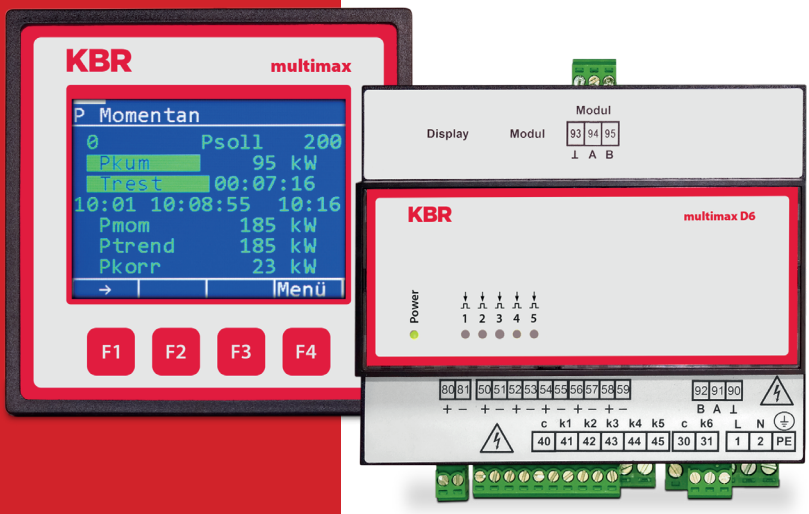
KBR
Energy Management

User Manual
Technical Parameters



multimax D6-xxx-5

System | English

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You can find the instructions for your KBR device at our download center.

https://www.kbr.de/de/dienstleistungen/download-center

Table of Contents

1	Introduction	6
1.1	User Manual	6
1.2	Safety Keys	7
1.3	Safety Notes	8
1.4	Product Liability	9
1.5	Scope of Delivery	9
1.6	Disposal	9
1.7	Overvoltage and Lightning Protection	9
2	Range of Functions	10
2.1	Monitoring Energy Consumption	10
2.2	Energy Optimization with Trend Calculation	10
2.3	Switching Devices On or Off Using Compensation Power	10
2.4	Switching Devices Off Via Relay Outputs	10
2.4.1	Device Regulation via Analog Output Module multisio D2-2AO-1	10
2.4.2	Digital Output	11
2.4.3	Decentralization Using Substations	11
2.5	Recording States Using Message Modules	12
2.6	Power Measurement Using Energy Pulses from the Energy Supplier	13
2.7	Meter Pulse Monitoring	13
2.8	Recording Current Power	13
2.9	Measurement Period Synchronization Using an Energy Supplier Pulse	14
2.10	3 Target Values for Consumption Limits	14
2.11	Error Messages	15
2.12	Long-term Memory	15

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25832_EDEBDA0289-5020-1_EN

3	Device Overview	16
4	Installation	17
4.1	Device Assembly	17
4.2	Connection Diagram	18
4.3	Terminal Assignment	19
5	Device Memory	20
6	Control and Display Panel	21
6.1	Description of Buttons and Displays, Default Settings, Setting Ranges	21
7	Error Message Overview:	29
8	Overview of system parameters	31
9	Description of parameters	31
9.0.1	General parameters	31
10	Line parameters	39
10.1	Meter inputs	49
10.2	Module Management	50
10.3	I/O parameters	50
10.4	Timer programs	52
10.5	Time/date	56
10.6	Bus parameters	57
10.7	Display parameters	58
10.8	Error message parameters	59
10.9	Password / Reset	60
11	Description of display items	61
11.1	P current	61
11.2	Potential	62
11.3	Line data	64
11.4	I/O state	65
11.5	Tracked Ptarg	66
11.6	Counter values	67
11.7	Current error messages	71
12	Technical Data multimax D6-xxx-5	72
12.1	Technical data for multimax D6-xxx-5 basic module	72
12.1.1	Control and display elements	72
12.1.2	Device memory	72
12.1.3	Power supply	72
12.1.4	Hardware inputs	72

25832_EDEBDA0289-5020-1_EN

12.1.5	Electrical connection	73
12.1.6	Hardware outputs	74
12.1.7	Mechanical data and dimensioned drawing of the basic module	75
12.1.8	Surrounding conditions / electrical safety	76
12.1.9	Troubleshooting	76
12.2	General Technical Data for Additional Modules	78
12.3	Serial interface	80
12.4	Protective Measures – Overvoltage and Lightning Protection	80
13	Connecting additional modules	81
13.1.	Function Description of the Relay Output Module multisio D4-4RO ISO-1	81
13.1.1	Connection Diagram for Relay Output Module	81
13.1.2	Relay output module LED display	82
13.1.3	Function of Scan button	82
13.1.4	DIP switch functions	83
13.1.5	DIP Switch Settings	84
13.2.	Function description of relay module multisio D6-4RO ISO-1 with eBus 85	
13.2.1	Relay Module - Connection Diagram	85
13.2.2	Connection Variants of the Supply Voltage	86
13.2.3	Terminal Assignment:	87
13.2.4	Function of Scan button	88
13.2.5	Manual Operation:	88
13.2.6	DIP Switch for Terminating RS-485 Interface:	89
13.2.9	Technical Data	90
13.3	Function Description of the Digital Input Module multisio D2-4DI-2	93
13.3.1	Connection Diagram for Digital Input Module	93
13.3.2	Digital Input Module LED Display	94
13.3.3	Function of Scan button	94
13.3.4	DIP switch functions	95
13.3.5	DIP Switch Settings	96
13.4	Function description for multimess D4-1 measurement module	97
13.4.1	Device Installation	97
13.4.2	Commissioning the multimess D4-1 with multimax D6-xxx-5	98
13.5	Function Description of the Digital Input Module multisio D2-4AI-2	99
13.5.1	Analog Input Module - Connection Diagram	99

25832_EDEBDA0289-5020-1_EN

13.5.2 Analog input module LED display 100
13.5.3 Scan button function 101
13.5.4 DIP switch function: 101
13.6. Function Description of Analog Output Module multisio D2-2AO .. 102
13.6.1 Analog Output Module – Connection Diagram 103
13.6.2 Analog Output Module – LED Display 103
13.6.3 Function of Scan Button 103
13.6.4 Function of the DIP Switches: 104
13.6.5 The individual DIP switches signify the following: 104

25832_EDEBDA0289-5020-1_EN

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 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.

25832_EDEBDA0289-5020-1_EN

1.2 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 user manual to which special reference is being made.

Disclaimer

The contents of these user manual have been carefully reviewed in terms of the hardware and software described. However, deviations cannot be excluded and therefore, complete conformity cannot be guaranteed. The specifications made in this user manual are reviewed on a regular basis; any corrections required will be included in the next revision.

25832_EDEBDA0289-5020-1_EN

1.3 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.

DANGEROUS VOLTAGE

The applicable DIN/VDE regulations must be observed during installation!

Connection to the mains, commissioning and operation of the device may only be carried out by qualified personnel. Qualified personnel within the meaning of the safety instructions in this manual are persons with electrical engineering training and knowledge of national accident prevention regulations, safety engineering standards and the installation, commissioning and operation of the device.

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.

Incorrectly connecting the device can lead to damage!

When connecting the device, adhere to the information given in the connection diagram (see "Connection diagram") and that the connecting cables are not live. When wiring, always ensure that all cables used are neither damaged nor faulty

and observe correct polarity!

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 mains! 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. Error-free functioning can no longer 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!

Lightning protection measures must be provided for all input and output cables in systems at risk from lightning strikes (See the chapter "Protective Measures")!

25832_EDEBDA0289-5020-1_EN

CAUTION

Do not connect any external voltage source to terminals 50–59.
Only apply safe-to-touch extra-low voltage in accordance with UL/CSA/IEC 61010-1 to terminals 80 and 81.
See Technical Data for maximum values.

1.4 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!

1.5 Scope of Delivery

Included in the scope of delivery:
- multimax device
- Connector set
- User manual

1.6 Disposal

Please dispose of defective, out-of-date or no longer used devices properly.

If you wish, we can 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.

25832_EDEBDA0289-5020-1_EN

2 Range of Functions

The **multimax D6-xxx-5** energy control system can significantly contribute to lowering commercial energy costs.

2.1 Monitoring Energy Consumption

The peak power is an important cost factor for special tariff devices.

The **multimax D6-xxx-5** ensures optimum distribution of available power and helps prevent expensive power peaks by means of intelligent monitoring of energy consumption.

2.2 Energy Optimization with Trend Calculation

The **multimax D6-xxx-5** works as an optimization calculator, taking into account the assumed further energy consumption within the measurement period. To avoid unnecessary shutdown, careful adjustments are made to the energy consumption in consideration of the device properties:

2.3 Switching Devices On or Off Using Compensation Power

Negative compensation power switches devices off and positive compensation power switches them on. Compensation power is the result of the comparison of the trend power with the rated power taking into account the available consumer power.

2.4 Switching Devices Off Via Relay Outputs

The basic module features 5 non-floating relay contacts to switch off the devices participating in optimization.

Using 4-stage additional components, up to 32 switching outputs can be implemented (see "Connecting Additional Modules").

NO or NC contact functions can be programmed to switch off the devices.

2.4.1 Device Regulation via Analog Output Module multisio D2-2AO-1

For devices that can be regulated continuously via an analog input (0–10 V/0–20 mA), there is an analog output module available.

This ensures that power consumption is fully and continuously exploited (the trend power always corresponds to the target period value).

25832_EDEBDA0289-5020-1_EN

2.4.2 Digital Output

The basic module of the multimax load management system features a digital output (I/O – parameter M00.12, please ensure correct polarity!) with a freely assignable output address. This means that devices, which feature a digital input (S_0 compatible), can be controlled directly. Furthermore, the current state of a device can be visualized, e.g. by connecting a digital output to a BMS.

By assigning a digital output to the prewarning contact (A 48), its status can be established, e.g. through a control light with a digital control input.

Using the **additional module multisio-4DO**, this functionality can be extended by 4 digital outputs.

2.4.3 Decentralization Using Substations

The multimax energy control system and its central system can be expanded using substations. Communication is carried out via a bus line.

25832_EDEBDA0289-5020-1_EN

2.5 Recording States Using Message Modules

By determining the state of the optimizable devices, the optimization action can be controlled. A message input can be associated to every output.

In addition to the digital input module inputs (for floating switches or electronic switches (ensure correct polarity)), the voltage inputs of the multimess D4-xxx-1 measuring module can also be used as message inputs. This module enables 230 VAC feedback (e.g. directly from the device main switch) to be evaluated, whereby an input voltage of > 70 VAC is evaluated as an on state.

The multimax 4 load management system receives important information about each device via the message inputs. In this way, it can be established whether

- the device is reported as optimizable via the input
- the device is reported as inactive

The following are also possible:

- External device control (permanently switched on (Manual_On) or permanently switched off (Manual_Off))
- Changing line priority

In the case of running timer programs, there is an additional option to modify the process and influence the state of the optimization lines:

- Emergency_On (switches on the line in case of emergency)
- Emergency_Off (switches off the line in case of emergency)
- Starting a generator (CHP)
- Default as contact (when active)

The contact switches, for example when the compensation power is negative, if there is no longer any line to switch off and the trend power is greater than the target value.

The hysteresis for switching back is fixed at 10 seconds; there is no hysteresis for switching on.

The maximum prewarning contact is activated through the assignment of the virtual output A48 to a relay output.

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2.6 Power Measurement Using Energy Pulses from the Energy Supplier

The multimax can be adapted to the energy supplier conditions. Energy proportional energy pulses are required as characteristic quantity for the power. They are either provided by the network operator or created by a pulse generator/counter. The instantaneous power for trend calculation is continuously determined via pulse period measurement and pulse count.

2.7 Meter Pulse Monitoring

In case the pulses are interrupted, a central error message system can be activated by means of the error message contacts.

2.8 Recording Current Power

If the electricity supplier is not able to provide an energy pulse, you have the option of implementing the instantaneous operating reference power via a voltage and current measurement (active power reference), using a multimess D4-1.

The multimess D4-1 measuring module has three measuring channels whose measured values can be further processed directly as power values. The fourth channel relays the total value of the three measuring channels. This means that four power values are provided.

I/O parameters of channels 1 to 4:

Channels 1, 2 and 3 (single channel):

- Channel name
- Primary transformer voltage value
- Secondary transformer voltage value
- Primary transformer current
- Secondary transformer current
- Measurement type: consumption or recovery
- Single or three-phase power measurement

Channel 4 (mixed channel):

- Channel name
- Primary transformer voltage value (taken from channels 1 to 3)
- Secondary transformer voltage value (taken from channels 1 to 3)
- Primary transformer current value (taken from channels 1 to 3)
- Secondary transformer current value (taken from channels 1 to 3)
- Measurement type: consumption or recovery

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Channels 1, 2 and 3 (single channel):

If set to single phase, only the measured value of this channel will be relayed as current power.

If set to three-phrase, the measured value of the channel is extrapolated to a three-phase measurement and relayed as the total current power. The output value of channel 4 would then correspond to the sum of three three-phase measurements.

For three-phase measurements, either measuring channels 1, 2 and 3 can be used as three different meter inputs or channel 4 can be used exclusively as a single mixed channel.

However, the measuring mode of each individual channel must be set to single phase.

Meter Pulse Monitoring:

Meter pulse monitoring can only be used to monitor digital inputs.
However, the multimess D4-1 provides an analog measured value.

2.9 Measurement Period Synchronization Using an Energy Supplier Pulse

A measurement period synchronized pulse provides for synchronicity of the measurement periods from energy supplier and energy control system. This pulse is generally provided by the network operator. If there is no synchronized pulse, the device will generate the measurement period time itself. In the overall system, synchronization is generally performed by the eBus master.

2.10 3 Target Values for Consumption Limits

3 individually programmable rated values for power are available. Switching between the rated values is realized by means of floating contacts (e.g. by the energy supplier). The switching of target values can either be performed using internal timer programs or a target value list.

25832_EDEBDA0289-5020-1_EN

2.11 Error Messages

If an error occurs, an error message is displayed.
Emergency shut-down E17 Pcum > Ptarg
Emergency shut-down E18 max. Pact limit violated
Emergency shut-down E22 meter pulse 1 failure
Emergency shut-down E23 meter pulse 2 failure
Emergency shut-down E24 meter pulse 3 failure
Emergency shut-down E25 meter pulse 4 failure
Emergency shut-down E26 meter pulse 5 failure
After the error is removed, the message is automatically reset.

2.12 Long-term Memory

The energy control system contains a long-term memory.

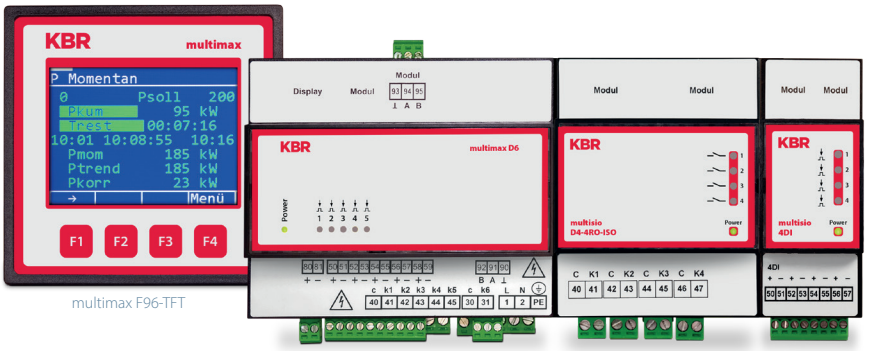
- Measurement period values for 40 days at 15 min. measurement intervals
- Continuous energy meter for high and low tariffs
- 2,450 switching operations
- 4,096 event memory entries
- 512 operation logbook entries
- 512 timer program entries

25832_EDEBDA0289-5020-1_EN

3 Device Overview

From left to right, you can see:

- **The display and its function keys**
- **multimax D6-xxx-5 basic module,**
- **The multisio relay module**
- **The multisio digital input module**



multimax F96-TFT

multimax D6

multisio Relaismodul

multisio digitales Eingangsmodul

4 Installation

This chapter describes:

- „Mounting the device“
- „Connection diagram“ on page 18
- „Terminal assignment“ on page 19

4.1 Device Assembly

The housing of the multimax D6-xxx-5 has been designed for switchgear cabinet mounting on a 35 mm DIN rail. The module is snapped onto the mounted DIN rail.

CAUTION

The device control voltage must be secured with a back-up fuse on site.
The electrical installation of the building must have a disconnecter or circuit breaker for the power supply voltage.
The disconnecter must be close to the device and be easily accessible to the user.
It must be marked as an isolating switch for this device.
The isolating switch must be UL/IEC-approved.

For the wiring of the pulse output, synchronized pulse, and pulse output, we recommend to exclusively use shielded twisted pair material to avoid disturbances (e.g. installation line I-Y(ST) Y 2 x 2 x 0.8 mm. The shielding may only be connected on one side).

During installation, please also observe our instructions on safety measures against overvoltage and lightning in the chapter “Overvoltage and Lightning Protection” on page 9 and page 80.

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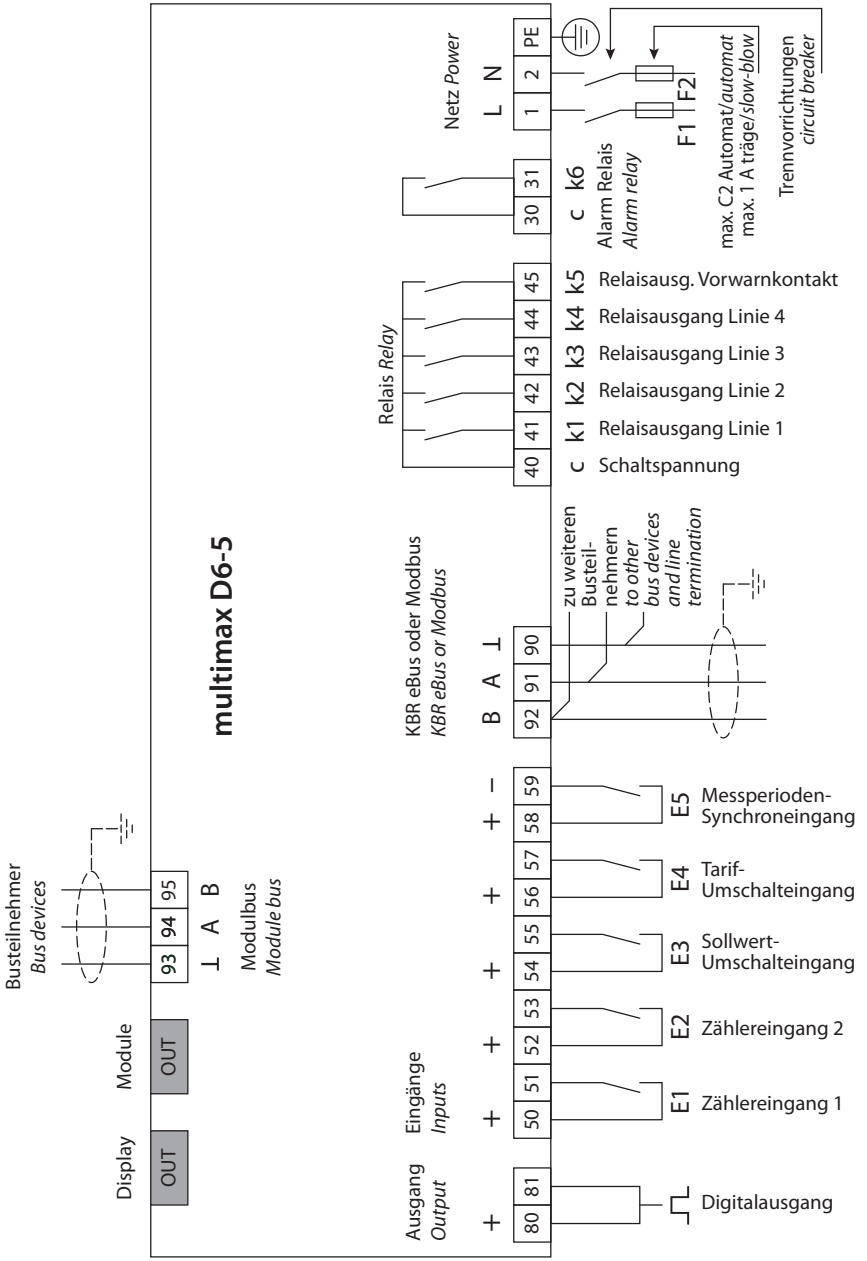
4.2 Connection Diagram



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4.3 Terminal Assignment

Terminals 1 (L) / 2 (N) and PE	**Power Supply Connection.** Auxiliary voltage is required for device operation. For technical data, please refer to the nameplate.
Terminals 90 (ground), 91 (A) and 92 (B)	**Interface Connection.** For communication at the energy bus
Terminal 40 (C)	**Connection for Voltage Supply to the Relay Output Terminals 41 to 45.** The relays for the control outputs share the same connection to the supply voltage.
Terminals 41 (k1) to 45 (k5)	**Non-floating Relay Contacts.** These contacts serve as control outputs. The contacts are open as long as the device is dead and in stages that are not connected. Maximum switching capacity 2A at 250V AC.
Terminal 30 (C)	**Supply oltage connection to the relay output terminal 31 (k6).**
Terminal 31 (k6)	**Floating Relay Contact. This contact serves as a message or alarm output. During operation, an acoustic or visual message can be activated or a consumer switched off using this relay. The contact is open as long as the device is dead as well as when there is an active message. Maximum switching capacity** **2A at 250V AC.**
Terminals 80 and 81	**Digital Output**
Terminals 50 to 59	**Digital Inputs, e.g. for pulse counter**
Display OUT	**Display Connection.** For communication with the display.
Module OUT	**Module Bus Connection.** For communication with expansion modules.
Module Bus: **Terminal 93** (ground) **Terminal 94** A **Terminal 95** B	**Bus Connection.** For communicating with expansion modules farther away.

25832_EDEBDA0289-5020-1_EN

5 Device Memory

Non-volatile long-term memory

The device is equipped with an internal, non-volatile memory in which long-term data is stored.

Buffered real-time clock (RTC)

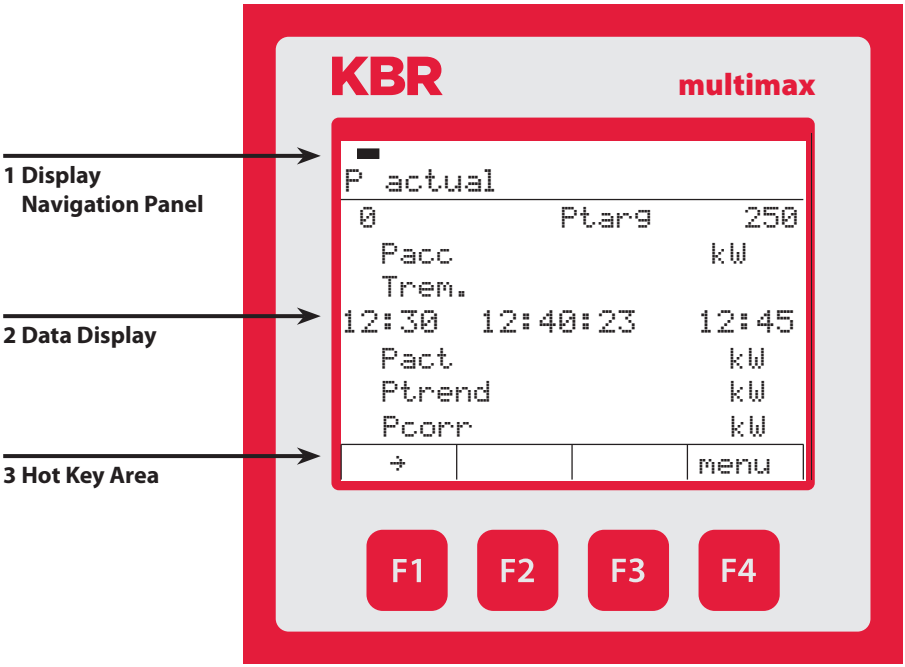
After an uninterrupted charging time (device connected to the supply voltage) of approx. 8 hours, the buffer capacitor will have a sufficient charge to protect the internal clock from failure due to lack of operating voltage for approx. 14 days.

NOTE

If the buffer capacitor is discharged and there is no supply voltage, once the device has been switched on, the time settings will be incorrect and must therefore be reset!

25832_EDEBDA0289-5020-1_EN

6 Control and Display Panel



6.1 Description of Buttons and Displays, Default Settings, Setting Ranges

1 Display Navigation Panel
The navigation panel shows the main menu selected, considerably simplifying device operation. The operator can immediately see what menu he is in.

2 Unit Display
The DOT matrix display is normally used to show measured values.
In some submenus, this display area is used to show additional information to assist operation.

3 Hot key Area
The text line corresponds to the function keys below it and is used to issue messages and text. The interaction between key and corresponding display ensures user-friendly and self-explanatory operation.

25832_EDEBDA0289-5020-1_EN

I/O Parameters	Basic Module		Function		
	Inputs	E01	Pulse counter		Terminals 50 and 51
		E02	Pulse counter		Terminals 52 and 53
		E03	Setpoint switching input	NO contact	Terminals 54 and 55
		E04	Tariff switching input	NO contact	Terminals 56 and 57
		E05	Measuring interval synchronous input	NO contact	Terminals 58 and 59
	outputs	A01	Relay output		Terminals 40 and 41
		A02	Relay output		Terminals 40 and 42
		A03	Relay output		Terminals 40 and 43
		A04	Relay output		Terminals 40 and 44
		A48	Early-warning contact relay output	NO contact	Terminals 40 and 45
		A49	Alarm relay	NC contact, dead and open in the event of errors	Terminals 30 and 31
		A50	Digital output	Digital output	Terminals 80 and 81
	Module number Input number	M00.1	Pulse counter E 01	inverse	no
				t Pmom => 0	0 sec.
				Pulse value	1 p./kWh
				U primary	1V
				U secondary	1V
				I primary	1A
				I secondary	1A

	Module number Input number	M00.2	Pulse counter E 02	inverse	no
				t Pmom => 0	0 sec.
				Pulse value	1 p./kWh
				U primary	1V
				U secondary	1V
				I primary	1A
				I secondary	1A
		M00.3	Digital input target value switching	E 03	not inverse
		M00.4	Tariff switching input	E 04	not inverse, HT, if active = LT
		M00.5	Synchronous input	E 05	not inverse
	Module number Output number	M00.6	Relay output	A 01	not inverse, relay group 0
		M00.7	Relay output	A 02	not inverse, relay group 0
		M00.8	Relay output	A 03	not inverse, relay group 0
		M00.9	Relay output	A 04	not inverse, relay group 0
		M00.10	Early-warning contact relay output	A 48	not inverse, relay group 0
		M00.11	Alarm relay	A 49	inverse
		M00.12	Digital output	A 50	not inverse, relay group 0

Parameters		Setting Ranges
General parameters 1	TYPE	a value, switching input, list of target values
	Target value 1	0 to 50000 kW
	Degree of optimization	80% to 100%
	Period duration	1, 10, 15, 30 or 60 minutes
	Switching interval	2 to 30 seconds
	Synchronization	Input, internal, bus, tariff
General parameters 2	Minimum monitoring	yes, no
	Pact monitoring	yes, no
	Target value tracking	Off, month, year
	Target value tracking	0% to 100%
	Energy type	0 to 99
	Unit	kW, MW, m^3/h
General parameters 3 *hidden for a value and list of target values*	Target value 2	0 to 50000 kW
	Target value 3	0 to 50000 kW
	Target value 2 address selection	I00 to I50
	Target value 3 address selection	I00 to I50
	*Pact 2 max lim.	0 to 60000 kW
	*Pact 3 max lim.	0 to 60000 kW
General parameters 4	Tariff switching	Bus, internal, input
	Start LT	12:00 AM to 11:59 PM
	End LT	12:00 AM to 11:59 PM
	*Pact 1 max lim.	0 to 60000 kW
	*Pact min. lim.	0 to 50000kW
	*Pact max. limit relay address	A42
	*Pact min. limit relay address	A43

*lim. = limit

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Prewarning Contact Parameters:	
TYPE	Negative compensation power greater than available switch-off power
	Cumulated power greater than power warning threshold
	Trend power greater than power warning threshold
	Off (function deactivated)
Warning threshold	30 to 150 percent
Hysteresis	0 to 50000 kW
Minimum on time	0 to 999 minutes
Minimum down time	0 to 999 minutes
Period time-out	0 to 999 minutes
Prewarning contact address	Fixed at O48

Parameters		**Setting Ranges**
Line parameters	Line name	Depending on selection (with F4 key)
	Power	0 to 9999 kW
	Priority	01 to 32
	TYPE	Standard, therm. Device, controllable
	on switch-off	open, closed
	active	yes, no
	Mode	Auto, On, Off
	Feedback input address	I00 to I50
	Feedback type	Enable, Manual On, Manual Off, priority, Emergency_On, Emergency_Off
	Actual Pact address	I00 to I50
	Switch off in event of error	yes, no
	Period time-out	0.0 to 999 minutes
	Lead time	0 to 999 seconds
	Run-on time	0 to 999 seconds
	Minimum on time/ day	0 to 24 hours
	Minimum on time	0 to 999 minutes
	Minimum off time	0 to 999 minutes
	Maximum off time	0 to 999 minutes

25832_EDEBDA0289-5020-1_EN

Parameters		Setting ranges
Meter inputs	Input 1	+/- I 00 to I 50
	Input 2	+/- I 00 to I 50
	Input 3	+/- I 00 to I 50
	Input 4	+/- I 00 to I 50
	Input 5	+/- I 00 to I 50
	Meter pulse monitoring	00:00 am to 11:59 pm
	M1 max. interval	0 to 999 seconds
	M2 max. interval	0 to 999 seconds
	M3 max. interval	0 to 999 seconds
	M4 max. interval	0 to 999 seconds
	M5 max. interval	0 to 999 seconds
Module management	Basic module	
	No additional models	Max. 20 additional modules
	Module bus scan timeout (basic module)	0 to 5 seconds
	Module bus timeout (additional modules)	0 to 5 seconds
I/O parameters	Basic module	
	Inputs 1 to 5	Pulse counter, tariff switching, synchronous input, digital input
	Outputs 1 to 5	Relay output, limit relay
	Output 6	Alarm relay
	Output 7	Digital output, pulse generator, pulse generator P, pulse generator W
	inverse	yes, no
Timer programs:	Number	of the timer program
	Enable	0 = not enabled, 1 = enabled
	Active	0 = inactive, 1 = active
	Action	that the timer program carries out
	Mode	Current status
Measured value output	Channels 1 to 4	Output address
		Measured value (Pact, Pcum, Ptrend, etc.)
		Input address (for measured value "input")
Clock / date	Daylight saving time	Auto, Off
	Start	Months 01 to 12
	End	Months 01 to 12

25832_EDEBDA0289-5020-1_EN

Parameters		Setting Ranges
Bus parameters	Bus address	0 to 9999
	Bus protocol	KBR eBus / Modbus
	Bus address KBR eBus	0 to 9999 configurable on the device, scanning mode
	Transmission speed	38,400 baud
	Bus address Modbus	1 to 247 configurable on the device
	Transmission speed	4800, 9600, 19200, 38400 can be selected
	Protocol type	RTU Parity none, even, odd
Display parameters	Contrast	60 to 100 %
	Brightness	0 to 100 %
	inverse	yes, no
	Language	German, English
	Dimming brightness	0 to 100 %
	Dimming time	0 to 255 minutes

25832_EDEBDA0289-5020-1_EN

Error Message Dialog:

Parameters		Setting Ranges
	I01 power failure	Message, message and error message relay, off
	I02 limit violated	Message, message and alarm relay, off
	I04 synchronized pulse missing	Message, message and alarm relay, off
	I05 reset performed	Message, message and alarm relay, off
	I07 error message	Message, message and alarm relay, off
	I09 Ptarg exceeded	Message, message and alarm relay, off
	I15 module bus error	Message, message and alarm relay, off
Emergency shut-down	I17 Pcum > Ptarg	Message, message and alarm relay, off
Emergency shut-down	I18 max. Pact limit violated	Message, message and alarm relay, off
	I19 min. Pact limit violated	Message, message and alarm relay, off
Emergency shut-down	I22 meter pulse 1 failure	Message, message and alarm relay, off
Emergency shut-down	I23 meter pulse 2 failure	Message, message and alarm relay, off
Emergency shut-down	I24 meter pulse 3 failure	Message, message and alarm relay, off
Emergency shut-down	I25 meter pulse 4 failure	Message, message and alarm relay, off
Emergency shut-down	I26 meter pulse 5 failure	Message, message and alarm relay, off

Exceeding maximum target values can be avoided through the targeted and **immediate** shut-down of relevant devices (the emergency shut-down must be activated for the optimization line).

Any programmed measurement period time-outs and minimum on times are not taken into account.

The following errors can trigger a shut-down:

- the cumulated measurement period power is greater than the target value
- the "maximum current power" limit has been exceeded
- Meter 1 meter pulse failure
- Meter 2 meter pulse failure
- Meter 3 meter pulse failure
- Meter 4 meter pulse failure
- Meter 5 meter pulse failure

25832_EDEBDA0289-5020-1_EN

7 Error Message Overview:

Global Error State

Error no.	Explanation
E01	Power failure has occurred
E02	A limit has been violated
E04	External synchronized pulse missing
E05	Reset has been performed
E07	Error message (1 when relay is switched, 0 if not)

Error State multimax D6-xxx-5

Error no.	Explanation
E09	Maximum period target value exceeded
E10	Value has fallen below minimum period target value
E13	Battery voltage critical
E14	Parameter error (default value replaces incorrect value)
E15	Module bus error
-	Advanced error messages (error state is reset automatically)

Advanced Error Messages

Error no.	Explanation
E17	Maximum period target value exceeded
E18	Upper Pact limit exceeded
E19	Lower Pact limit fallen below
E20	Prewarning active
E22	Meter pulse 1 failure
E23	Meter pulse 2 failure
E24	Meter pulse 3 failure
E25	Meter pulse 4 failure
E26	Meter pulse 5 failure
E28	Module 20 cannot be reached
E29	Module 19 cannot be reached

25832_EDEBDA0289-5020-1_EN

Error no.	Explanation
E30	Module 18 cannot be reached
E31	Module 17 cannot be reached
E32	Module 16 cannot be reached
E33	Module 15 cannot be reached
E34	Module 14 cannot be reached
E35	Module 13 cannot be reached
E36	Module 12 cannot be reached
E37	Module 11 cannot be reached
E38	Module 10 cannot be reached
E39	Module 9 cannot be reached
E40	Module 8 cannot be reached
E41	Module 7 cannot be reached
E42	Module 6 cannot be reached
E43	Module 5 cannot be reached
E44	Module 4 cannot be reached
E45	Module 3 cannot be reached
E46	Module 2 cannot be reached
E47	Module 1 cannot be reached

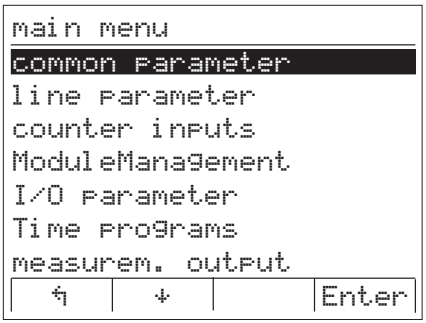
25832_EDEBDA0289-5020-1_EN

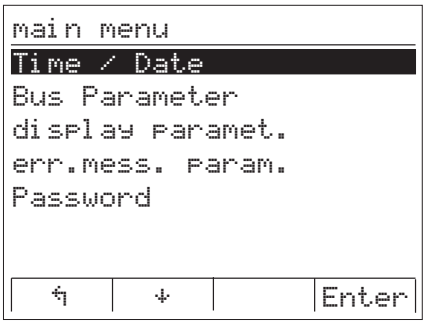
8 Overview of system parameters

You can program the **multimax D6-xxx-5** to adapt it to the system to be optimized. The following are programmed:

- **"General parameters"**
- **"Line parameters"**
- **"Meter inputs"**
- **"Module Management"**
- **"I/O parameters"**
- **"Timer programs"**
- **"Measured value output"**
- **"Clock time / date"**
- **"Bus parameters"**
- **"Display parameters"**
- **"Error message parameters"**
- **"Password"**

The menu navigation of the **multimax D6-xxx-5** is self-explanatory.





9 Description of parameters

9.0.1 General parameters

In the general parameters area, you can adjust the most important general settings. Depending on the parameters you chose, you have access to up to six areas.

1. From the main menu, select **Gen. parameters > Enter.**

2. Begin programming by selecting Edit.

25832_EDEBDA0289-5020-1_EN

Gen. param. 1	Programming	Explanation
TYPE	Selection: **value, switch. inp., target value list**	You can define a fixed value as a target value or switch between several values. By selecting **switch inp.**, i.e. switching the target value using another input signal, you can program these inputs and the associated target values in the **Gen. Param. 3** area. Optionally, a target value list can also be processed.
Target value 1	Numeric value in **kW, MW, m3/h**	Enter the value here that has been agreed by the energy supplier.
Degree of optimization	Numeric value in %	Enter the percentage value of the optimal state (100%) that the device should achieve.
Period duration	Numeric value in **min**	Enter the value here that has been agreed by the energy supplier.
Switching interval	Numeric value in **sec**	Time between two switching operations
Synchronization	Selection: **Internal, inp., bus**	Sets the synchronization type for the period start time.

Internal target value list

The device can process an internal target value list. This can be a daily, weekly, or monthly target value list.

Target value entries:

Daily target value list max. 96 target value entries

Weekly target value list max. 7 target value entries

Monthly target value list max. 31 target value entries

In the main menu – General parameters 1, the following target values may be selected:

- Value
  - the fixed target value 1 is used
- Switch-input - Target values 2 and 3 can be activated by customizable inputs
- Target value list
  - the internal target value list is processed

If, however, the target value is to be provided by an internal or external (via the KBR eBus) timer program, this has priority.

NOTE

The system can be implemented as a monitor of maximum or minimum values.

Gen. param. 2	Programming	Explanation
Minimum monitoring	**On/Off**	Monitors the minimum recovery in the case of a self-generated supply and contractually-agreed energy recovery into the energy supplier network.
Pact monitoring **(Mode)**	**On/Off**	Period-independent monitoring of whether current power exceeds the set target value (the stages are switched off if exceeded and switched back on if the stage power is free). If instantaneous value monitoring mode is activated, the cumulated power is generally no longer used for calculating the compensation power. Here, the compensation power is the difference between the active target value and the current power.
Target value track.	Numeric value in %	Maximum value of target value tracking.
ext. Pcorr default	**On/Off**	**On** deactivates the internal target value setting if a target value of an external system is to be used.
Energy type	**Numeric value**	Energy type, e.g. 00 = Electricity HT
Unit	Selection: **kW, MW, m³/h**	Set the unit type for electricity or gas

The following energy types can be selected:

Energy type	Tariff no.	Description
00	0	Electricity – high tariff
00	1	Electricity – low tariff
01	0	Water
01	1	Water
02	0	Gas
02	1	Gas

Energy type	Tariff no.	Description
03	0	Heat
03	1	Heat
04	0	Cryogenic power
04	1	Cryogenic power

Gen. param. 3 (only when selecting **switch inp.** as **TYPE** in the **Gen. param. area 1)**	**Programming**	**Explanation**
Target value 2	Numeric value in **kW, MW, m³/h**	Enter the value here that has been agreed by the energy supplier.
Target value 3	Numeric value in **kW, MW, m³/h**	Enter the value here that has been agreed by the energy supplier.
Adr. TV2 selection	Input I...	Input of a connected module for target value switching.
Adr. TV3 selection	Input I...	Input of a connected module for target value switching.
Max. Pact2	Numeric value in **kW, MW, m³/h**	Maximum permissible current power.
Max. Pact3	Numeric value in **kW, MW, m³/h**	Maximum permissible current power.

Gen. param. 4	**Programming**	**Explanation**
Set tariff	**Bus, intrn, inp.**	Determines whether the tariff switching time is input via the bus, the tariff switching input, or is defined internally. When intrn is chosen, the start LT and end LT parameters are active for programming the low tariff period
Max. Pact1	Numeric value in **kW, MW, m³/h**	Maximum permissible current power for this target value.
Min. Pact	Numeric value in **kW, MW, m³/h**	Minimum permissible current power.
Max. Pact limit adr.	**A42**	Max. Pact. message output address
Min. Pact limit adr.	**A43**	Min. Pact. message output address

Instantaneous value monitoring max. Pact1 limit, max. Pact2, max. Pact3

The lines are switched off according to priority and switching cycle. This requires that Pact > max. Pact lim. This can be set in General parameters 3 or 4 (according to which target value is active).

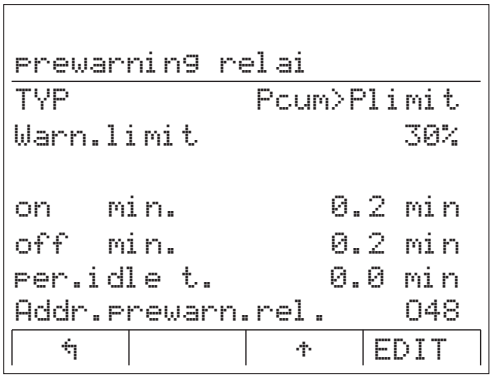
25832_EDEBDA0289-5020-1_EN

Maximum prewarning contact:

The default contact setting is closed, when active.

Prewarning contact parameters:

TYPE	Selection	Negative compensation power greater than available switch-off power
		Cumulated power greater than power warning threshold
		Trend power greater than power warning threshold
		Off (function deactivated)
Warning threshold	In % of active target value	30 to 150 percent
Hysteresis	in kW	0 to 50000 kW
Minimum on time	in minutes	0 to 999 minutes
Minimum down time	in minutes	0 to 999 minutes
Period time-out	in minutes	0 to 999 minutes
Prewarning contact address	A48	fixed



25832_EDEBDA0289-5020-1_EN

Default values:

Prewarning contact active		
TYPE		-Pcorr > Pavail
Minimum on time	in minutes	0.2 minutes (=12 sec.)
Minimum off time	in minutes	0.2 minutes (=12 sec.)
Period time-out	in minutes	0 minutes
Prewarning contact address	A 48	Cannot be changed

Default setting function:

The contact switches when the compensation power is negative if there is no longer any line to switch off and the trend power is greater than the target value.

There is no hysteresis for the compensation power (if Pcorr fluctuates around 0).

The maximum prewarning contact is activated through the assignment of the virtual output O48 to a relay output (in I/O management).

Programming example:

Function type: Cumulated power greater than power warning threshold

Prewarning contact active		
TYPE		Pcum > Pthresh
Warning threshold	In % of active target value	90 percent
Minimum on time	in minutes	0.5 minutes
Minimum off time	in minutes	1.0 minutes
Period time-out	in minutes	10 minutes
Prewarning contact address	A 48	Cannot be changed

Currently-active period target value: 100kW
Warning threshold: 90% (corresponds to 90 kW)
Hysteresis: 10 kW
Minimum on time: 0.5 minutes (corresponds to 30 seconds)
Minimum down time: 1.0 minutes (corresponds to 60 seconds)
Period time-out: 10.0 minutes

25832_EDEBDA0289-5020-1_EN

The result is the following:

The contact switches if the cumulated power is greater than 90 kW
(90% of the target value) and the message **I20 prewarning contact** active is issued.

No hysteresis is available, as the cumulated power only increases during the measurement period.

The contact remains switched until the measurement period ends.
It drops at the beginning of the next measurement period because the cumulated power restarts below the warning threshold.

However, the prewarning contact is not deactivated if the minimum on time has not yet elapsed.

The message **E20 prewarning contact active** is issued when the contact is switched off.

When a measurement period is first started, the
prewarning contact function is locked for the first 10 minutes (measurement period time-out). This means that the prewarning contact is not active or is deactivated (if the contact was active at the end of the previous period and no minimum on time is applied).

The measurement period time-out is always started at the beginning of a measurement period. The minimum on and off times take priority over the measurement period time-out.

Programming example:

Function type: Trend power greater than power warning threshold

Prewarning contact active		
TYPE		Ptrend > Pthresh
Warning threshold	In % of active target value	90 percent
Hysteresis	in kW	10 kW
Minimum on time	in minutes	0.5 minutes
Minimum off time	in minutes	1.0 minutes
Period time-out	in minutes	10 minutes
Prewarning contact address	A 48	Cannot be changed

Currently-active period target value: 100kW
Warning threshold: 90% (corresponds to 90 kW)
Hysteresis: 10 kW
Minimum on time: 0.5 minutes (corresponds to 30 seconds)
Minimum down time: 1.0 minutes (corresponds to 60 seconds)
Period time-out: 10.0 minutes

25832_EDEBDA0289-5020-1_EN

The result is the following:

The contact switches if the trend power is greater than 90 kW (90% of the target value) and the message I20 prewarning contact active is issued.

The hysteresis for switching back is 10kW, meaning that the contact will switch back if the trend power is 80 kW (90% of the target value minus a hysteresis of 10kW).

The contact remains switched on for 30 seconds even if the trend power falls under 80 kW during this period.

After the contact is switched off, the next switching operation is carried out after a minimum of 60 seconds, as the minimum off time is still applicable.
The message **I20 prewarning contact active** is issued when the contact is switched off.

When a measurement period is first started, the prewarning contact function is locked for the first 10 minutes (measurement period time-out). This means that the prewarning contact is not active or is deactivated if the minimum on time has not yet elapsed.

The measurement period time-out is always started at the beginning of a measurement period. The minimum on and off times take priority over the measurement period time-out.

25832_EDEBDA0289-5020-1_EN

10 Line parameters

The following assignments have been set for inputs (I) and outputs (O):

Inputs: I 00 to I 50

Outputs: O 00 to O 50

Whereby:

- O 01 to O 32 correspond to lines 1 to 32 (i.e. are permanently assigned to the lines)
- O 33 to O 41 = free
- A 42 = Pact max. limit
- A 43 = Pact min. limit
- A 44 = measured value output 1
- A 45 = measured value output 2
- A 46 = measured value output 3
- A 47 = measured value output 4

In the Line parameters area, you can adjust the required settings for your devices.

1. From the main menu, select **Line parameters > Enter**

Li	**MC**	**Adr**	**P**	**Pr**	**Ac**
Line number	Three-digit number. Digits 1 and 2 represent the module (00 is the basic module) and digit 3 represents the contact number	Address	Configured power/consumption	Device shut-down priority: the device with priority 1 is shut down first, then the device with priority 2, etc.	Device de-activated/ activated

25832_EDEBDA0289-5020-1_EN

2. Select a line and begin programming with **Para** and **Edit**.

Para Line (1, 2, etc.)	Programming	Explanation
Power	Numeric value in**kW, MW, m³/h**	Device power.
Priority	Numeric value **1–32**	Device shut-down priority. The default setting is the line number.
TYPE	**Standard, therm., signal, controllable**	Standard, therm. Device, controllable device (via analog output), signal (in development)
on switch-off	**open, closed**	Defines whether the device is switched off when the contact is closed/opened.
active	**On/Off**	An activated optimization line is integrated into the optimization cycle.
Mode	**Auto, Off, On**	Defines whether the device is integrated into optimization (**Auto**), remains constantly on, or remains constantly off.

Notes on the line parameters

a) Power

b) Priority

c) Type:

a) Power
The power consumption should be entered **manually** here.
A device's current power consumption can also be determined using the additional modules multimess D4-1 or multisio D2-4AI-2.

Determining a device's current power using multimess D4-1:
Using this function, a device's actual current power consumption can be determined. In this way, a suitable time for shut-downs that are necessary for optimization reasons can be determined (load-dependent power consumption).

The device's programmed power consumption (line parameters) is used in this case only for switching on the device. Settings per measurement channel:
in the case of three-phase power, the measured

25832_EDEBDA0289-5020-1_EN

power per channel is extrapolated to a three-phase device.
multimess D4-1 I/O parameters channel 4 (mixed channel), 3-phase measurement:

- Channel name
- Primary transformer voltage value (taken from channels 1 to 3)
- Secondary transformer voltage value (taken from channels 1 to 3)
- Primary transformer current value (taken from channels 1 to 3)
- Secondary transformer current value (taken from channels 1 to 3)
- Measurement type: consumption
- Settings per measurement channel: Single-phase power

NOTE

When connecting the multimess D4-1 measurement module, it must be ensured that the measurement voltage is not switched off with the device, as the module receives its supply voltage from the measurement voltage! In the case of single-phase measurement, it also should be ensured that the transformers are in phase with the measurement voltage.

Recording power using the analog input module multisio 4AI:

The analog input module multisio 4AI can record a current of 0 to 20 mA DC or a voltage of 0 to 10 V DC via each of its four analog inputs.
By appropriately configuring the inputs (minimum value, maximum value), a current power value can be established and forwarded for further processing. In this way, a suitable time for shut-downs that are necessary for optimization reasons can be determined (load-dependent power consumption).
The device's programmed power consumption (line parameters) is used in this case only for switching on the device.

The following parameters are available for each input:

- Module name
- Range selection
- Minimum value in kW
- Maximum value in kW
- Consumption power type

b) Priority

The programmed priority (the device shut-down order) can be changed using a timer program (see **Timer programs** chapter).

25832_EDEBDA0289-5020-1_EN

c) Type
A standard device is switched on and off based on its programmed power (taking into account any programmed time-outs).

The standard parameters are set for this device type. Parameters (example):	
Power	18 kW
Priority	01
Type	Standard
on switch-off	Open
active	yes
Mode	Automatic
Period time-out	0 minutes
Lead time	0 seconds
Run-on time	0 seconds
Minimum on time/day	0 hours
Minimum on time	0 minutes
Minimum down time	0 minutes
Maximum off time	0 minutes

Thermal device

In addition to the standard parameters, the following parameters are available for this device type:

- The evaluation of the state of the device main switch via a digital input or, in the case of the multimess D4-1, via a voltage input
- The evaluation of the state of the device thermostat switch via a digital input or, in the case of the multimess D4-1, via a voltage input
- Optimization in the heat-up phase and the continued heating phase can be optionally activated or deactivated.

The following parameters are available (example):

Power	18 kW
Priority	01
Type	Thermal device
on switch-off	Open
active	yes
Mode	Automatic
Main switch input address	I06
Thermostat switch input address	E07
Optimization in the heat-up phase	yes

25832_EDEBDA0289-5020-1_EN

Optimization in the continued heating phase	yes
Maximum on time	0 minutes
Period time-out	0 minutes
Lead time	0 seconds
Run-on time	0 seconds
Minimum on time/day	0 hours
Minimum on time	0 minutes
Minimum down time	0 minutes
Maximum off time	0 minutes

Application examples:

Optimization in the heat-up phase	yes
Optimization in the continued heating phase	yes

Output state:

Main switch input address	Open (main device switch is off)
Thermostat switch input address	Closed (device is heating up)
Reason for optimization line switching	On/enable/0
This means that: the device is switched off, because there is no operating state feedback available from the device to integrate it into optimization.	

The main switch is switched on:

Main switch input address	closed
Thermostat switch input address	Closed (device is heating up)
Reason for optimization line switching	On/optimization/1
This means that: the device is switched on, there is operating state feedback available from the device and the device could be switched off for optimization reasons.	

25832_EDEBDA0289-5020-1_EN

Thermo-switch opens:

Main switch input address	closed
Thermostat switch input address	Open (device has reached its temperature)
Reason for optimization line switching	On/optimization/1
This means that: the device is now in the continued heating phase (after the thermostat switch first opens) and could be switched off for optimization reasons.	

No optimization in the heat-up phase:

Main switch input address	I06
Thermostat switch input address	E07
Optimization in the heat-up phase	no
Optimization in the continued heating phase	yes
Main switch input address	closed
Thermostat switch input address	closed
Reason for optimization line switching	On/heat-up/1
This means that: The device is in the heat-up phase and cannot be switched off for optimization reasons.	

The thermo-switch is not monitored:

Main switch input address	I06
Thermostat switch input address	I07
Optimization in the heat-up phase	yes
Optimization in the continued heating phase	yes
Main switch input address	closed
Thermostat switch input address	Open (not monitored)
Reason for optimization line switching	On/optimization/1
This means that: The device is immediately in the continued heating phase and could be switched off for optimization reasons.	

25832_EDEBDA0289-5020-1_EN

Cyclic operation (no forced cycles):

To set the device cycles, only the times

- Maximum on time
- Maximum off time

are programmed.

These times may not be followed to completion if

- in the case of max. off => there is already sufficient free power such that no further cycling must be carried out
- in the case of max. on => optimization has already been carried out

Display for programmed cyclic operation:

Line state on => The device is constantly on and there is sufficient free power available such that the device does not need to be cycled.

Line state off => The device is cycled, because there is not sufficient free power for constant operation.

Message in event memory => **Line switched off, reason: optimization**.

The switching interval configurable in the general parameters (in sec.) is not taken into account in cyclic operation.

Controllable devices

The multisio D2-2AO-1 can be used for this device type. If a controllable line is used, the multimax will attempt to configure the line output power such that the compensation power is zero and the trend power does not exceed the target value currently active. Irrespective of the actual device conditions, this will not happen immediately, which results in transient oscillation behavior.

The transient oscillation behavior does not depend on the programmed stage power. This is only determined when the next stage intervenes. The transient oscillation behavior is influenced by a real control loop: i.e. by the actuator (analog output module), the analog device and the measurement input (for Pact).

The delay times also influence the control behavior. The sum of the delay times (actuator, device, measurement input (pulses)) should be less than the switching cycle (risk: resonance in control loop). If the actuator is programmed such that the power change set by the controller at the measurement input leads to a larger power change, the controller will overshoot.

If the power change is less than that expected by the controller, the power to be adjusted will only be reached after several switching cycles.

Therefore, the actual conditions should be programmed as accurately as possible.

25832_EDEBDA0289-5020-1_EN

The line output power only changes in the switching cycle: once the output power has changed, it will not be changed again for the duration of the switching cycle.

Once output power reaches 0 or 100%, the next line is switched to (depending on the line priority). This is also the case for circular switching (lines with the same priority).

The following parameters are considered:

- Minimum off time:
  Takes effect when the output power has reached zero.

- Minimum on time:
  Takes effect when the output power is greater than zero. The output power can then not be reduced until the minimum on time has elapsed.

Additional notes:

On/off state:
When the output power is zero, then the state is "Off."
Otherwise, the state is "On." Switching reasons that switch the line on or off switch the power to 100% or 0% (e.g. Manual On/Manual Off). The period time-out switches the output power to 100%. Timer programs can currently only switch the analog lines off (0%) or on (100%). In the switching operations memory, only a change from 0% to greater than 0% and vice-versa is logged.

The following parameters are available:

1. Module name (module no., output no.)
2. Logical address O01 (example) to O32
3. Type: 10 V or 20 mA
4. min. value kW (+/-)
5. max. value kW (+/-)
6. Min. output value: 0 V or 0 mA
7. Max. output value: 10 V or 20 mA
8. Default value (output): 0 V or 0 mA
9. Edge (gradient) in milliseconds

Explanation:
Default value = output when power returns after power failure
Edge = change in output value in milliseconds (jump from min. to max.)

25832_EDEBDA0289-5020-1_EN

3. Program the address with **Adr** and **Edit**.

Para Lines (1, 2, ...)	Programming	Explanation
Adr. output	**Numeric value O01–O32, fixed**	Device address, O01–O04 on the base device; afterwards, numbering is continued for connected modules.
Adr. feedb.	**I00-I50**	The multimax checks whether the device is on or off and sends a message about this via the feedback input. If this does not occur, the multimax switches regardless of whether the device is on or off and then waits the set time until the next switching event.

NOTE

In addition to the digital input module inputs (for floating switches or electronic switches (ensure correct polarity)), the voltage inputs of the multimess D4-1 measurement module can also be used as feedback inputs. With this module, 230 VAC feedback messages (e.g. directly from the device main switch) can be evaluated. An input voltage of > 70 VAC is evaluated as an on state.

4. Program the device's time-dependent parameters with **Time** and **Edit.**

Line times (1, 2, etc.)	Programming	Explanation
Per. Time-out	Numeric value in **min**	Defines the time that the device stays on from the start of the period under all circumstances.
Lead time	Numeric value in **sec**	Defines the lag time for turning the device on – the device only reaches its power after this time.
Run-on time	Numeric value in **sec**	Defines the lag time for turning the device off – the device power only reaches zero after this time.
Minimum on time/ day	Numeric value in **hrs**	Minimum time period for which the device must be switched on per day
Min. On Min. Off Max. Off	Numeric value in **min**	Minimum time period for which the device may be switched on or max./min. time period for which the device may be switched off in relation to a period.

25832_EDEBDA0289-5020-1_EN

Para Lines (1, 2, ...)	Programming	Explanation
Feedback type	**Enable, Manual_Off, Manual_On, Emergency_Off, Emergency_On, priority 1–32**	Defines whether the device is integrated into optimization via its feedback (enable), remains constantly on (Manual_On), or is switched off independently of its trend calculation (Manual_Off). In the case of running timer programs, there is an additional option to modify the process and influence the state of the optimization lines: Emergency_On (switches on the line in case of emergency) Emergency_Off (switches off the line in case of emergency) The current line priority can also be changed
Pact Adr.	Input **I...**	Message input address via which the current device power consumption is established using a power measurement module or analog input module.
Switch off in event of error	**On/Off**	Defines whether the device is switched off in event of error.
Power on state	**On/Off**	Determines the line state when the power returns after a power failure
Line group	**0 to 65535**	Line assignment to a line group

The following errors can trigger an emergency shut-down:

- the cumulated measurement period power is greater than the target value
- the "maximum current power" limit has been exceeded
- Meter 1 meter pulse failure
- Meter 2 meter pulse failure
- Meter 3 meter pulse failure
- Meter 4 meter pulse failure
- Meter 5 meter pulse failure

25832_EDEBDA0289-5020-1_EN

10.1 Meter inputs

In the **Meter inputs** area, you can set and configure inputs for meters.

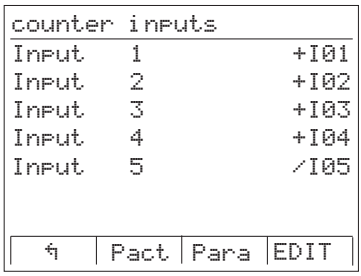
1. From the **main menu, select Meter inputs > Enter**.

2. Begin programming by selecting **Edit**.

Meter inputs	Programming	Explanation
Input 1, 2, etc.	**+/- I...**	A + before the meter input adds the meter values to the total power and a - subtracts them from the total power, e.g. when a meter is measurement a self-generated energy supply.

Recording the operate values without sum offsetting:

Is it now possible to record a meter input (load profile memory, energy meters) without the value being added to or subtracted from the instantaneous power. This can be done by selecting "/" for the relevant meter input instead of "+" or "-". This means that the power of a photovoltaic device can be recorded without this power being included in the total power under consideration.



3. You can display the current values of each meter using **Pact**. This is only possible here.

4. Program meter pulse monitoring using **Para**.

25832_EDEBDA0289-5020-1_EN

10.2 Module Management

In the Module Management area, you can manage and program the basic and additional modules.

From the **main menu, select Module Management > Enter**.

Select a module.

CAUTION: If necessary, start a module scan using **Scan**. This function recognizes your connected modules; however, it only does so one after the other and if they are in scan mode.

Select a module from the list and begin programming with **Para**.

Para Module (0, 1, 2, etc.)	Programming	Explanation
Time-out	Numeric value in **sec**	Defines the time accepted for feedback from the module in network operation. This is particularly helpful for slower networks in terms of avoiding unnecessary error messages.
Flashing	**On/Off**	Makes the selected module's LEDs blink sequentially to be able to assign a number to a connected module.
Removal	**On/Off**	Deregisters an additional module from the basic module.

10.3 I/O parameters

In the I/O parameters section, you can define and program the inputs and outputs.

1. From the main menu, select I/O parameters > Enter.

2. Select an input/output from the list and define it with Edit.

- The available inputs are: synchronous input, tariff, digital input and pulse counter.
- The available outputs are: relay output, error message, limit mess. and digital output.

3. Select an input/output from the list and configure it with Para.

25832_EDEBDA0289-5020-1_EN

E.g. when defining as a pulse counter

Para (...) Input	Programming	Explanation
Log. address	**I…**	Fixed logical address.
inverse	**On/Off**	Determines whether the input reacts to a positive or negative pulse.
t Pact -> 0	Numeric value in **sec**	Determines the time before the power drops to 0.
Imp. val	Numeric value in **I/kW, MW, m³**	Pulse value as per energy supplier.
I/V prim/sec	Numeric value in **A/V**	Transformer ratio Current/voltage

E.g. when defining as a relay output

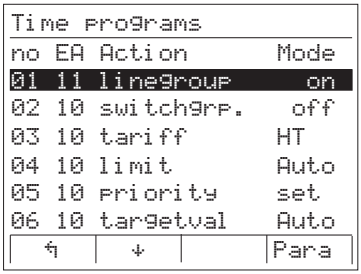
Para (...) outputs	Programming	Explanation
Log. address	**O…**	Configurable lines can be assigned to a terminal. The terminal is determined by hardware
inverse	**On/Off**	Determines whether the relay reacts to a positive or negative pulse.
Switch Group	Numeric value in **sec**	Assigns the relay to a switch group (switches independently of the multimax)

When defining as a limit signaling relay, the following additional parameters are available:

t-delay: Delay until relay is switched

t-drop: Hold time beyond the duration of the limit violation

10.4 Timer programs



In the timer program overview, the following information is displayed:

- **N**umbe**r** of the timer program
- **E**nable (0 = not enabled, 1 = enabled)
- **A**ctive (0 = inactive, 1 = active)
- **Action** of the program
- **Mode** (current state)

If a timer program is in Auto mode, the device functions with the values defined in the device (General parameters).

The following actions are available:

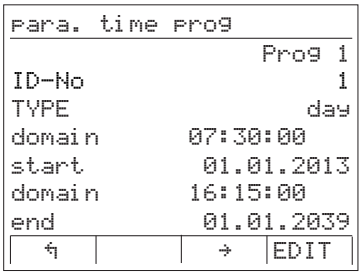
- Switch switch group
- Tariff switching
- Set limit
- Switch line group
- Set priority
- Set target value

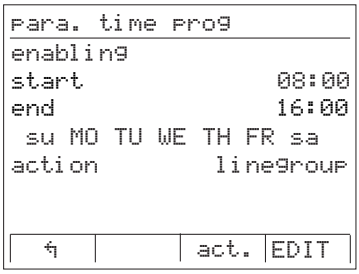
NOTE

For "Set Target Value," in addition to the three target values programmed under Menu/ General parameters, the target values from the target value list can also be used. These max. 96 entries (daily target value list) are managed as target values 4 to 99.

25832_EDEBDA0289-5020-1_EN

Setting the parameters:

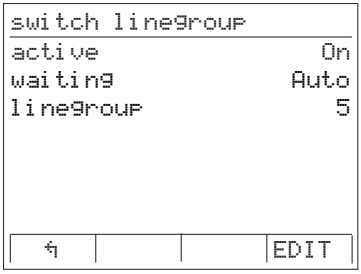




To start a programmed timer program, Enable must be activated and the time range must have been entered (time, date).

	Parameters:	Settings:
1. screen:	Program name	Text input
	ID no.	1 to 65534
	Type	Day/week
	Range start	Time, date
	Range end	Time, date

2. screen:	Enable	Yes/No
	Start time	Time
	End time	Time
	Select day for type: day/week	Sunday to Saturday, individually selectable for type: day
	Select month for type: day/week	January to December, individually selectable
	Selecting an action	
	Switch relay group	On, Off, Auto modes, relay groups 1 to 999
	Tariff switching	HT, LT, Auto/energy type 0–255
	Set limit	Auto, Set/lim. – select Pact/value in kW
	Switch line group	On, Off, Auto modes, line groups 1 to 999
	Set priority	0 to 32, line 1 to 32
	Set target value	Auto, Set modes/1 to 99
	Take no action	Selection not possible



Use the F4 key to configure the selected action.

Action	
active	Corresponds to the selected action
waiting	Corresponds to the selected action
Parameters	Corresponds to the selected action

25832_EDEBDA0289-5020-1_EN

NOTE

The timer programs have a priority order corresponding to their ID no., whereby ID 01 is the most important timer program, then ID 02, etc.

When carrying out an action, timer programs (internal or external) always have priority over bus switching, digital input (manual switching) and device programming.

The device can manage and process up to 10 timer programs. The timer programs are divided into daily programs and weekly programs.

Daily programs:

One or more days can be selected on which the timer program runs. If the time of the final action is before that of the start action or at the same time (e.g. 04:00 am to 04:00 am), the end time will not be reached until the next day (irrespective of the day).

If the time is set to 00:00 am to 23:59 pm, the timer program runs for 24 hours on the same day.

Weekly programs:

The start and end day can be selected. The started function is active until the end day and is repeated in a weekly cycle. If the end day is before the start day (e.g. start day is Friday, end day is Monday), then the program runs, including over the weekend.

NOTE

For all daily and weekly programs, the month in which the program is to be active can also be selected. For example, January, February and December can be chosen, meaning that March to November are excluded.

10.5 Time/date

In the **Time/date** area, you can set the time and date and configure daylight saving time settings.

1. From the **main menu, select Time/date > Enter**.
2. Begin programming by selecting **Edit**.

Time/ date	Programming	Explanation
Time	Numeric value in HH:MM:SS	Defines the time if this is not provided by an external system (eBus).
Date	Numeric value in DD:MM:YYYY	Defines the date if this is not provided by an external system (eBus).
Daylight saving time	AUTO/OFF	AUTO activates daylight savings time automatically according to the data entered for Start and End.
Start	Numeric value from 1–12	Beginning of daylight savings time. The default is **03** (March).
End	Numeric value from 1–12	Beginning of daylight savings time. The default is **10** (October).
Runtime	Numeric value in **DD HH:MM:SS**	Indicates how long the **multimax** is in continuous operation.

25832_EDEBDA0289-5020-1_EN

10.6 Bus parameters

In the **Bus parameters** area, you can set the address of the **KBR eBus**, for example.

1. From the **main menu, select Bus parameters** > **Enter**.
2. If necessary, start a bus scan using **scan**.
3. Begin programming by selecting **Edit**.

If you have selected the protocol Modbus RTU, proceed as follows:

The device will reboot after switching to Modbus.

1. From the **main menu, go to Bus parameters** > **Enter** again.
2. Begin programming the bus address by selecting **Edit**.
3. Select the baud rate and then the protocol type (mode) from (4800, 9600, 19200, 38400 or RTU Parity none, even, odd)

Bus Parameters	**Bus protocol**	**KBR eBus / Modbus**
	Bus address KBR eBus	0 to 9999 configurable on the device, scanning mode
	Bus address Modbus	1 to 247 configurable on the device
	Transmission speed	Can choose 4800, 9600, 19200, 38400 baud
	Protocol type	RTU Parity none, even, odd

25832_EDEBDA0289-5020-1_EN

10.7 Display parameters

In the **Display parameters** area, you can change the LED display settings.

1. From the **main menu, select Display parameters > Enter**.

2. Begin programming by selecting **Edit**.

Display parameters	Programming	Explanation
Contrast	Numeric value in %	Defines the text contrast in relation to the background.
Brightness	Numeric value in %	Defines the brightness of the background lighting.
inverse	**On/Off**	Defines whether dark text is displayed on a light background or light text is displayed on a dark background.
Language	Choice between **German** and **English**	Defines the display language.
Dimming brightness	Numeric value in **%**	Decreases the display brightness to the given percentage.
Dimming time	Numeric value in **min**	Decreases the display brightness as per the given time to the value set under **Dimming brightness**. This makes sense if you want to work on the device for a while and then dim the display to save energy. After dimming, the display returns to its original brightness once a key is pressed.
Version	Number/letter combination	Information on the display version.

3. Test the display for pixel errors with **test**.

4. Press **OK** if the horizontal lines are correctly displayed.

5. Press **OK** if the vertical lines are correctly displayed.

6. Test the function keys by following the instructions on the device.

After pressing all function keys, you are returned to the menu.

25832_EDEBDA0289-5020-1_EN

10.8 Error message parameters

In the **Error message parameters** area, you can set the type of message for different errors.

1. From the **main menu, select Error message param. > Enter**.

2. Begin programming by selecting **Edit**.

Error message param.	Programming	Explanation
Error message parameter type	**Mess., Mess. Rel. + Mess., Off**	**Mess.** simply sends an error message if there is an error of this type. **Mess. Rel. + Mess.** sends a message and activates an error message relay. **Off** triggers no action.

You can find a list of all parameters in the"Error message parameters" menu.

25832_EDEBDA0289-5020-1_EN

10.9 Password / Reset

In the **Password** area, you can define a password to protect the device from unauthorized inputs and reset the password. Here you can also reset the device to factory settings.

1. From the **main menu, select Password > Enter.**
The device displays "Unlocked," meaning the standard value 9999 has not been changed and the device does not require a password to enter data.

2. Begin programming by selecting **Edit**.

3. Enter a four-digit figure as a password.

The device now displays **Lckd**. You now must enter a password when you want to enter data into the device.

When you have unlocked the device with the password, the device will relock itself after a few minutes.

Reset password

You can unlock the device if you no longer require a password.

- Unlock the device using the current password and enter **9999** as a password in the **Password** menu.

The device displays **Unlocked**, meaning the standard value **9999** has been reinstated and the device does not require a password to enter data.

Reset

You can reset the device to factory settings if you no longer need your current settings.

1. Select **Reset.**

2. Select **Edit.**

3. Select **Reset to factory settings.**

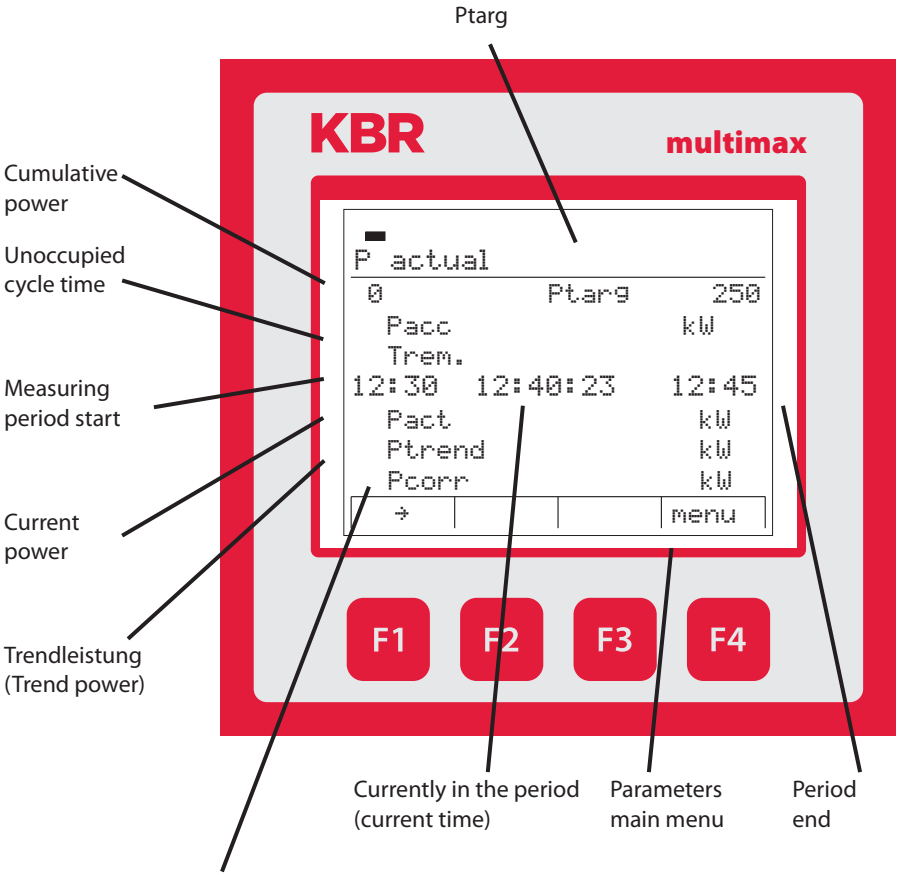
4. Confirm with **YES.**

All of your settings are lost and the device is reset.

25832_EDEBDA0289-5020-1_EN

11 Description of display items

11.1 P current



If this value reaches the value of a configured device, a device is switched off (when compensation value is negative) and switched on (when the compensation value is positive) as per the stage parameters.

11.2 Potential

Power values of all devices that can still currently be switched off

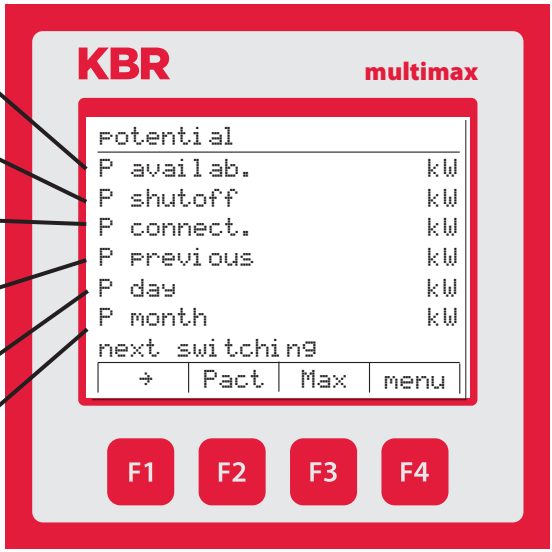
Lines with this power have already been switched off

Lines with this power have been switched off

Power in the previous period (exceeded, target reached, fallen short)

Highest daily period value

Highest monthly period value



Measuring period maximum values: (with respect to the active target value)

Use the F3 key to display the maximum values for target values 1, 2 and 3.

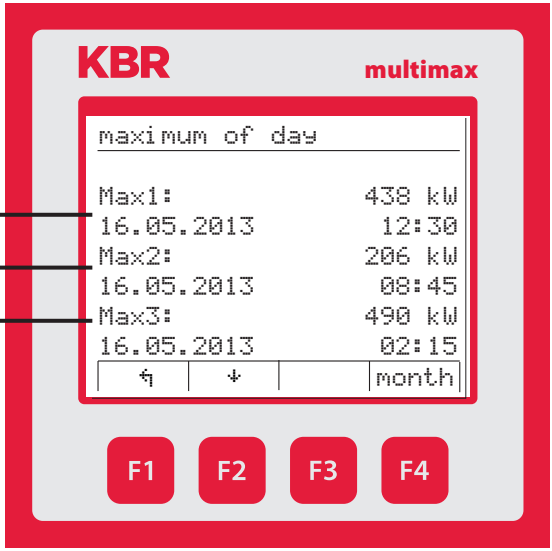
Daily maximum:

Max 1: Value, date, time

Max 2: Value, date, time

Max 3: Value, date, time

Use the F4 key to switch the display from the daily maximum to the monthly maximum values.



25832_EDEBDA0289-5020-1_EN

Monthly maximum:

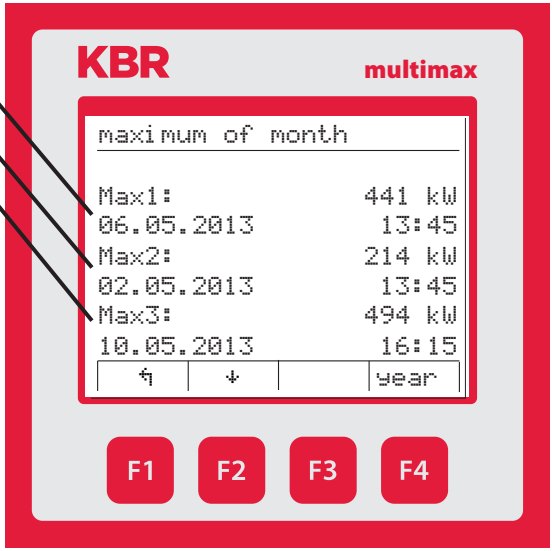
Max 1: Value, date, time

Max 2: Value, date, time

Max 3: Value, date, time

Use the F2 key to display the maximum values from the previous month and other previous months going back 12 months.

Use the F4 key to switch the display from the monthly maximum to the annual maximum values.



Annual maximum:

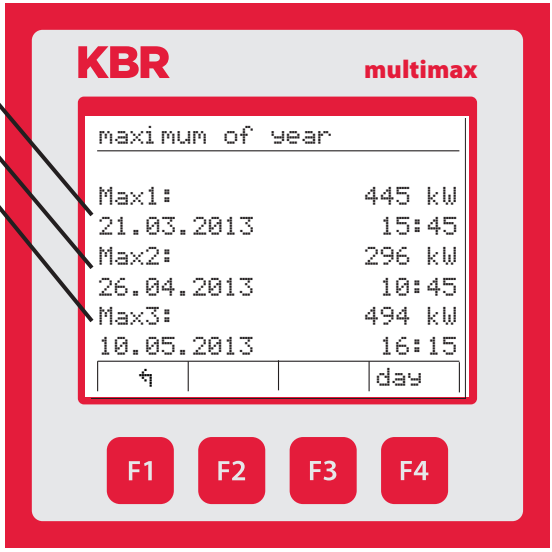
Max 1: Value, date, time

Max 2: Value, date, time

Max 3: Value, date, time

Use the F4 key to switch the display of the annual maximum back to

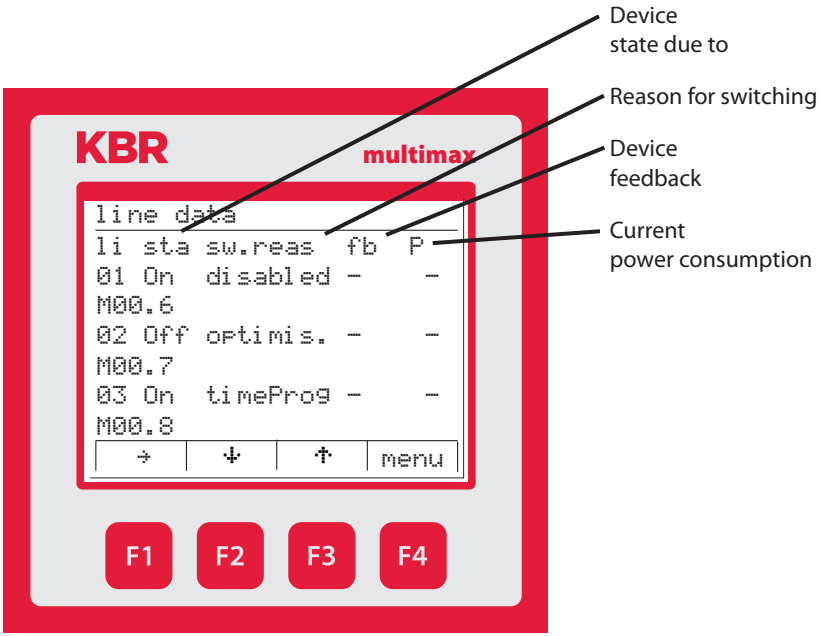
The daily maximum values.



NOTE

If a target value list is being processed, the max. values are registered at target value 1.

11.3 Line data



In the Line data menu, in addition to the items

- Line number (Li)
- Switching output state for the device (Sta)
- Reason for switching (S.reason)
- Device feedback input (Fe) state (if available)

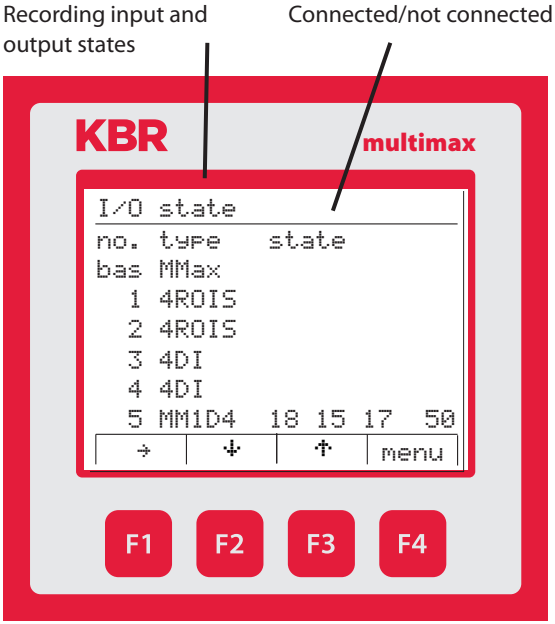
the item

- Current device power consumption (P) (measured using multimess D4-1, if available)

is displayed.

25832_EDEBDA0289-5020-1_EN

11.4 I/O state



Possible messages:

i No pulse at pulse input (low level)

I Pulse detected at pulse input (high level)

o Output passive (relay or pulse)

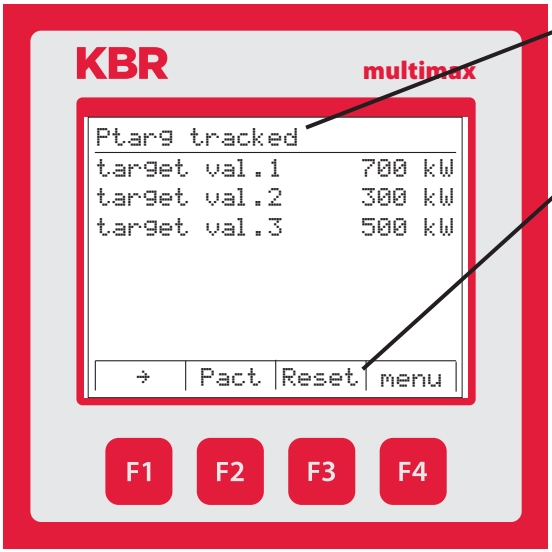
O Output active (relay or pulse)

In the I/O state menu in the additional module multimess D4-1 (if available), the measured current power of the three phases and the total power, as per the configuration of the measurement module, are displayed in the State column.

Example: L1 = 18 kW, L2 = 15 kW, L3 = 17 kW, Ptotal = 50 kW

25832_EDEBDA0289-5020-1_EN

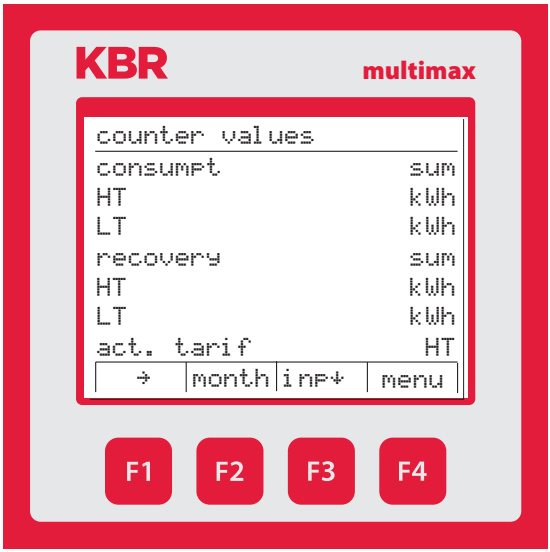
11.5 Tracked Ptarg



Display of the set target values or the tracked target values, if target value tracking is activated

Resets to the configured target value

11.6 Counter values



In the Meter values menu, in addition to the current tariff, the following values can also be displayed:

Total values up to now

Continuous energy meter
Total HT consumption

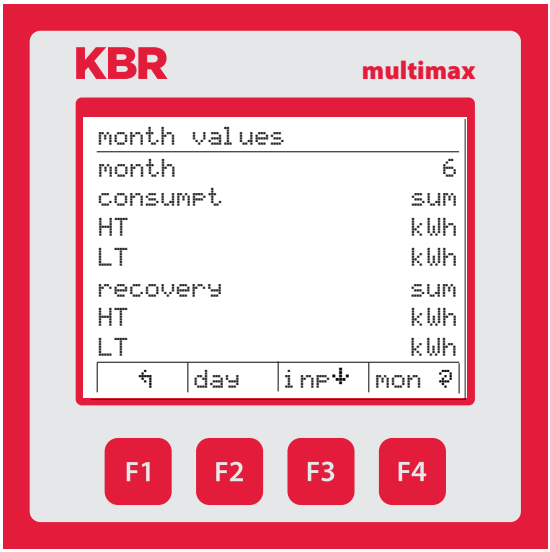
Continuous energy meter
Total LT consumption

Continuous energy meter
Total HT recovery

Continuous energy meter
Total LT recovery

Use the F3 key to display meter inputs meter 1 to meter 5 individually.

Use the F2 key to display



Monthly values – current month

Continuous energy meter
Total HT consumption

Continuous energy meter
Total LT consumption

Continuous energy meter
Total HT recovery

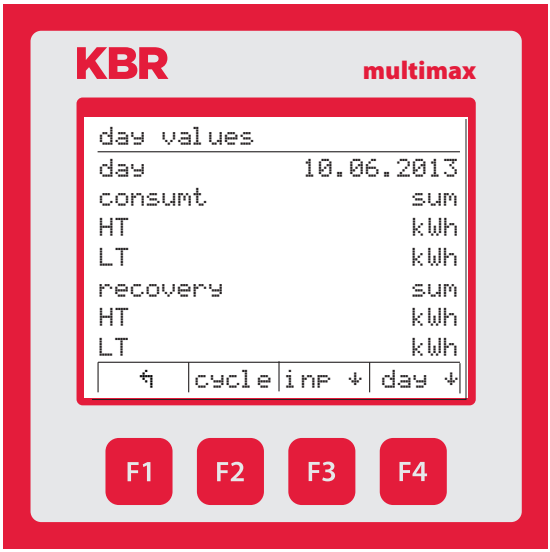
Continuous energy meter
Total HT recovery

Use the F3 key to display meter inputs meter 1 to meter 5 individually.

Use the F4 key to switch from the display of the current month to the previous month.

25832_EDEBDA0289-5020-1_EN

Use the F2 key to display



Daily values

Continuous energy meter
Total HT consumption

Continuous energy meter
Total LT consumption

Continuous energy meter
Total HT recovery

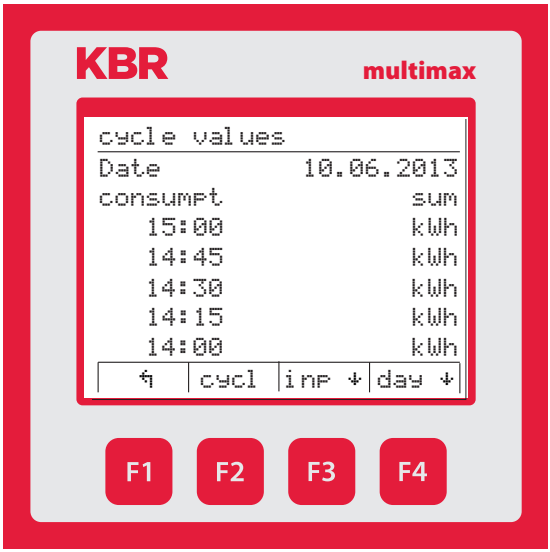
Continuous energy meter
Total HT recovery

Use the F3 key to display
meter inputs meter 1 to meter 5 individually.

Use the F4 key to switch from the display of the current day to the last 30 days, starting with the most recent.

25832_EDEBDA0289-5020-1_EN

Use the F2 key to display



Period values

Period values in period duration grid

Consumption and recovery

Use the F2 key to display the period values, starting with the latest.

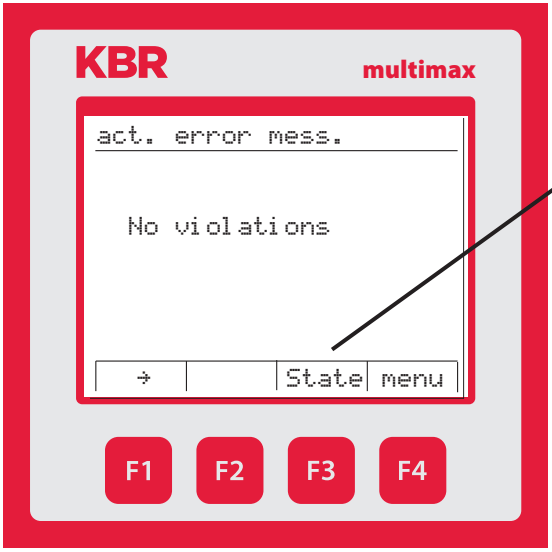
Use the F3 key to

- display meter inputs meter 1 to meter 5 individually.
- Display of respective active target value for the period
- Display of reduced power in the relevant period (saving)

Use the F4 key to switch from the display of the current day to the last 30 days, starting with the most recent.

25832_EDEBDA0289-5020-1_EN

11.7 Current error messages



Active error messages do not have to be acknowledged and disappear when the error is resolved

Messages that have to be acknowledged (Del.)
e.g. lim. violated, power failure

12 Technical Data multimax D6-xxx-5

12.1 Technical data for multimax D6-xxx-5 basic module

12.1.1 Control and display elements

Operation	Pushbutton for reset and scan mode (accessible after housing cover removal)
Control display	6 green LEDs: 5 x input status, 1 x operating status

12.1.2 Device memory

Energy, data and program memory	2 MB flash
Memory type	Ring buffer
Long-term memory for max. 160 days, min. 64 hours, depending on memory configuration	Load profile memory: Maximum of 4*3840 entries; 60 / 30 / 15 / 1 min. interval duration
Event memory	A maximum of 4096 entries to record tariff switching commands, mains failures, error messages etc.
Switching operations memory	Maximum of 2450 entries
Operation logbook	Maximum of 512 entries
Timer programs:	Maximum of 512 entries
Password memory	4-digit code

12.1.3 Power supply

Power supply	US1: 100–240 V ± 10% DC/50/60 Hz
Power consumption	22 VA

12.1.4 Hardware inputs

Digital inputs	As pulse counter input 1 to 5	Digital input for floating contact, S_0 compatible, pulse length ≥ 30ms
	As status input	Digital input for floating contact, S_0 compatible, e.g. to synchronize the measurement interval; pulse length ≥ 250ms
	Voltage supply	27 V/15 mA DC internal

25832_EDEBDA0289-5020-1_EN

12.1.5 Electrical connection

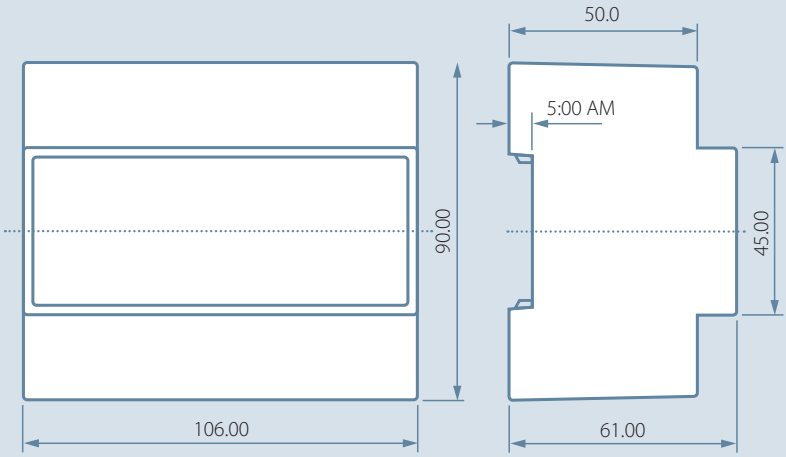
Connection elements		Plug-in terminals
Max. permitted profile of the connecting cables		2.5 mm²
Input power supply	Fuse	max. 1 A slow blow max. C2 automatic isolating switch UL/IEC-approved
KBR eBus and Modbus connection	Connection material	For proper operation, use shielded twisted-pair cables only, e.g. I-Y(St)Y 2x2x0.8
Pulse inputs	Connection and cables	Observe correct polarity!
Synchronous input	Connection and cables	Observe correct polarity!
KBR eBus and Modbus connection	via RS485	Terminal 90 (⊥) Terminal 91 (A) Terminal 92 (B)
Expanded module bus	via RS485	Terminal 93 (⊥) Terminal 94 (A) Terminal 95 (B)

12.1.6 Hardware outputs

Interface	Serial interface	RS 485 for connection to the KBR eBus; a maximum of 32 devices per bus segment, up to 1000 m without bus repeater if placed suitably. For additional information, see KBR eBus installation guide.
	Bus protocol	KBR eBus, Modbus
	Transmission speed	38.400 baud, can be selected on Modbus 4.800, 9.600, 19.200 baud
	Address assignment	Can be addressed up to address number 9999 for KBR eBus; scan mode can be activated on the device
		Bus addresses for Modbus 1 to 247 configurable on the device
Module bus interface	Serial interface	RS 485 (RJ12) for ready-made KBR system cable (6-pin modular cable, unshielded), max. length 30 m if placed suitably
	Maximum DC power output	8 W
Display and configuration interface	Serial interface	RS485 (RJ12)
Relay outputs	Switching stages	5 relays
	Switching capacity	250V (AC) / 2A per relay, potential depending on shared connection - not safe to touch
Alarm relay	Switching capacity	Max. 250 V (AC)/2 A floating – not safe to touch
1 digital output	S_0 compatible	max. 35V / 50mA

12.1.7 Mechanical data and dimensioned drawing of the basic module

Top hat rail device	Housing dimensions	90 x 106 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. 650g



multimax D6-xxx-5

All dimensions are in mm. Not suitable for measurement purposes.

12.1.8 Surrounding conditions / electrical safety

Surrounding conditions	Standards	DIN EN 60721-3-3/A2: 1997-07; 3K5+3Z11; (IEC721-3-3; 3K5+3Z11)
	Operating temperature	K55 (-5 °C …. +55 °C)
	Air humidity	5 % … 95 %, non-condensing
	Storage temperature	K55 (-25°C …. +70°C)
	Operating height	0…2,000 m above sea level
Electrical safety	Standards	DIN EN 61010-1: 2011-07
	Protection class	I
	Overvoltage category	CAT III: Relay CAT II
	Rated surge voltage	4kV
Protection type	Standards	IP20 in accordance with DIN EN 60529: 2014-09
EMC	Standards	DIN EN 61000-6-2:2006-03 + amendment 1:2011-03 DIN EN 61000-6-3:2011-09 + amendment 1:2012-11 DIN EN 61326-1:2013-07

12.1.9 Troubleshooting

No function.

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

No display of pulse inputs (LEDs flash)

Check power supply. Check the correct connection of the input polarity.

12.2 Technical data of the display

12.2.1 Power supply

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

12.2.2 Hardware inputs and outputs

Serial interface	Module bus	RS485 via RJ12 interface
	Baud rate	38400

25832_EDEBDA0289-5020-1_EN

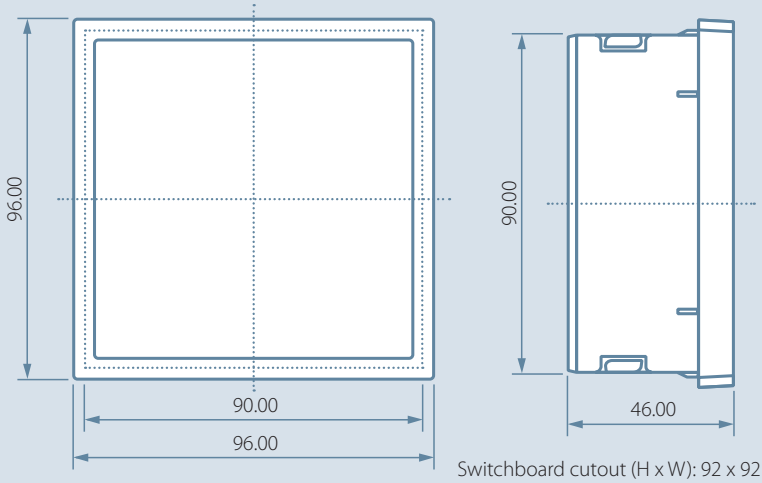
12.2.3 Electrical connection

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

12.2.4 Mechanical data

Switchboard installation	Housing dimensions	96 x 96 x 46 mm (H x W x D)
	Installation cut-out	92 x 92 mm
	Protection type	Front IP 40
	Weight	Approx. 175g

multimax F96-DS



Switchboard cutout (H x W): 92 x 92

All dimensions are in mm. Not suitable for measurement purposes.

25832_EDEBDA0289-5020-1_EN

12.2 General Technical Data for Additional Modules

Power supply:	Via module bus	24 VDC/approx. 2W for multimess 1D4 only for the interface RS485 24 VDC/approx. 0.3 W
	Connection	Modular connector RJ12 6P6C
Module bus interface:	serial interface	RS485
	Module bus connection	RJ12 for ready-made KBR system cable, max. length 30 m when placed suitably
	Transmission speed	38400 Bps
	Bus protocol	KBR module bus

Mechanical data (for all models except for multisio D4-4RO-ISO-1 and multimess D4-1):		
DIN rail measurement device	Housing dimensions	90 x 36 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. 100g

Mechanical data multisio D4-4RO-ISO-1:		
DIN rail measurement device	Housing dimensions	90 x 70 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. 130g

25832_EDEBDA0289-5020-1_EN

Mechanical data multisio D6-4RO-ISO-ES-1:		
DIN rail measurement device	Housing dimensions	90 x 106 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. 200g

Mechanical data multimess D4-1:		
DIN rail measurement device	Housing dimensions	90 x 70 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. 175g

12.3 Serial interface

Operating modes and interface configuration RS 485 bus operation

The multimax's RS485 interface is designed for operation on the **KBR eBus**. You can operate one or several multimax D6-xxx-5 devices together on the **KBR eBus** across great distances. Typically, the bus is connected to the computer via the **KBR eBus TCP** gateway. With the according Windows® Software, all bus devices can be parameterized and visualized. We will be glad to provide information on which other devices you can connect to the **KBR eBus** as well as on the functionality of our software.

Information on the structure and technical parameters of the **KBR eBus** can be gathered from our installation guide for the **KBR eBus**. You are welcome to request this installation guide from us at any time.

12.4 Protective Measures – 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.

25832_EDEBDA0289-5020-1_EN

13 Connecting additional modules

You can expand your **multimax** with the additional modules multisio and multimess. You will find a description of the functions of these devices in the following section.

13.1. Function Description of the Relay Output Module multisio D4-4RO ISO-1

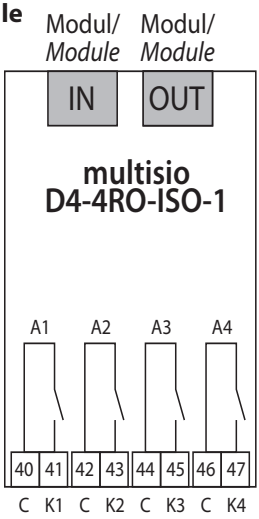
The **multisio D4-4RO ISO-1** hardware supports four floating relay outputs, 5 LEDs and an 8-fold DIP switch.

The relay outputs serve to control contactors of devices or other systems.

The module can be accessed from a base device (**multimax D6-xxx-5, multisio D6-xxx-** or higher, or a computer with **visual energy** via **multisys D2-ESBS-3**) using the module bus interface. The master device has to configure the module.

The operating voltage is supplied via the module bus interface.

13.1.1 Connection Diagram for Relay Output Module



Terminal assignment

Terminal 40: Input relay 1 (A1)

Terminal 41: Output relay 1 (A1)

Terminal 42: Input relay 2 (A2)

Terminal 43: Output relay 2 (A2)

Terminal 44: Input relay 3 (A3)

Terminal 45: Output relay 3 (A3)

Terminal 46: Input relay 4 (A4)

Terminal 47: Output relay 4 (A4)

IN/OUT:
Module bus/power supply

NOTE

The module relay outputs are designed as floating outputs.

13.1.2 Relay output module LED display

In KBR module bus scanning mode, all four output LEDs flash. In module detection mode, the output LEDs generate a chase light effect.

The LEDs represent:

LED1 for: Output relay 1 (A1) switched

LED2 for: Output relay 2 (A2) switched

LED3 for: Output relay 3 (A3) switched

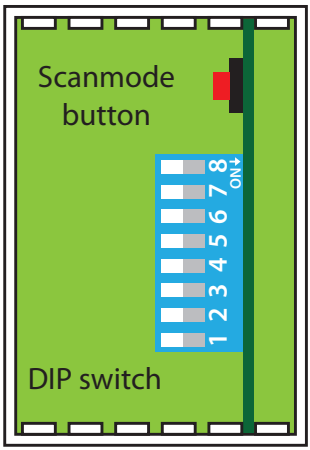
LED4 for: Output relay 4 (A4) switched

Power LED: Operating voltage

13.1.3 Function of Scan button

NOTE

If the scan button is pressed briefly, the module enters scanning mode.



13.1.4 DIP switch functions

Mode of operation:

For every output, the **multisio D4-4RO ISO-1** differentiates between the operating modes
"normal" and "manual." Switching is performed via the DIP switches 5 to 8.

The DIP switches are assigned to the outputs as follows:

- DIP switch 5 determines the operating mode of output 1
- DIP switch 6 determines the operating mode of output 2
- DIP switch 7 determines the operating mode of output 3
- DIP switch 8 determines the operating mode of output 4

If the DIP switch is set to Off, the respective output is in the normal operating mode. If the DIP switch is set to On, the respective output is in the manual operating mode.

Illustrated switch setting:

OFF = white

ON = gray

Normal operating mode

In the normal operating mode, the state created in the module is issued at the corresponding output.

Manual operating mode

In manual operating mode, the state of DIP switches 1 to 4 is issued at the corresponding output instead of the state created by the module. The DIP switches are assigned to the outputs as follows:

- DIP switch 1 determines the state of output 1
- DIP switch 2 determines the state of output 2
- DIP switch 3 determines the state of output 3
- DIP switch 4 determines the state of output 4

If the DIP switch is set to **Off**, the output is passive / off. If the

DIP switch is set to **On**, the output is active/on.

25832_EDEBDA0289-5020-1_EN

13.1.5 DIP Switch Settings

Mode of operation DIP		State DIP		Explanation
S5	Off	- -	- -	Output 1 = normal operating mode
	On	S1	Off	Output 1 = manual operating mode passive / off
			On	Output 1 = manual operating mode passive / off
S6	Off	- -	- -	Output 2 = normal operating mode
	On	S2	Off	Output 2 = manual operating mode passive / off
			On	Output 2 = manual operating mode passive / off
S7	Off	- -	- -	Output 3 = normal operating mode
	On	S3	Off	Output 3 = manual operating mode passive / off
			On	Output 3 = manual operating mode passive / off
S8	Off	- -	- -	Output 4 = normal operating mode
	On	S4	Off	Output 4 = manual operating mode passive / off
			On	Output 4 = manual operating mode passive / off

25832_EDEBDA0289-5020-1_EN

13.2. Function description of relay module multisio D6-4RO ISO-1 with eBus

The multisio D6-4RO ISO-1 with eBus hardware supports four floating relay outputs (changeover relays), 5 LEDs and an 8-fold DIP switch.

The relay outputs serve to control contactors of devices or other systems.

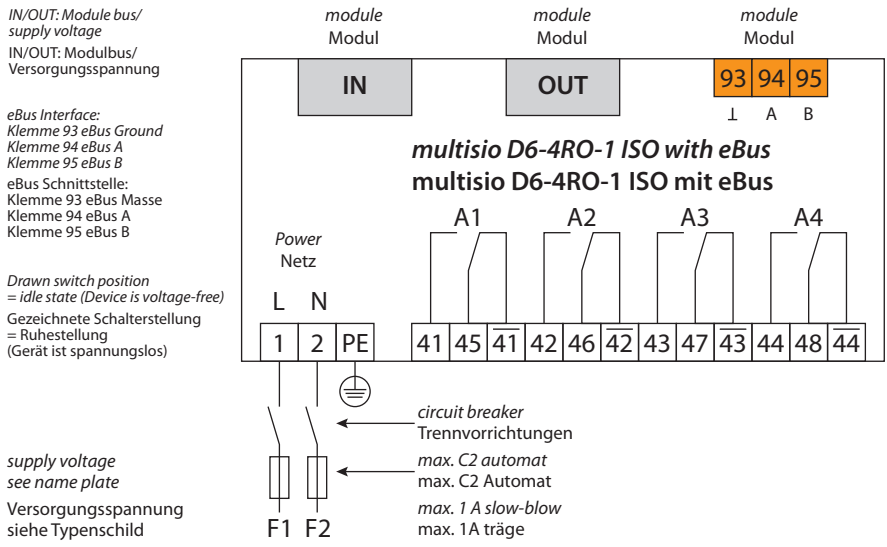
The module can be accessed from a master device (multimax D6-5, multisio D6-7 or higher, or a computer with visual energy via multigate ESBS) using the module bus interface. The master device has to configure the module. The module cannot be used on its own

The bus interface is powered via a power supply (of Ph-N 100V – 240V+/-10% 50Hz/ 60Hz AC or DC) or the module bus interface (24 VDC). The device is equipped with a "power" LED for supply voltage monitoring.

NOTE

The expanded module bus interface (RS 485 serial) also functions as a gateway (implementation of module bus RJ12 on eBus (BSES)).
Prerequisite: Module bus input via RJ12 - connector
eBus output via terminal 93, 94, and 95

13.2.1 Relay Module - Connection Diagram



NOTE

When connecting the phase (L1) to terminal 1 and the neutral conductor (N) to terminal 2 (Ph-N 100V – 240V+/-10% DC/50Hz/60Hz) the safety device and the disconnector in the supply line to terminal 2 (N) are not required.

The safety device and the disconnector to terminal 2 (N) are only required for the following connection variants:

Alternating voltage: Terminal 1 (L1) and terminal 2 (L2):
US1 Phase-Phase 100V - 240V +/-10% 50Hz/60 Hz

Direct voltage: Terminal 1 (+) and terminal 2 (-):
US1 100V - 240V +/-10% DC

13.2.2 Connection Variants of the Supply Voltage

Terminal 1	Terminal 2	Voltage	Safety device and disconnector to Terminal 2 required
		Power supply unit US1	
Phase L	Neutral conductor N	100V - 240V +/-10% AC 50/60 Hz	No
Phase L1	Phase L2	100V - 240V +/-10% AC 50/60 Hz	Yes
+	-	100V - 240V +/-10% DC	Yes

13.2.3 Terminal Assignment:

Mains	Terminal 1:	Phase (L) and DC (+)
	Terminal 2:	Neutral conductor and DC (-)
	Terminal PE:	Protective earth
eBus	Terminal 93:	eBus ground
	Terminal 94:	eBus A
	Terminal 95:	eBus B
Changeover relay A1:	Terminal 41:	NO contact relay 1
	Terminal 45:	Shared connection relay 1
	Terminal $\overline{41}$:	Break contact relay 1
Changeover relay A2:	Terminal 42:	NO contact relay 2
	Terminal 46:	Shared connection relay 2
	Terminal $\overline{42}$:	Break contact relay 2
Changeover relay A3:	Terminal 43:	NO contact relay 3
	Terminal 47:	Shared connection relay 3
	Terminal $\overline{43}$:	Break contact relay 3
Changeover relay A4:	Terminal 44:	NO contact relay 4
	Terminal 48:	Shared connection relay 4
	Terminal $\overline{44}$:	Break contact relay 4

NOTE

The potential at the relay outputs on the module matches the respective input (shared connection) of the relay! (Ph-N 100V - 240V +/-10% DC/50Hz/60Hz)

In scanning mode, all 4 output LEDs are flashing.

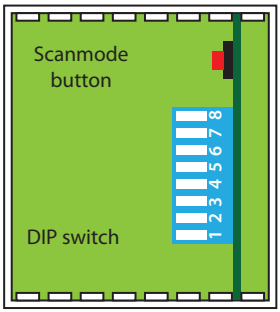
In the module detection mode, the output LEDs generate a chase light effect.

The LEDs represent:

LED 1:	Output relay 1 (A1) switched
LED 2:	Output relay 2 (A2) switched
LED 3:	Output relay 3 (A3) switched
LED 4:	Output relay 4 (A4) switched
LED Power	Operating voltage

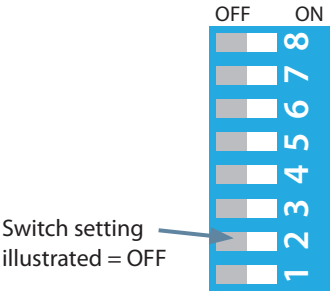
13.2.4 Function of Scan button

If the scan button is pressed briefly (2 to 4 seconds), the module enters the scan mode (module detection mode).



13.2.5 Manual Operation:

Each output can manually be set to active. If the DIP switch for the channel is set to "OFF," the output state is established within the module. If the DIP switch is set to "ON," the state for this output is kept as active, regardless of the state of the output that has actually been determined.



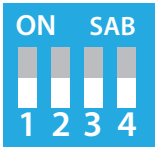
25832_EDEBDA0289-5020-1_EN

Relay state	Output 1		Output 2		Output 3		Output 4	
	DIP S1	DIP S5	DIP S2	DIP S6	DIP S3	DIP S7	DIP S4	DIP S8
automatic	X	OFF	X	OFF	X	OFF	X	OFF
manual passive / off	OFF	ON	OFF	ON	OFF	ON	OFF	ON
manual active / on	ON	ON	ON	ON	ON	ON	ON	ON

X: DIP switch state does not matter

If necessary, the RS-485 interface on the module bus side can be terminated using four DIP switches (terminating resistors are fitted into multisio).

13.2.6 DIP Switch for Terminating RS-485 Interface:



DIP1 and DIP2 ON, DIP3 OFF = failsafe active
DIP1 and DIP2 OFF, DIP3 ON = termination active
DIP1 and DIP2 OFF, DIP3 OFF= no failsafe, no termination
DIP4 is not assigned!

NOTE

The failsafe termination can only be activated once per bus segment!

13.2.9 Technical Data

Hardware inputs		
Power supply	Via module bus	24 V DC / max. 3W
	Connection	Modular connector RJ12:6P6C
	Via network connection	Ph-N 100V - 240V +/-10% 50Hz/60 Hz/DC, max. 25 VA, 13W
		Terminal 1 phase (+)
		Terminal 2 neutral conductor (-)
		Terminal 3 PE
Connection elements	Plug-in terminals	
Permissible cross-section of the connecting cables	Voltage supply 2.5 mm²	
Input control voltage	Fuse max. 1 A slow-blow max. C2 automatic isolating switch UL/IEC-approved	

Hardware outputs		
Module bus interface	Serial interface	RS485
	Module bus connection	RJ12 for ready-made KBR system cable, max. length 30 m when suitably placed Maximum DC power output 7W
	Transmission speed	38400 Bps
	Bus protocol	KBR module bus/eBus
optional	Module bus connection	
	Connection material	
	Connections: eBus via plug-in terminal, 3-pin	Device: Terminal 93 (⊥) Terminal 94 (A) Terminal 95 (B)
	Bus protocol	KBR – module bus / eBus

Continuation of table right

Continuation of table Hardware Outputs

4 relay outputs	2 plug terminals, each 6-pin	
Changeover relay A1:	Terminal 41	NO contact relay 1
Changeover relay A1:	Terminal 45	Shared connection relay 1
Changeover relay A1:	Terminal $\overline{41}$	Break contact relay 1
Changeover relay A2:	Terminal 42	NO contact relay 2
Changeover relay A2:	Terminal 46	Shared connection relay 2
Changeover relay A2:	Terminal $\overline{42}$	Break contact relay 2
Changeover relay A3:	Terminal 43	NO contact relay 3
Changeover relay A3:	Terminal 47	Shared connection relay 3
Changeover relay A3:	Terminal $\overline{43}$	Break contact relay 3
Changeover relay A4:	Terminal 44	NO contact relay 4
Changeover relay A4:	Terminal 48	Shared connection relay 4
Changeover relay A4:	Terminal $\overline{44}$	Break contact relay 4
Contact capacity	500VA each, 2A, 250V 50/60Hz AC	
Overvoltage category	CAT II	
Display	LED	4x message 1x operation display
Control unit	DIP switch	1x 8-fold, for manual operation
		1x 4-fold, for bus termination serial connection RS485
	Button	Scan button (module bus)

Mechanical data		
DIN rail device	Housing dimensions	90 x 108 x 61 mm (H x W x D)
	Mounting type	Wall mounting on DIN rail 7.5 mm deep, in accordance with DIN EN 60715. Suitable for distribution board mounting
	Weight	Approx. 650g

25832_EDEBDA0289-5020-1_EN

12.2.10 Environmental Conditions / Electrical Safety

Surrounding conditions	Standards	DIN EN 60721-3-3/A2: 1997-07; 3K5+3Z11; (IEC721-3-3; 3K5+3Z11)
	Operating temperature	K55 (-5 °C …. +55 °C)
	Air humidity	5 % … 95 %, non-condensing
	Storage temperature	K55 (-25°C …. +70°C)
	Operating height	0…2,000 m above sea level
Electrical safety	Standards	DIN EN 61010-1: 2011-07
	Protection class	I
	Overvoltage category	CAT III
	Rated surge voltage	4kV
Protection type	Standards	IP20 in accordance with DIN EN 60529: 2014-09
EMC	Standards	DIN EN 61000-6-2:2006-03 + amendment 1:2011-03 DIN EN 61000-6-3:2011-09 + amendment 1:2012-11 DIN EN 61326-1:2013-07

25832_EDEBDA0289-5020-1_EN

13.3 Function Description of the Digital Input Module multisio D2-4DI-2

The **multisio D2-4DI-2** hardware is equipped with four digital inputs.

The module detects an input as active if the input is shorted out. An open switch is detected as passive.

Ensure that the polarity is correct when you connect the electronic switches.

The four input LEDs indicate the state of the digital inputs and the power LED indicates whether the power is on or off.

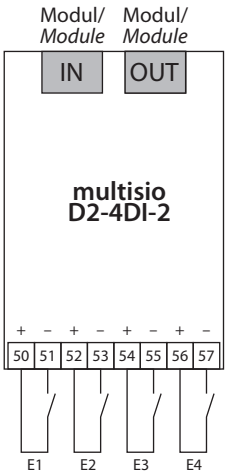
The digital inputs can be used differently, e.g. as state or meter inputs.

The module can be accessed by a master device (**multimax, multisio xD6** (from D6-ESBS-5DI6RO1DO) with a module bus, multicomp with a module bus or via computer with
visual energy via multisys D2-ESBS-3/multisys D2-BSES-3) using the module bus interface. The master device has to configure the module and read out the data acquired by the module for further processing.

The operating voltage is supplied via the module bus interface.
The module cannot be used on its own.

13.3.1 Connection Diagram for Digital Input Module

Terminal assignment



Terminal 50: Digital input 1 +

Terminal 51: Digital input 1 -

Terminal 52: Digital input 2 +

Terminal 53: Digital input 2 -

Terminal 54: Digital input 3 +

Terminal 55: Digital input 3 -

Terminal 56: Digital input 4 +

Terminal 57: Digital input 4 -

IN/OUT:

Module bus/power supply

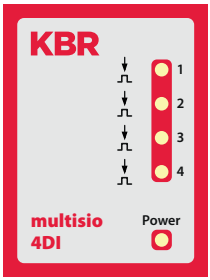
25832_EDEBDA0289-5020-1_EN

13.3.2 Digital Input Module LED Display

In KBR module bus scanning mode, all four input LEDs flash.

In module detection mode, the input LEDs generate a chase light.

The LEDs represent:



LED1 for input 1

LED2 for input 2

LED3 for input 3

LED4 for input 4

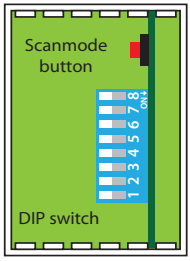
Power LED on:
Operating voltage is applied

The LEDs on the digital input module indicate the current state of the digital input. If the input is active, the LED is on. If the input is passive, the LED is off.

13.3.3 Function of Scan button

NOTE

If the scan button is pressed briefly,
the module enters scanning mode.



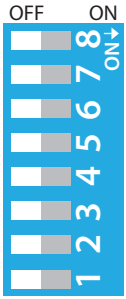
13.3.4 DIP switch functions

Mode of operation:

For every input, the multisio D2-4DI-2 differentiates between the operating modes "normal" and "manual." Switching is performed via the DIP switches 5 to 8.

The DIP switches are assigned to the inputs as follows:

- DIP switch 5 determines the operating mode of input 1
- DIP switch 6 determines the operating mode of input 2
- DIP switch 7 determines the operating mode of input 3
- DIP switch 8 determines the operating mode of input 4



If the DIP switch is set to Off, the respective input is in normal operating mode. If the DIP switch is set to On, the respective input is in manual operating mode.

Illustrated switch setting:

OFF = white

ON = gray

Normal operating mode

In normal operating mode, the current state of the associated input is further processed.

Manual operating mode

In manual operating mode, the state of DIP switches 1 to 4 is further processed, instead of the state of the corresponding input. The DIP switches are assigned to the inputs as follows:

- DIP switch 1 determines the state of input 1
- DIP switch 2 determines the state of input 2
- DIP switch 3 determines the state of input 3
- DIP switch 4 determines the state of input 4

If the DIP switch is set to **Off**, the input state passive/off is further processed. If the DIP switch is set to **On**, the input state active/on is further processed.

13.3.5 DIP Switch Settings

Mode of operation DIP		State DIP		Explanation
S5	Off	--	--	Input 1 = normal operating mode
	On	S1	Off	Input 1 = manual operating mode passive/off
			On	Input 1 = manual operating mode active/on
S6	Off	--	--	Input 2 = normal operating mode
	On	S2	Off	Input 2 = manual operating mode passive/off
			On	Input 2 = manual operating mode active/on
S7	Off	--	--	Input 3 = normal operating mode
	On	S3	Off	Input 3 = manual operating mode passive/off
			On	Input 3 = manual operating mode active/on
S8	Off	--	--	Input 4 = normal operating mode
	On	S4	Off	Input 4 = manual operating mode passive/off
			On	Input 4 = manual operating mode active/on

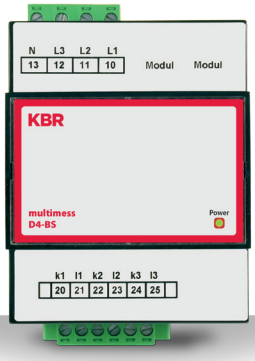
25832_EDEBDA0289-5020-1_EN

13.4 Function description for multimess D4-1 measurement module

The multimess D4-1 is a multimeter for DIN rail mounting.

On the output side, it can measure all typical alternating and direct current parameters of devices.

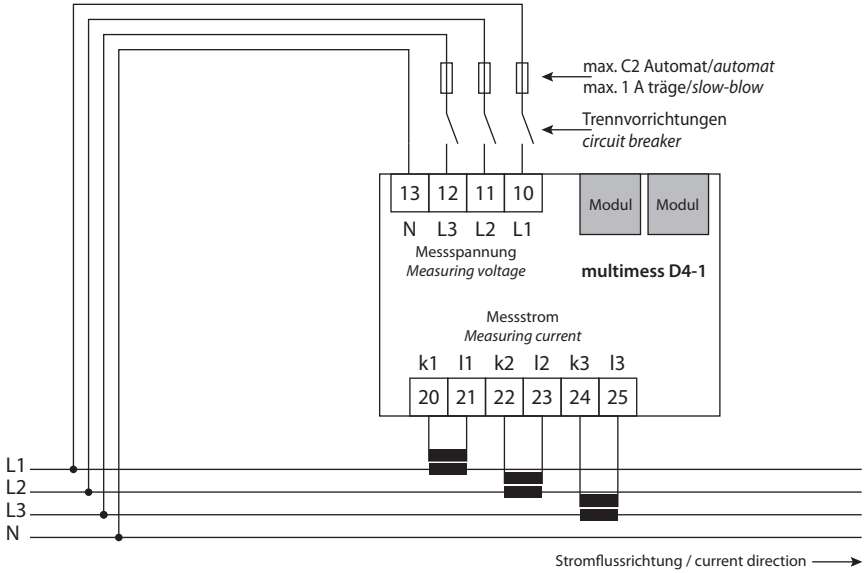
- For busbar assembly (7.5 mm rail)
- Connection to measurement voltage Ph-N 230 VAC
- Measuring-current connection via transformer x/1A or x/5A
- Plug terminal connection 2.5 mm²
- RJ12 module bus connection for supply voltage of the bus interface/ connection of additional measurement modules.
- Recording of current current and voltage values.



13.4.1 Device Installation

The applicable VDE regulations must be observed during installation! Before the device is connected to the power supply, check whether the local power supply conditions comply with the specifications on the nameplate. A faulty connection may destroy the system! The device must be connected in accordance with the connection diagram.

Connections	
Terminals 10–13 (L1, L2, L3, N)	**Measuring voltage.** The power supply of the device is also provided by the measurement 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 measurement inputs for current must be connected via current transformers x/1A AC or x/5A AC. When connecting transformers, pay attention to the current flow direction and the correct assignment of measurement voltage inputs to the current transformers.



13.4.2 Commissioning the multimess D4-1 with Multimax D6-xxx-5

To commission the multimess D4-1 with multimax D6-xxx-5, please proceed as follows:

1. Connect the measurement module to the multicomp D6-xxx-5 via the module bus interface.
2. At the terminals 10 (L1), 11 (L2), 12 (L3) and 13 (N), connect the measurement voltage (the operating voltage of the measurement module).
3. In the multimax D6-xxx-5 main menu, select the sub-menu Module Management to scan for the connected measurement module.
4. Pre-existing modules are displayed, in addition to the menu item "scan."
5. After selecting the menu item "scan," scan mode is activated and the function LED on the measurement module flashes slowly.
6. At the measurement module, the scan sensor button (close to the status LED, flashing green) is unlocked.

25832_EDEBDA0289-5020-1_EN

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

8. The multimax D6-5 basic module now recognizes the measurement module and adds it to the list of connected modules.

13.5 Function Description of the Digital Input Module multisio D2-4AI-2

The hardware of the multisio D2-4AI-2 supports four analog inputs and five LEDs. With its four analog measurement inputs, current values from 0 to 20 mA and voltage values from 0 to 10 V can be measured. The four input LEDs indicate the state of the analog inputs and the power LED shows whether an operating voltage is present. The operating voltage is supplied via the module bus interface

13.5.1 Analog Input Module - Connection Diagram

IN/OUT: Module bus/power supply

Terminal assignment

Terminal 70: Analog input 1 +

Terminal 71: Analog input 1 -

Terminal 72: Analog input 2 +

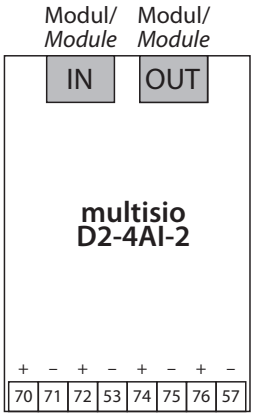
Terminal 73: Analog input 2 -

Terminal 74: Analog input 3 +

Terminal 75: Analog input 3 -

Terminal 76: Analog input 4 +

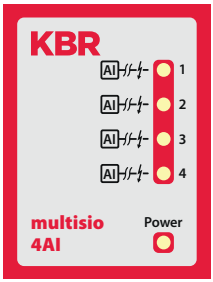
Terminal 77: Analog input 4 -



13.5.2 Analog input module LED display

In the scan mode of the KBR module bus, all 4 input LEDs flash.
In module detection mode, the input LEDs flash in sequence.

The LEDs represent:



LED1 for input 1

LED2 for input 2

LED3 for input 3

LED4 for input 4

Power LED on:
Operating voltage
is applied

The LEDs on the module with 4 digital inputs turn on when an analog input signal is detected and the measured values are within the set limits. The LEDs go out if no analog encoder is connected or if the encoder is short-circuited. The LEDs flash if the value exceeds or falls below a limit.

NOTE

For operation at the multisio D6...x (D6-ESBS-5DI6RO1DO-5 and higher) base device, the module is always set up for 0-20 mA/0-10 V, meaning that the LEDs of inputs 1-4 are always on.

The multisio D6...x base device makes the conversion to 4-20 mA/2-10 V.

25832_EDEBDA0289-5020-1_EN

13.5.3 Scan button function

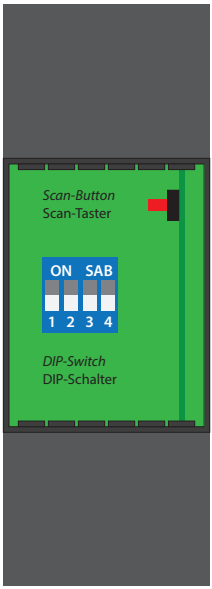
NOTE

If the scan button is pressed briefly, the module enters the scan mode.

Illustrated switch setting:

OFF = white

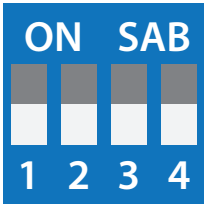
ON = gray



13.5.4 DIP switch function:

Switching inputs 1 to 4:

Switch set to OFF:	Switch set to ON:
S1 = 0 / 2 – 10V	S1 = 0 / 4 – 20mA
S2 = 0 / 2 – 10V	S2 = 0 / 4 – 20mA
S3 = 0 / 2 – 10V	S3 = 0 / 4 – 20mA
S4 = 0 / 2 – 10V	S4 = 0 / 4 – 20mA



ON = grau

13.6. Function Description of Analog Output Module multisio D2-2AO

The multisio D2-2AO module is a modular component that can be connected to an existing system. The module can be connected directly to the multimax basic module (from multimax D6). This basic module supplies the module with the necessary operating voltage and communicates through the module bus using the double analog output module. If the double analog output module is operated directly on the KBR eBus, then a separate multisys D2-ESBS gateway must be provided for the module.

The multisio D2-2AO hardware supports 2 analog outputs, 5 LEDs, an eightfold DIP switch and a button to start scanning.

LEDs 1 and 2 display the output level of the analog outputs. If the LEDs are on continuously, the output level lies between 80% and 100%. The shorter the "on" time of the LEDs, the lower the output level (if the lengths of the flashes vary, see description of test operation).

At its outputs, the module provides a voltage of 0 to 10 volts or a current of 0 to 20 mA, in accordance with the configuration made via module bus.

For the analog outputs, the following values are given as typical:

Current output: Load max. 400 ohms

Voltage output: Load min. 1,000 ohms

The analog outputs are each connected through a dipolar connector plug.
The connectors are marked with "+" and "-" signs. The analog outputs are not electrically isolated from each other.

It is possible to switch between normal and test operation using the DIP switches.

The power LED shows whether the operating voltage is present.

25832_EDEBDA0289-5020-1_EN

13.6.1 Analog Output Module – Connection Diagram

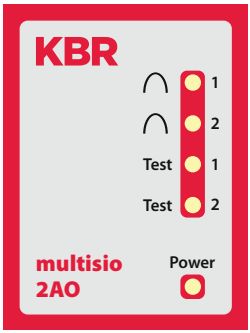
IN/OUT: Module bus/supply voltage

Terminal Assignment

Terminal 60: Analog output 1 +
Terminal 61: Analog output 1 -
Terminal 62: Analog output 2 +
Terminal 63: Analog output 2 -

13.6.2 Analog Output Module – LED Display

In KBR eBUS scan mode, all four output LEDs flash. In the module detection mode, the output LEDs generate a chase light effect.



The displays are:

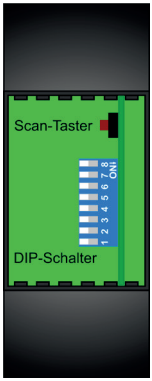
LED 1 for output 1 (analog value)
LED 2 for output 2 (analog value)
LED 3 for output 1 (test operation)
LED 4 for output 2 (test operation)

Power LED on: Operating voltage present

13.6.3 Function of Scan Button

NOTE

If the scan button is pressed briefly until the LEDs flash quickly, the module enters scanning mode.

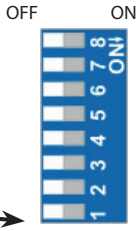


13.6.4 Function of the DIP Switches:

Normal and Test Operation:

It is possible to switch between normal and test operation using the DIP switches.

Switch setting illustrated = OFF



13.6.5 The individual DIP switches signify the following:

Switch	Off	On
1	Channel 1: normal operation	Channel 1: test operation
2	Channel 1: 0 V to 10 V (in test operation)	Channel 1: 0 mA to 20 mA (in test operation)
3	Channel 2: normal operation	Channel 2: test operation
4	Channel 2: 0 V to 10 V (in test operation)	Channel 2: 0 mA to 20 mA (in test operation)

In test operation, DIP switches 5 to 8 indicate the analog value output as a percentage.

Switch	Meaning in Test Operation
5	10% of the analog end value (in test operation, for both channels)
6	20% of the analog end value (in test operation, for both channels)
7	30% of the analog end value (in test operation, for both channels)
8	40% of the analog end value (in test operation, for both channels)

The analog output value and mode of operation should be set first. Following that, the DIP switch should first be set to test operation. The output value for this channel will then be saved and output. In this way, it is possible to assign an individual output value to each channel. Changes to the operating mode and value output will be discarded until the normal/test switch is set to test operation.

LEDs 1 and 2 display the analog value of the respective output channels. For this purpose, the LEDs are controlled by flashing. The speed of the flashes shows the analog output value. The rhythm of the flashes is divided into 20% stages. If the LED is on for 20% of the time, the output value is < 20%. If the LED is on continuously, the output value is > 80%. In between, the time during which the LED is on is increased in 20% increments.
LED 3 is switched on if output 1 is in test operation.

LED 4 indicates the test operation of channel 2.

25832_EDEBDA0289-5020-1_EN

Notes

25832_EDEBDA0289-5020-1_EN

25832_EDEBDA0289-5020-1_EN

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25832_EDEBDA0289-5020-1_EN