E_R00

Information about the operation manual

IMPORTANT! Please read this operation manual very carefully before assembling and starting this device!

The operation manual is a part of the delivery of this device, i.e. it should be made available to each and every person involved with the starting, maintenance or operation of the device. The device should be transported, mounted, started, maintained and operated only by electro technical personnel.
The local specifications for the prevention of accidents as well as the general guidelines according to IEC 364 should always be followed!

The functional descriptions in the operation manual correspond to those at the time of the publication. Technical changes can be carried out by the Eltek Valere Industrial GmbH without making any revisions or announcements.
There is no responsibility for the constant revision of the operation manual.
The device complies to the EN- and VDE-standards applicable at the time of the publication. The CE symbol on the device confirms the conformation of the EU-guidelines for 73/23 EWGLow voltage and for 89/339 EWG-Electromagnetic compatibility.

The devices are delivered exclusively according to our delivery and sales conditions. Alterations in the technical details in this operation manual as well as the respective data sheets are reserved.

Complaints about the delivered goods should be made as soon as possible on receiving them along with the packing invoice as well as the information about the type, serial number and complaint.

Guarantee claims of the customer will not be entertained in the case of visible external influences (e.g. absent or loose screws, welding, loose sheets, etc.), that could be attributed to a non permitted opening of the device.
Eltek Valere Industrial GmbH does not undertake any responsibility for applications of the device, which have not been intended by the manufacturer.
It is the responsibility of the final consumer to take the necessary measures for the prevention of damage to personnel and to goods (see upper text section).

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ATTENTION!

Revisions – MU1000C Language USER MANUAL

Revision: 00

Date: 2008-08-04

System: MU1000C

System voltage: 24 / 48 / 108 / 216 VDC

Revision	Description	Author	Date
/00	Preliminary version (translation of the German version ...R02)	PS	2008-08-04

Directory

1. Applications, Functioning 6

2. Review of the types 7

3. Features 8

4. Description of the individual functions 9

4.1 Measuring inputs U_{dc1}, U_{dc2}, U_{dc3} 9
4.2 Measuring inputs I_{dc1}, I_{dc2}, I_{dc3} 9
4.3 Monitoring the insulation error 10
4.4 DC-Low voltage signal 10
4.5 DC- High voltage signal 10
4.6 Temperature control and temperature compensation of the charge voltage 11
4.7 Mains voltage control 11
4.8 Digital inputs 11
4.9 Additional Relays K1/K2 (K11-K18) 12
4.10 Monitoring: Battery unsymmetry 12
4.11 Boost charging 13
4.12 Bootloader 13

5. Operation 14

6. Menu- and display structure 15

6.1 General structure 15
6.2.1. Customer menu 16
6.2.2. Service menu 1 32
6.2.3. Service menu 2 / calibration menu 32

7. Connections 32

7.1 CAN-BUS-connector 34

8. Optional: Relay board DCC-RB6 35

9. Optional: Digital input board DCC-DIG8 35

10. Optional: Relay board MU1000C-I/O (RK1) 35

11. Technical Data MU1000C 37

1. Applications, Functioning

The Signalling and Monitoring unit MU 1000C (named MU 1000C in the following) is used as a central monitoring- and signalling unit in DC–power supply systems. These plants can be battery-powered or can operate as direct supply for DC-bus bars.

They are used in all the places, where plant information is collected (such as voltages and current at different intersections of the system), where parameters have to be monitored and errors signalled or when a boost charge function or a discharge test is required in a battery system.
The mounting of the monitoring unit can be very universal. Thus it is just as possible to mount it in 19” – complete slide-in units (above 3HE) as in a 19”- partial slide-in unit (with 1/3-19” width).

The individual signal parameters, like voltages and current, are connected over secured lines directly to the MU 1000 over a plug (DIN41612, R48).
The MU1000 receives these values, indicates them on the display, compares the values with adjusted monitoring thresholds, gives disturbance signals (LED + relay) and operates in the boost charge operation as well as discharge test operation as a controlling device for the connected rectifier.
Additionally the output values of rectifier REC and inverter INV can be read out if CAN-bus is connected.

The user language can be selected over a parametric menu. All the necessary monitoring parameters can be read by the end-user directly at the site of application and can be adjusted over a code-protected service menu. Special software adaptations are not necessary for this.

The MU 1000C can be obtained for 2 different voltage ranges and can be directly connected to the corresponding DC potential without any further measures.
The software as well as the default values for the plant parameters for the MU 1000C is programmed in an EPROM. The current values (adaptations on site etc) as well as the error data are stored in an EEPROM.

If due to a defect in the MU 1000C, there is cancellation in the EEPROM, then when the device is switched on again, there is a reprogramming with the default values of the plant from the EPROM. During this reprogramming, all the functions, which have a control, function for external devices (boost charge option, discharge test) are deactivated in order to prevent damage due to false values in the plant. These functions must be manually activated again in the service menu.

2. Review of the types

MU1000C

Type designation	Item Number	Connection-/Measuring voltage in V DC
MU1000C-I Language	300-110-660.00	24 – 80 (Low Voltage Version)
MU1000C-II Language	300-110-770.00	80 – 300 (High Voltage Version)

Options and additional articles, which can be delivered:

- 3-phase mains monitoring board: DCC-MM
- Battery monitoring: DCC-BM (old: MU1000C-BM)
- 8 digital inputs: DCC-DIG8
- 6 Relay outputs: DCC-RB6
  optional: I/O-Relay board MU1000C-I/O RK1
- Profibus-accessibility with a unigate gateway CL
- Modbus-accessibility with a unigate gateway CL-RS
- 1/3-19" x 6 HE - Front plate for mounting of 1x MU1000; printed
- 19" x 3 HE – Front plate for mounting of 1x MU1000; printed

3. Features

The MU1000C has the following standard features:

- Real time clock(RTC) with date and Event History
- Measurement, announcement and supervision of 3 DC voltages in the system
- Measurement, announcement and supervision of 3 DC currents in the system
- Isolation mistake supervision
- Boost charge automatic (dependent on current, voltage and time)
  BC switchable on digital input
- Battery test (dependent on time) and switchable on digital input
- Countercell Control
- Battery unsymmetric supervision
- Control for low discharge
- RS232- Interface to the parametrization with a configurator on a laptop / PC
- 4 relay exits free of potential (K1-K4)
- 8 digital measuring inputs for the evaluation of external registration loops
- CAN bus interface to the control and parameter query of electricity supply modules
- Multilingual facility, 7 languages(3 at the same time): in English a. German (always), French, Italian, Russian (Cyrillic), Swedish, Czech
- LED signals to the mistake announcement
- Free programming of announcement texts and error texts
- Free allocation of individual errors to urgent and not urgent alarms as well as to the registration relays
- with BootLoader, i.e. firmware-update about CAN or RS232

Optional offers the MU1000C the following extension possibilities:

- Temperature compensation of the loading tension
  (in connection with the temperature sensor LM335)
- Measurement, announcement and supervision from current and voltage of 3 phases net (in connection with extension board DCC-MM)
- 8 additional relay registration contacts free of potential, freely programmable (in connection with extension board MU1000C-I/O)
- 8 additional digital measure inputs (DCC-DIG8- board)
- 6 additional potential free relay contacts (DCC-RB6-board)
- Data distant query about modem
- Program software for the parametrization of the unity about RS232
- Connection to Profibus (with external gateway unigate CL)
- Connection to Modbus (with external gateway unigate CL-RS)

4. Description of the individual functions

4.1 Measuring inputs U_{dc1}, U_{dc2}, U_{dc3}

- Voltage version 1 (LV): Operating voltage, measurement and indication of 24V-80VDC
- Voltage version 2 (HV): Operating voltage, measurement and indication of 80V-300VDC

The supply lines have to be externally fused. If U_{dc3} is used for monitoring the battery symmetry, pay attention to use the same reference connection point for the minus connections of U_{dc1} and U_{dc3}!

The clear text names for the display indication of the measuring inputs U_{dc1}-U_{dc3} can be programmed via software (not included in this version) in the user menu.

The accuracy of the indication of the values corresponds to a class1 measuring device.

Clear text terms:

- U_{dc1}: freely programmable; designation in this version: Ubatt
- U_{dc2}: not connected
- U_{dc3}: not connected

4.2 Measuring inputs I_{dc1}, I_{dc2}, I_{dc3}

The assignment of the nominal shunt values is done in the Service menu. The following shunt magnitudes can be assigned to the individual measuring inputs:

- I_{dc1}:(+/-)0-50A in 1A steps,50-1000A in 5A steps;0A means no sh.installed
- I_{dc2}: 0-50A in 1A steps, 50-1000A in 5A steps; 0A means no shunt installed
- I_{dc3}: 0-50A in 1A steps, 50-1000A in 5A steps; 0A means no shunt installed

The assigned maximum current of the shunt corresponds to a potential drop of 60mV.
As only the measuring input I_{dc1} can show negative current values, it should be used for the reading of the battery charging- and discharging current.

The accuracy of indication of the values corresponds to a Class 1 measuring instrument.

ATTENTION!
All shunts have to be referenced to the same DC-bar. A potential difference in the current path of the shunts leads to failure of the measuring inputs.
A connection of the digital GND to the positive (in the direction of current flow) connection at the current shunt is necessary for the correct indication of the current measuring value. If more than one shunt is used in the system, then the connection to one shunt is sufficient.

4.3 Monitoring the insulation error

The connection of the measuring and supply voltage Udc1 as well as of the protective conductor is the minimum necessity for monitoring the DC-system for insulation errors. While measuring the insulation error, it can be seen whether there is an insulation error between the plus pole and the earth or the minus pole and the earth.

Insulation errors are recognised only when they appear between the plus potential/minus potential and the earth, not between the potentials.
The threshold value of the insulation resistance can be adjusted over the user menu. The prefix indicates whether there is an earth-leakage against the plus or minus.

Earth fault R = +(-)xxxkOhm

Factory setting: The error signal does not enter collective failure relay.

4.4 DC-Low voltage signal

A monitoring threshold U<Umin can be adjusted for each measuring voltage (U_{dc1} to U_{dc3}). The LED indication at the front side $U>U_{min}$ and the relay K4 are connected with the monitoring U_{dc1}. In case of an error the Green LED $U>U_{min}$ goes out and the signalling relay K4 will switch over.

An external signal of the monitoring for U_{dc2} and U_{dc3} is possible over an assignment of the signal to the reserve relay K1 or LED-signal S1 or S2.

A time-delay can be adjusted in the user-menu for these signals.

Indication: $U_{dc1}<U_{min}$
$U_{dc2}<U_{min}$
$U_{dc3}<U_{min}$

4.5 DC- High voltage signal

A monitoring threshold U>Umax can be adjusted for each measuring voltage (U_{dc1} to U_{dc3}). The LED indication at the front side $U>U_{max}$ and the relay K3 are connected with the monitoring U_{dc2}. In case of an error the red LED $U>U_{max}$ lights up and the signalling relay K3 pulls up.

An external signal of the monitoring for Udc2 and Udc3 is possible over an assignment of the signal to the reserve relay K1 or to the LED-signals S1 and S2.

A time-delay can be adjusted in the user-menu for these signals.

Indication: $U_{dc1}>U_{max}$
$U_{dc2}>U_{max}$
$U_{dc3}>U_{max}$

4.6 Temperature control and temperature compensation of the charge voltage

If an active temperature sensor (LM335) is connected to the monitoring unit, then the temperature in the devices or the battery can be monitored. The signal can be programmed as a collective failure (can be selected by the user) or be conducted over the reserve relay K1 (can be programmed)
Thus the contact can be used for e.g. for a ventilation control. The temperature monitoring can be activated in the service menu. The temperature threshold and hysteresis can be similarly adjusted in the service menu.

Thus the contact can be used for e.g. for a ventilation control. The temperature monitoring can be activated in the service menu. The temperature threshold and hysteresis can be similarly adjusted in the service menu.

Indication: High temperature T>

The source tension of rectifier modules connected over CAN bus is steered through choice of the option Temperature compensation dependent on temperature. The temperature coefficient as well as the start temperature and final temperature of the loading tension regulation are programmable.

4.7 Mains voltage control

With additional board MU1000-MM (option) the unit monitors and displays the mains voltages. The monitoring threshold is programmable in service menu.

Indication:

UR	US	UT	f
xxxV	xxxV	xxxV	50.0

and

IR	IS	IT
xxxA	xxxA	xxxA

Fault Indication: MM1 fault, mains fault V< or mains fault V>

With abandonment of the programmable supervision tension area a mistake signal is generated. This mistake signal is filed in the event memory and can be assigned to a Signal-LED (S1 or S2) as well as a registration relay.

The indicated frequency is measured by the phase L1.

4.8 Digital inputs

In total 8 digital inputs are available for different monitoring functions.
External relay contacts, like fuse monitoring are connectable to monitor and signalling fault messages via MU1000C.

4.9 Additional Relays K1/K2 (K11-K18)

A signal can be assigned to the signalling relay K1 or K2 over the adjustments in the service menu. If several signals are assigned, then the individual signals are connected thus, the signalling relays switch when one or more of the assigned signals appear. In the case of activated boost charge option, the relay is assigned to the signal boost charge. Thus a battery compartment ventilator can be operated over this contact. In this case, the other error signals cannot be assigned to K1.
The falling-off of the relay is thereby delayed with entry of a mistake in the opposed time. Put on the relay with discontinuation of the mistake condition occurs against it undelayed.

All the individual signals can be assigned to the signalling relay K1.

For every relay a delay of 0-300 seconds can be programmed.

4.10 Monitoring: Battery unsymmetry

Defective battery cells can be recognised over the deviation of the mean voltage of the battery ($U_{batt}/2$) from the adjustment of the monitoring threshold dU_{batt} and the mean voltage of the battery $U_{batt}/2$ in the service menu. Only a very high non-symmetry in the battery system is recognised and not the position of the defective cell/s. The condition for this monitoring function is the connection of the measuring voltage U_{dc3} between the minus potential and the centre of the battery.
Setting occurs in % of the battery nominal tension (=cell count x 2.0V)

Fault indication: Battery unsymmetrical

4.11 Boost charging

There are different possibilities the boost charge (BC) to switch on.

Once about the manual activation. One must release the suitable point and then can switch on in the main menu the BC with ENTER.
The BC can be also switched off so again.

To the second an automatic activation can occur.
One can let the BC by certain conditions one or also switch off.

e.g. BC switch On, if the battery tension is smaller of a certain one Off tension value

or

if I_{batt} (I_{lade}) > 200 A is.

The boost charge (BC) can be also released about a digital entrance (MU1000 or I/O or DIG8).

The BC can be begun likewise automatically after a battery test.

If the BC is active, this is indicated in the main menu of the MU.

By a digital entrance one can switch off the BC or block also, so that the BC is not switched on only at all.

There is furthermore a hand load where one can give by hand the tension.

Also a system charge is possible.

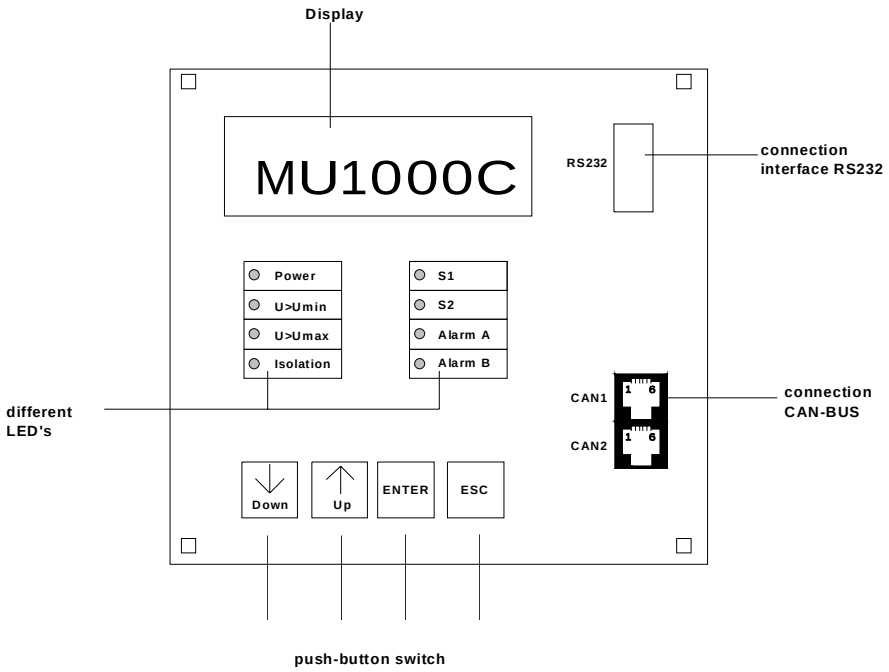
One can put a timer which switches off the BC after max. 1-24 hours.

4.12 Bootloader

From the firmware version MU 2.0 a Bootloader is integrated, i.e. you can carry out over the CAN bus (with an USB-CAN-Dongle) or above the RS232 interface a firmware-update.

5. Operation

The MU 1000 is operated over the 4 keys at the front side (↑, ↓ , ENTER,ESC). The function of the individual key depends on the indication of the display and on the respective menu level.



Picture 5.1: Front view MU1000C

Change in indication (scroll)
Pressing the keys ↑, ↓ does the scrolling between the different indications, whereby the previous indication appears when ↑ is pressed and the next indication occurs with ↓. The serial order of the indications should be taken from the sub-point Menu- and Indication structure.

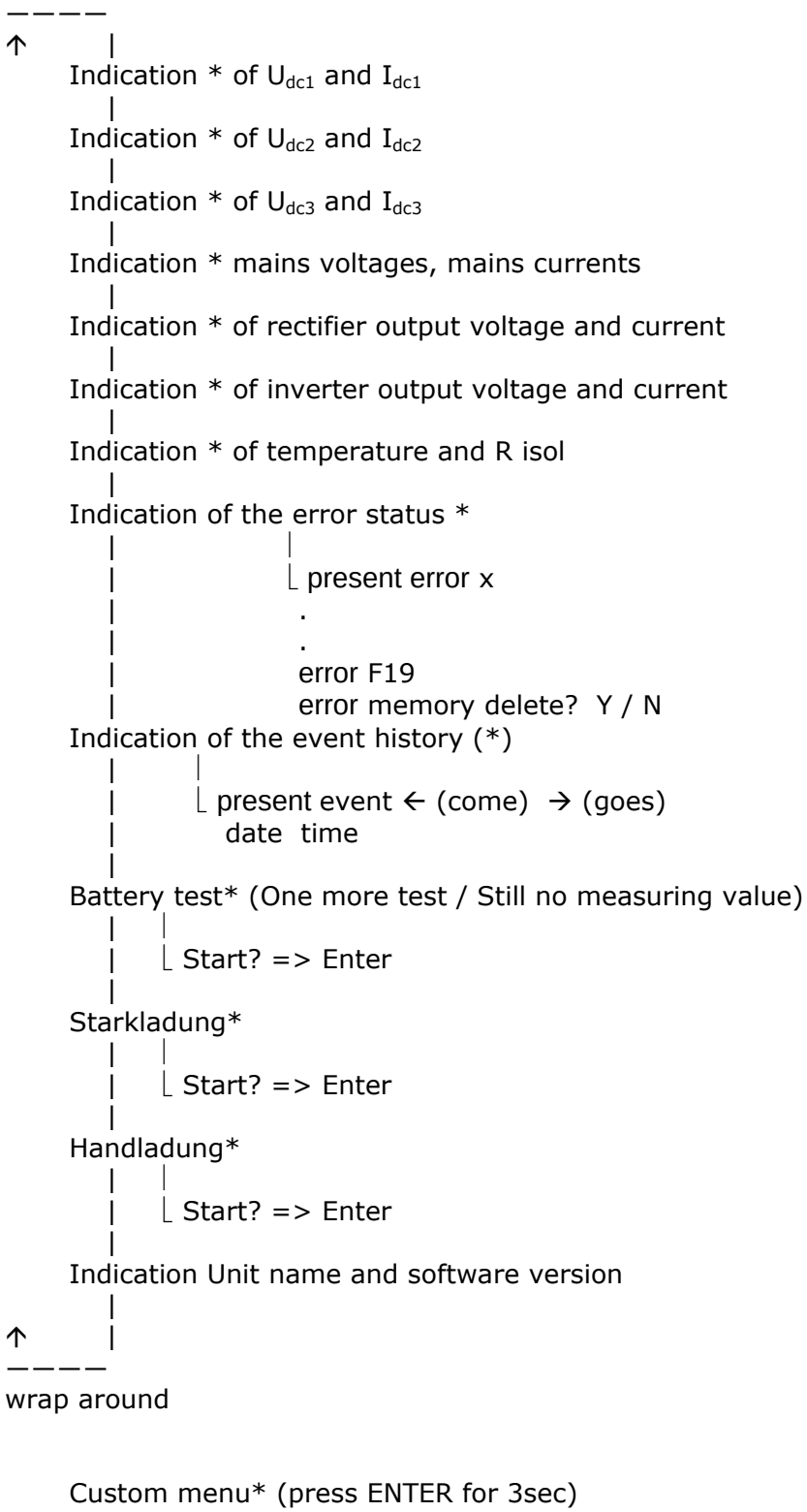
Menu change
Indications, which contain a selectable sub-menu, are labelled with a star "*". By pressing the key "ENTER" for a short time one reaches the respective sub-menu. The return to the above menu is done by simultaneously pressing the "ESC" key.

Change of figure values / Assignment
For changing an indicated value, the key ↑ should be pressed for increasing the value and ↓ should be pressed for decreasing the value. By touching the individual keys separately the value is changed by the smallest possible amount (usually one digit). If one key is pressed for a longer time, then the values change continuously. The speed of change thereby increases with the duration for which it is pressed.

Saving the changed values
After changing the adjustments the user can save the values by pressing the key "ENTER" key.

6. Menu- and display structure

6.1 General structure



6.2 Service menu

The service menu is used for changing parameters in the MU 1000. It is protected against unauthorized access by a 3-digit access code. For the calibration of the voltage and current measuring inputs, a calibration menu can be selected with a second access code (see Pt. *6.2.3.*)

Only authorised technical personnel should do changes in the service menu because wrong adjustments could damage the system, the connected battery and the load device. Eltek Valere Industries does not warrant damages caused by
incorrect operation of the MU 1000C or by changes in the service menu. The menu is shown with a star " * " , because it has the sub-menu s.

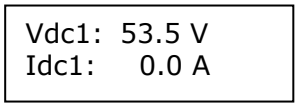
The indication values and possible parameters / adjustment fields are programmable only by service personnel.

6.2.1. Customer menu

The customer menu is a kind of reflection of the service menu, i.e. all valid values of the system are indicated. However, these values cannot be changed in contrast to service menu. The menu point should serve to give a topical overview about the investment parameters to the customer or to allow a detailed distant diagnosis in the mistake case.
The menu is shown with a star " * " , because it has the sub-menu s.

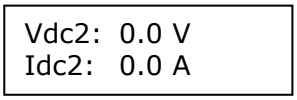
Menu description MU1000C

1. Display at switching on



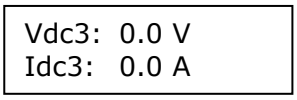

1x press

2. Display




1x press

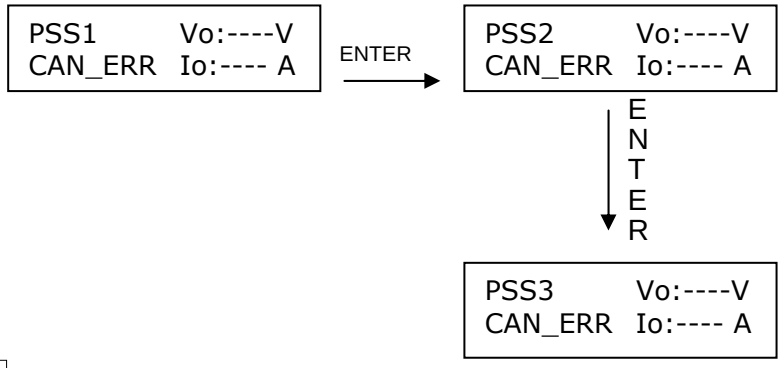
3. Display




1x press

4. Display
4a)

4b)



4c)


1x press

5. Display

UNV1 Vo:----V
CAN_ERR Io:---- A

▲ 1x press

6. Display

Temp.: 23.1 °C
Risol: >500kΩ

▲ 1x press

7. Display

No Errors
20.04.2006

▲ 1x press

8. Display

No Event
20.04.2006

▲ 1x press

9. Display

Battery Test*
a) No test at all
b) No test value

a) & b) alternating visible on Display

▲ 1x press on ENTER

10. Display

Boost charge*

Abort Boost cha*
Boost ch. runs

▲ 1x press

11. Display

Manual charge *

or System charge*

▲ 1x press

12. Display

Eltek-Valere
MU1000_C V2.08

Texts freely configurable

▲ 1x press

Display 1. appears

Call the customer menu

By pressing the ENTER – button for 4 sec the following menu will appear:

Customers menu	ENTER
Exit	ESC

By pressing the ENTER-button the Custumers menu appiers.
With the ▲ UP – button you move throw the menu step by step

The display shows the following menu:

		✶ shows new subroutines
a), b)	Denotations ✶	Thresholds ✶
c), d)	Monitor.-delays ✶	Signal config ✶
e), f)	Signal delays ✶	Dig.inp.delays ✶
g), h)	IO-inp.delays ✶	Nominal values ✶
i), j)	System values ✶	Contact alloca ✶
k), l)	IO- Contact alloca ✶	Mains monitor ✶
m), n)	RS232 PC/Modem✶	Battery param. ✶
o), p)	Boost charge ✶	Manual charge ✶
q), r)	System test ✶	Countercells ✶
s), t)	Language English (GB)	Date/Time 27.04.2008 08:27

u), v), w)	Weekday Thursday	LCD-Contrast 75 %	LCD- illumination Ein

x), y)	LCD/LED - test	Thyristor loader St:0x0000 0x0000
z), aa)	Reset (boot)	Version: 2.08 JJ000000-000.000

then display a) appears again

Items of the menu a) – z)

Press the ENTER-button to get into the menu.
With the ▲ UP-button you will run throw the menu.

to a)

Denotations ✶		(press ENTER)

a1) , a2) from MU1000	Udc1= Udc1 :	Udc2= Udc2 :
a3) , a4)	Udc3= Udc3 :	Idc1= Idc1 :
a5) , a6)	Idc2= Idc2 :	Idc3= Idc3 :
a7) , a8) from BM-card	2Udc1= BM1Udc1:	2Udc3= BM1Udc3:
a9), a10)	2Idc1= BM1Idc1:	3Udc1= BM2Udc1:
a11), a12)	3Udc3= BM2Udc3:	3Idc1= BMIdc1:
a13), a14) from MU1000	input 1 input 1	input 2 input 2
a15), a16)	input 3 input 3	input 4 input 4
a17), a18)	input 5 input 5	input 6 input 6
a19), a20)	input 7 input 7	input 8 input 8
a21)-a28) from IO-card	I/O- input 1 I/O- input 1	bis I/O - input 8 I/O - input 8

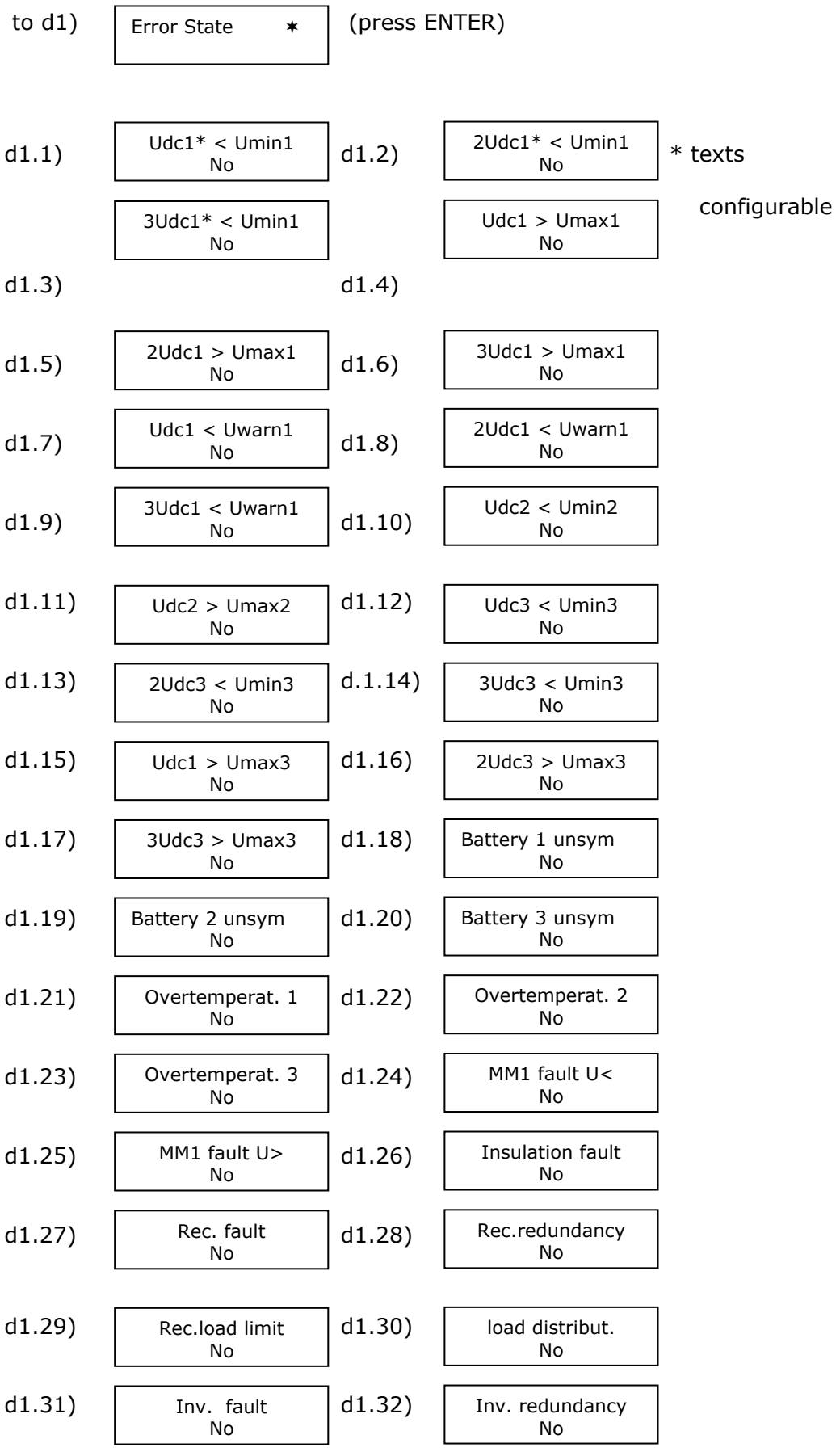
then display a1) appears again with ESC a level back

to b)	Thresholds ✶	(press ENTER)
b1), b2)	Umin [Udc1] 43.2V = 1.80V/Z	Umax [Udc1] 57.6V = 2.40V/Z
b3), b4)	Uwarn [Udc1] 45.6V = 1.90V/Z	Umin [Udc2] 43.2V = 1.80V/Z
b5), b6)	Umax [Udc2] 57.6V = 2.40V/Z	Umin [Udc3] 43.2V = 1.80V/Z
b7), b8)	Umax [Udc3] 57.6V = 2.40V/Z	Imax [Idc1] 30.0 A
b9), b10)	Imax [Idc2] 30.0 A	Imax [Idc3] 30.0 A
b11), b12)	Hysteresis Umin1 5 %	Hysteresis Umin2 5 %
b13), b14)	Hysteresis Umin3 5 %	Hysteresis Umax 1 %
b15), b16)	Hysteresis Imax 1 %	Temperature high 60.0 °C
b17), b18)	Hysteresis Tmax 5 %	Batt. Operation -IB> 20.0 A
b19), b20)	Hyst. Batt.oper 5 %	Battery unsymmet. 2.5 V
b21), b22)	Hyst. Batt.-unsy 5 %	Insulation fault 60 kΩ
b23)	Hyst. Insul. fault 5 %	

then display b1) appears again

to c)	Monitor.- delays✶	(press ENTER)
c1), c2)	Delay Udc1 < Umin1 10s	Delay Udc2 < Umin2 10s
c3), c4)	Delay Udc3 < Umin3 10s	Delay Udcx > Umax 3s
c5), c6)	Delay Idcx > Imax 1s	Delay T > Tmax 20s
c7), c8)	Delay batt.-oper. 20s	Delay insu.fault 10s
c9), c10)	Delay batt.unsym 10s	Delay Uglr - 0 s
c11)	Delay Uglr + 0 s	

to d)	Signal config. ✶	(press ENTER)
d1), d2)	Error state ✶	Event history ✶
d3) , d4)	Signal LED S1 ✶	Signal LED S2 ✶
d5) , d6)	Alarm A ✶	Alarm B ✶
d7) , d8)	Relay K1 ✶	Relay K2 ✶
d9) - d16) only if an IO	Relay K11 ✶	Relay K18 ✶
d17)	Modem ✶	



d1.33)	UNB fault No	d1.34)	I/O fault No	
d1.35)	MM1- fault No	d1.36)	BM1- fault No	
d1.37)	fan tray fault No	d1.38)	input 1 No	input texts freely
d1.39)	input 2 No	d1.40)	input 3 No	configurable
d1.41)	input 4 No	d1.42)	input 5 No	
d1.43)	input 6 No	d1.44)	input 7 No	
d1.45)	input 8 No	d.1.46)	I/O - input 1 No	
d1.47)	I/O - input 2 No	d1.48)	I/O - input 3 No	
d1.49)	I/O - input 4 No	d1.50)	I/O - input 5 No	
d1.51)	I/O - input 6 No	d1.52)	I/O - input 7 No	
d1.53)	I/O - input 8 No	d1.54)	Battery fault No	
d1.55)	Battery test No	d1.56)	Batt.operation	
d1.57)	Boost charge No	d1.58)	Fan operating No	
d1.59)	Countercell 1 No	d1.60)	Countercell 2 No	
d1.61)	Idc1 > Imax1 No	d1.62)	Idc2 > Imax2 No	
d1.63)	Idc3 > Imax3 No	d1.64)	Reserve	

to d2) | Event history ✶ | (press ENTER)

The points at the display for d2.1) to d2.64) are the same like d1.1) to d1.64)

to d3) | Signal LED S1 ✶ | (press ENTER)

The points at the display for d3.1) to d3.64) are the same like d1.1) to d1.64)

to d4) | Signal LED S2 ✶ | (press ENTER)

The points at the display for d4.1) to d4.64) are the same like d1.1) to d1.64)

to d5) | Alarm A ✶ | (press ENTER)

The points at the display for d5.1) to d5.64) are the same like d1.1) to d1.64)

to d6) | Alarm B ✶ | (press ENTER)

The points at the display for d6.1) to d6.64) are the same like d1.1) to d1.64)

to d7/8) | Relais K1/2 ✶ | (press ENTER)

The points at the display for d7/8.1) to d7/8.64) are the same like d1.1) to d1.64)

to d9-16) | Relais K11/K18 ✶ | (press ENTER)

The points at the display for d9-16.1) to d9-16.64) are the same like d1.1) to d1.64)

to e) | Signal delays ✶ | (press ENTER)

e1) | Delay signal S1 5s

e2) | Delay signal S2 5s

e3) | Delay alarm A 5s

e4) | Delay alarm B 5s

e5/6) | Delay K1/2 5s

e7-14) | Delay K11/18 5s

to f) | Dig.inp.delays ✶

like Point e1) to e14)

to g) | IO-inp.delays ✶

like Point e1) to e14)

h) | Nominal values ✶ | (press ENTER)

h1), h2) | Nom.Vrect_norm 54.5V = 2.27V/Z

Nom.Vrect_fast 57.5V = 2.40V/Z

h3), h4) | Nom.Vrect_bat 42.5V = 1.77V/Z

Nominal Iract 50.0A

h5) | Nominal Vmains 230V

to i)	System values ✶	(press ENTER)
i1), i2)	Rec. count 3	Rec.count rdancy 0
i3), i4)	Rec. Load limit 100 % 0.0 %	Rec. Loadl delay 1 s
i5), i6)	Rec. Load alloca. 10 %	Rec.Loada. delay 5 s
i7),i8)	Rec.-blink addr0 No	Rec. reset 0
i9), i10)	Inv. count 1	Inv.count rdancy 0
i11), 12)	UNB present? No	I/O-Board? No
i13), i14)	RB6 - Board? No	DIGI8 - Board? No
i15), i16)	Ext. mains monit? No	Thyr.count ? 0
i17), i18)	BM1 present ? No	Fan tray count 0
i19), i20)	Num. of batteries 1	Batt1 capacity 50Ah
i21), i22)	Batt2 capacity 50Ah	Batt3 capacity 50Ah
i23), i24)	Max.charge cur1 30 30.0 A	Max.charge cur2 30 30.0 A
i25), i26)	Max.charge cur3 30 30.0 A	Batt. cellcount 24
i27)	Batt. tap. point 12	

i28/29)	Temperat.Sensor1 Yes	Temperat.Sensor 2 No
i30/31)	Temperat.Sensor1 3 No	Measurement Riso? No
i32/33)	Refer to Vload? No	TempComp -2 mV/K
i34/35)	Tmin K 0.0° C	Tmax K 60.0° C
i36/37)	Batt1 Shunt Idc1 60mV = 50A	Batt1 Shunt Idc2 60mV = 50A
i38/39)	Batt1 Shunt Idc3 60mV = 50A	Batt2 Shunt Idc1 60mV = 50A
i40), i41)	Batt3 Shunt Idc1 60mV = 50A	IP-address 192.168.1.1

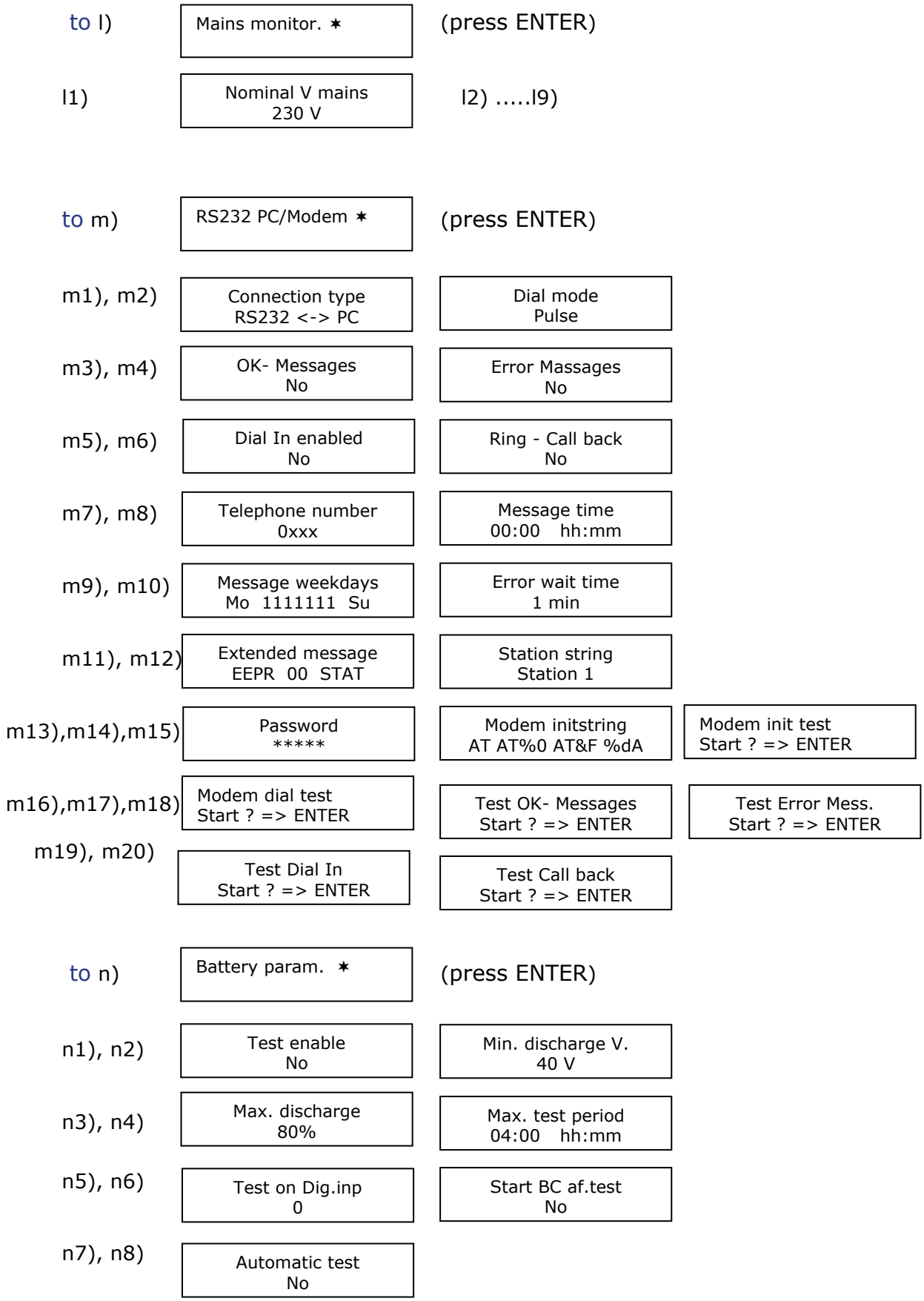
again to i1)

to j) Contact alloca ✶ (press ENTER)

j1)	Alarm A Close contact	j2)	Alarm B Close contact
j3-4)	Relay K1/2 Close contact	j5-12)	Relay K11-18 Close contact
j13-20)	Input 1-8 Close contact		

to k) IO-contact al. ✶ (press ENTER)

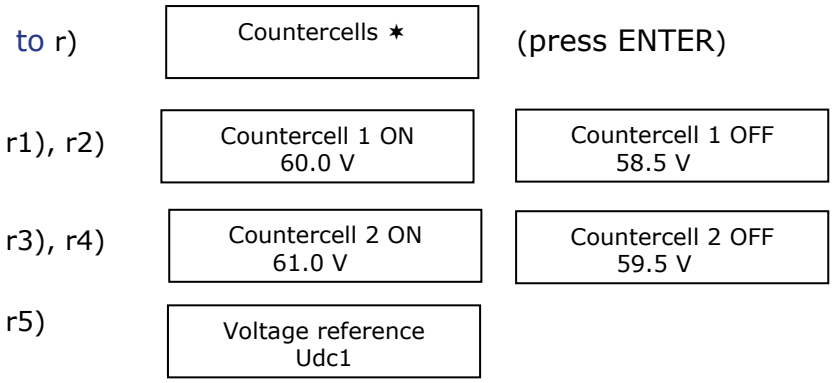
k1-8) I/O- Input 1-8
Close contact



to o)	Boost charge ✶	(press ENTER)
o1), o2)	Man.boost chrge No	Auto boost chrge No
o3), o4)	Boost charge at: 43.2V = 1.80V/Z	Boost charge ON I Lade >: 250.0A
o5), o6)	Delayed trigger 2 s	Level post run 56.0V = 2.33V/Z
o7), o8)	Boost charge OFF I Lade <: 30.0A	Delay post run 20 s
o9), o10)	Charge down time 1 min	BattOper/Mainoff 15 min
o11), o12)	Fan off delay 5 min	Charge OFF Dinp 0
o13), o14)	Charge off D.Inp 0	Max.BC. duration 1 hh

to p)	Manual charge ✶	(press ENTER)
p1), p2)	Manual charge No	Overvoltage alarm No
p3), p4)	Switch off inmed. 3.5 V	Alarm delay 600 s
p5), p6)	Max.charge volt 65.0V = 2.71V/Z	Irectifier nomin 40.0 A

to q)	System test ✶	(press ENTER)
q1), q2)	System test No	Overvoltage alarm No
q3), q4)	Alarm delay 600 s	Umin Umax 20.0 V 80.0 V
q5)	Irectifier nomin 50.0 A	



6.2.2. Service menu 1

In the service menu all parameters of the system are programmed. This menu is protected with a code and is accessible only to the service staff.

6.2.3. Service menu 2 / calibration menu

In this menu the voltage indication can be adjusted to show the actual values. The adjustment is done separately for all 3 voltages and currents. The indicated value has to be changed by pressing the arrow-keys until it coincides with an externally measured value. After this, the value can be saved.

An offset of the battery current indication can be compensated in a separate menu. This has to be done while no current flows over the shunt!

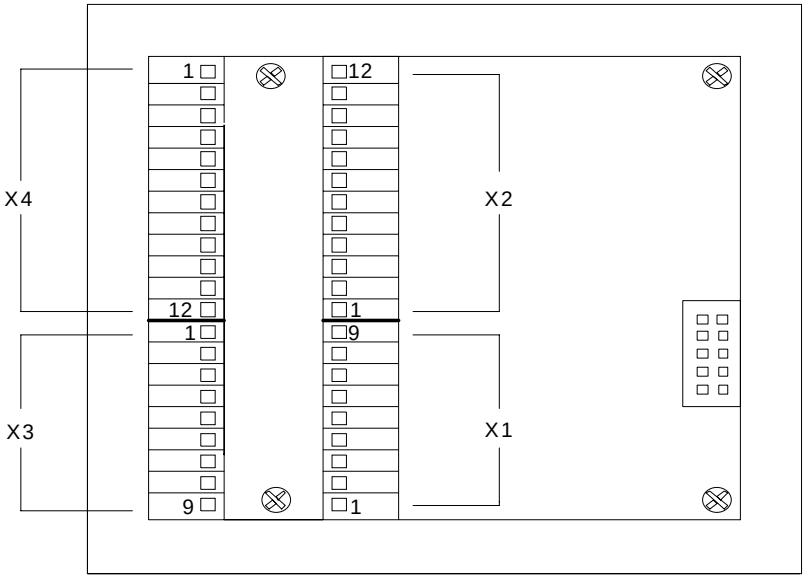
After activity of both keys the calibrated "zero" of the announcement is stored away.

7. Connections

The connections to the MU 1000C are made over a 48 pol. Plug. The matching plug is part of the delivery of the unit. The delivery of the MSTB-plug (screw connection) is optional.

The following figure shows the order of the connections with the MSTB plug:

Picture 7.1: Back surface of MU1000C



back surface of the MU1000C
with the connections X1 / X2 / X3 / X4

Connections:

Pin - No. MSTB-Plug	Name	Remark
- X2:12	PE	Earth connection for earth fault monitoring
- X2:11	$+U_{dc1}$	Measuring and supply volt. 1 (Plus potential)[1)]
- X2:10	$-U_{dc1}$	Measuring and supply volt. 1 (Minus potential)
- X2:9	$+U_{dc2}$	Measuring and supply volt. 2 (Plus potential) [1)]
- X2:8	$-U_{dc2}$	Measuring and supply volt. 2 (Minus potential)
- X2:7	$+U_{dc3}$	Measuring voltage 3 (Plus potential) [2)]
- X2:6	$-U_{dc3}$	Measuring voltage 3 (Minus potential)
- X4:1	$+I_{dc1}$	Current shunt 1 (Plus potential) [3)]
- X4:2	$+I_{dc2}$	Current shunt 2 (Plus potential) [3)]
- X4:3	$+I_{dc3}$	Current shunt 3 (Plus potential) [3)]
- X4:6	$-I_{dc1}$	Current shunt 1 (Minus potential)
- X4:5	$-I_{dc2}$	Current shunt 2 (Minus potential)
- X4:4	$-I_{dc3}$	Current shunt 3 (Minus potential)
- X4:7		Not connected
- X4:8		Not connected
- X4:10	-TS	Temperature sensor input for LM335 (Minus potential)
- X4:9	+TS	Temperature sensor input for LM335 (Plus potential)
- X2:5	Iconst	Control line for current-dependent boost charge option
- X2:4		Digital input 1
- X2:3		Digital input 2
- X2:2		Digital input 3
- X2:1	SIG - GND	Signal – GND
- X4:12		Digital input 4
- X4:11		Digital input 5
- X3:3	SIG - GND	Signal – GND
- X3:2		Digital input 6
- X3:1		Digital input 7
- X1:9	SIG - GND	Signal – GND
- X1:8		Digital input 8
- X1:7		Not connected
- X3:6	K4 / NO	Relay contact K4 (Alarm A, urgent alarm)
- X3:5	K4 / COM	Relay contact K4
- X3:4	K4 / NC	Relay contact K4
- X1:6	K3 / NO	Relay contact K3 (Alarm B)
- X1:5	K3 / COM	Relay contact K3
- X1:4	K3 / NC	Relay contact K3
- X1:3	K2 / NO	Relay contact K2 (freely programmable)
- X1:2	K2 / COM	Relay contact K2
- X1:1	K2 / NC	Relay contact K2
- X3:9	K1 / NO	Relay contact K1 (freely programmable)
- X3:8	K1 / COM	Relay contact K1
- X3:7	K1 / NC	Relay contact K1

1)

The supply voltages U_{dc1} and U_{dc2} should be connected redundantly whereby the decoupling is done over the diodes on the MU 1000- sheet. The measuring voltage is additionally required for the evaluation $U<U_{min}$ and insulation error and the measuring voltage U_{dc2} is used for U>.
The connection of a protective conductor is necessary for recognising an insulation error.

2)

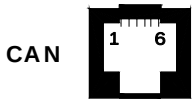
In the case of monitoring the unsymmetrical of the battery, this circuit should be connected in the correct polarity between the minus potential of the battery and $U_{batt}/2$. It should thereby be noted that the minus wire is connected at the same point as the minus wire of the measuring voltage Udc1. If the unsymmetrical monitoring is not necessary, then another voltage point can be measured in the system.

3)

The potential drop (max 60 mV) to be measured over the shunt, measured with the correct potential, should be connected in the direction of the current, otherwise the MU 1000 will not indicate any current value. With the exception of Idc1, the unit only processes positive voltage values. The measuring voltage for Idc1 could be negative. It is intended for shunts, which are in the battery connection (charging and discharging current). Thus only I_{dc1} can be used as "I_{batt}". In order to indicate correctly all the currents, the SIG-GND should be connected to the shunt potential.

7.1 CAN-BUS-connector

(Modular plug RJ45, 6polig)



Pin-No. CAN-BUS	Allocation
1	+8...15V
2	+8...15V
3	CAN_High
4	CAN_LOW
5	Masse
6	Masse

8. Optional: Relay board DCC-RB6

This extension board makes available 6 other relay contacts free of potential. The allocation of individual defects and mistake groups are freely programmable. It can be installed at any place in the electricity supply system and is simply connected on the CAN bus.

Further information is evident in the data sheet.

9. Optional: Digital input board DCC-DIG8

The board disposed about 8 digital inputs.

The activation / deactivation, as well as the naming of the single inputs are freely programmable.

They are likewise connected over the CAN bus.

10. Optional: Relay board MU1000C-I/O (RK1)

With the help of this board, which can be delivered as an option, in addition to the 4 relay signals of the monitoring element MU 1000C, another 8 error signals can be made available over potential-free contacts.
The connection to the MU 1000C is done over a 10-pole flat band cable (CAN-bus). The connection to the external signal lines is done over screw clamps on the board. The board can be directly fastened over a cap band. The individual error signals are assigned in the service menu in the sub-point "Relay Assignment". The relay switches off when a fault appears.

Connections see next page!

With connected relay board the board itself forms to the final knots in the CAN bus. Therefore, it is to be seen to the fact which is closed the jumper J1 (Final opposition actively).

Connections I/O-Board (RK1):

Pin - No.-MSTB-Plug	Name	Remark
- X11:1-10		Flat band wire for connection with MU1000 (CAN-Bus)
- X12:1	COM	Relay signal K11
- X12:2	NC	
- X12:3	NO	
- X12:4	COM	Relay signal K12
- X12:5	NC	
- X12:6	NO	
- X12:7	COM	Relay signal K13
- X12:8	NC	
- X12:9	NO	
- X12:10	COM	Relay signal K14
- X12:11	NC	
- X12:12	NO	
- X12:13	COM	Relay signal K15
- X12:14	NO	
- X12:15	COM	Relay signal K16
- X12:16	NO	
- X12:17	COM	Relay signal K17
- X12:18	NO	
- X12:19	COM	Relay signal K18
- X12:20	NO	
- X12:21	+24VDC	Digital input 1
- X12:22	Inp1	
- X12:23	+24VDC	Digital input 2
- X12:24	Inp2	
- X12:25	+24VDC	Digital input 3
- X12:26	Inp3	
- X12:27	+24VDC	Digital input 4
- X12:28	Inp4	
- X12:29	+24VDC	Digital input 5
- X12:30	Inp5	
- X12:31	+24VDC	Digital input 6
- X12:32	Inp6	
- X12:33	+24VDC	Digital input 7
- X12:34	Inp7	
- X12:35	+24VDC	Digital input 8
- X12:36	Inp8	

* only by use of extension boards

11. Technical Data MU1000C

Type	MU1000C-I	MU1000C-II
Item number	300-110-660.00	300-110-770.00
Type of Device	microprocessor controlled signalling and monitoring unit	
Input voltage (redundant)	18 - 80 V DC	80 - 300 V DC
Max. input power consumption	ca. 10 W	

Measuring inputs

analoque	3 x DC - voltage 0 – 100 V 1 x DC - current +/- 60 mV 2 x DC - current + 60 mV 1 x Temperature sensor (compatible zu LM335) 1 x Earth fault (PE-connection) 3 x mains voltage (with option board MU1000C-MM) 3 x mains current
digital	mains error (with option board MU1000C-MM) 8 x digital inputs
Display indication	2 x 16 - Matrix-clear text indication, background illuminated
Operation	4 multifunction keys; all monitor thresholds, time- and voltage hysteresis, automatic functions as well as control functions freely programmable

Signalling/Control outputs

LED	Operation (green), $U > U_{min}$ (green), $U > U_{max}$ (red), Insulation error (red), S1 (Reserve, red), S2 (Reserve, red) Alarm A (red), Alarm B (red),
Relay (potential free)	Alarm A, Alarm B, 2 reserve relays (free programmable); contact loading: 24 - 125 V DC/1 A, 250 V AC/2 A
Contact	Characteristic switch over U_{a2} / U_{a3} for charger (Switch over 24V DC)

Error message (with saving)

Error memory for actual adjacent errors
event memory for 100 events

Automatic functions	Boost charge automatic dependent on current and dependent on tension (incl. postloading time) programmable. Battery test dependent on time or dependent on tension programmable. Realization of a countercell control or discharge Disconnection possibly.
Clear text indication	Assignment of pre-defined clear text names for U_{dc1} - U_{dc3} and I_{dc1} - I_{dc1} and the Relay inputs
Languages	German, English, French, Italian, Russian, Swedisch, Tschech (other languages on request)
Painting	Front plate RAL 7032
Model/ Dimensions	Mounting module for front plate assembly 142 x 129 x 70 mm B x H x T (suitable front plates for 19"-mounting can be delivered)
Nature of protection	Front: IP 20; else IP00
Surrounding temp.	0 °C until 40 °C
Storage temperature	-30 °C until +70 °C
Environmental conditions	IEC 721 Part 3 - 3 class 3K3 / 3Z1 / 3B1 / 3C2 3S2/3M2
Operation altitude	up to 1000 m above S.L.
Mechanical strength and shatter-proof	acc. to VDE 0160 Issue 5.88
Connections	Plug acc. to DIN41612, R48 (Matching plug included in the delivery; can optionally; have one adapter with MSTB-plug)

Optional Profibus or Modbus - binding about RS232 with a gateway.