Operating Instructions
Technical Parameters

KBR
ENERGIEMANAGEMENT
mit System

Power Analyzer

MULTIMESS - Light

- Basic

Your Partner For Network Analyzing

KBR GmbH • Am Kiefernschlag 7 • D-91126 Schwabach • Telefon: +49 (0)9122/6373-0 • Telefax: +49 (0)9122/6373-83 • email: info@kbr.de

Dear Customer

We would like to thank you for choosing a **KBR GmbH** quality product.

In order to familiarize yourself with the operation and programming of the device and always be able to use the whole functionality of this high-quality product, we recommend that you read this manual thoroughly.
The individual chapters serve to explain the technical details of the device and show how to avoid damage by means of proper installation and commissioning.

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The manual is included in the scope of delivery of the device and must be accessible for the user at all times (e.g. in the switchgear cabinet). Even when the device is resold to third parties, the manual remains part of the device.

Although we used the utmost care in assembling this manual, we would like to thank you in advance for notifying us about any errors or ambiguous descriptions that might be in it. You will find a form for corrections in the appendix.

Sincerely,

KBR GmbH Schwabach

Safety Precautions

This manual contains notes that must be observed for your personal safety and to avoid damage to equipment. Notes are identified by a warning sign or an info symbol according to the degree of hazard they represent.

Danger

means that death, major injuries or damage **will** occur in case the appropriate safety measures are not performed.

Warning

means that death, major injuries or damage **may** occur in case the appropriate safety measures are not performed.

Caution

means that minor injuries or damage may occur in case the appropriate safety measures are not performed.

Note

is an important information on the product, product handling or the respective part of the user manual to which special reference is made.

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Disclaimer

The contents of this manual has been checked with the described hardware and software components. Certain deviations, however, cannot be excluded, so the manufacturer is not liable for complete conformity. The specifications made in this manual are checked on a regular basis, necessary corrections are included in the next revision.
We appreciate your corrections and comments.

KBR GmbH
Subject to change

General Safety Precautions

In order to prevent operating errors, handling of the device is kept as simple as possible. This way, you will be able to use the device very soon.

In your own interest, however, you should read the following safety precautions carefully.

Warning

During installation, the applicable DIN / VDE regulations must be observed!

Mains connection, setup and operation of the device must only be performed by **qualified personnel**. Qualified personnel as understood in the safety precautions of this manual are persons authorized to setup, ground and mark equipment, systems and wiring systems in accordance with applicable standards.

To avoid the hazard of fire and electrical shock, the device must not be subjected to rain or other humidity!

Before the device is connected to the mains, you will have to check whether the local mains conditions comply with the specifications on the manufacturer's label. A wrong connection may destroy the device!

When connecting the device, the connection chart must be observed (see chapter "Connection chart") and the connection lines must be powerless. Only use proper line material and watch the correct polarity when wiring!

In order to ensure proper and safe operation of the product, it must be transported, stored, installed and mounted in accordance with the specifications and operated and maintained carefully.

A device showing visible damage must by all means be considered as unfit for operation and must be disconnected from the mains!

Error detection, repairs and maintenance work may only be carried out in our facilities or after contacting our service team. Every warranty obligation of the manufacturer expires if the device is opened without written consent from our service team. Proper operation can no longer be guaranteed!

Opening the device may expose parts under voltage. Capacitors in the device may still be loaded even if the device was disconnected from all voltage sources. It is generally not allowed to operate the open device!

In facilities subject to hazard of lightning, lightning protection must be provided for all input and output lines (recommendations see chapter "Protective measures")!

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Product Liability

With these product, you have acquired a quality product.

In its manufacture, only components of the highest reliability and quality were used. Each device is subject to long-term testing before it is delivered.

For information on product liability, please refer to our General Terms and Conditions for electronic devices.

The warranted properties of the device apply only if it is operated in accordance with its intended use!

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Disposal

Please dispose of defective, outdated or no longer used devices properly.
At your request, we will be pleased to dispose of the devices for you.

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1 DEFINITION OF TERMS

Following you will find brief explanations of the terminology used in this manual.

Effective value: According to definition, an effective value is the RMS value of an alternating or *pulsating quantity.* MULTIMESS-Light / Basic exclusively calculates with effective values of pure alternating quantities (RMS).

Instantaneous effective value: The value determined by MULTIMESS-Light / Basic during its measuring intervals.

Measuring interval: During a measuring interval, the electrical quantity “Voltage” or “Current” of ***one*** phase is scanned. The resulting scanning spots are available for further calculations. This interval is mainly determined by the A/D conversion.

Measuring cycle: The measuring cycle is the time the device needs for measuring all possible quantities for all three phases.

Firmware: Operating system software implemented in the micro controller of MULTIMESS

Load profile memory: Saves the actual values of the measuring periods with timestamp.

Measuring period max: The measuring period containing the highest (maximum) value that occurred.

Active / reactive power periods: Actual active or reactive power within a measuring period.

Measuring period: The period of time used to determine the power average values. Typical intervals: e.g. 15, 30, 60 minutes.

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2 IMPLEMENTATION/FUNCTIONS

MULTIMESS-Light / Basic is an affordable network measuring device for flush mounting for the measurement of all important values in three-phase networks.
The MULTIMES-Light / Basic micro processor records mains voltage and current consumption of the measuring point for all three phases – via analog/digital converter inputs – and calculates the relation of active, reactive and apparent power in the three-phase network.

Convenient operation and display
The LED displays serve to either display the measured values directly or enter the respective parameters and configuration data. In addition, eleven LEDs serve to indicate menus and the status. Six buttons facilitate clearly structured navigation through the menus.

For 100 / 400 V networks
The MULTIMESS-Light / Basic can be applied in three-wire as well as four-wire networks. The unit can be implemented in 100 V as well as in 400 V networks for direct measurement. Higher voltages can only be connected via external voltage transformers; primary and secondary voltage can be programmed. The measuring voltage inputs of the device measure directly, i. e. there is no electrical isolation by a voltage transformer!
In case of a supply system with a non-zero earth potential outer conductor, a suitable isolating device (e.g. voltage transformer) must be used.

x/5A or x/1A freely programmable
The measuring inputs for current **must always** be fed via current transformers, while the transformer ratio is programmable. The primary current value as well as the secondary current value can be selected.

Determining the neutral conductor current
The neutral conductor current is determined and displayed.

Harmonic oscillation analysis
Harmonic oscillation analysis via Fourier transform
MULTIMESS-Light measures the harmonic oscillation of the 3rd / 5th / 7th / 9th / 11th / 13th / 15th / 17th and 19th network harmonics of the voltage and calculates their partial oscillation as well as the total distortion factor of the voltage.
In addition to the voltage harmonics, MULTIMESS-Basic measures the harmonic oscillation of the 3rd / 5th / 7th / 9th / 11th / 13th / 15th / 17th and 19th network harmonics of the current and calculates their partial oscillation as well as the total distortion factor of the voltage.

Two-tariffs counter function (HT/LT)
MULTIMESS-Light
Consumption during high and low tariff intervals is saved separately. Switching from high to low tariff is carried out exclusively by means of the internal clock.
MULTIMESS-Basic
Consumption during high tariff and low tariff times is saved separately. Switching from high to low tariff times and vice versa is either carried out by means of a digital signal to be applied externally, e.g. from the energy supplier, or via an internal clock. When operated with the KBR Energy Bus, switching can also be carried out centrally via the MULTIMASTER or PC.

Programmable pulse output
Active energy or reactive energy proportional pulses can be output via a programmable output laid out as S_0 interface The pulse output type (in proportion to active or reactive energy) as well as the pulse values (number of pulses per kWh or per kVArh) and the pulse length can be programmed. These pulses can be proc-

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essed by e.g. a master system for data acquisition or optimization, a maximum-demand monitor or a central process control.

Serial interface

MULTIMESS-Light

By default, MULTIMESS-Light disposes of a serial interface (RS485) to conveniently configure the instrument via PC and optional software.

This interface enables MULTIMESS-Light as well to be upgraded to MULTIMESS-Basic functions. It is therefore possible to upgrade MULTIMESS-Light to MULTIMESS-Basic.

MULTIMESS-Basic

In its default configuration, the MULTIMESS-Basic has a serial port (RS485) for operation with the KBR Energy Bus.

A large amount of information that cannot be shown on the display can be read from the device via the Energy Bus.

Numerous online measuring values as well as a considerable amount of data can be read from the long-term memory.

Extensive Storage functions (MULTIMESS-Basic only)

In addition to its measuring and counting functions, the MULTIMESS-Basic offers extensive storage functions.

- a **load profile memory** to record the cumulated active and reactive power
- a memory to record the **daily energy values** for 365 days
- and an **event memory** that records defined actions of the measuring device as e.g. mains failures, tariff switching actions, delete functions and many more.

The storage functions are exclusively available via the KBR Energy Bus.

Synchronization (MULTIMESS-Basic only)

To synchronize the load profile memory, an individual digital input was integrated in the MULTIMESS-Basic. The synchronization signal of the energy supplier counter can be connected there, for example. Synchronization as well as high / low tariff switching can be controlled centrally via the KBR Energy Bus as well as via the internal clock.

Software (optional)

A number of software products that can be executed on most Microsoft® Windows® operating systems is available for the convenient programming and storage of long-term data.

Separate power supply

The device requires a separate auxiliary voltage for operation (see nameplate).

For questions on this device or on our products please don't hesitate to contact us. We will be glad to assist you.

Please see the cover sheet of this manual for your contact.

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3 MULTIMESS-LIGHT / BASIC CONNECTION

3.1 Installation and mounting

- Current VDE regulations must be obeyed for mounting.
- Prior to connecting the device to the mains, check whether the local mains properties correspond to the requirements on the nameplate. A wrong connection may result in destruction of the device. A different mains frequency influences the measurement.
- Connect the device according to the chart.
- In case the plant is subject to lightning hazard, provide lightning protection for the power supply input. You will find suggestions and suppliers in the appendix.

Caution

The control voltage as well as the applied measuring voltage of the device must be protected by means of a back-up fuse.

When connecting the current transformers, the direction of the energy flow and the correct assignment to the voltage paths must be observed!

For the wiring of the pulse output, we recommend to use twisted pair and shielded material exclusively to avoid disturbance (e.g. installation line I-Y(ST) Y 2x2x0.8 mm, while the shielding may only be connected on one side).

During installation, please also observe our notes on safety measures against overvoltage and lightning in chapter “Protective Measures” of this manual.

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Note

Take the following into consideration when connecting the device to the three-phase network to be measured:
- Energy flow direction
- Assignment measuring voltage input/current transformer input

Rotary field:

The unit can be operated in a clockwise or an anti-clockwise rotating field. When switching on the device’s power supply, MULTIMESS-Light / Basic automatically checks the rotary direction. Rotary field check:

- Connect **only** the **measuring voltage** to the device (U_{Meas} see nameplate) for this purpose.
- Switch on the device by applying voltage to the power supply connections (L and N). Immediately after the device has been switched on, it will check the mains rotary direction.
- The rotary field is displayed in the menu U_{PH-PH}, sub menu rotary field For a clockwise rotary field, the display shows L1 **0**, L2 **120** and L3 **240** degrees.
- If you want to change the rotary direction, you only have to exchange two terminals, i.e. two phases. Then switch the device off and on again. The display

now shows the correct voltage and the device starts measuring automatically. Then check again whether the association of the voltage path L1 and the current path L1 as well as for all other phases still is correct.

Current transformation connection:

- ***Energy flux direction:***
  When mounting the transformers, observe the current flow or energy flow direction. If the current transformer is mounted the wrong way, the measured value will be negative.
  Prerequisite is that energy is consumed.

- ***Assigning measuring voltage input/current transformer input:***
  The current transformer on terminal 20/21 (k1/l1) must be arranged in the phase where the measuring voltage for the terminal 10 (L1) is measured. The same applies to the other transformer and measuring voltage connections.

  ⇨ The phase sequence can be checked with the MULTIMESS-Light / Basic as follows:
  - Switch to the main menu “I“.
  - Connect the current transformer to the corresponding wires.
  - The device will display only positive currents when connection and energy flux direction are correct.
  - If connections are wrong all currents will be negative. Interchange the connections until the display shows correct values.

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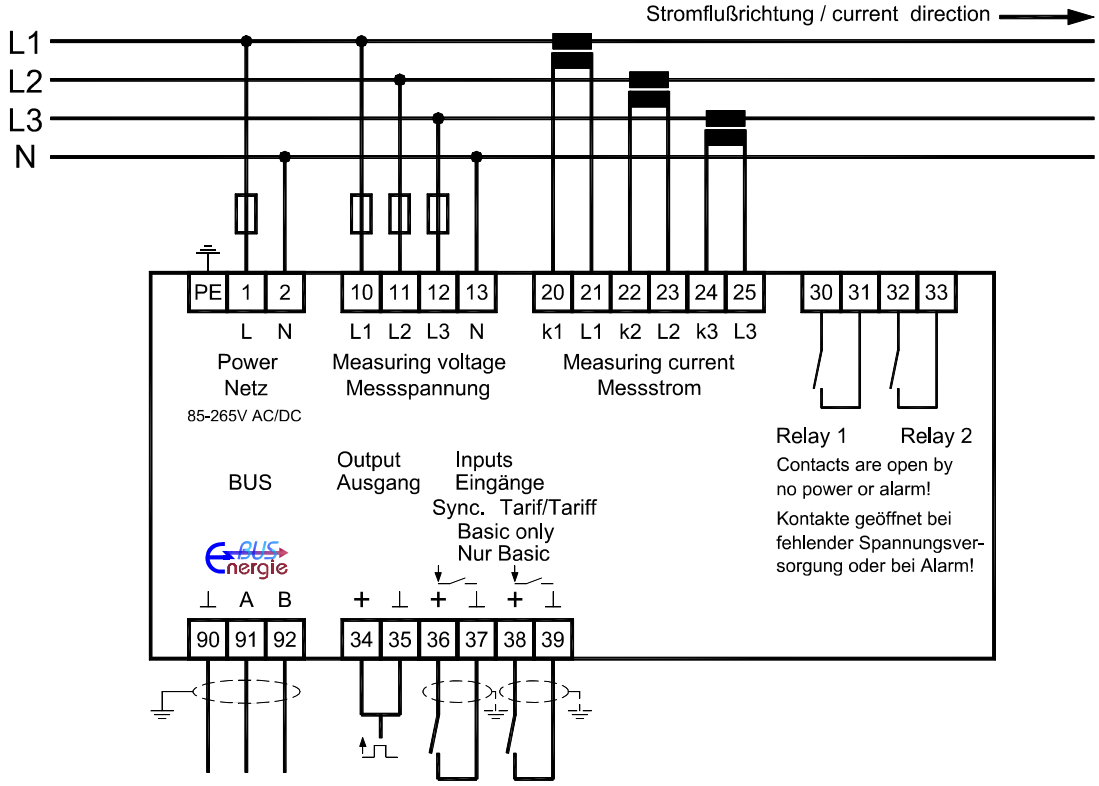
Caution

Before any interchanging the transformers must be shorted out!

3.2 Connection diagram



The Sync. and Tariff inputs are only available for MULTIMESS-Basic.

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3.3 Terminal assignment

Terminal 1 (L) and 2 (N):

Connection power supply

A control voltage is required to supply the device with power. The unit is equipped with a multi-range power supply and may be supplied by voltages of 85 – 265V AC/DC or 20 – 70V AC/DC resp. (Equipment tension see type signpost).

Terminal 10 (L1) :
11 (L2) :
12 (L3) :
13 (N):

Measuring input for voltage

Three-phase voltage measurement in three-wire as well as four-wire rotary current networks. Direct measurement for 3x5…100…120V or 3x20…500…600V AC Measuring intervals are programmable. Exceeding the measuring interval results in an error message.
For higher voltages, the unit needs to be connected via a voltage transformer.

Terminal 20 (k1) and 21 (I1)
22 (k2) and 23 (I2)
24 (k3) and 25 (I3)

Measuring inputs for current

The measuring inputs for current must be connected via current transformers x/1A AC or x/5A AC.
When connecting transformers, pay attention to the energy flow direction and to the correct assignment of measuring voltage inputs to current transformers.

Terminal 30 and 31: **Floating relay contact relay 1**

This contact serves as message or alarm output. During operation, an audible or visual message may be activated or a consumer shut down. The contact is open as long as the device is current less and in case of an active message. Maximum switching capacity of 2A at 250V AC

Terminal 32 and 33: **Floating relay contact relay 2**

Refer to the description of the floating relay contact relay 1

Terminal 90 (ground):
91 (A)
92 (B)

Interface connectivity

MULTIMESS-Light: to configure the instrument
MULTIMESS-Basic: For communication at the Energy Bus

Terminal 34 (+) and 35 (-): **Pulse output**

Output of energy-proportional pulses via a digital contact (S_0 interface in accordance with DIN 43864). Polarity is important for this output. The output signals can be processed e.g. by a maximum demand monitor or a master central process control.

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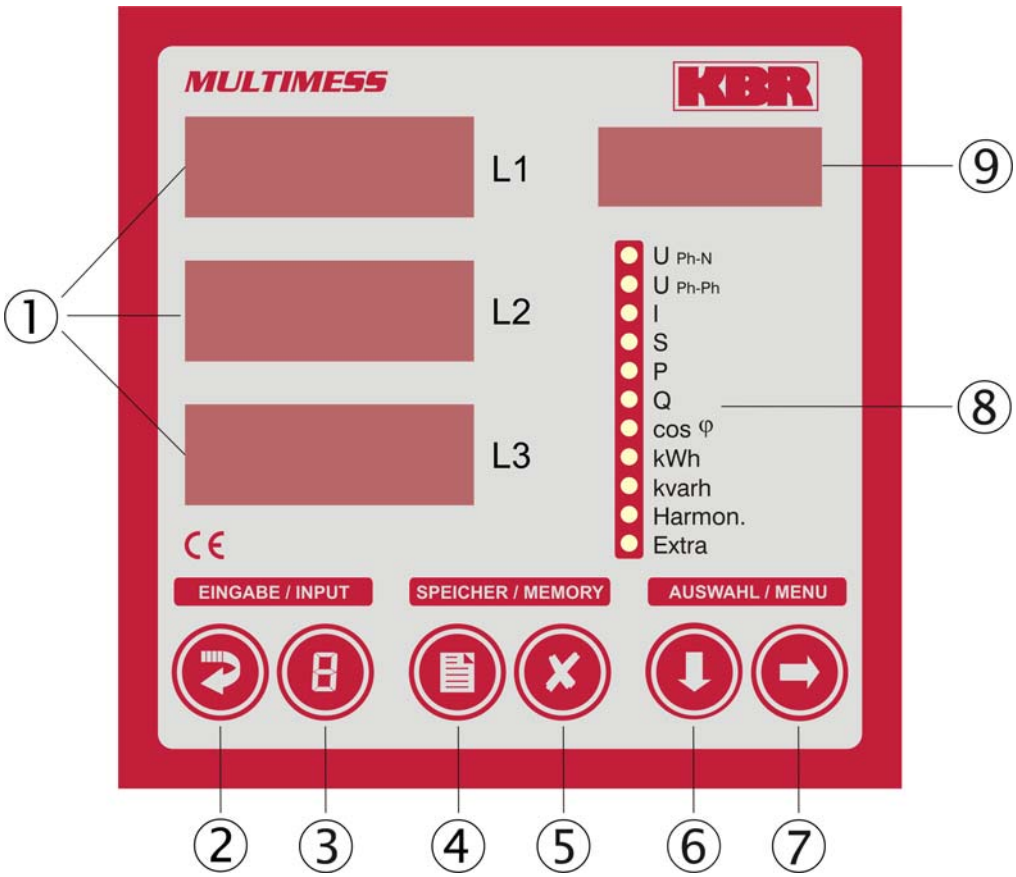
Terminal 36 and 37: **Synchronization input (MULTIMESS-Basic only)**

A floating contact, e.g. from the energy supplier for synchronizing the measuring period, can be connected to this input.

Terminal 38 and 39: **Tariff input (MULTIMESS-Basic only)**

A floating contact, e.g. from the energy supplier for switching from high to low tariff, can be connected to this input.

3.4 Operating and display panel



3.4.1 Description of buttons and displays

① 230 L1 / 230 L2 / 230 L3 — Three four-digit 7-segment displays for displaying measured, stored and programmed values (3-phase; L1-L2-L3)

② Starts the programming mode and switches between the places to be edited in ① and ⑨. Programmable places are flashing.

③ Changes the value of the flashing place in programming mode in ① or the decimal point in ① and the prefix of units in ⑨.

④ Display for saved minimum and maximum values.
In programming mode, it enables saving the parameters or values that were entered..

⑤ Deletes the values displayed by , such as extreme values, energy etc. In programming mode you can use this button to cancel programming without applying any changes.

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⑥

Selects one of the 11 main menus or jumps back to the current main menu item from a sub menu. Keep the key depressed to switch between the individual main menus automatically.
In programming mode you can use this button to switch between the input fields L1, L2 and L3.

Keep the button depressed and press the button to navigate backwards.

⑦

Jumps to the corresponding sub menus.

⑧

11 green LEDs indicate the main menus.
A permanent LED indicates the currently selected menu.
If an LED is flashing this indicates a limiting value violation in the corresponding menu. The LED is not flashing, however, if the limiting value violation occurred in the menu that is currently displayed.

⑨

The 4-digit 14-segment display for displaying information and dimensions of the values displayed in ①.
The display switches between the unit and the display MIN for minimum value or MAX for maximum value when reading the saved extreme values. This principle applies to other menus as well and will be described in the corresponding sections in this manual.

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4 OPERATION

4.1 Menu structure of MULTIMESS-Light / Basic

- Switches the main menus
  They are indicated by a permanent LED
- The main menus are switched automatically if you keep the button depressed.
- Pressing this button within a sub menu will return you immediately to the associated main menu and discards all modifications.

- Switches to the desired sub menu.
- Press this button to switch from the last sub menu back to the corresponding main menu.

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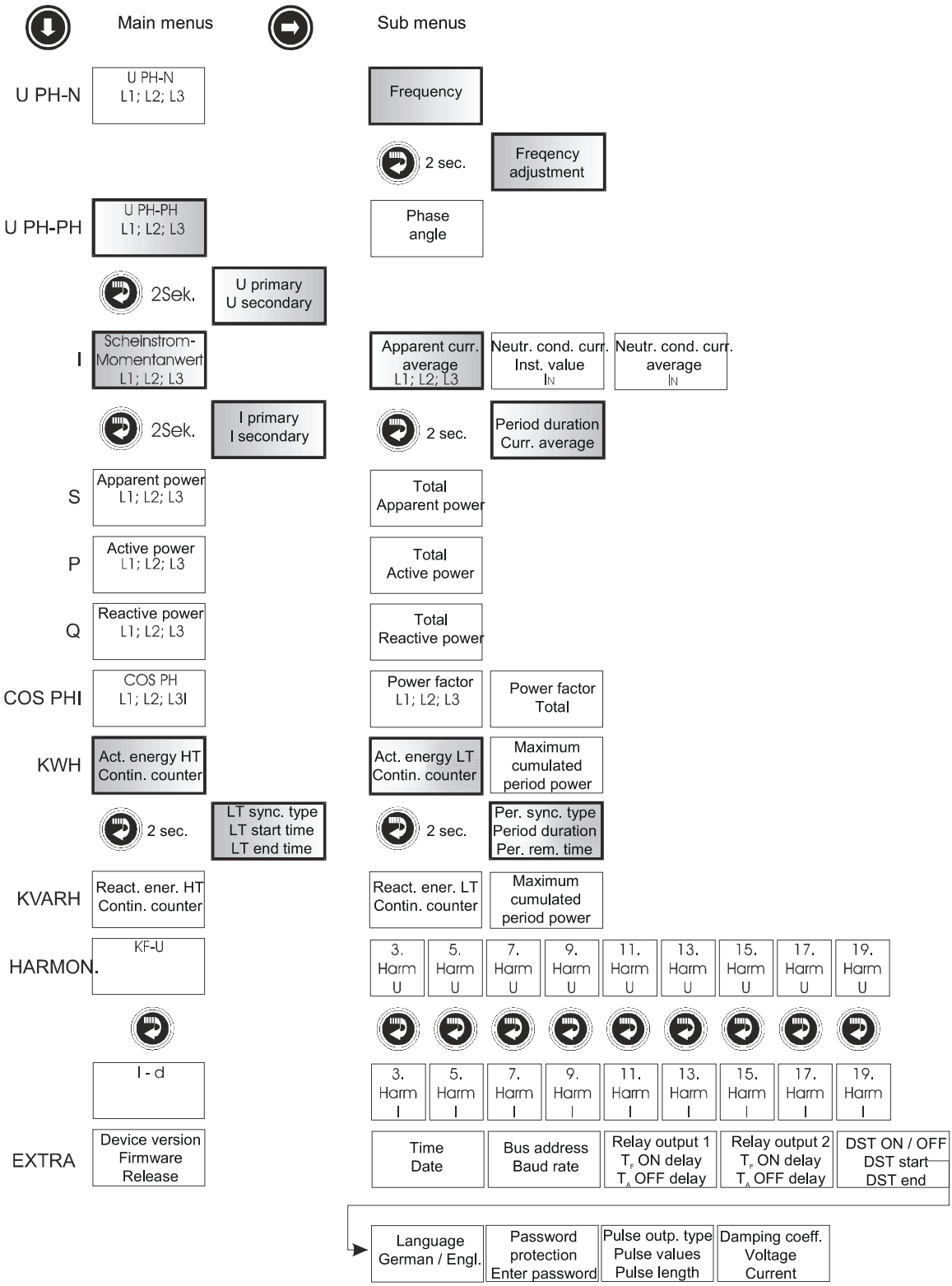
4.2 Navigation and device displays



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5 SETTING PARAMETERS

5.1 General programming scheme

The programming scheme displayed below applies to all parameters to be programmed in each menu.

- Press this button for 2 seconds to switch to programming mode from a main or sub menu. The parameters that are set are displayed.
- Press this button again to activate the input mode for parameters.
- This button is also used for switching from one place to the next when entering values.

- Value input

- Press this button in programming mode to switch the input fields L1, L2 and L3.
- Also press this button to return to the main menu after you have saved changes or cancelled programming mode.

- This button is used to save changes.

- Press this button if you want to cancel the programming mode without applying any changes.

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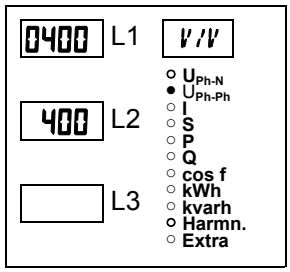
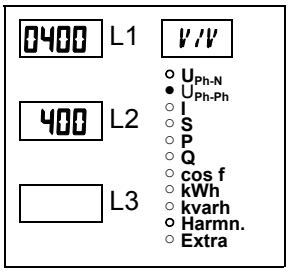
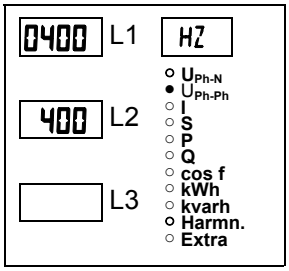
5.2 U_{Ph-N} - Measuring reference voltage/Rated network voltage

Menu	Button	Device display	Description
Main menu U_{Ph-Ph} Sub menu Voltage Set transformer ratio	 Keep button depressed for 2 seconds Start input mode		When calling the menu, the following text will be displayed in the unit display: *V / V VOLTAGE TRANSFORMER RATIO UPRI / USEC* The display L1 displays the primary voltage. The display L2 displays the secondary voltage.

Menu	Button	Device display	Description
Sub menu Voltage Set transformer ratio	....		The first digit is flashing in display L1. Press the button to set the value of this digit. Press the button to switch to the next digit. If all digits have been set, the display L1 will be flashing. To move the decimal point, press the button .
	next digit		
	cancel		
	or		
	save		
Main menu U Ph-Ph	or		
Note	or		Use these buttons to switch the individual displays in input mode (a digit is flashing).
Sub menu Voltage Set transformer ratio secondary	....		The first digit is flashing in display L2. Press the button to set the value of this digit. Press the button to switch to the next digit. Values between 1V and 600V are permissible.
	next digit		
	cancel		
	or		
	save		
Main menu U Ph-Ph	or		

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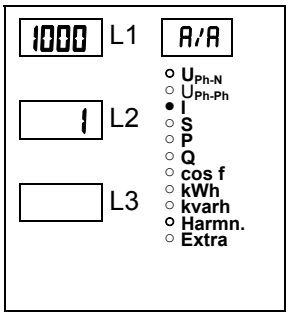
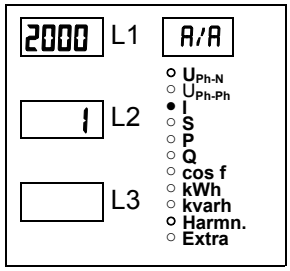
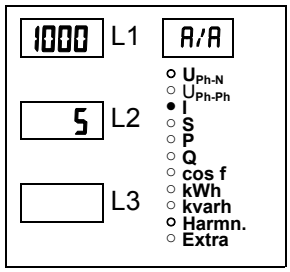
5.3 I – Current transformer transfer ratio

Menu	**Button**	**Device display**	**Description**
Main menu I			
Sub menu Current Set transformer ratio	Keep button depressed for 2 seconds		When calling the menu, the following text will be displayed in the unit display: A / A CURRENT TRANSFORMER IPRI / ISEC The display L1 shows the primary current. The display L1 shows the secondary current.
	Start input mode		

Menu	Button	Device display	Description
Sub menu Current Set transformer ratio primary	....		The first digit is flashing in display L1. Press the button to set the value of this digit. Press the button to switch to the next digit. If all digits have been set, the display L1 will be flashing. To move the decimal point, press the button .
	next digit		
	cancel		
	or		
	save		
Main menu I	or		
Note	or		Use these buttons to switch the individual displays in input mode (a digit is flashing).

Menu	Button	Device display	Description
Sub menu Current Set transformer ratio secondary	select ...		The first digit is flashing in display L2. Press to switch from 1A to 5A.
	cancel		
	or		
	save		
Main menu I	or		

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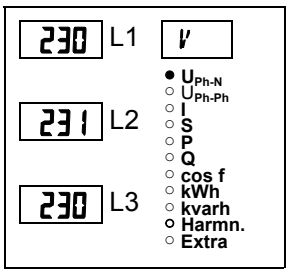
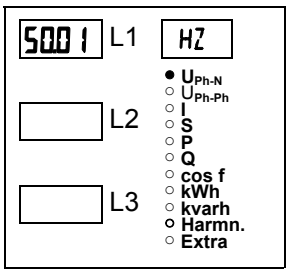
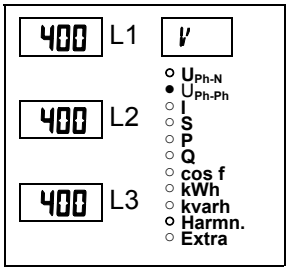
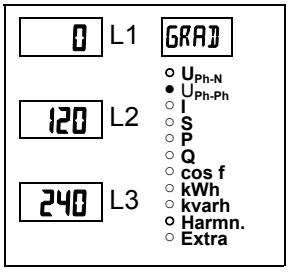
6 DISPLAY FUNCTIONS

6.1 U_{PH-N} – Voltage phase to neutral, frequency

Menu	Button	Device display	Description
Main menu U Ph-N	next		The three neutral conductor voltages UL1-N, UL2-N and UL3-N are shown in the displays L1 to L3. The unit display shows the unit for the voltage. The device switches from V to kV automatically.
Sub menu Frequency			Shows the current frequency in the display L1.
Main menu U Ph-N	or		

6.2 U_{PH-PH} – Voltage phase to phase, Rotary field display

Menu	Button	Device display	Description
Main menu U Ph-Ph	next		The three phase voltages U_{L1-L2}, U_{L2-L3} and U_{L3-L1} are shown in the displays L1 to L3. The unit display shows the unit for the voltage. The device switches from V to kV automatically.
Sub menu Rotary field			The three rotary field angles of the voltages against each other are displayed. The unit display shows the unit "DEG".
Main menu U Ph-Ph	or		

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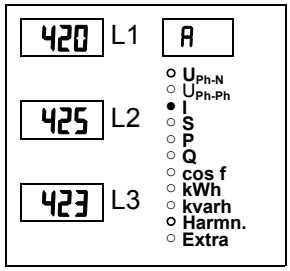
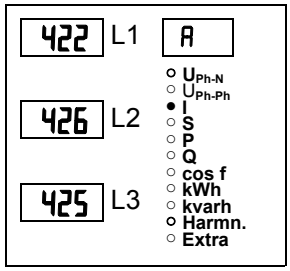
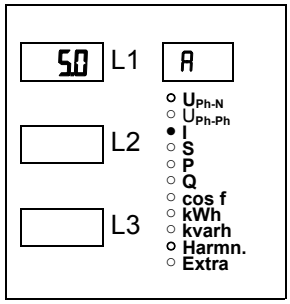
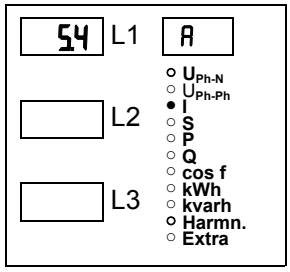
6.3 I / I_N – Current / Neutral conductor current, Instantaneous – Average value switch-over

Menu	Button	Device display	Description
Main menu I Instantaneous value	 next		Displays the three conductor currents in the phases L1, L2 and L3. The values displayed are instantaneous values. The unit display switches from ACT to A.
Sub menu I Average value	next or back to the main menu		Displays the three conductor current intensities of the phases L1, L2, and L3. The values displayed are average values. The unit display switches from AVG to A.

Note

The signs in front of the value determine the energy flux direction.
A positive sign indicates energy consumption.
A negative sign indicates energy recovery.

Menu	Button	Device display	Description
Sub menu I_N Neutral conductor current Instantaneous value Main menu I Instantaneous	or		The display L1 shows the instantaneous neutral conductor current. The unit display switches from NACT to A.
Sub menu I_N Neutral conductor current Average value	next or back to the main menu		The display L1 shows the average value of the neutral conductor current. The unit display switches from NAVG to A.

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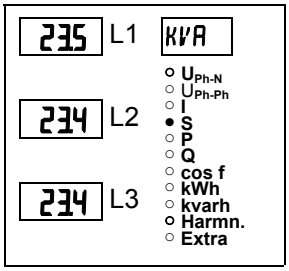
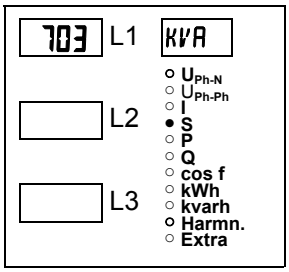
6.4 S – Apparent power / Total apparent power

Menu	Button	Device display	Description
Main menu S Apparent power			The apparent power of the three phases is shown in the displays L1 to L3. The unit display shows the unit "kVA". The device switches from VA to kVA or MVA automatically.
	next		
Sub menu Total apparent power			Shows the total apparent power in the display L1. The unit display switches from STOT to kVA. The device switches from VA to kVA or MVA automatically.
Main menu S Apparent power	or		

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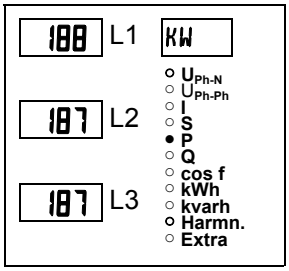
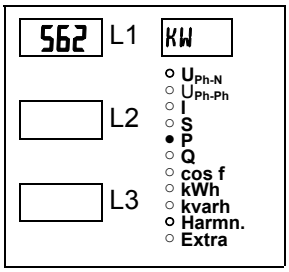
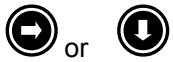
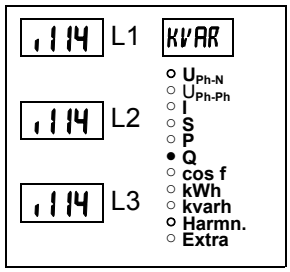
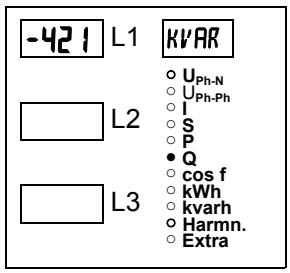
6.5 P – Active power / Total active power

Menu	Button	Device display	Description
Main menu P Active power			The active power of the three phases is shown in the displays L1 to L3. The unit display shows the unit "kW". The device switches from W to kW or MW automatically.
	next		
Sub menu Total active power			Shows the total active power in the display L1. The unit display switches from PTOT to kW. The device switches from W to kW or MW automatically.
Main menu P Active power	 or		

6.6 Q – Reactive power / Total reactive power

Menu	Button	Device display	Description
Main menu Q Reactive power			The reactive power of the three phases is shown in the displays L1 to L3. An "i" in front of the value indicates inductive, a "c" capacitive reactive power. The unit display shows the unit "kVAR". The device switches from VAR to kVAR or MVAR automatically.
	next		
Sub menu Total reactive power			Shows the total reactive power in the display L1. The dash ('-') in front of the measured quantity indicates that the reactive power is e.g. capacitive. The unit display switches from QTOT to kVAR. The device switches from VAR to kVAR or MVAR automatically.
Main menu P Active power	or		

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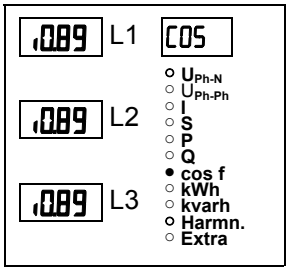
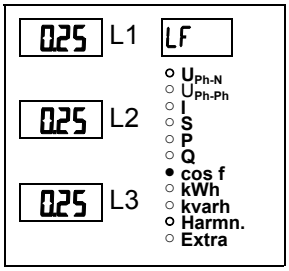
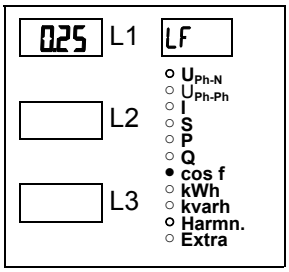
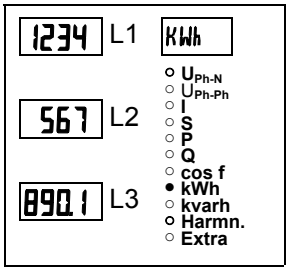
6.7 Cos φ - First harmonic power factor, PF, Cumulated PF

Menu	Button	Device display	Description
Main menu cos φ			Displays the cos f. Display L1 shows the cos f for the phase L1. (inductive, c capacitive) Display L2 shows the cos f for the phase L2. (inductive, c capacitive) Display L3 shows the cos f for the phase L3. (inductive, c capacitive) The unit display shows COS. (The cos f displayed here refers to the fundamental)
	next		
Sub menu PF			Display of the power factor PF. Display L1 shows the power factor 1 for the phase L1. Display L2 shows the power factor 2 for the phase L2. Display L3 shows the power factor 3 for the phase L3. The unit display shows PF.
	next or back to the main menu		
Sub menu Cumulated PF			Displays the cumulated power factor. The display L1 shows the cumulated power factor. The unit display switches from TOT to PF.
Main menu cos φ	or		

6.8 kWh – Effective energy HT/NT, maximum cumulated periodical effective power

Menu	Button	Device display	Description
Main menu kWh Active energy High tariff			Active energy counter for high tariff; The display L1 shows the value of the continuous energy counter. The unit display switches from HT to KWh. 1234 Display L1 G Wh 567 Display L1 M Wh 890.1 Display L1 k Wh
	next		

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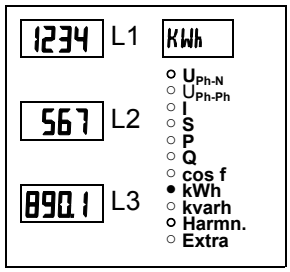
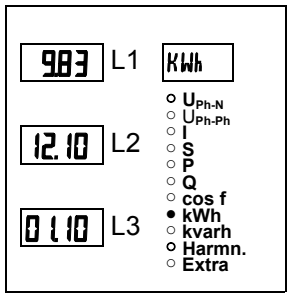
Menu	Button	Device display	Description
Sub menu kWh Active energy Low tariff	next or back to the main menu		Active energy counter for low tariff; The display L1 shows the value of the continuous energy counter. The unit display switches from LT to KWh. 1234 Display L1 G Wh 567 Display L1 M Wh 890.1 Display L1 k Wh
Sub menu Pcum-max Maximum cumulated period power			When calling the menu, the following text will be displayed in the unit display: PCMX MAXIMUM CUMULATED POWER IN PERIOD Then the display switches from PCMX to KW. The display L1 shows the period value. The display L2 shows the exact time the maximum occurred (hh:mm) The display L3 shows day and month alternately with the year (dd.mm.yyyy).
Main menu kWh Active energy High tariff	or		

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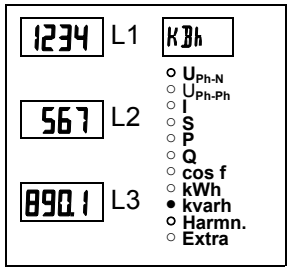
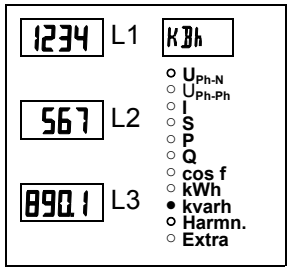
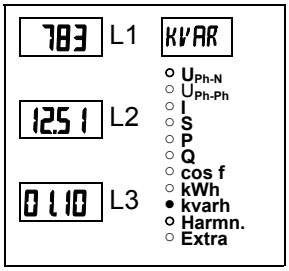
6.9 kvarh – Reactive energy counter HT/NT, maximum cumulated periodical reactive power

Menu	**Button**	**Device display**	**Description**
Main menu kVARh Reactive energy High tariff	next		Reactive energy counter for high tariff; The display L1 shows the value of the continuous energy counter. The unit display switches from HT to KBh. 1234 Display L1 G Bh 567 Display L1 M Bh 890.1 Display L1 k Bh
Sub menu kWh Reactive energy Low tariff	next or back to the main menu		Reactive energy counter for low tariff; The display L1 shows the value of the continuous energy counter. The unit display switches from LT to KBh. 1234 Display L1 G Bh 567 Display L1 M Bh 890.1 Display L1 k Bh

Menu	Button	Device display	Description
Sub menu Qcum-max Maximum cumulated period power			When calling the menu, the following text will be displayed in the unit display: QCMX MAXIMUM CUMULATED POWER IN PERIOD Then the display switches from QCMX to KVAR. The display L1 shows the period value. The display L2 shows the exact time the maximum occurred (hh:mm) The display L3 shows day and month alternately with the year (dd.mm.yyyy).
Main menu kWh			

Note (MULTIMESS-Basic only)

The daily energy counters (active and reactive) of the unit may only be read out via the KBR Energy Bus by means of optionally available software.

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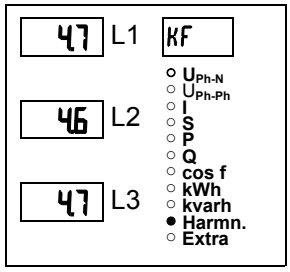
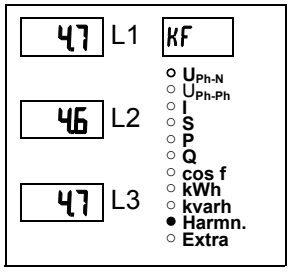
6.10 Harmonic distortion factor and partial oscillations of network harmonics for voltage and current

Measurement of current harmonics is only supported by MULTIMESS-Basic.

Menu	Button	Device display	Description
Main menu Harmon. Voltage Distortion factor (MULTIMESS-Basic only)	next or switch to the harmonics of the current or back to the main menu		The display L1 shows the distortion factor in % for the voltage of phase L1. The display L2 shows the distortion factor in % for the voltage of phase L2. The display L3 shows the distortion factor in % for the voltage of phase L3. The unit display switches from HD to %.
Sub menu 3rd –19th Harmon (MULTIMESS-Basic only)	next or switch to the harmonics of the current or back to the main menu	 MULTIMESS-Basic only	Displays the 3rd harmonics. The display L1 shows the 3rd harmonics in % for the voltage of phase L1. The display L2 shows the 3rd harmonics in % for the voltage of phase L2. The display L3 shows the 3rd harmonics in % for the voltage of phase L3. The unit display switches from 3. U to %. The following harmonics (5th – 19th) are displayed in the same manner. If e.g. the harmonics of current is displayed, the display switches from 3. I to A or from Id to A if the distortion current is displayed.

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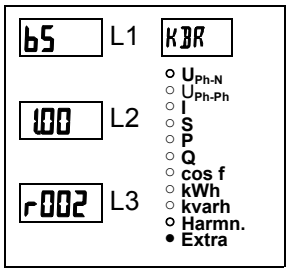
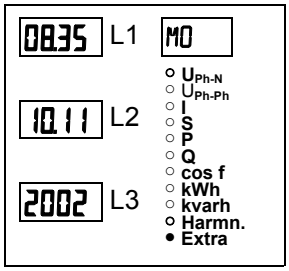
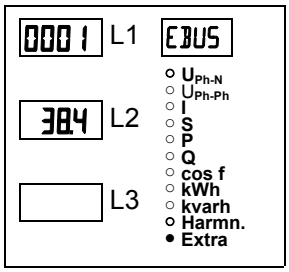
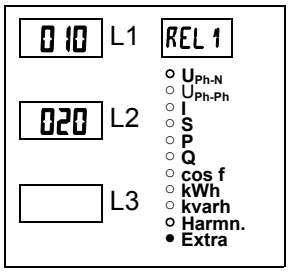
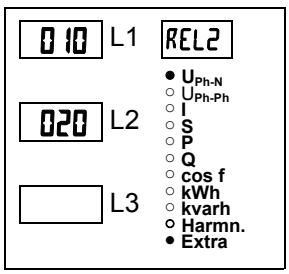
Note (MULTIMESS-Basic only)

Use the button to switch from the harmonics of the current to the harmonics of the voltage at any position in the menu.
The current harmonics are displayed with the unit Ampere.

6.11 Extra

Menu	Button	Device display	Description
Main menu Extra	next		The display L1 shows the device type (here: Basic). The display L2 shows the version number. The display L3 shows the release number. The unit display shows the name of the device.
Sub menu Date and time	next or back to the main menu		The display L1 shows the time (hh.mm). The display L2 shows the date (dd.mm). The display L3 shows the year (yyyy). The unit display shows the day of the week.
Sub menu E – Bus MULTIMESS-Basic only	next or back to the main menu		The display L1 shows the device address. The display L2 shows the baud rate. The unit display shows EBUS.
Sub menu REL 1	next or back to the main menu		The display L1 shows the pickup delay for the relay 1 in seconds. The display L2 shows the release delay for the relay 1 in seconds. The unit display switches from REL 1 to tON.
Sub menu REL 2	next or back to the main menu		The display L1 shows the pickup delay for the relay 2 in seconds. The display L2 shows the release delay for the relay 5.08 cm seconds. The unit display switches from REL2 to tON.

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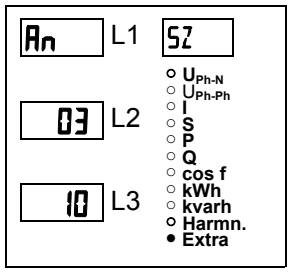
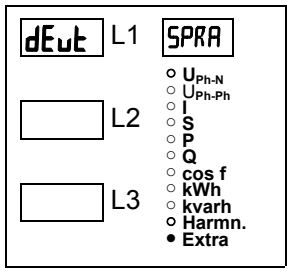
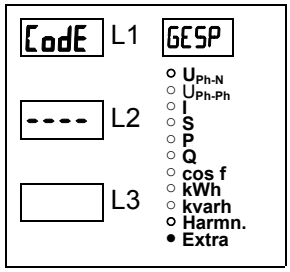
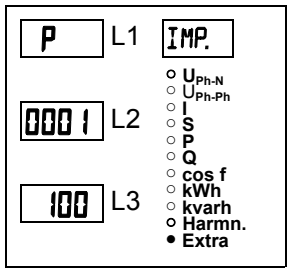
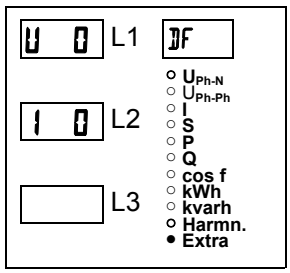
Menu	Button	Device display	Description
Sub menu Daylight saving time	next or back to the main menu		The display L1 indicates whether daylight saving time is activated or not (here: ON). The display L2 shows the month daylight saving time begins. The display L3 shows the month daylight saving time ends. The unit display shows DAYLIGHTSAVING TIME and then DST.
Sub menu Language	next or back to the main menu		The display L1 shows the device language. For German: dEut For English: EnGL The unit display shows SPRA if German is selected as the device language. LANG will be displayed for English.
Sub menu Password	next or back to the main menu		The display L1 shows **CODE**. The unit display shows LOCK or FREE. In L2, the code number will be displayed if the device is unlocked, ---- will be displayed if the device is locked. **The device is defaulted with the code 9999, i.e. all functions of the device are available.**
Sub menu Pulse output	next or back to the main menu		The display L1 indicates whether the pulse output is deactivated (OFF) or configured for active (P) or reactive (Q) energy. The display L2 shows the pulse value, i.e. pulse/kWh or kvarh. The display L3 displays the energy pulse duration in msec.
Sub menu Damping coefficient			The display L1 shows the damping coefficient for acquiring the voltage. Display l2 shows the damping coefficient for current calculation.
Main Menu Tools	or		

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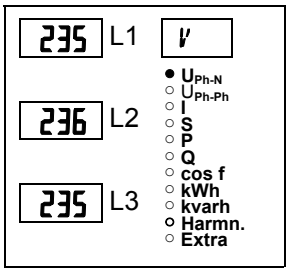
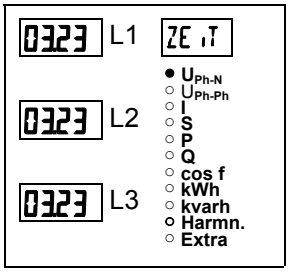
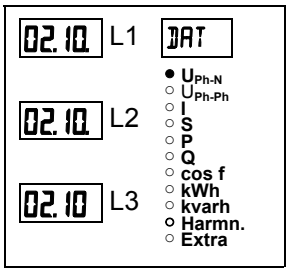
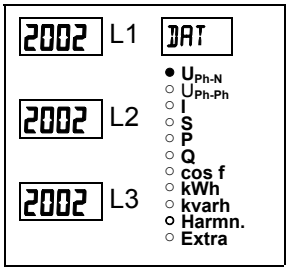
6.12 Maximum / Minimum values display

The following section explains how to display the extreme values; the maximum and minimum values for the phase voltage serve as an example.

Menu	Button	Device display	Description
Main menu U_{Ph-N}			
Voltage Maximum	next or back to the main menu		The maximum values that occurred for the phase voltages are displayed in the displays L1 to L3 for each phase. The unit display switches from MAX to V.
Voltage Maximum	next or back to the main menu		The time when the individual maximum values of the phase zero voltages occurred are displayed on the displays L1 to L3. The unit display switches from MAX to TIME.
Voltage Maximum	next or back to the main menu		The date when the individual maximum values of the phase zero voltages occurred are displayed on the displays L1 to L3. The unit display switches from MAX to DATE.
Voltage Maximum			The year when the individual maximum values of the phase zero voltages occurred are displayed on the displays L1 to L3. The unit display switches from MAX to DATE.
Main menu U_{Ph-N}	or		

Note

Use the button to switch from maximum to minimum values at any position in the menu. Operation for reading the minimum values corresponds to reading the maximum values.

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The subsequent table shows which extreme values are stored by MULTIMESS-Light / Basic .

Stored extreme values with date and time they occurred.

Menu	Measured quantity	Stored extreme values	Text output in German and English
Main menu U_{Ph-N}	Phase-to-neutral voltage	Minimum and maximum value for L1 – L2 – L3 with date and time	Min and Max
Sub menu F_{mains}	Mains frequency	Minimum and maximum value for L1 with date and time	Min and Max
Main menu U_{Ph-Ph}	Phase-to-phase voltage	Minimum and maximum value for L1 – L2 – L3 with date and time	Min and Max
Main menu I_{inst}	Instantaneous values for phase current	Minimum and maximum value for L1 – L2 – L3 with date and time	Min and Max
Sub menu $I_{average}$	Average values for phase current	Minimum and maximum value for L1 – L2 – L3 with date and time	Min and Max
Sub menu I_{Ninst}	Instantaneous value of neutral conductor current	Minimum and maximum value for neutral conductor with date and time	Min and Max
Sub menu $I_{Naverage}$	Average value of neutral conductor current	Minimum and maximum value for neutral conductor with date and time	Min and Max
Main menu S	Apparent power	Minimum and maximum value for L1 – L2 – L3 with date and time	Min and Max
Sub menu S_{tot}	Total apparent power	Minimum and maximum value for total apparent power with date and time	Min and Max
Main menu P	Active power	Minimum and maximum value for L1 – L2 – L3 with date and time	Min and Max
Sub menu P_{tot}	Total active power	Minimum and maximum value for total active power with date and time	Min and Max
Main menu Q	Reactive power	Minimum and maximum value for L1 – L2 – L3 with date and time	Min and Max
Sub menu Q_{tot}	Total reactive power	Minimum and maximum value for total reactive power with date and time	Min and Max
Main menu cos φ	Fundamental power factor	Minimum and maximum value for L1 – L2 – L3 with date and time	Min and Max
Sub menu PF	Power factor	Minimum and maximum value for L1 – L2 – L3 with date and time	Min and Max
Sub menu Cumulated PF	Cumulated power factor	Minimum and maximum value for cumulated power factor with date and time	Min and Max
Main menu Harmon.	Harmonics	MULTIMESS-Light Maximum values of the voltage distortion factor and of the 3^{rd} to 19^{th} harmonics. MULTIMESS-Basic additionally current harmonics and their total value L1–L3	Max

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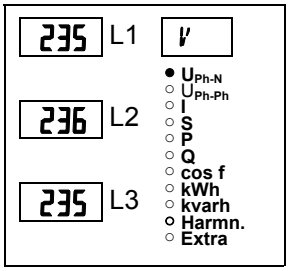
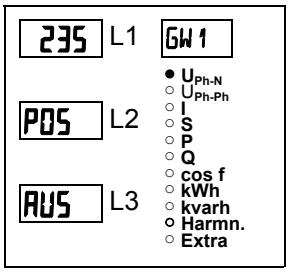
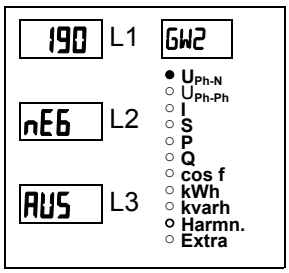
6.13 Displaying limiting values

The following section explains how to display the limiting values; the limiting values 1 and 2 of the phase-to-neutral voltage serve as an example.

Menu	Button	Device display	Description
Main menu U_{Ph-N}			
Sub menu Voltage Maximum	Keep button depressed for 2 seconds		The maximum values of the phase zero voltages are displayed for the individual phases on the displays L1 to L3. The unit display switches from MAX to V.
Sub menu Limiting value 1	go to limiting value 2 or back to the main menu		The display L1 shows the limiting value. The display L2 shows the direction of the limiting value. POS: Value may not exceed this limit NEG: Value may not fall below this limit OFF: Limiting value deactivated The display L3 shows the message type for the limiting value. OFF: Message only via the KBR Energy Bus rEL 1: Additional message to relay 1 rEL2: Additional message to relay 2 A limit violation is always indicated by a flashing LED in the corresponding main menu.
Sub menu Limiting value 2	back to limiting value 1 or back to the main menu		Corresponds to limiting value 1

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The following table shows the limiting values that are available for MULTIMESS-Light / Basic.

Programmable limiting values

Menu	Measured quantity	Programmable Limits	Text output in German and English
Main menu U_{Ph-N}	Phase-to-neutral voltage	Limiting value 1 and Limiting value 2 for L1 – L2 – L3	GW 1 and GW 2 Lim 1 and Lim 2
Sub menu F_{Netz}	Mains frequency	Limiting value 1 and Limiting value 2	GW 1 and GW 2 Lim 1 and Lim 2
Main menu U_{Ph-Ph}	Phase-to-phase voltage	Limiting value 1 and Limiting value 2 for L1 – L2 – L3	GW 1 and GW 2 Lim 1 and Lim 2
Main menu I_{MOM}	Instantaneous values for phase current	Limiting value 1 and Limiting value 2 for L1 – L2 – L3	GW 1 and GW 2 Lim 1 and Lim 2
Sub menu $I_{average}$	Average values for phase current	Limiting value 1 and Limiting value 2 for L1 – L2 – L3	GW 1 and GW 2 Lim 1 and Lim 2
Sub menu I_{Ninst}	Instantaneous value of neutral conductor current	Limiting value 1 and Limiting value 2 for neutral conductor current	GW 1 and GW 2 Lim 1 and Lim 2
Sub menu $I_{Naverage}$	Average value of neutral conductor current	Limiting value 1 and Limiting value 2 for neutral conductor current	GW 1 and GW 2 Lim 1 and Lim 2
Main menu S	Apparent power	Limiting value 1 and Limiting value 2 for L1 – L2 – L3	GW 1 and GW 2 Lim 1 and Lim 2
Sub menu S_{tot}	Total apparent power	Limiting value 1 and Limiting value 2 for total apparent power	GW 1 and GW 2 Lim 1 and Lim 2
Main menu P	Active power	Limiting value 1 and Limiting value 2 for L1 – L2 – L3	GW 1 and GW 2 Lim 1 and Lim 2
Sub menu P_{SUM}	Total active power	Limiting value 1 and Limiting value 2 for total active power	GW 1 and GW 2 Lim 1 and Lim 2
Main menu Q	Reactive power	Limiting value 1 and Limiting value 2 for L1 – L2 – L3	GW 1 and GW 2 Lim 1 and Lim 2
Sub menu Q_{SUM}	Total reactive power	Limiting value 1 and Limiting value 2 for total reactive power	GW 1 and GW 2 Lim 1 and Lim 2
Main menu cos φ	Fundamental power factor	Limiting value 1 and Limiting value 2 for L1 – L2 – L3	GW 1 and GW 2 Lim 1 and Lim 2
Sub menu LF	Power factor	Limiting value 1 and Limiting value 2 for L1 – L2 – L3	GW 1 and GW 2 Lim 1 and Lim 2
Sub menu Total LF	Cumulated power factor	Limiting value 1 and Limiting value 2 for cumulated power factor	GW 1 and GW 2 Lim 1 and Lim 2
Main menu Harmon.	Harmonics	MULTIMESS-Light Limiting value 1 and Limiting value 2 of the voltage distortion factor and of the 3^{rd} –19^{th} network harmonics for L1–L3 MULTIMESS-Basic additionally current harmonics and their total value L1-L3	GW 1 and GW 2 Lim 1 and Lim 2

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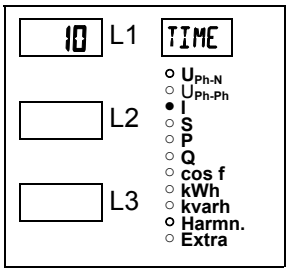
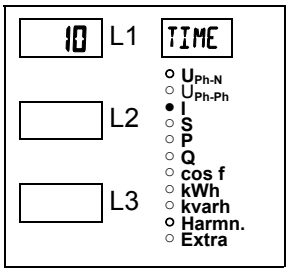
7 PROGRAMMING

7.1 Period time for average current value

Menu	Button	Device display	Description
Sub menu I Average value			
Sub menu I Average value Period time	Keep button depressed for 2 seconds Start input mode		When calling the menu, the following text will be displayed in the unit display: TIME AVERAGE CURRENT The period time in minutes is displayed in display 1.
Sub menu I Average value Set period time	.... next digit cancel or save		The first digit is flashing in display L1. Press the button to set the value of this digit. Press the button to switch to the next digit. Value can be set between 1 and 15 minutes.
Main menu I	or		

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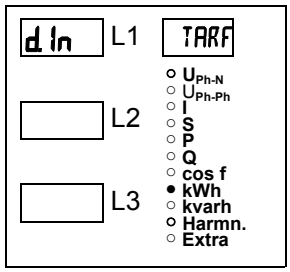
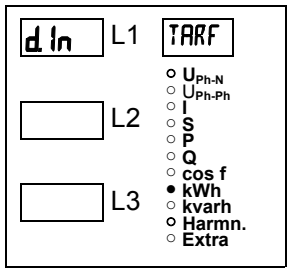
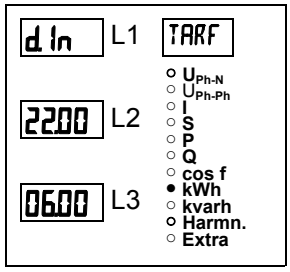
7.2 Tariff switching method

MULTIMESS-Light is only capable of tariff switching by means of its internal clock.

Menu	Button	Device display	Description
Main menu kWh / HT Sub menu kWh / HT Tariff switching method	Keep button depressed for 2 seconds Start input mode		When calling the menu, the following text will be displayed in the unit display: TARF LT TARIFF TIMES The tariff switching method is displayed in the display L1. The following switching methods can be selected: - d In by external pulse (MULTIMESS-Basic only) - bUS by Energy Bus command (MULTIMESS-Basic only) - Int by internal time program
MULTIMESS-Basic only Sub menu kWh / HT Set tariff switching method	. next mode cancel or save		The display L1 is flashing. Press to switch the tariff switching modes mentioned above. The unit display switches from TARF to TYPE.
Main menu kWh	or		
Main menu kWh / HT Sub menu kWh / HT Set tariff switching time	Set start time L3 flashes Set end time cancel or save		The display L2 is flashing. The button serves to set the start and end time.
Main menu kWh	or		

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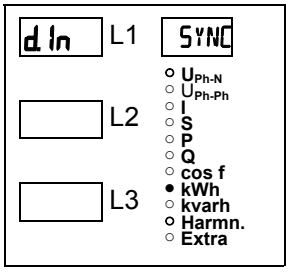
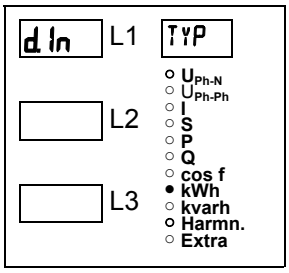
7.3 Measuring period synchronization (MULTIMESS-Basic only)

Menu	Button	Device display	Description
Sub menu kWh / LT Sub menu kWh / LT Measuring period	Keep button depressed for 2 seconds		When calling the menu, the following text will be displayed in the unit display: SYNC PARAMETER The synchronization type will be displayed in the display L1. The display L2 displays the measuring period in minutes. The time remaining until the next synchronization will take place is indicated in the display L3 in minutes and seconds. The following synchronization types can be selected: - Int by internal clock - d In by external contact - bUS by Energy Bus command - tArF by tariff switching Refer to chapter Measuring period synchronization.
	Start input mode		
Sub menu kWh / LT Set measuring period synchronization	next mode		The display L1 is flashing. Press to switch the tariff switching modes mentioned above.
	cancel or		
	save		
Main menu kWh	or		

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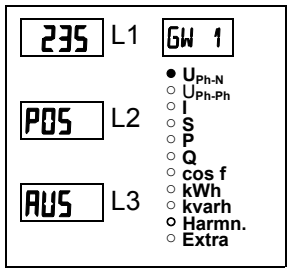
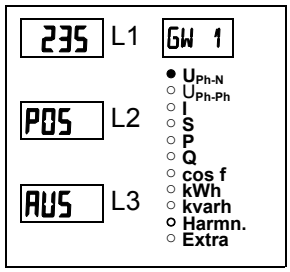
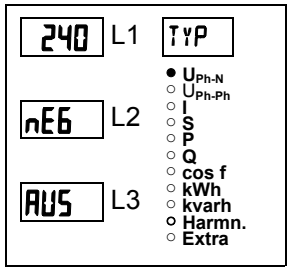
7.4 Programming limiting values

The following section explains how to parameterize the limiting values; the limiting values 1 and 2 of the phase-to-neutral voltage serve as an example.

Menu	Button	Device display	Description
Sub menu Voltage U_{Ph-N} maximum	Keep button depressed for 2 seconds Start input mode		The display L1 shows the limiting value. The display L2 shows the direction of the limiting value. (Limiting value active when exceeding POS or falling below nEG or blocked OFF.
Sub menu Voltage U_{Ph-N} Limiting value 1 Set value	.... next digit cancel or save		The first digit is flashing in display L1. Press the button to set the value of this digit. Press the button to switch to the next digit. If all digits have been set, the display L1 will be flashing. To move the decimal point, press the button . The unit display switches from GW 1 to V.
Main menu U_{Ph-N}	or		
Note	or		Use these buttons to switch the individual displays in input mode (a digit is flashing).
Sub menu Voltage U_{Ph-N} Limiting value 1 Set direction	. next mode cancel or save		The display L2 is flashing. Press the button Z to select whether the limiting value is to be activated when exceeded (POS) or when the value falls below the limit (nEG) or whether it should be locked (OFF).
Main menu U_{Ph-N}	or		
Note	or		Use these buttons to switch the individual displays in input mode (a digit is flashing).

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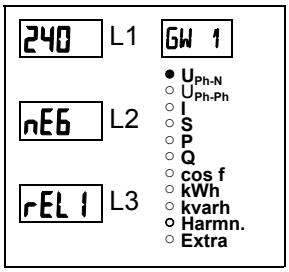
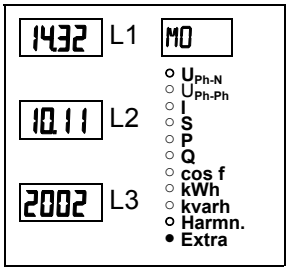
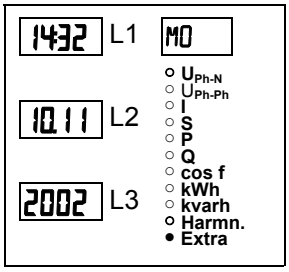
Menu	Button	Device display	Description
Sub menu Voltage U_{Ph-N} Limiting value 1 Set message type	. next mode cancel or save		The display L3 is flashing. Use the button to determine the message type for a limit violation: - Alarm on relay 1 (rEL 1) - Alarm on relay 2 (rEL2) - Alarm only via KBR Energy Bus (OFF)
Main menu U_{Ph-N}	or		

7.5 Setting clock and date

Menu	**Button**	**Device display**	**Description**
Sub menu Date and time	Start input mode		The display L1 shows the time (hh.mm). The display L2 shows the date (dd.mm). The display L3 shows the year (yyyy). The unit display shows the day of the week.
Sub menu Set date and time	.... next digit cancel or save		The first two digits in the display L1 are flashing. Use the button to set the values for these digits. Press the button to switch to the next digit. Proceed as described above to set the day of the week and the month in the display L2. The same applies to the year in the display L3.
Main menu Extra Note	or next or		Use these buttons to switch the individual displays in input mode (a digit is flashing).

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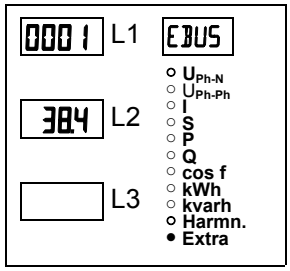
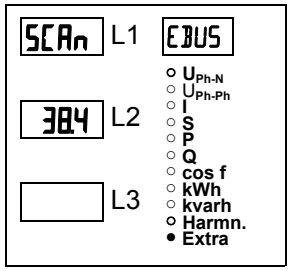
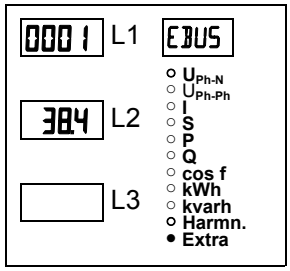
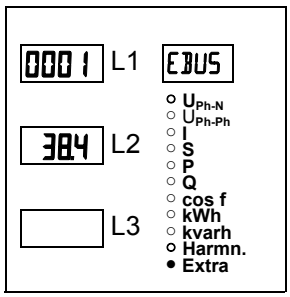
7.6 Setting bus address and baud rate (MULTIMESS-Basic only)

Menu	Button	Device display	Description
Sub menu E-Bus	Start input mode (BUS Scan)		The display L1 shows the device address. The baud rate is displayed in display 2.
Sub menu E Bus Assign address	Start input mode		The display L1 indicates that the device is in scan mode. As soon as the device is recognized at the Bus, an address is assigned automatically by the software and the address is entered in the device memory. The baud rate is displayed in display 2.
Note	or		Use these buttons to switch the individual displays in input mode (a digit is flashing).
Sub menu Assign E Bus address manually	.... next digit cancel or save		The first digit is flashing in display L1. Press the button to set the value of this digit. Press the button to switch to the next digit.
Main menu Extra	or next		
Sub menu E Bus Assign baud rate	next baud rate cancel or save		The display L2 is flashing. Press the button to select the baud rate. 4,8 k Baud 9.6 k Baud 14.4 k Baud 19.2 k Baud 38.4 k Baud 57.6 k Baud 115 k Baud
Main menu Extra	or next		

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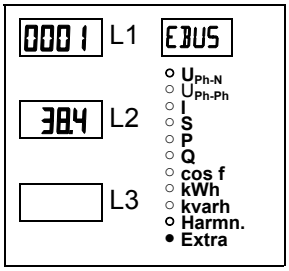
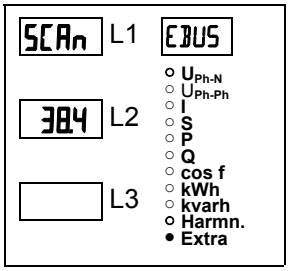
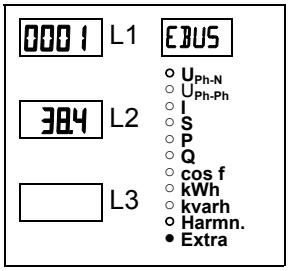
7.7 Setting bus protocol (MULTIMESS-Basic only)

Menu	Button	Device display	Description
Sub menu E-Bus	Start input mode (BUS Scan)		The display L1 shows the device address. Display L2 shows the baud rate. The unit display shows the active bus protocol.
Sub menu E Bus Assign address	Start input mode		The first digit on the display L1 flashes. Press the button to enter the input mode for the configuration of the bus protocol
Sub menu E – Bus Assign bus protocol	... selection		The display L1 shows the device address. Display L2 shows the baud rate. The unit display flashes. Press the button to switch between the different bus protocols.
Main menu Extra	cancel or save		

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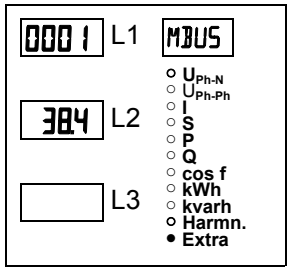
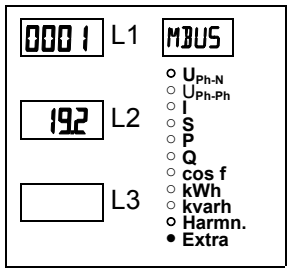
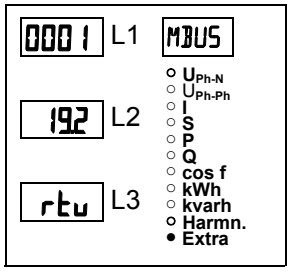
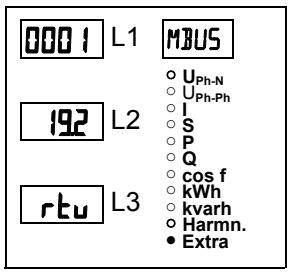
7.8 Setting bus address and baud rate for MOD-Bus (MULTIMESS-Basic only)

Menu	Button	Device display	Description
Sub menu MOD-Bus	Start input mode		The display L1 shows the device address. Display L2 shows the baud rate
Sub menu MOD – Bus Assign address	…. next place cancel or save		The first digit is flashing in display L1. Press the button to set the value of this digit. Press the button to switch to the next digit.
Main menu Extra	or next		
Sub menu MOD – Bus Assign baud rate	next baud rate cancel or save		The display L2 is flashing. Press the button to select different baud rates with their parities even / odd or no parity. 4,8 k Baud 9.6 k Baud 19.2 K Baud
Main menu Extra	or next		
Sub menu MOD – Bus Assign transfer mode	next baud rate cancel or selection save		The display L3 is flashing. Press the button to switch between the different modes (RTU or ASC).
Main menu Extra	or next		

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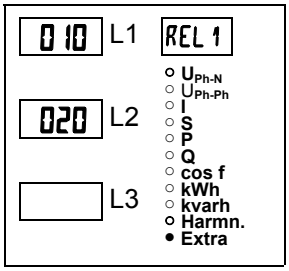
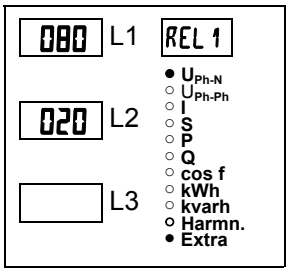
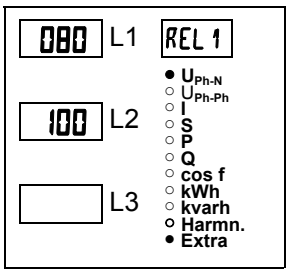
7.9 Setting pickup and release delay of the relays

Menu	Button	Device display	Description
Sub menu REL 1	Start input mode		The display L1 shows the pickup delay for the relay 1 in seconds. The display L2 shows the release delay for the relay 2 in seconds. The unit display changes between REL 1 and tEIN.
Sub menu REL 1 Set pickup delay	.... next digit cancel or save or next		The first digit is flashing in display L1. Press the button to set the value of this digit. Press the button to switch to the next digit.
Main menu Extra			
Note	or		Use these buttons to switch the individual displays in input mode (a digit is flashing).
Sub menu REL 1 Set release delay	.... next digit cancel or save		The first digit is flashing in display L2. Press the button to set the value of this digit. Press the button to switch to the next digit.
Main menu Extra	or next		

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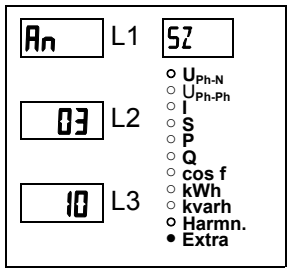
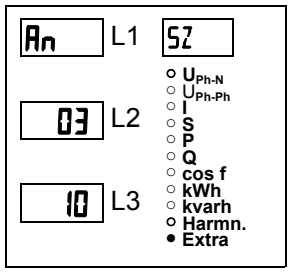
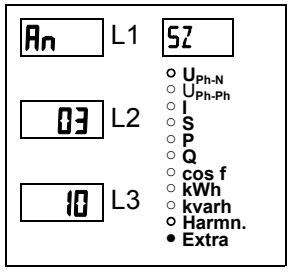
Note

The settings for the relay 2 correspond to that of the relay 1 described above.

7.10 Activating daylight saving time

Menu	Button	Device display	Description
Sub menu Daylight saving time	Start input mode		The display L1 indicates whether daylight saving time is activated or not (here: ON). The display L2 shows the month daylight saving time begins. The display L3 shows the month daylight saving time ends. The unit display shows DAYLIGHT SAVING TIME and then DST.
Sub menu Set daylight saving time	.... next display cancel or save		The display L1 is flashing. Press the button to activate (On) or deactivate (OFF) daylight saving time.
Main menu Extra	or next		
Note	or		Use these buttons to switch the individual displays in input mode (a digit is flashing).
Sub menu Set daylight saving time Begin	.... next display cancel or save		The display L2 is flashing. Press the button to set the month daylight saving time begins. The unit display alternately shows BEG and DST.
Main menu Extra	or next		
Note	or		Use these buttons to switch the individual displays in input mode (a digit is flashing).

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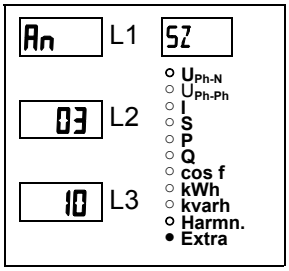
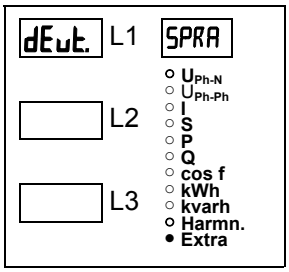
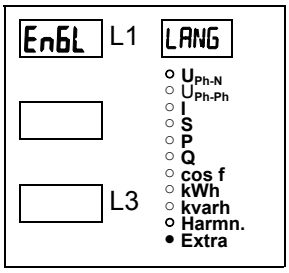
Menu	Button	Device display	Description
Sub menu Set daylight saving time End	.... next display cancel or save		The display L3 is flashing. Press the button to set the month daylight saving time ends. The unit display alternately shows END and DST.
Main menu Extra	or next		

7.11 Language settings

Menu	**Button**	**Device display**	**Description**
Sub menu Language	Start input mode		The display L1 is flashing. For German: dEut For English: EnGL The unit display will show SPRA for the German user interface. LANG will be displayed for English.
Sub menu Set language	.... cancel or save		The display L1 shows the device language. Press the button to select the operating language. For German: dEut For English: EnGL The unit display will show SPRA for the German user interface. LANG will be displayed for English.
Main menu Extra	or next		

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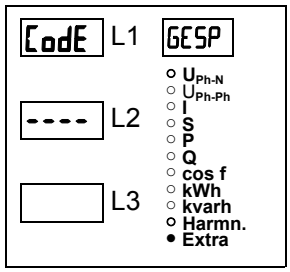
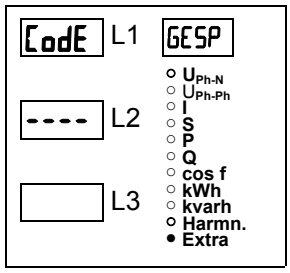
7.12 Password

Menu	Button	Device display	Description
Sub menu Password	Start input mode		The display L1 shows **CODE**. The unit display shows LOCK or FREE. At the unlocked device, L2 will show the code number, at the locked device ----. **The device is defaulted with the code 9999, i.e. all functions of the device are available.**
Sub menu Password Input	.... next digit cancel or save		The display L1 shows **CODE**. The unit display shows LOCK or FREE. At the unlocked device, L2 will show the code number, at the locked device ----. The display L2 is flashing. Press the button to set the value of this digit. Press the button to switch to the next digit.
Main menu Extra	or next		

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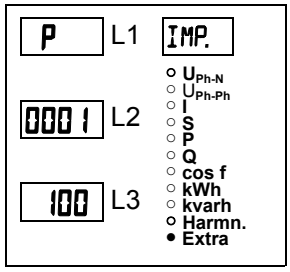
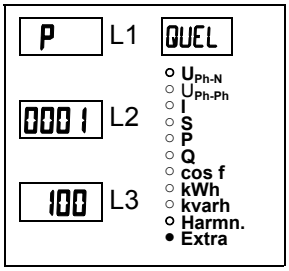
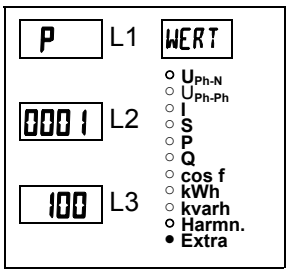
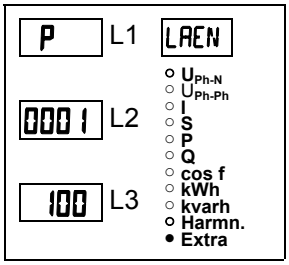
7.13 Programming the pulse output

Menu	Button	Device display	Description
Sub menu Pulse output	Start input mode		Display L1 indicates whether the pulse output is off (OFF) or is configured for effective power (P) or for reactive power (q) The display L2 shows the pulse value, i.e. pulse/kWh or kvarh. The display L3 displays the energy pulse duration in msec.

Menu	Button	Device display	Description
Sub menu Pulse output Set pulse source	.... next mode cancel or save		When calling the menu, the following text will be displayed in the unit display: SRC. SOURCE The display L1 will be flashing. Press the button to select the active energy (P), the reactive energy (q) or deactivate (OFF) the energy pulse.
Main menu Extra	or next		
Note	or		Use these buttons to switch the individual displays in input mode (a digit is flashing).
Sub menu Pulse output Set pulse value	.... next digit cancel or save		When calling the menu, the following text will be displayed in the unit display: VAL VALENCY The first digit is flashing in display L2. Press the button to set the value of this digit. Press the button to switch to the next digit.
Main menu Extra	or next		
Note	or		Use these buttons to switch the individual displays in input mode (a digit is flashing).
Sub menu Pulse output Set pulse Duration	.... next digit cancel or save		When calling the menu, the following text will be displayed in the unit display: DUR DURATION DUR The first digit is flashing in display L3. Press the button to set the value of this digit. Press the button to switch to the next digit.
Main menu Extra	or next		

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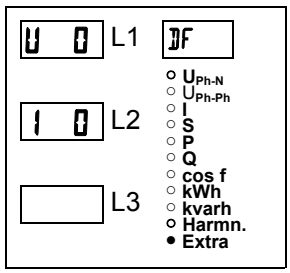
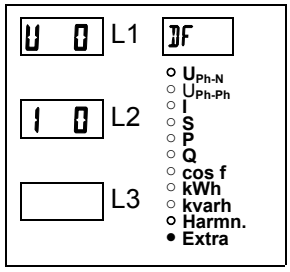
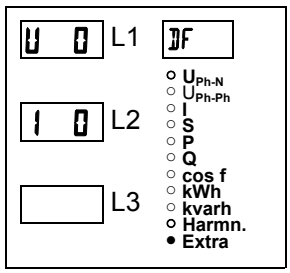
7.14 Damping coefficient

Menu	Button	Device display	Description
Sub menu Damping coefficient	Start input mode		The display L1 shows the damping coefficient for acquiring the voltage. The display L2 shows the damping coefficient for acquiring the current.
Sub menu Damping coefficient Set voltage	.... cancel or save		When calling the menu, the following text will be displayed in the unit display: DAMPING COEFFICIENT DC The first digit is flashing in display L1. Press the button to set the value of this digit. Range of values: 0 – 8
Main menu Extra	or next		
Note	or		Use these buttons to switch the individual displays in input mode (a digit is flashing).
Sub menu Damping coefficient Set current	.... cancel or save		The last digit is flashing in display L2. Press the button to set the value of this digit. Range of values: 0 – 8
Main menu Extra	or next		

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8 RESET AND DELETE FUNCTIONS

8.1 Reset

Reset should only be carried out during setup and when the device is completely reprogrammed. Caution! A reset will set all values to their factory defaults!!!

Disconnect the device from supply voltage!

Keep the buttons depressed and connect the device to the supply voltage. The 14-segment display will alternately show ---- -> KILL -> ----

The device is reset to its **default** settings, i.e. all stored data is **lost**!

This includes all operating parameters, limiting and extreme values as well as the release delay of the signaling relays.,

The memory for limit violations is deleted.

The settings for time, date and bus address are not affected by a reset.,

Check all operating parameters for correctness!

Default settings can be found in chapter 10.10

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8.2 Delete energy count

8.2.1 Delete energy count manually

Keep the button depressed for approximately 2 seconds to delete the value that is currently displayed in the continuous energy count (active or reactive energy, HT or LT).

8.2.2 Delete energy count centrally

All power counters can only be deleted by a reset or by additional software via the energy bus.

8.3 Deleting extreme values

8.3.1 Delete extreme values manually

Press the button for approximately 2 seconds to delete the extreme values (minimum or maximum values) currently displayed.

8.3.2 Delete extreme values centrally

If you want to delete all minimum and maximum values, keep the buttons and depressed for approximately 2 seconds while any minimum or maximum value is being displayed. The function is also available via the KBR Energy Bus.

8.4 Deleting limiting value settings

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8.4.1 Delete limiting value settings manually

Deactivating individual limiting values is only enabled in programming mode.
Set the type of the limiting value you want to deactivate to "OFF" while in programming mode.

8.4.2 Delete limiting value settings centrally

If you want to delete all limiting values, keep the buttons and depressed for approximately 2 seconds while any limiting value is being displayed. The function is also available via the KBR Energy Bus.

9 MEMORY FUNCTIONS

9.1 Device settings

All device settings and parameter data for storage utilization are stored in the device.

9.1.1 Device basic parameters

Parameters	**Stored by user**
Measuring voltage	programmable by user from 0001V … 999.9 kV
Measuring current; transformer primary current	programmable by user from 0001A … 999.9 kA
Measuring current (at device input, i.e. transformer secondary!)	can be selected by user: 1A or 5A
Pulse output type / pulse significance / pulse length	acc. to user settings
Tariff switching	MULTIMESS-Light Only via internal clock (intervals can be programmed by user) MULTIMESS-Basic User may choose between digital input, energy bus or intervals that are configured in the device
Synchronization settings	MULTIMESS-Basic only Possible settings – refer to sect. 2.1.3 Measuring period synchronization
Bus address	MULTIMESS-Basic only acc. to user settings between 0001 and 9999
Time	acc. to user settings in hh:mm:ss
Password	acc. to user settings Password is a 4-digit number (leading zeros) 9999 means: Device is not password-protected
Device name	MULTIMESS-Basic only can be freely chosen by the user [1*)]
Event name	an individual designation is assigned to every event [1*)]
Measuring period	MULTIMESS-Basic only 1 / 15 / 30 / 60 min [1*)]

1*) This function can only be set by means of the PC with optionally available software (e.g. Visual Energy).

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9.1.2 Long-term memory (MULTIMESS-Basic only)

The functions described here are only supported by MULTIMESS-Basic.
MULTIMESS-Basic features an additional long-term memory option.

9.1.2.1 Load profile memory

The measuring unit features a load profile memory for active power periods (HT/LT) and reactive power periods (HT/LT) and a measuring period that may be selected by the user (possible period values 60 / 30 / 15 / 1 minutes) that can store up to 3360 entries.
This means that a period of 60 minutes and one value to be saved (e.g. the active power) results in a maximum storage time of 140 days.
The measuring period can be programmed via the PC using the optionally available software.

Note

Setting the device internal clock
If the time of the MULTIMESS-Basic is adjusted by less than the duration of one period, the measurement for the instantaneous period is finished at the next synchronization event and saved.
If the time of the MULTIMESS-Basic is adjusted by more than the duration of one period, the load profile memory is deleted and restarted.
In both cases, a clock adjustment event is created and saved in the event memory.

Adjusting the period duration
If the period duration is adjusted, the load profile memory is deleted and restarted.
An adjustment event (adjustment of the parameters) is created and entered in the event memory.

9.1.2.2 Annual energy memory

The daily energy values of the past 365 days for W_{Act} consumption, W_{React} inductive are stored in an annual energy memory separated for high and low tariff.

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9.1.2.3 Event memory

The event memory stores 4096 events with date, time and status in a circular memory.

The following events are acquired:

Event	**Acquisition**
Tariff input	Switchover signal HT => LT with date and time Switchover signal LT => HT with date and time
Sync input	Intermediate synchronization with date and time, specification of synchronization type
Mains failures	with date, time and duration of the mains failure
Error	Error type with date and time
Changed settings / deletions	e.g. reset via EBUS / set time / deletions / general parameter modifications
Measuring voltage failures	In case the failure lasts for more than 20 ms and results in a 100% voltage dip

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Note

The described memories can only be read or parameterized via the Energy Bus by means of optionally available software (e.g. Visual Energy).

9.1.3 Measuring period synchronization (MULTIMESS-Basic only)

The functions described here are only supported by MULTIMESS-Basic.
There are four ways to execute the measuring period synchronization of MULTIMESS-Basic. In each case, the duration of the measuring period can be specified as described in section 2.1.2.1. The measuring period duration and the synchronization always affect all period values.

The following 4 types of synchronization are possible:

9.1.3.1 Synchronization only by means of internal clock

The synchronization by internal clock is started with the manufacturer's reset. From this time onwards, the clock synchronizes the measuring period every 15 minutes.

9.1.3.2 Synchronization by means of energy supplier synchronous pulse

If the synchronous pulse is available as floating contact from the energy supplier, it can be connected to the synchronization input. If the contact closes for at least 30 ms, it will be recognized as synchronous pulse and the measuring period is restarted.
Under certain operating conditions, the energy supplier may carry out an intermediate synchronization while a measuring period is still running. The MULTIMESS-Basic will terminate the running period measurement and save the period value with a time stamp. The time pattern is shifted to the new start time and a new measurement is started immediately.
Example:
Period duration is set to 15 min
i.e. 20 kW input power results in a period value of 20 kW (15 min period)
if there is an intermediate synchronization 3 min after period start and this 3 min period is saved,
the period value to be recorded will be 4 kW.
When the energy supplier synchronous pulse fails, the message "ext. synchr. pulse missing" will be issued and the time pattern will be continued by the internal clock.

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9.1.3.3 Synchronization by means of KBR ENERGY BUS

Synchronization is carried out via a telegram created either by the PC or by the MULTIMASTER and sent via the KBR ENERGY BUS to the selected recipients.
Under certain operating conditions, an intermediate synchronization may be carried out while a measuring period is still running. The MULTIMESS-Basic will terminate the running period measurement and save the period value with a time stamp. The time pattern is shifted to the new start time and a new measurement is started immediately.
Example:
Period duration is set to 15 min
i.e. 20 kW input power results in a period value of 20 kW (15 min period)
if there is an intermediate synchronization 3 min after period start and this 3 min period is saved,
the period value to be recorded will be 4 kW.
When the EBUS synchronous pulse fails, the message "ext. synchr. pulse missing" will be issued and the time pattern will be continued by the internal clock.

9.1.3.4

9.1.3.5 Synchronization when tariffs are changed

This type of synchronization makes it possible for the measuring unit to change tariffs immediately after the tariff HT/LT has been switched instead of waiting until the end of the measuring period.
The internal clock synchronizes the measuring period. If the tariff is changed, depending on the configuration by contact at the HT/LT input or by bus signal, this event will additionally synchronize the measuring period.
Under certain operating conditions, the synchronization pulse and the internal measuring period synchronization may not be in accordance with the same time pattern. The MULTIMESS-Basic will terminate the running period measurement and save the period value with a time stamp. The time pattern is shifted to the new start time and a new measurement is started immediately.
Example:
Period duration is set to 15 min
i.e. 20 kW input power results in a period value of 20 kW (15 min period)
if synchronization is carried out 3 min after period start and if this 3 min period is saved,
the period value to be recorded will be 4 kW.

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10 TECHNICAL DATA

10.1 Measuring and display values

Waveform for U and I		any
Voltage	Actual value of a measuring interval	Phase – 0: U_{L1-N}; U_{L2-N}; U_{L3-N} / Phase – Phase: U_{L1-2}; U_{L2-3}; U_{L3-1}
	Units	[V, kV] display is switched automatically
	Measuring range	0.00kV to 999.9kV
Current (apparent current)	Actual value of a measuring interval	$I_{L1\ Inst}$; $I_{L2\ Inst}$; $I_{L3\ Inst}$; Instantaneous value for each phase
	Average value formation	$I_{L1\ Av}$; $I_{L2\ Av}$; $I_{L3\ Av}$; floating average value from actual values over a programmable period of time.
	Units	[A;kA;MA] display is switched automatically
	Measuring range	0.00A to 999.9kA
Neutral conductor current	Actual value of a measuring interval	$I_{N\ Inst}$ / $I_{N\ Av}$ Instantaneous and average value – cf. "Phase current"
	Units	[A;kA;MA] display is switched automatically
	Measuring range	0.00A to 1.2 MA
Frequency	Mains frequency measurement	f_{Netz} ; measured with mains correction
	Units	[Hz]
	Measuring range	40.....70Hz
Apparent power	Calculation	S_{L1}; S_{L2}; S_{L3}; S_{tot}
	Units	[VA; kVA; MVA] display is switched automatically
	Measuring range	0.00VA to 999MVA
Active power	Calculation	P_{L1}; P_{L2}; P_{L3} ; P_{total}
	Units	[W; kW; MW] display is switched automatically
	Measuring range	0.00W to 999MW
Reactive power	Calculation → ind. & cap.	Q_{L1}; Q_{L2}; Q_{L3}; Q_{tot}; ind./cap. differentiated
	Units	[VAR; kVA; MVAR] display is switched automatically
	Measuring range	0.00VAR to 999MVAR
Power factor	Calculation → ind. & cap.	$\cos\varphi_{L1}$; $\cos\varphi_{L2}$; $\cos\varphi_{L3}$; LF_{L1}; LF_{L2}; $LF_{L3;}$ $LF_{Ges.}$; distinction ind./cap. $\cos\varphi$ on the display
	Measuring range	CosPhi 0.1ind. ← 1 → 0.1cap., PF 0.1 - 1
Active energy	Calculation	W (HT/LT); $P_{average\ max.\ of\ a\ measuring\ period}$
	Units	[Wh; kWh; MWh] display is switched automatically
	Measuring range	0.0kWh to 9999999999.9kWh
Reactive energy	Calculation	W_{bl} (HT/NT) → ind. or kap. $Q_{average\ max.\ of\ a\ measuring\ period}$
	Units	[varh; kwarh; Mvarh] display is switched automatically
	Measuring range	0.0kvarh to 9999999999.9kvarh
Harmonics	Distortion factor for voltage	Voltage: DF-U_{L1}; DF-U_{L2}; DF-U_{L3}
	Partial distortion factors	3.; 5.; 7.; 9.; 11.; 13.; 15.; 17. and 19th harmonic of the voltage
	Units	[%]
	Measuring range	0.00% to 100%
Current harmonics (MULTIMESS-Basic only)	Current harmonics Total of the current harmonics	3.; 5.; 7.; 9.; 11.; 13.; 15.; 17. and 19th harmonics for each phase Current: I_{totL1}; I_{totL2}; I_{totL3} for each phase separately
	Units	[A]
	Measuring range	0.00A to 999.9kA

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10.2 Measuring accuracy

Current	± 0.5 % / ± 1 digit
Voltage	± 0.5 % / ± 1 digit
Apparent power	± 1 % / ± 1 digit
Active power	± 1 % / ± 1 digit
Reactive power	± 1 % / ± 1 digit
Power factor	± 1 % / ± 1 digit
Frequency	± 0.1 Hz / ± 1 digit

10.3 Measuring principle

Reading	128 values per period
A/D converter	10 Bit
Measuring U and I	acquiring measuring values for U and I simultaneously;
Update speed (complete measurement cycle)	~ 330 ms
Calculation of harmonics	DFT with 128 points over one period
Frequency measurement	Mode: Voltage measured between phase L1, L2, L3 – N; correct frequency measurement due to mains correction

10.4 Device memory

Main and data memory		512 KB RAM, battery-buffered
Program and parameter memory		256 KB flash
Memory type		Ring buffer
Long-term memory (1 year) - Basic only		daily values for active and reactive energy (HT and LT)
Long-term memory for 160 / 80 / 40 days / 64 hours - Basic only		60 / 30 / 15 / 1-minute – average values of: P_{total}; Q_{total}
Extreme values (Max./Min.)		extreme values that occurred after connection to mains or after the extreme value memory has been deleted manually including date and time
Event memory:	Memory size	4096 events including date and time they occurred
Limit violation	Time for acquisition	≥ 550 ms
Voltage dips	Time for acquisition	> 20 ms, in case of a power failure, threshold can be set via PC, default after reset 93 V
Battery life		approx. 5 years, according to manufacturer

10.5 Power supply

Power supply	85 – 265V AC/DC; 15VA see detail on type signpost.

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10.6 Hardware – Inputs and outputs

10.6.1 Inputs

Measuring input for voltage	U_{L1-L2} ; U_{L2-L3} ; U_{L3-L1}	3 x 5V...**100V**...120V AC; (Measuring range 1) 3 x 20V...**500V**...600V AC; (Measuring range 2)
	Direct impedance	1.2 MOHM (Ph-Ph)
	Measuring range	programmable
Measuring input for current	I_{L1}; I_{L2}; I_{L3}	3 x 0.01A...**1A**...1.2A AC (Measuring range 1) 3 x 0.05A...**5A**...6A AC (Measuring range 2)
	Power consumption	≤ 0.3VA per input at 6A
	Measuring range	programmable

10.6.2 Outputs

Signaling relay for Limit violation	Number	2
	Contact	floating
	Reaction speed	programmable
	Switching capacity	250V AC / 2A;
Pulse output	Output type	in proportion to active or reactive energy ➢ programmable on the device
	Opto coupler output	15 mA at max. 35 V, S_0 interface
	Accuracy class	2
	Pulse duration	programmable, at least 30 ms
	Power supply	external
Serial interface MULTIMESS-Light	RS 485 interface	to configure the device via PC and optional software
	Baud rate	38400 fest
	Addressing	Address 1 fixed
Serial interface MULTIMESS-Basic	BUS	RS485 for connection to the Energy Bus; max. 32 devices, up to 1000 devices with bus amplifier
	Baud rate	38400 may be selected on the device
	Addressing	Can be addressed up to address 9999; automatically via software or manually on the device

10.7 Electric connection

Connection elements		Plug-in terminals
Permissible cross section of the connection lines		2.5 mm^2
Measuring voltage inputs	Fuse protection	max. 6 A
Measuring current inputs	Fuse protection	NONE!!! Always short-circuit current transformer terminals k and l prior to opening the circuit!
Input power supply	Fuse protection	max. 6 A
Relay output	Fuse protection	max 2A medium time-lag
BUS connection	Connection material	For proper operation please only use shielded twisted-pair cables; e.g. I-Y-St-Y 2x2x0.8
Pulse output	Connection & Cables	Watch proper polarity! For proper operation please only use shielded twisted-pair cables; e.g. I-Y-St-Y 2x2x0.8
Transformer connection	Connections	see connection chart

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Interface connectivity	MULTIMESS-Light RS 485 port to configure device MULTIMESS-Basic terminals for BUS connection via RS485	Device → MULTIMASTER or → Interface adaptor Terminal 90 (⊥) → Pin ⊥ → cf. software manual Terminal 91 (A;) → Pin A → Cf. software manual Terminal 92 (B;) → Pin B → Cf. software manual

10.8 Mechanical data

Flush-mounted device	Housing measures	144 x 144 x 60 mm (H x W x D)
	Mounting cutout	138 x 138 mm
	Mode of protection	Front IP51 (with optionally available front door max. IP54), terminals IP20
	Weight	750 g

10.9 Standards and other

Environmental conditions	Standards and amendments	DIN EN 60721-3-3/A2: 1997-07; 3K5+3Z11; (IEC721-3-3; 3K5+3Z11)
	Operating temperature	-5°C … +55°C
	Humidity	5% … 95%
	Storage temperature	-25°C … +70°C
Electrical safety	Standards and amendments	DIN EN 61010-1/A2: 1996-05; (IEC1010-1/A2)
	Protection class	II, in accordance with DIN EN 61010-/A2: 1996-05
	Overvoltage category	CAT III: U_{PH-PH} up to 400V CAT II: U_{PH-PH} up to 600V
	Mode of protection	Front IP51 (with optional front door max. IP54) terminals IP20 improved mode of protection possible via additional seals on request; DIN EN 40050 part 9 1993-05
	Electromagnetic compatibility	DIN EN 50081-1: 1993-03 DIN EN 61000-6-2: 2000-03; (IEC 61000-6-2)
Password protection	4-digit	Deleting and programming parameters on the device is not enabled if password protection is active.
EMC	Compatibility	
	complies with	EN 61010-1; EN 50081-1
Synchronization	Types	internal, manually, tariff switching or via Energy Bus (e.g. MULTIMASTER)
Synchronization time	selectable	manually once per measuring period if the internal synchronization type is selected on the device.

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10.10 Default settings after reset

Primary voltage / Secondary voltage	400 V
Primary current / Secondary current	5 A
Measuring period duration (MULTIMESS-Basic only)	15Min. Measuring period
Daylight saving time	from March to October
Low tariff time	Switching activated via hardware input on the device, programmed time for internal switching of HT and LT: int. 00.00 to 00.00 (no low tariff time activated)
Language	deut. (German text display)
Damping coefficient for current and voltage	DC 0 (no damping)
Energy pulse	P (active power for consumption) 1 pulse/kWh, pulse duration 100 ms
Error message relay	On-delay tON = 0 sec Off-delay tOFF = 0 sec
Measuring period synchronization (MULTIMESS-Basic only)	internal clock
Password	9999 / all functions can be accessed

Unchanged by a RESET:

1. Bus address
2. Time

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11 SERIAL INTERFACE

11.1 RS 485 interface operation (MULTIMESS-Light only)

The RS485 interface of MULTIMESS-Light provides convenient configuration of the device.
To connect the device and the PC, an interface converter E-BUS-232-485 is used. Optional software enables the user to configure the device.

11.2 RS 485 bus operation (MULTIMESS-Basic only)

The RS485 interface of ***MULTIMESS-Light / Basics*** is designed for operation at the KBR Energy Bus. You can operate ***one*** or ***several*** **MULTIMESS-Basic *devices*** together with the ***Energy Bus*** across ***great distances***. The bus is connected to the PC via the interface converter RS -232/-485 or the ***MULTIMASTER***. With the according Windows® Software, all bus devices can be parameterized and visualized. On demand, we will be glad to provide information on which other devices you can connect to the Energy Bus and on the functions of our software.

Information on the structure and the technical parameters of the Energy Bus can be found in our installation guide for the KBR Energy Bus. Please ask us for this installation guide.

12 OVERVOLTAGE AND LIGHTNING PROTECTION

We recommend installing overvoltage protection in order to prevent damage to our high-quality electronic products. It is recommended to protect control voltage inputs, pulse and bus lines.

Manufacturer: DEHN + SÖHNE, Hans-Dehn-Straße 1, 92318 Neumarkt, Germany
Phone: +49 (0) 9181-9060, Fax: +49 (0) 9181-906100

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13 TROUBLE SHOOTING

No function.

Check power supply, back-up fuse and supply line.

The measuring voltage of a phase is 0V.

Check back-up fuse of the phase.

A phase of the current display has a different sign.

Check k and I of current measurement and correct, if required.

The measured values for energy and power differ, compared to the power supplier measurement.

Check k and I of the current measurement as well as the correctness of the phases of the transformers, adjust, if required.

An LED of Ⓐ flashes.

The most recent limit violation occurred in the menu indicated.

ErrU OVERLOAD or ErrI OVERLOAD.

ErrU: Overload at the voltage input of the measuring amplifier.

Switch off measuring voltage and check programmed transformer ratio. In case of direct measurement, the programmed value must be identical with the mains voltage.

Note: The device chooses the measuring range depending on the programmed secondary voltage. MULTIMESS-Light / Basic operates in measuring range 1 if the programmed value of the secondary voltage does not exceed 110V. Otherwise, MULTIMESS-Light / Basic uses measuring range 2.

ErrI: Overload at the current input of the measuring amplifier.

Adjust programming and select wider measuring range. Other than that, switch off measuring current and check transformer ratio.

Note: The device chooses the measuring range depending on the programmed secondary current, i.e. either measuring range 1 for 1A or measuring range 2 for 5A.

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An

KBR GmbH
Abteilung Entwicklung
Am Kiefernschlag 7
D-91126 Schwabach

To

KBR GmbH
Development
Am Kiefernschlag 7
D-91126 Schwabach / Germany

Vorschläge: ❒

Korrekturen: ❒

Betrifft Gerät:

Suggestions: ❒

Corrections: ❒

Device concerned:

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