KBR
Energy Management

User manual
Technical parameters

Energy measuring device

Your partner for network analysis

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https://www.kbr.de/en/download/operating instructions/

System | English

29636_EDEBDA0338-1925-1_EN

Inhaltsverzeichnis

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1 Introduction

Thank you for choosing this KBR quality product.

To become familiar with the operation and programming of the device and to use the full range of functions of this high-quality product at all times, you should read this user manual carefully.

The individual chapters explain the technical details of the device and show how damage can be avoided through proper installation and commissioning.

1.1 User manual

This user manual describes the device version multimess D4-BS. This user manual must be accessible to the user at all times (e.g. in the switchgear cabinet). Even if the device is resold to third parties, the manual remains an inherent part of the device.

Although the utmost care has been taken in writing this user manual, errors may still occur. We would be very grateful if you would notify us of any errors or unclear descriptions you may notice.

1.2 Intended use

This device is intended for measuring electrical parameters via external transformers in the low-voltage network (400 VAC Ph-Ph).

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1.3 Safety keys

This manual contains instructions that you must follow for your personal safety and to avoid material damage. These instructions are identified by a warning sign or information symbol, depending on the degree of hazard they warn about.

DANGEROUS VOLTAGE

Warning means that death, major injuries or damage may occur if suitable safety precautions are not taken.

CAUTION

Caution means that minor injuries or damage may occur if the appropriate safety precautions are not taken.

NOTE

Note is an important piece of information on the product, its operation or the respective part of the operating instructions to which special reference is being made.

Disclaimer

The contents of these operating instructions have been carefully reviewed in terms of the hardware and software described. Nonetheless, deviations cannot be ruled out, and the manufacturer cannot guarantee 100% conformity. The specifications made in these operating instructions are reviewed on a regular basis; any corrections required will be included in the next revision.

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1.4 Safety notes

In order to prevent operating errors, device operation is kept as simple as possible. This will enable you to start your device up quickly.

It is in your own interest to read the following safety instructions carefully. The applicable DIN/VDE regulations must be observed during installation!

Power supply connection, setup and operation of the device must be performed by qualified personnel only. Qualified personnel as defined in the safety notes in this user manual are those authorized to set up, ground and mark devices, systems and circuits in accordance with applicable standards and regulations.

To prevent fire and electric shock, do not expose the device to rain or moisture!

Before connecting the device to the power supply, check whether the local power supply conditions comply with the specifications on the device nameplate.

CAUTION

Incorrectly connecting the device can damage it.

For device connection, the data given in the connection diagram must be complied with (see chapter "Connection diagram") and the connection lines must be voltage-free. When wiring, always ensure that all wiring material used is neither damaged nor defective and that the polarity is correct!

Proper and safe operation of the product requires correct transport, storage, installation and assembly as well as careful operation and maintenance.

If the device has any visible damage it is considered unfit for use and must be disconnected from the power supply!

Troubleshooting, repairs and maintenance work may only be carried out at our plant or after contacting our customer service team. If the device is opened without authorization, any warranty or guarantee claim is forfeited. Correct functioning can no longer be guaranteed!

Opening the device may expose live parts. Capacitors in the device may still be charged, even if the device has been disconnected from all power sources. Do not operate open devices under any circumstances!

Systems that are at risk from lightning strikes must feature lightning protection for all input and output lines.

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1.5 Product liability

You have purchased a high-quality product. Only top-quality components with exceptional reliability are used.

Each device undergoes a long-term test before delivery.

With regard to product liability, please see our general terms and conditions for electronic devices, which you can read at www.kbr.de.

The warranty on device characteristics only applies if the device is operated in accordance with its intended use!

1.6 Disposal

Please dispose of defective, out-of-date or no longer used devices properly.
If required, we will dispose of the device for you.

1.7 Overvoltage and lightning protection

To protect your purchased high-quality devices from damage, we strongly recommend that you take overvoltage protection measures. Protect control voltage inputs, pulse and bus lines.

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2 Range of functions

multimess D4 is a multimeter for busbar mounting. On the output side, it can measure all typical alternating and direct current parameters of consumers.

The device can record 1x 3-phase as well as 3x single-phase measured values. A prerequisite for single-phase measurement is that the neutral conductors of the individual measuring channels have the same potential.

The following device expansion stages are possible, featuring different ranges of function:

- "**multimess D4-BS** with **multimess F96-DS**" on page 9
- "**multimess D4-BS** with **multisio D6** and **multisio F96-DS**" on page 9
- "**multimess D4-BS** with **multisys D2-ESBS**" on page 9

2.1 multimess 1D4-BS with multimess 1F96-DS

Connection of the optional **multimess F96-DS** display can be established with a ready-made RJ12 cable. For operation of the display, an additional power supply unit is needed, e. g. the **multisys D4-PS-24V**. This way, no complicated wiring of voltage and current paths from the converter to the switchgear cabinet door is necessary. Up to 10 measuring modules can be read out and displayed. Connection between the modules is also established via ready-made RJ12 cables.

Power supply of the measuring device is provided by the measuring voltage. A separate control voltage is not necessary.

NOTE

multimess D4-BS with multimess F96-DS is the version described in this user manual.

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2.2 multimess D4-BS with multisio D6 and multisio F96-DS

If the multimess D4 is connected to the **multisio 6D6** instead of to the display, the multisio D6 creates a load profile memory (P+ P-/ Q+ Q-) and an eBus interface. Five measuring modules can be connected to each central storage module Connection between the modules is established via ready-made RJ12 cables.

2.3 multimess D4-BS with multisys D2-ESBS

For direct connection of the **multimess D4** to the KBR eBus, the **multisys D2-ESBS** gateway is required, which also provides the supply voltage for the module bus interface via ready-made RJ12 cables. A maximum of 15 measuring modules can be connected (power consumption of the measuring module interface approx. 0.3 W, power output of the **multisys D2-ESBS** gateway approx. 5 W at 24 VDC). For a larger number of measuring modules, the multisys 1D4-PS-24V power supply unit is required (power output 24 VDC, 10 W).

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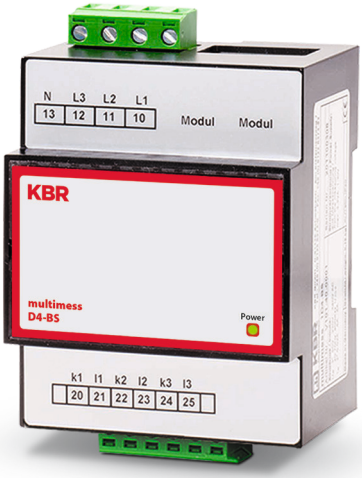
3 Device overview



multimess D4-BS
Messmodul

For busbar assembly (7.5 mm rail)

Connection to measuring voltage Ph-N 230 VAC

Measuring current connection via transformer x/1A or x/5A

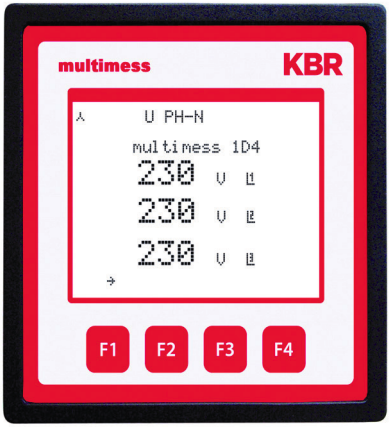
Plug terminal connection 2.5 mm²

RJ12 display connection

RJ12 module bus connection for supply voltage of the bus interface / connection of additional measuring modules.

Recording of momentary current and voltage values.

Continuous energy meter for active and reactive energy



multimess F96-DS
Display

Display illumination (Dot Matrix 128 x 96)

Brightness and contrast adjustable

Display dimming time adjustable (energy saving function)

Operation via sensor buttons

Mounting depth 40 mm

Door assembly cut-out 92 x 2 mm

Module bus connection RJ12 for measuring modules and supply voltage

Display of momentary current and voltage values

Continuous energy meter for active and reactive energy

Management of up to 10 measuring modules

Assignment of station names to the measuring modules

Display language selectable
German ("deut") / English ("engl")

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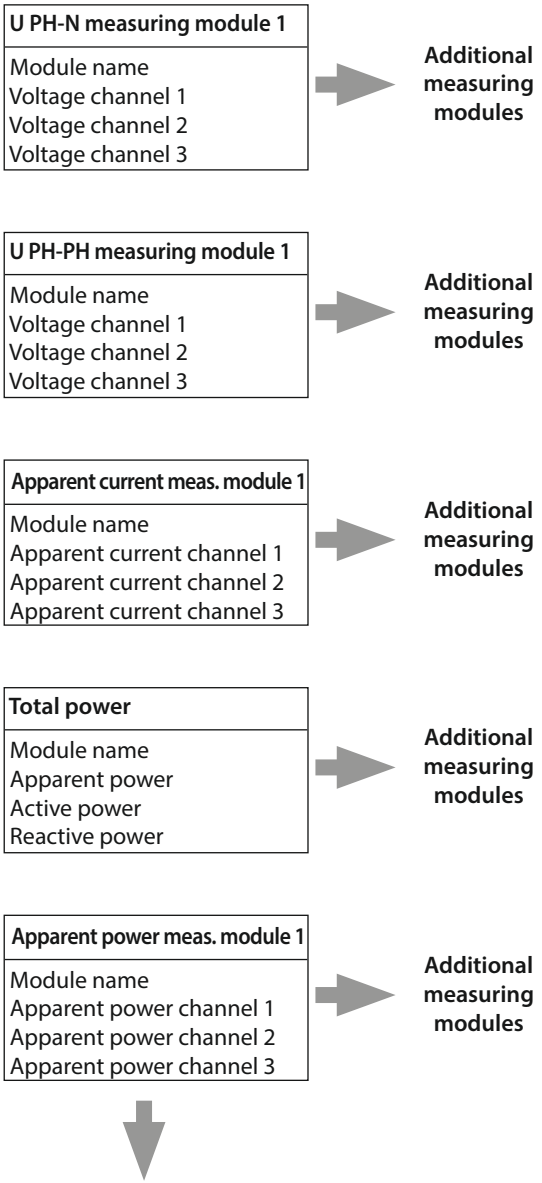
4 Operating structure

The following overview gives you an idea of the multimess D4 operating structure with the 196-DS display. For a detailed description, please refer to “Menu overview” on page 24.

Instantaneous value display



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Active power meas. module 1
Module name Active power channel 1 Active power channel 2 Active power channel 3

Additional measuring modules

Reactive power meas. module 1
Module name Reactive power channel 1 Reactive power channel 2 Reactive power channel 3

Additional measuring modules

Cosine Phi measuring module 1
Module name Cosine Phi channel 1 Cosine Phi channel 2 Cosine Phi channel 3

Additional measuring modules

Frequency
Module name Network frequency

Additional measuring modules

Energy meter:
Continuous counter active energy Continuous counter reactive energy

Additional measuring modules

Extras (Settings)
Display firmware version Commissioning Configuration

Commissioning
Password Module name Scan / remove module Reset display Single-phase / 3-phase measurement Transformer I 1 / 2 Transformer U 1 / 2

Configuration
Display firmware module Measuring module selection LCD contrast LCD brightness LCD dimmer brightness Dimmer delay Display test Language selection

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5 Installation

5.1 Device assembly

- The applicable DIN/VDE regulations must be observed for installation.
- Before the device is connected to the power supply, check whether the local power supply conditions comply with the specifications on the nameplate. Incorrect connection may result in the destruction of the device. A different mains frequency can also affect the measurement.
- The device must be connected in accordance with the connection chart.
- Systems that are at risk from lightning strikes must feature lightning protection measures for the power supply input.

DANGEROUS VOLTAGE

Warning: To reduce risk of electric shock, always open or disconnect circuit from power-distribution system (or service) of building before installing or servicing current transformers.

CAUTION

The applied measuring voltage of the device must be protected using a back-up fuse.

When connecting the current transformer, the energy flow direction and the correct assignment to the voltage path must be observed.

During installation, please also observe our safety instructions to protect against overvoltage and lightning in the "Protective measures" chapter of this manual.

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NOTE

The following points must be observed when connecting the device:
- Direction of energy flow
- Assignment of measuring voltage input/current transformer input
- For use with Listed Energy-Monitoring Current Transformers.

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

  A prerequisite for this is that energy is supplied to the device.

- **Assignment - Measuring voltage input / Current transformer input:**
  The current transformer on terminal 20/21 (k1/l1) must be installed in the phase in which the measuring voltage for terminal 10 (L1) is measured.

  – The device will display positive current when connection and energy flow direction are correct.

  - If connected incorrectly, the current displayed is negative. Interchange the connections until the display shows correct values.

CAUTION

Before any interchanging, the current transformer must be shorted out!

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5.2 Connections

Terminals 10 - 13 (L1, L2, L3, N)	**Measuring voltage.** The power supply of the device is also provided by the measuring voltage. For technical data, please refer to the nameplate.
Terminals 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 the correct assignment of measuring voltage inputs to the current transformers.

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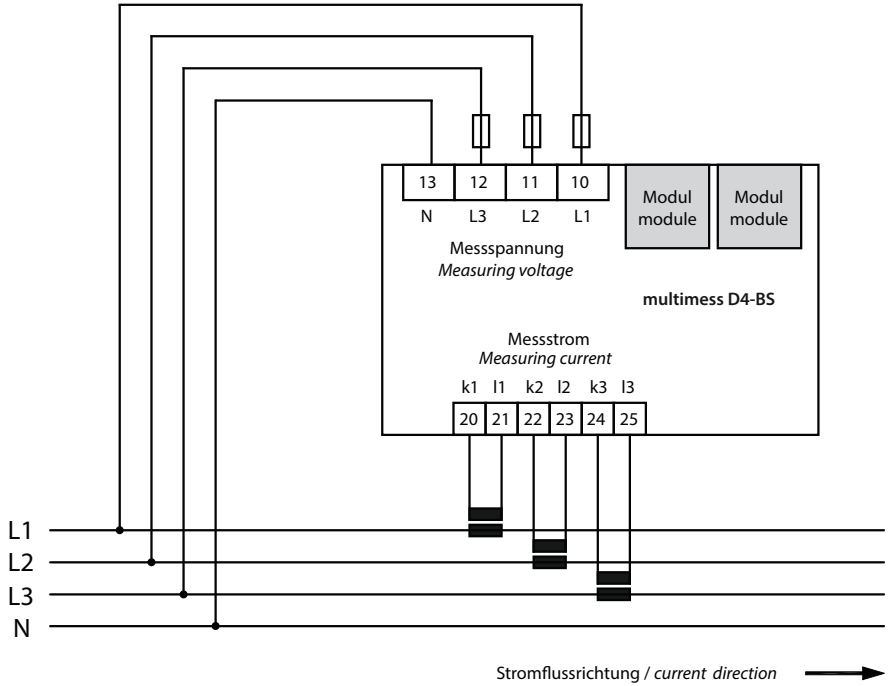
5.3 connection plan – multimess D4-BS



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6 Start-up

The following section describes the start-up procedure for the different device versions.

6.1 Start-up of the multimess D4 with multimess F96-DS display

For starting up the multimess D4 with multimess F96-DS display, please proceed as follows:

1. Connect the measuring module to the multimessF96-DS display via the module bus interface.
2. With the "Module out" connector, connect the measuring module to the multisys D4-PS-24V power supply unit via the second module bus interface.
3. At the multisys D4 power supply unit, connect the supply voltage (refer to nameplate). The operation LED on the device is illuminated green.
4. At the terminals 10 (L1), 11 (L2), 12 (L3) and 13 (N), connect the measuring voltage (the operating voltage of the measuring module).
5. At the display, select the menu Extras > Commissioning to scan measuring modules connected.
6. Displayed are modules already existing, as well as the menu items "scan" and "rem." (for removing measuring modules from the module bus list).
7. After selection of the menu item "scan", the scan mode is activated and the function LED at the measuring modules flashes slowly.
8. At the measuring module, the scan sensor button (close to the status LED, flashing green) is unlocked.

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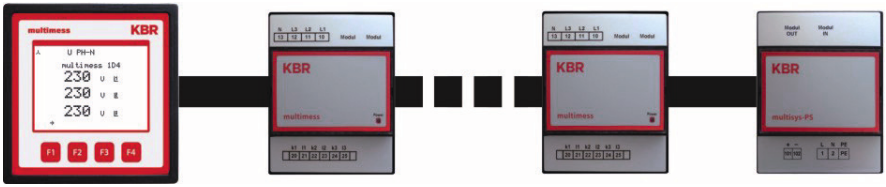
9. To set the measuring module into scan mode, touch the scan sensor button for about 4 seconds (the green status LED flashes more quickly)

10. The multimess display recognizes the measuring module and adds it to the list of modules connected.

11. You can now scan further modules, which are automatically added to the module list or, by touching the stop button, end the scanning process. The display can manage a maximum number of ten modules.

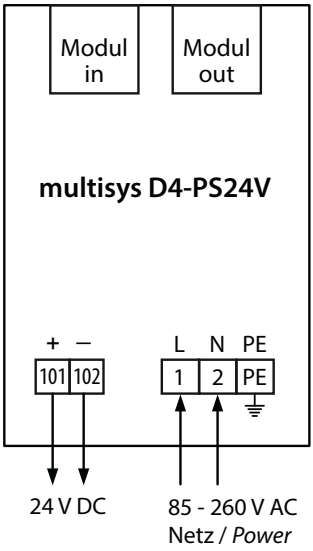
Set-up diagram for operation of the multimess D4 with multimess 1D4-DS (example):



LC-Display

Measuring module 1 to 10 (maximum)

multisys D4-PS-24V power supply unit



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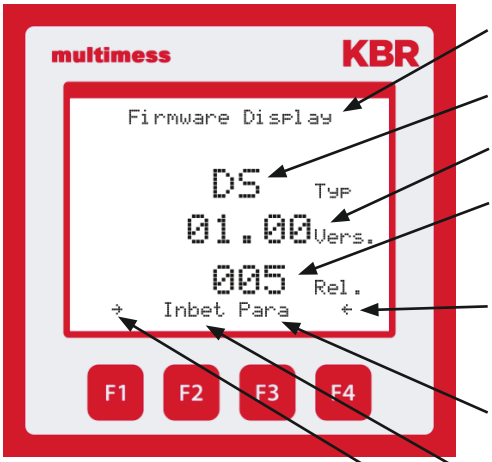
Configuration

Extras menu



Display of the firmware version and release of the display

DS display

01.00 version

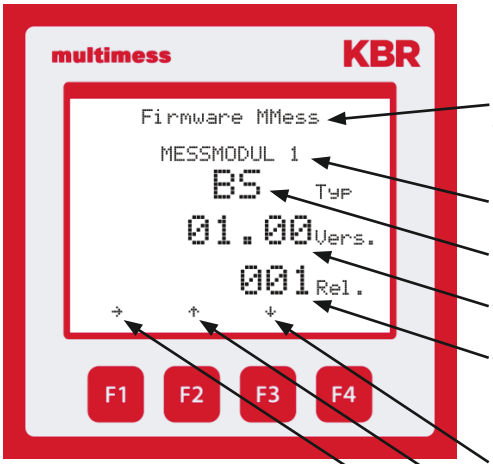
005 release

Previous menu

Display of measuring module version, Display configuration

Start commissioning

Next menu



Display of the firmware version and release of the measuring module at the module bus

Measuring module designation

BS type module bus device

01.00 version

001 release

Selection of next measuring module

Selection of previous measuring module

Next menu

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6.2 Start-up of the multimess D4 at the multisio D6 with multisio F96-DS

For starting up the multimess 1D4 at the multisio 6D6, please proceed as follows:

1. Connect the measuring module to the multisio 6D6 via the module bus interface.

2. At the terminals 10 (L1), 11 (L2), 12 (L3) and 13 (N), connect the measuring voltage (the operating voltage of the measuring module).

3. On the display, select the menu Settings > Module management.

4. Displayed are the multisio basic module as well as modules already existing and the menu item "scan".

5. After selecting this menu item with the cursor buttons, the scan mode can be started with the scan button and the scan display begins to flash. This way, the scan button at the measuring module (close to the status LED, flashing green) is unlocked.

6. By pressing the scan sensor button for approx. 4 seconds, set the measuring module into scan mode (the green status LED flashes more quickly).

The multisio basic module now recognizes the measuring module and adds it to the list of modules connected.

You can now scan further modules, which are automatically added to the module list or, by touching the stop button, end the scanning process. The multisio 6D6 can manage a maximum number of ten modules.

You can now read out and process the data.

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6.3 Start-up of the multimess D4 with multisys D2-ESBS

For starting up the multimess D4 at the KBR eBus via the multisys D2-ESBS gateway, please proceed as follows:

1. Connect the measuring module to the multisys D2 gateway via the module bus interface.

2. At the terminals 10 (L1), 11 (L2), 12 (L3) and 13 (N), connect the measuring voltage (the operating voltage of the measuring module).

3. Connect the multisys D2 gateway to the KBR eBus using terminals 90, 91 and 92.

   A command, triggered by the visual energy computer software, unlocks the scan button at the measuring module (close to the status LED, flashing green).

4. By pressing the scan sensor button for approx. 4 seconds, set the measuring module into scan mode (the green status LED flashes more quickly).

The measuring module is detected and included in the bus list.
You can now read out and process the data.

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7 System operation

In this chapter, you will find instructions on how to operate the multimess 1D4 with the multisio 1D4-DS display in daily use. Furthermore, it contains references to the complete range of functions.

7.1 Configuration of system parameters in the Extras menu

To adapt multimess 1D4 to the system monitored, its parameters have to be configured.

- Press the F1 key eleven times, selecting the Extras menu.

Here, measuring modules connected and the firmware version of the display are shown.

You have access to the following functions:

- „Commi function“ on page 22
- „Para function“ on page 22

The menu navigation of the multimess D4-DS is self-explanatory.
The operator is guided and supported by the device through operating instructions displayed for the respective situation.

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The following signs and abbreviations will be used in the display:

→ Scroll forward (through main menu or submenu)

← Scroll backwards (through main menu or submenu)

↰ Return

↓ Next measuring module

↑ Previous measuring module

+ Value input

↻ Select next screen

Para Return for configuration

EDIT Perform configuration

cosφ Fundamental power factor

U PH-N Voltage phase / neutral conductor

Freq. Network frequency

PΣ Active power – total (3-phase)

PQS Σ Active power / reactive power / apparent power – total (3-phase)

YES Confirmation to save configuration

NO Discard configuration

SCAN Scan mode (search mode) for module search

Firmware Operating software of the measuring module or display module

1x3P 3-phase measurement

3x1P single-phase measurement

]||[U Measuring voltage transformer 1 / 2

]||[I Main current transformer 1 / 2

LCD LCD parameter (display module)

code Password protection

reset Reset function display

7.2 Commissioning function

With the commissioning start-up function, up to 10 measuring modules connected can be integrated.

This includes:
- Password protection for configuration
- Assigning names to individual measuring modules
- Scan menu for reading in measuring modules connected
- Removing measuring modules connected
- Selection of single-phase or 3-phase measurements
- Configuration of current transformer primary / secondary
- Configuration of voltage transformer primary / secondary

HINWEIS

Single-phase or 3-phase measurement:

Ensure that you match the current transformer inputs to the correct measurement phases. Each phase is recorded and displayed individually for both measurement methods.

For the single-phase totals of apparent, active and reactive power, the measured values of the individual phases are added. For 3-phase measurements, the total power values are calculated (3-phase current value).

7.3 Para function

With the "para" configuration function, you can display the firmware version of the measuring modules connected, change the LCD settings and choose between English and German as the display language.

7.4 Consumption monitoring

In this operating mode, momentary measured values as well as continuous meters for active and reactive energy consumption can be read out directly at the display.

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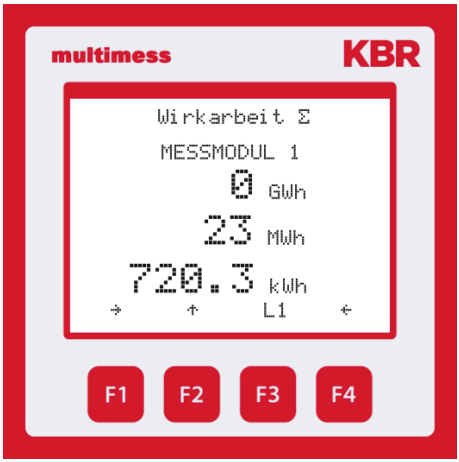

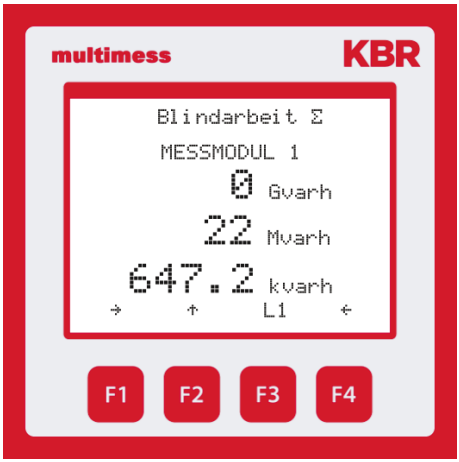

The respective module name is included on each screen, depending on the measuring module selected.

The following momentary values can be displayed:

1st screen:	Voltage Ph-N for phase L1, L2 and L3 individually
2nd screen:	Voltage Ph-Ph for phase L1-2, L2-3 and L3-1 individually
3rd screen:	Apparent current for phase L1, L2 and L3 individually
4th screen:	Total power for apparent, active and reactive power
5th screen:	Apparent power for phase L1, L2 and L3 individually
6th screen:	Active power for phase L1, L2 and L3 individually
7th screen:	Reactive power for phase L1, L2 and L3 individually
8th screen:	Cosine Phi for phase L1, L2 and L3 individually
9th screen:	Power frequency
10th screen:	Continuous energy meter for active energy consumption Continuous energy meter for reactive energy consumption
11th screen:	Commissioning (Extras menu) LCD parameters

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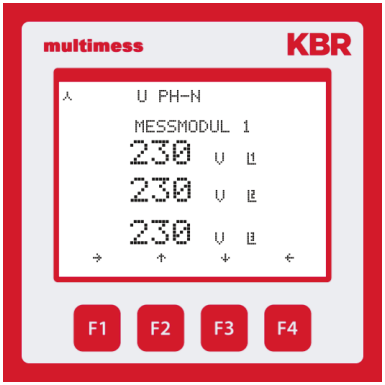
8 Menu overview

In this chapter, you will find a complete overview of all menus and menu items of the multimess.

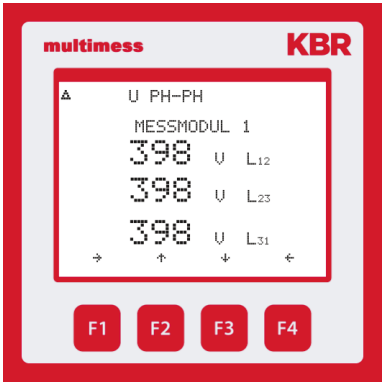


Display of momentary measuring voltage for

Phase L1-N

Phase L2-N

Phase L3-N



Display of momentary measuring voltage for

Phase L1-2

Phase L2-3

Phase L3-1

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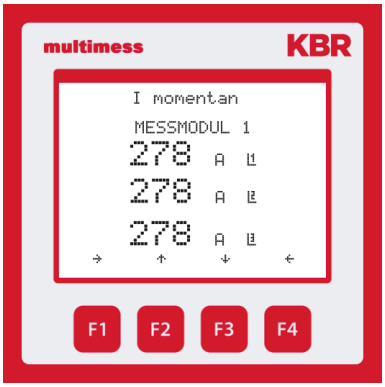
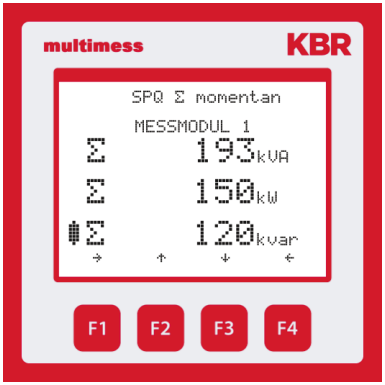


Display of momentary apparent current for

Phase L1

Phase L2

Phase L3

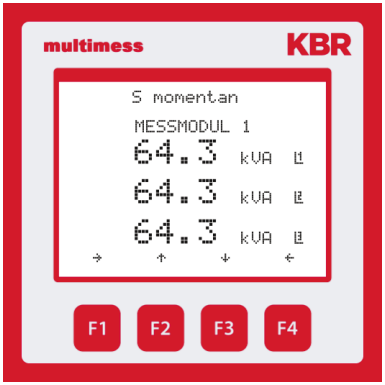


Display of total values of

Apparent power

Active power

Reactive power



Display of momentary apparent power for

Phase L1

Phase L2

Phase L3

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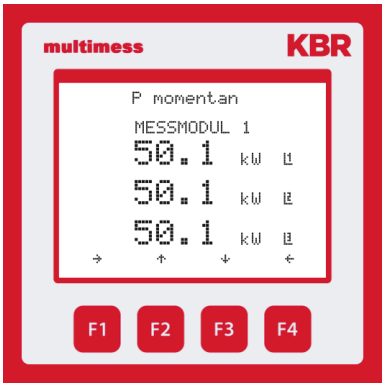
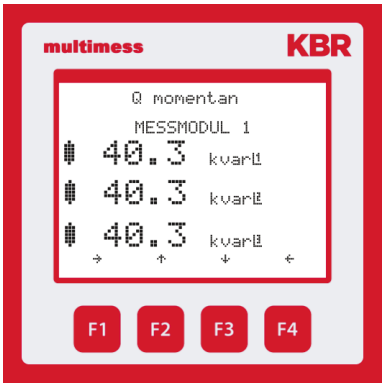


Display of momentary active power for

Phase L1

Phase L2

Phase L3

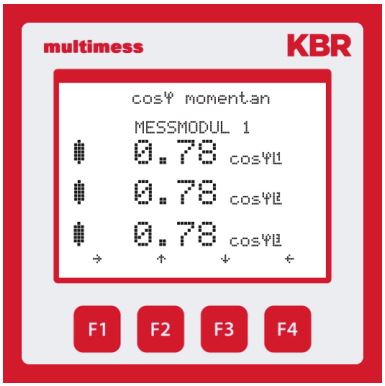


Display of momentary reactive power for

Phase L1

Phase L2

Phase L3



Display of momentary values of cosine Phi for
Phase L1
Phase L2
Phase L3

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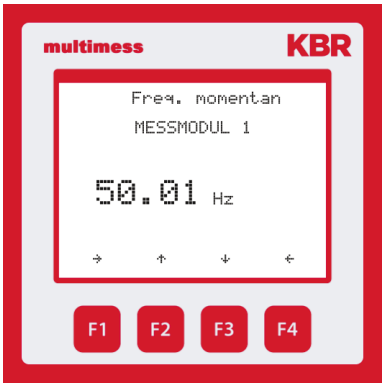
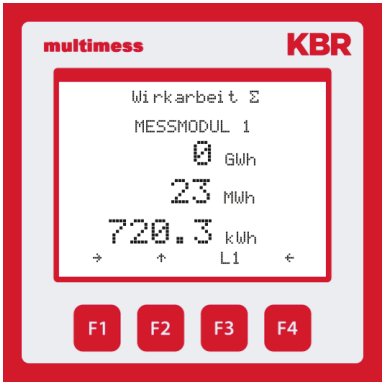
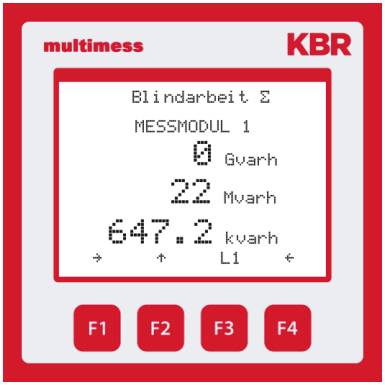


Display of momentary network frequency



Display of the continuous energy meter for active energy (total value).

In the submenus (F3), the values of the individual phases can be seen.



Display of the continuous energy meter for reactive energy (total value).

In the submenus (F3), the values of the individual phases can be seen.

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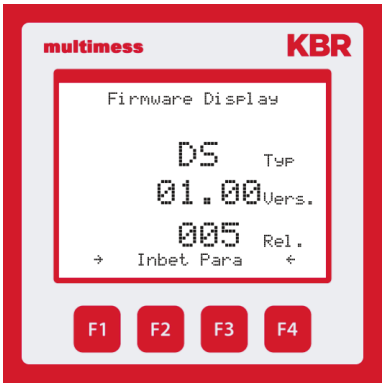

Display of the firmware version of the display.

Furthermore, the Commissioning and Configuration submenus are included.

9 Technical Data – multimess D4-BS

9.1 Measuring accuracy

Current	± 0,5 % / ± 1Digit
Voltage	± 0,5 % / ± 1Digit
Apparent power	± 1 % / ± 1Digit
Active power	± 1 % / ± 1Digit
Reactive power	± 1 % / ± 1Digit
Frequency	± 0,1 Hz / ± 1Digit

9.2 Measuring principle

Reading	128 measured values per period
A/D converter	12 bit
Measurement of U and I	simultaneous recording of measured values for U and I;
Update speed (complete measuring cycle)	< 1 sec.
Harmonics calculation	DFT with 128 points over one period
Frequency measurement	Mode: Voltage measured between phase L1, L2, L3 – N

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9.3 Device memory

Main and data memory		16kB RAM unbuffered
Program / parameter memory		256 kB Flash / 4kB EEP
Energy counter P+, P-, Q+, Q-		saved in EEP
Limit violation	Time for acquisition	8 min. for average current value, saved in RAM

9.4 Power supply

Measuring module power supply	50...230...280 VAC Ph-N, 3,2VA, 50/60 Hz, provided by the measuring voltage
Module bus power supply	ext. 24 VDC, 0.3 W, via RJ12 module bus connector

9.5 Hardware inputs and outputs

9.6 Inputs

Measuring inputs for voltage	U_{L1-N} ; U_{L2-N} ; U_{L3-N}	3 x 50V...230V...280V AC, 50/60 Hz
	Input impedance	900 kOhm each (Ph-N)
Measuring inputs for current	I_{L1}; I_{L2}; I_{L3}	3 x 0,02A...5A...6A AC
	Power consumption	<_ 0.3 VA per input at 6A

9.7 Outputs

Serial interface	Module bus	RS485 via RJ12 interface
	Baud rate	38400
	Addressing	Can be addressed using the display or visual energy (connection via multisio D2 ESBS gateway)

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9.8 Electrical connection

Connection elements		Plug terminals
Permissible cross section of the connection lines		2.5 mm²
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 control voltage		via measuring voltage
Module bus connection	Connection material	ready-made KBR system cable (6 pole modular cable, unshielded), max. length 30 m if placed accordingly

9.9 Mechanical data

Busbar devices	Housing measurements	90 x 71 x 61 mm (H x W x D)
	Mounting type	Wall mounting on DIN rail 7.5 mm deep, in accordance with DIN EN 50022 Suitable for distribution board mounting
	Weight	approx. 175 g

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9.10 Standards and miscellaneous

Environmental conditions	Standards and amendments	DIN EN 60721-3-3/A2: 1997; 3K5+3Z11; (IEC721-3-3; 3K5+3Z11)
	Operating temperature	-5 °C … +55 °C
	Humidity	5 % … 95 % non-condensing
	Storage temperature	-25 °C … +70 °C
Electrical safety	Standards and amendments	DIN EN 61010: 2001 +B1: 2002; +B2: 2004
	Protection class	II
	Overvoltage category	CAT III: U_{PH-PH} bis 400 V
	Rated insulation voltage	4 kV
	Pollution degree	PD2
	Degree of protection	IP 20 DIN EN 60529:1991 +A1:2000
	Electromagnetic compatibility	DIN EN 61000-6-1: 2007, DIN EN 61000-6-2: 2005, DIN EN 61000-6-3: 2007, DIN EN 61000-6-4: 2007

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10 Technical Data – Display multimess F96-DS

10.1 Power supply

Power supply	ext. 24 VDC, 1W, via RJ12 module bus connector

10.2 Hardware inputs and outputs

Serial interface	Module bus	RS485 via RJ12 interface
	Baud rate	38400

10.3 Electrical connection

Module bus connection	Connection material	ready-made KBR system cable (6 pole modular cable, unshielded), max. length 30 m if placed accordingly

10.4 Mechanical Data

Front panel device	Housing dimensions	96 x 96 x 46 mm (H x W x D)
	Mounting cutout	92 x 92 mm (according to manufacturer's specifications)
	Protection type	Front IP 40
	Weight	approx. 175 g

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10.5 Standards and miscellaneous

Environmental conditions	Standards and subsequent amendments	DIN EN 60721-3-3/A2: 1997; 3K5+3Z11; (IEC721-3-3; 3K5+3Z11)
	Operating temperature	-5 °C … +55 °C
	Humidity	5 % … 95 %, non-condensing
	Storage temperature	-25 °C … +70 °C
Electrical safety	Standards and subsequent amendments	DIN EN 61010-1/A2: 1996-05; (IEC1010-1/A2)
	Protection type	IP20 in accordance with DIN EN 40050 part 9: 1993-05
	Electromagnetic compatibility	DIN EN 61000-6-3: 2005-06; (IEC 61000-6-3) DIN EN 61000-6-2: 2000-03; (IEC 61000-6-2)

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