KBR
Energy Management

User manual
Technical parameters

multicomp

5D6-ESBSDS-1V1C6RO

System | English

Your partner for network analysis

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1 Introduction

Thank you for choosing this KBR quality product.

In order to familiarize yourself with the operation and configuration of the device, we recommend that you read this manual thoroughly, so that you are able to make use of the entire range of functions of this high-quality product.

The individual chapters serve to explain the technical details of the device and show how to avoid damage by means of proper installation and commissioning.

1.1 User manual

This user manual describes the device version multicomp 5D6. This user manual must be accessible for the user at all times (e.g. in the switchgear cabinet). Even when the device is resold to third parties, the manual remains part of the device.

Although we used the utmost care in assembling this user manual, we would like to thank you in advance for notifying us about any errors or ambiguous descriptions you might notice.

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1.2 Explanation of safety relevant symbols

This user manual contains notes that must be observed for your personal safety and to avoid damage to equipment. These notes are identified by a warning sign or information symbol, depending on the degree of hazard they represent.

Warning

"Warning" means that death, major injuries or damage may occur in case the appropriate safety measures are not taken.

Caution

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

Note

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

Disclaimer

The content of this user manual has been carefully reviewed in terms of the hardware and software described. Certain deviations, however, cannot be excluded, and the manufacturer is not liable for complete conformity. The specifications made in this user manual are checked on a regular basis, necessary corrections will be included in the next revision.

1.3 Safety notes

In order to prevent operating errors, operation of this device is kept as simple as possible. This way, you will be able to quickly start working with the device.

In your own interest, however, you should read the following safety notes carefully. During assembly, the applicable DIN / VDE regulations must be observed!

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

To avoid fire and electrical shock, the device must not be exposed to rain or humidity!

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

Caution

A faulty connection can lead to the destruction of the device!

When connecting the device, observe the connection chart (see chapter “Connection chart”) and make sure that no voltage is applied to the connection lines. Only use proper wiring material and observe the correct polarity when wiring!

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

A visibly damaged device must generally be considered unfit for use and disconnected from the power supply!

Error detection, repair and maintenance work may only be carried out in our facilities or after contacting the service team. Unauthorized opening of the device voids any warranty. Correct operation can no longer be guaranteed!

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

In systems subject to hazard of lightning, lightning protection must be provided for all input and output lines!

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1.4 Product liability

You have acquired a high-quality product. In its production, KBR only uses components of the highest reliability and quality.

Each device is subject to long-term testing before it is delivered.

Regarding product liability, we refer you to our general terms and conditions for electronic equipment, which you can find at www.kbr.de .

The warranted characteristics of the device only apply for operation in accordance with its intended use!

1.5 Disposal

Defective, outdated or no longer used devices must be properly disposed of.

At your request, we will dispose of the devices for you.

1.6 Overvoltage and lightning protection

It is recommended to install overvoltage protection measures to protect our high-quality devices from damage. We also recommend to protect control voltage inputs and pulse lines, if required.

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2 Connection of the multicomp 5D6

2.1 Installation and assembly

- During installation, the applicable VDE regulations must be observed.
- Before connecting the device to the power supply, check whether the local power supply conditions comply with the specifications on the nameplate. A wrong connection may destroy the device. A different grid frequency influences the measurement accordingly.
- The device must be connected in accordance with the connection chart.
- In systems susceptible to lightning, lightning protection must be provided for the power supply input.

Caution

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

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

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

Note

The following points must be observed when connecting the device:
- Energy flow direction
- Assignment of measuring voltage input / current transformer input

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

  Prerequisite is that energy is consumed.

- **Assignment - measuring voltage input / current transformer input:** The current transformer on terminal 20/21 (k1/l1) must be assigned to the phase of the measuring voltage for terminal 10 (L1).

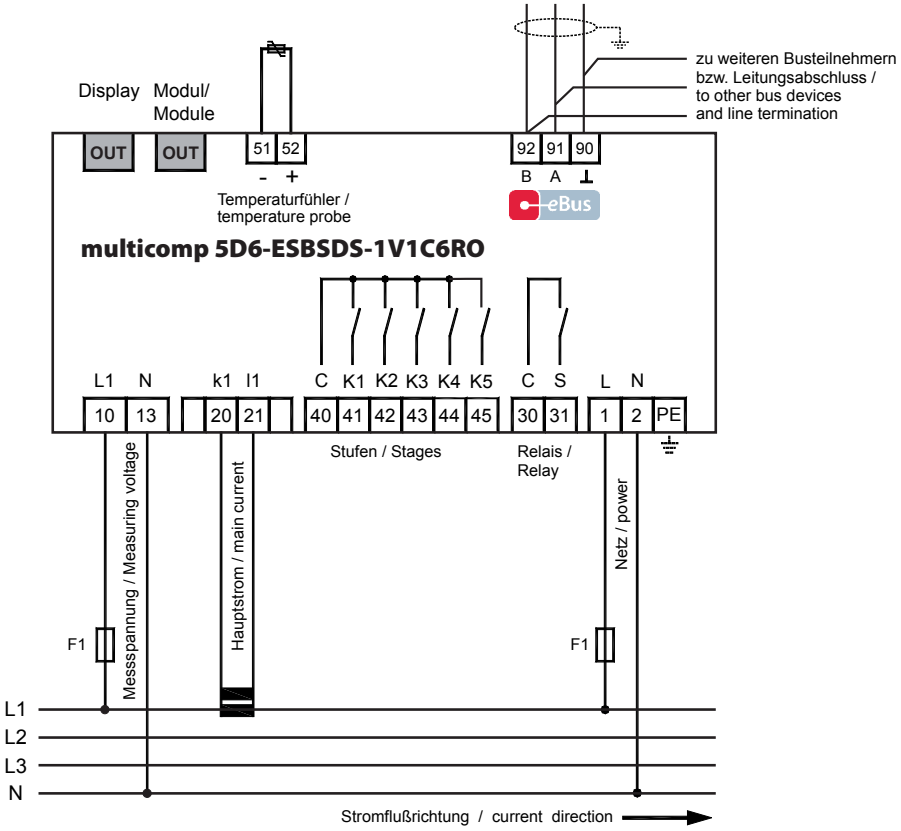
  - If connection and energy flow direction are correct, the device will display positive current values.

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

Caution

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

2.2 Connection chart



Caution

The coil voltage for the capacitor contactors and the measuring voltage have to be drawn from the same phase, as only the measuring voltage is monitored (to protect the contactors from direct resetting in case of short-term monophase power failure).

2.3 Terminal assignment

Terminal	
1 (L) and 2 (N):	**Power supply connection** A control voltage is required to supply the device with power. The unit is equipped with a multi range power supply and may be supplied by voltages of 85 – 265V AC/DC (see nameplate for device voltage).
10 (L1,Lx): **13 (N,Ly):**	**Measuring input for voltage** Voltage measurement both as PH-N and PH-PH measurement. Direct measurement for 100... 500...600V AC. Measuring ranges are configurable. Exceeding the measuring range results in an error message. For higher voltages, connection via a voltage transformer is necessary (medium voltage measurement x/100 V), with a measuring range from 500V to 30.0 KV Ph-Ph.
20 (k1) and 21 (l1)	**Measuring input for current** The measuring input for current must be connected via a current transformer x/1A AC or x/5A AC. When connecting the transformer, pay attention to the energy flow direction and to the correct assignment of measuring voltage input to the current transformer.
30 (C) and 31 (S):	**Floating relay contact** This contact serves as a message or alarm output. During operation, an acoustic signal or visual message may be activated, or a consumer shut down. The contact is open as long as the device is de-energized and if a message is active. Maximum switching capacity of 2A at 250V AC
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.

Terminal:	
41 (K1) to 45 (K5):	**Floating relay contacts** These contacts are used as control outputs for the capacitor contactors. The contacts are opened if the device is de-energized and for stages not hooked up. Maximum switching capacity of 2A at 250V AC
51 (-) and 52 (+):	**Temperature sensor input** A temperature sensor, e.g. PT1000, can be connected to this input to measure the switchgear cabinet temperature. Temperature measuring range of – 20°C to 100°C +/- 2°C.
90 (earth): **91 (A)** **92 (B)**	**Interface connection** For communication on the eBus or Modbus

2.4 Inserting or replacing backup battery

The device is equipped with an internal data memory, which is battery buffered to preserve long-term data. To prevent it from being discharged, the backup battery (e.g. Varta CR 2032) is not built in when the device is delivered, but included separately in the delivery.

Caution

Before initial start-up of the device, please insert the backup battery (as described in the following), as otherwise, all stored data would be lost in case of a power failure.

1. Disconnect the device from the supply voltage.
2. Lift the upper housing cover with a suitable tool (e.g. a small screwdriver).
3. When replacing a battery, remove the empty battery from the clamping bracket with the tool.
4. Push the new battery into the clamping bracket and make sure that it is inserted correctly and has the right polarity.

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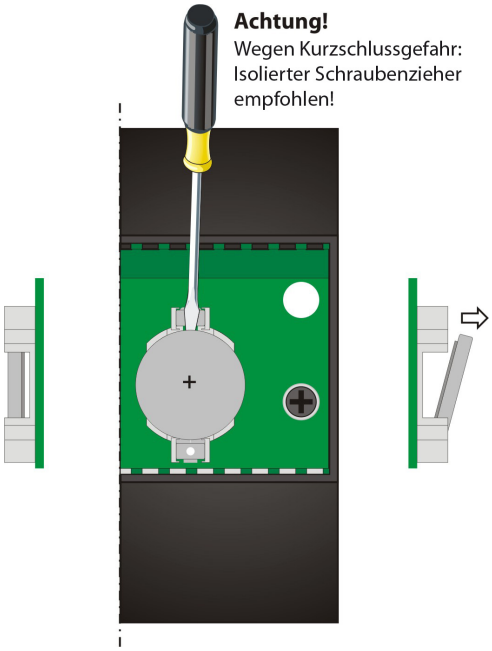
5. Put the upper housing cover back on and click it into place by pushing.

6. Reconnect the device to the supply voltage.

Caution

As, when the battery is empty or removed and there is no supply voltage, not only the storage data are lost but the time is not correct anymore either, the time has to be reset in visual energy with the corresponding command!



Caution

To prevent short circuits, it is recommended to use an insulated screwdriver!

3 Commissioning guideline for the multicomp 5D6

This guideline helps you to correctly start up the **multicomp 5D6** compensation controller. It provides you with step-by-step instructions to help you find the options relevant for you within the manual.

To begin with, there are two cases in which the commissioning procedure for the **multicomp 5D6** differs.

Case 1: You have bought a complete compensation system from **KBR**, with the controller already installed. If this is the case, certain settings are already preconfigured in the controller.

Case 2: You only bought the controller, or the controller with additional modules (**multisio 2D2-1T2RO, multisio 2D2-4RO, multisio 1D2-4CI** and **multimess 1D4**) and individual capacitor stages, but the device is not assembled. In this case, the controller is delivered with the default settings (refer to chapter Default settings) and has thus not been preconfigured.

3.1 Controller not preconfigured

If a controller not configured is to be commissioned, the following procedure has to be performed step by step.

1. Configuring additional modules (**multisio 2D2-1T2RO, multisio 2D2-4RO, multisio 1D2-4CI** and **multimess 1D4**)

If there are no additional temperature, relay or induced current measuring modules, this step can be skipped. To configure additional modules, connect them and the supplied bus line to the basic module. The additional modules can then be activated individually in scan mode, which has to be triggered via the basic module's operating panel and the DIP switches or scan buttons on the additional module. If the compensation system controls several cabinets, the correct cabinet assignment has to be set up.

Detailed instructions for this step are given in chapter Settings under Submenu Modules / display.

2. Configuring current transformer values

For the compensation controller to function properly, all current transformer parameters have to be set correctly. Primary and secondary current of the transformer have to be set. These parameters can be read on the nameplate of the current transformer. In addition, the phase allocation of the transformer has

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to be set correctly. This means that the phase (L1, L2, L3) in which the current transformer is integrated has to be set up in the controller.

Detailed instructions for this step as well as additional information on this topic are given in chapter Commissioning under Submenu Transformer settings.

3. Setting target cosine:

For information on the target cosine to be set up at this point, contact your energy supplier. The target cosine is by default set to 0.95 inductive (see chapter Default settings).

Detailed instructions for this step as well as additional information on this topic are given in chapter Commissioning under Submenu Target cosine.

4. Configuring the capacitor stages

There are two ways of configuring the capacitor stages. The stages can be configured manually or using the auto configuration mode (a connected current measuring module is required).

The most important setting to pay attention to is the stage power. The stage power can be looked up on the nameplate of the stage or the circuit diagram and then programmed manually. The auto configuration mode automatically sets this value. However, the value has to be checked and confirmed each time the auto configuration mode is applied.

Detailed instructions for the auto configuration mode are given in chapter Extra ➔ Commissioning ➔ Stages ➔ Stage ➔ Auto configuration mode.

After the stage power has been configured, you have to set the detuning factor. This factor can be read on the circuit diagram cover sheet or the nameplate of the stage.

If the compensation system consists of several cabinets, the cabinet assignment should be adjusted accordingly.

Detailed instructions for this step are given in chapter Commissioning under Submenu Stages.

5. Function test

After all values have been configured, a function test should be performed. To do so, the controller has to be taken off the voltage supply for a few seconds.

After re-connecting it to the voltage supply, the controller has to start automatically. If the cosφ voltage is read out in the cosφ momentary menu immediately after switching it on, the value for cosφ should be low and

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inductive. After approx. 180 seconds, the controller starts switching on the individual capacitor stages.

The cosφ, which can be read out in the cosφ momentary menu, should have risen in comparison with former values, or it should rise when switching on additional stages. If the compensation unit is dimensioned correctly, the controller should compensate the set target cosine after a certain period of time.

3.2 Controller not preconfigured

If a controller already integrated into a KBR compensation unit by default is to be used, only the parameters of the current transformer have to be configured.

1. Configuring current transformer values

For the compensation controller to function properly, all current transformer parameters have to be set correctly. Primary and secondary current of the transformer have to be set. These parameters can be read on the nameplate of the current transformer. In addition, the phase allocation of the transformer has to be set correctly. This means that the phase (L1, L2, L3) in which the current transformer is integrated has to be set up in the controller.

Detailed instructions for this step and additional information on this topic are given in chapter Commissioning under Submenu Transformer settings.

2. Function test

After all values have been configured, a function test should be performed. To do so, the controller has to be taken off the voltage supply for a few seconds.

After re-connecting it to the voltage supply, the controller has to start automatically. If the cosφ voltage is read out in the cosφ momentary menu immediately after switching it on, the value for cosφ should be low and inductive. After approx. 180 seconds, the controller starts switching on the individual capacitor stages.

The cosφ, which can be read out in the cosφ momentary menu, should have risen in comparison with former values, or it should rise when switching on additional stages. If the compensation unit is dimensioned correctly, the controller should compensate the set target cosine after a certain period of time.

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IMPORTANT SAFETY INFORMATION

Caution

For the following programmed stage powers, the discharge times are automatically predefined. However, these must be checked and corrected if they differ from the capacitor specifications.

Capacitor power	Discharge resistance	Discharge time
2.5 kvar–7.5 kvar	300 kOhm	60 seconds
10 kvar–17.5 kvar	300 kOhm	120 seconds
20 kvar and over	300 kOhm	180 seconds

4 Functions of the controller in the secureC safety and maintenance concept

Caution

These functions are available with the current measuring module multisio 1D2-4CI and the energy measuring module multimess 1D4!

Information on password protection of secureC can be found in chapter 5.13.2.3 Service submenu.

4.1 Stage resonance frequency monitoring

A stage is only locked from further use if it enters the critical range (resonance frequency) due to loss of capacitance. In the display, the respective stage will be identified by an X.

Caution

You can unlock the stage in the submenu Mode of the Stage administration menu.

If the stage is locked (due to loss of capacitance), do NOT activate the learning mode but exchange the defective capacitor!

1. Evaluating the resonance frequency:

a) **Detuning 5.5%, 7% or 8% (5th harmonic is critical)** If the resonance frequency is below 111% of the 5th harmonic, the **warning threshold** is exceeded.
If the resonance frequency is below 107% of the 5th harmonic, the **alarm threshold** is exceeded.

b) **Detuning 12.5% or 14% (3rd harmonic is critical)** If the resonance frequency is below 104% of the 3rd harmonic, the **warning threshold** is exceeded.

If the resonance frequency is below 103 % of the 3rd harmonic, the **alarm threshold** is exceeded.

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When the

warning threshold is exceeded, a message (E28 Capacitance loss) is displayed (**warning threshold** if induced current approx. 35% too low)

alarm threshold is exceeded, a message (E28 Capacitance loss) is displayed (**alarm threshold** if induced current approx. 45% too low)

If loss of capacitance can still be detected after five more attempts at switching on a stage, the respective stage is locked from further connection and the message **E30 Stage locked** is displayed.

4.2 Current consumption and performance monitoring of stages

Caution

Monitoring is only performed when switching on or off additional stages!

If a stage is detected to be defective (**E26 Capacitor current too high or E 28 Capacitance loss (capacitor current too low))**, a message is displayed. Limiting condition is the stage pattern of the stages created.

The error message **E27 check fuse** is displayed if the current consumption of the system (the cabinet in which the measurement is performed) does not change when a stage is switched on.

If the value does not change when a stage is switched off, the message **E29 Contactor defective** (stuck) is displayed.

4.3 Current consumption and performance monitoring of complete cabinets

Current consumption monitoring of individual cabinets is an important safety function.

The current consumption is measured in the cabinet, with a **multisio 1D2-4CI** current measuring module or a **multimess 1D4** energy measuring module. Each cabinet is monitored individually. Current consumption values which are too high or too low are taken into account.

Function with too high power consumption:

The cabinet is permanently monitored. The intervals between the measurements vary according to the number of connected modules (measurement intervals: 50 to 500 ms).

If the power consumption in a cabinet is too high, the stages in this cabinet are switched off one after the other until either all stages in the cabinet are switched off or the power consumption is within limits again.

Settings:
The settings can be changed in the menu Extra => Settings => System => Parameters => Limits => Lim U => Lim +Ie.

Possible settings:
Permissible limit violation between 110% and 200% of rated current
Monitoring of limit violation active or off

Action in case of an error:
Only alarm relay switches
Only the compensation stages are switched off
The alarm relay switches and the compensation stages are switched off
No action, just a message via KBR eBus

In case of an error, an additional message is displayed on the LCD.

Example: E31 Lim Ie violated, cabinet No.: 2

For **3-phase** induced current monitoring, **a current measuring module** is required **for each cabinet**.

Using **monophase** induced current monitoring, **one current measuring module can be used to monitor 4 cabinets**. In this case, the cabinet assignment of the current measuring module is equivalent to the first input of the current measuring module.

Example: Current measuring module assigned to **cabinet 1**:

Input 1	=	cabinet 1
Input 2	=	cabinet 2 etc.

Current measuring module assigned to **cabinet 2**:

Input 1	=	cabinet 2
Input 2	=	cabinet 3 etc.

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Function with too low power consumption:

Settings: The settings can be changed in the menu Extra => Settings => System => Parameters => Limits => Lim U => Lim +Ie.

Possible settings: Permissible limit violation between 0% and 90% of rated current
Monitoring of limit violation active or off

Action in case of an error: Alarm relay switches
No action, just a message via the KBR eBus

In case of an error, a message is displayed but **no stages are switched off.**

4.4 Temperature monitoring of stages

The overtemperature stage switching performance is as follows:

1.) Reducing the cabinet temperature if the alarm threshold is exceeded (prerequisite: at least 2 cabinets)

When the alarm temperature is exceeded and a dwell time of 3 minutes has elapsed, the device tries to replace the stage with an equivalent stage (same stage power, detuning and type (thyristor / contactor)) from a cabinet with lower temperature. After a dwell time of another 3 minutes, the device tries to replace the next stage.

If the cabinet temperature falls under the alarm temperature (not yet below hysteresis limit), no further stage is replaced. (the hysteresis is not working!)

2.) Temperature as selection criterion when switching stages on or off

If the alarm temperature has been exceeded in a cabinet, the temperature is used as a criterion for selecting the stage to be switched.

If several stages with the same stage power and detuning factor are available, the stage with the higher cabinet temperature is preferred for switching off.

For **switching on**, the stage with the lowest cabinet temperature is preferred.

The temperature is only used as a selection criterion if the alarm temperature is exceeded, as otherwise the stage "circuit switching" does not work anymore.

3.) Emergency shut-down

If the switch-off temperature is exceeded, only one stage is switched off at first. The next stage is not switched off until a dwell time of 2 minutes has elapsed.

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If the temperature falls below the switch-off temperature (not yet below hysteresis), no other stages are switched off. On the other hand, no stages of this cabinet are switched on as long as the temperature does not fall below the hysteresis threshold.

As soon as the temperature falls below the hysteresis threshold, the stages in this cabinet are released for compensation.

The default settings are:

Operating point fan = 28 °C / hysteresis = 5 °C

Operating point alarm = 45°C / hysteresis = 5 °C

Operating point overtemperature = 50 °C / hysteresis = 5°C

This means that the fan switches on when 28°C are exceeded and switches off again when the temperature drops below 23°C. The overtemperature alarm is triggered when 45°C are exceeded and is reset when the temperature drops below 40°C. The overtemperature stage switch-off is activated when 48 °C are exceeded. After the temperature has dropped below 43 °C, the stages are, if required, hooked up again after the discharge time has elapsed.

The overtemperature switch-offs for the individual stages are added together for subsequent determination whether there are temperature problems and, if so, in which cabinet.

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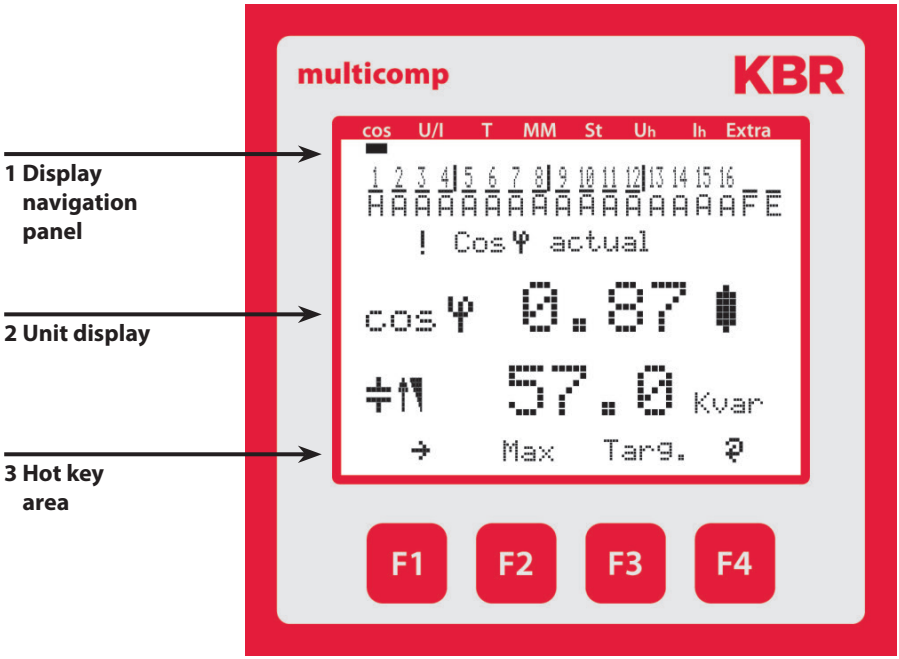
5 Control and display panel



5.1 Description of buttons and displays

1 Display navigation panel

The navigation panel shows the main menu selected, considerably simplifying operation of the device.
The operator can immediately see which 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 respective function keys and is used to issue messages and text. The interaction of key and accompanying display enables convenient and self-explanatory operation.

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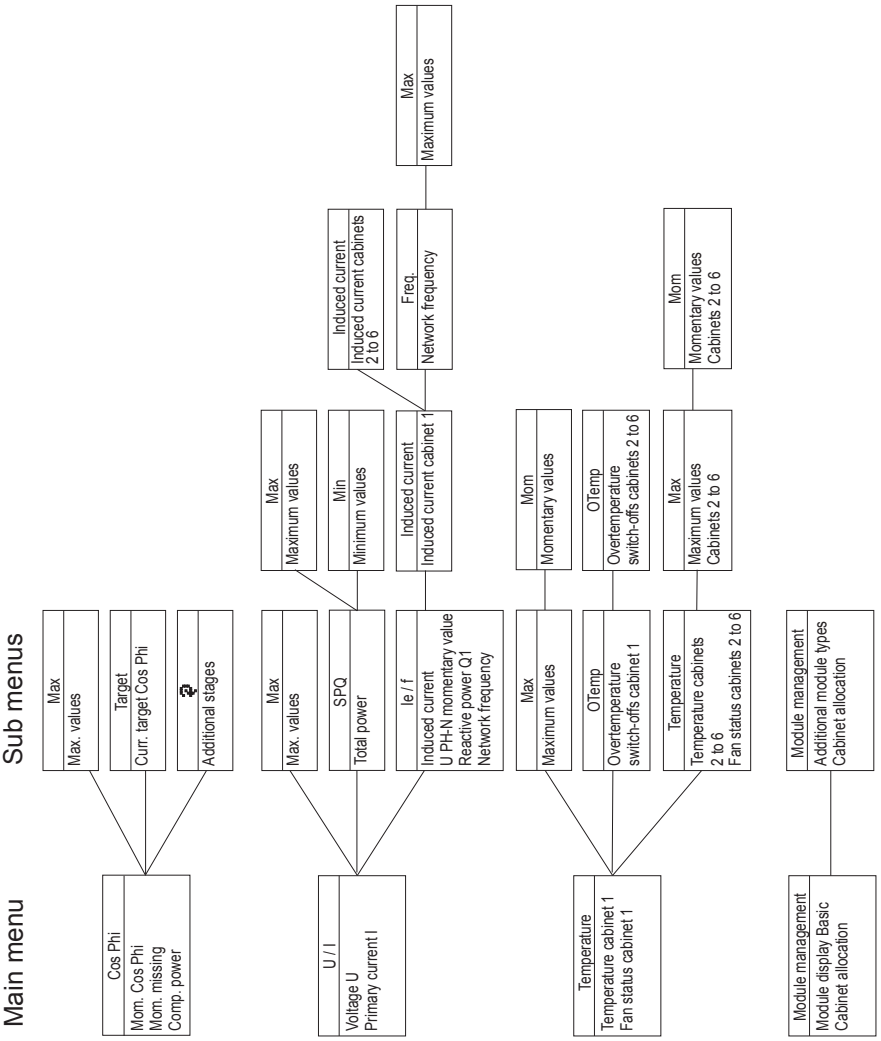
5.2 Navigation and device displays



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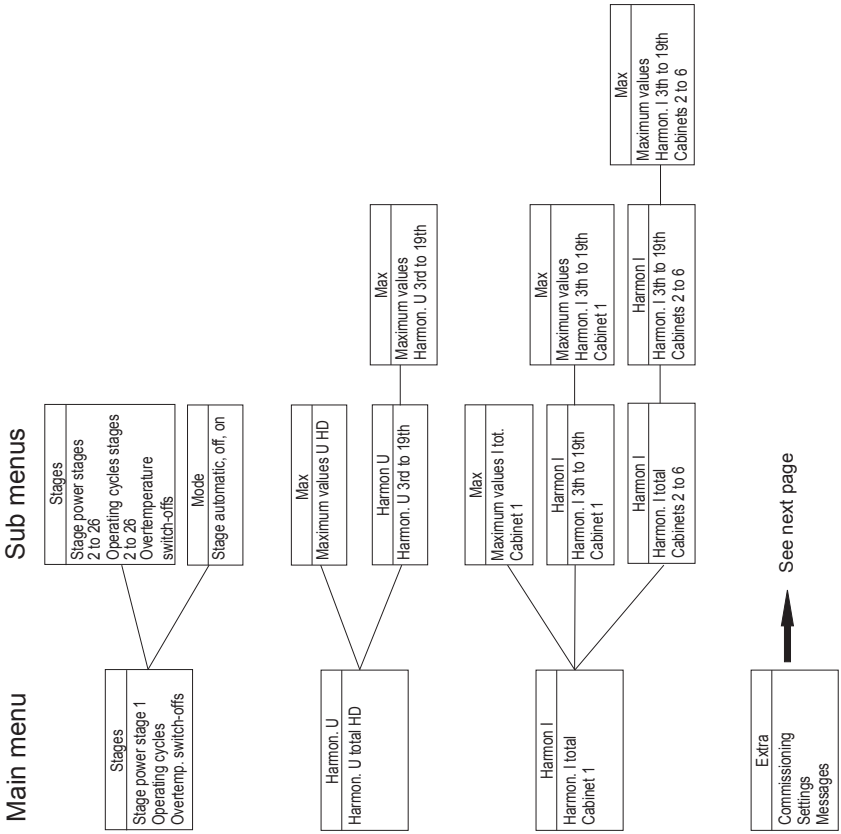
Main menu
Sub menus
Stages
Stage power stage 1
Operating cycles
Overtemp. switch-offs
Stages
Stage power stages 2 to 26
Operating cycles stages 2 to 26
Overtemperature switch-offs
Mode
Stage automatic, off, on
Harmon. U
Harmon. U total HD
Max
Maximum values U HD
Harmon. U
Harmon. U 3rd to 19th
Max
Maximum values Harmon. U 3rd to 19th
Harmon I
Harmon. I total
Cabinet 1
Max
Maximum values I tot. Cabinet 1
Harmon I
Harmon. I 3th to 19th Cabinet 1
Max
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Harmon I
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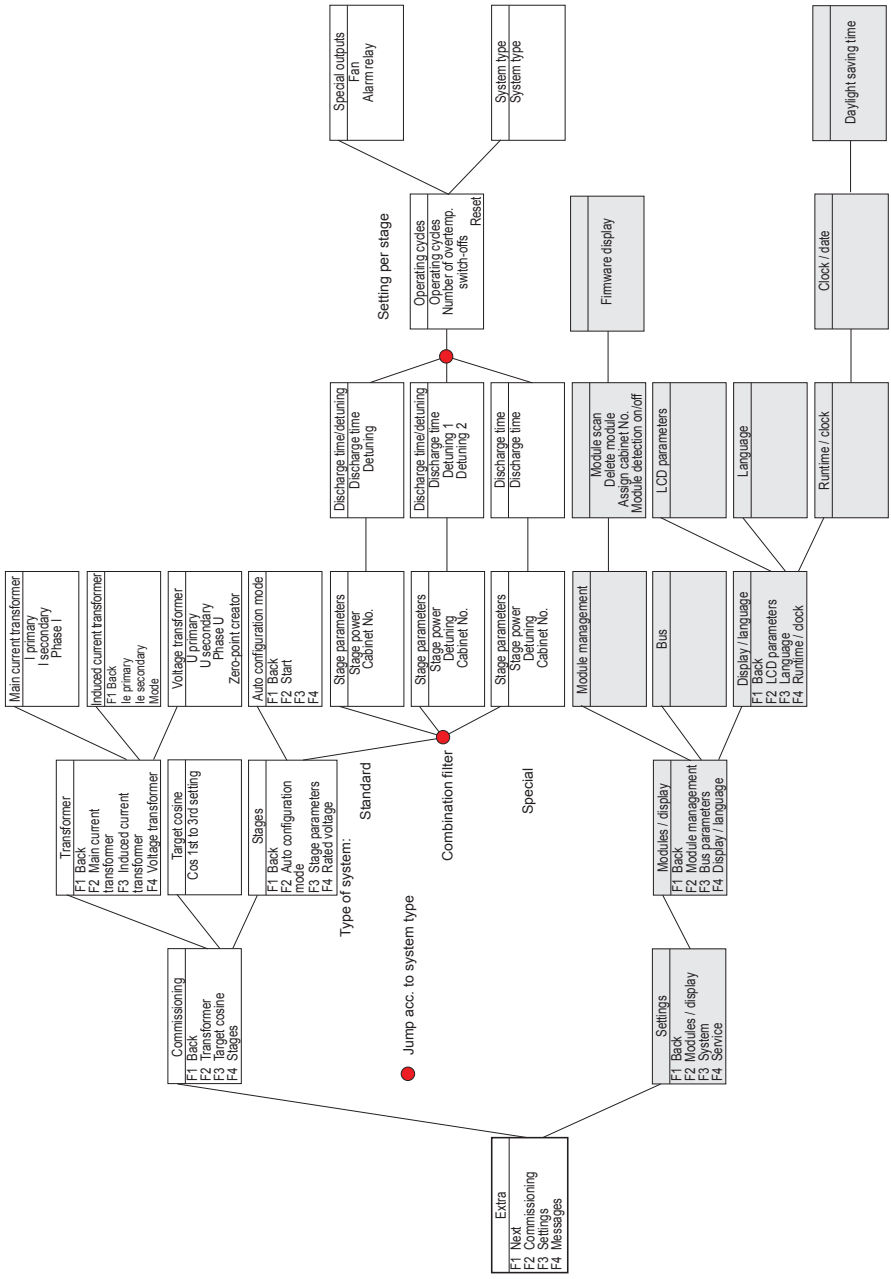
Cabinets 2 to 6
Harmon I
Harmon. I 3th to 19th Cabinets 2 to 6
Max
Maximum values Harmon. I 3th to 19th Cabinets 2 to 6
Extra
Commissioning
Settings
Messages
See next page


Extra
F1 Next
F2 Commissioning
F3 Settings
F4 Messages
Commissioning
F1 Back
F2 Transformer
F3 Target cosine
F4 Stages
Settings
F1 Back
F2 Modules / display
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F4 Service
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F3 Stage parameters
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F4
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Stage parameters
Stage power
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Cabinet No.
Stage parameters
Stage power
Detuning
Cabinet No.
Module management
Bus
Display / language
F1 Back
F2 LCD parameters
F3 Language
F4 Runtime / clock
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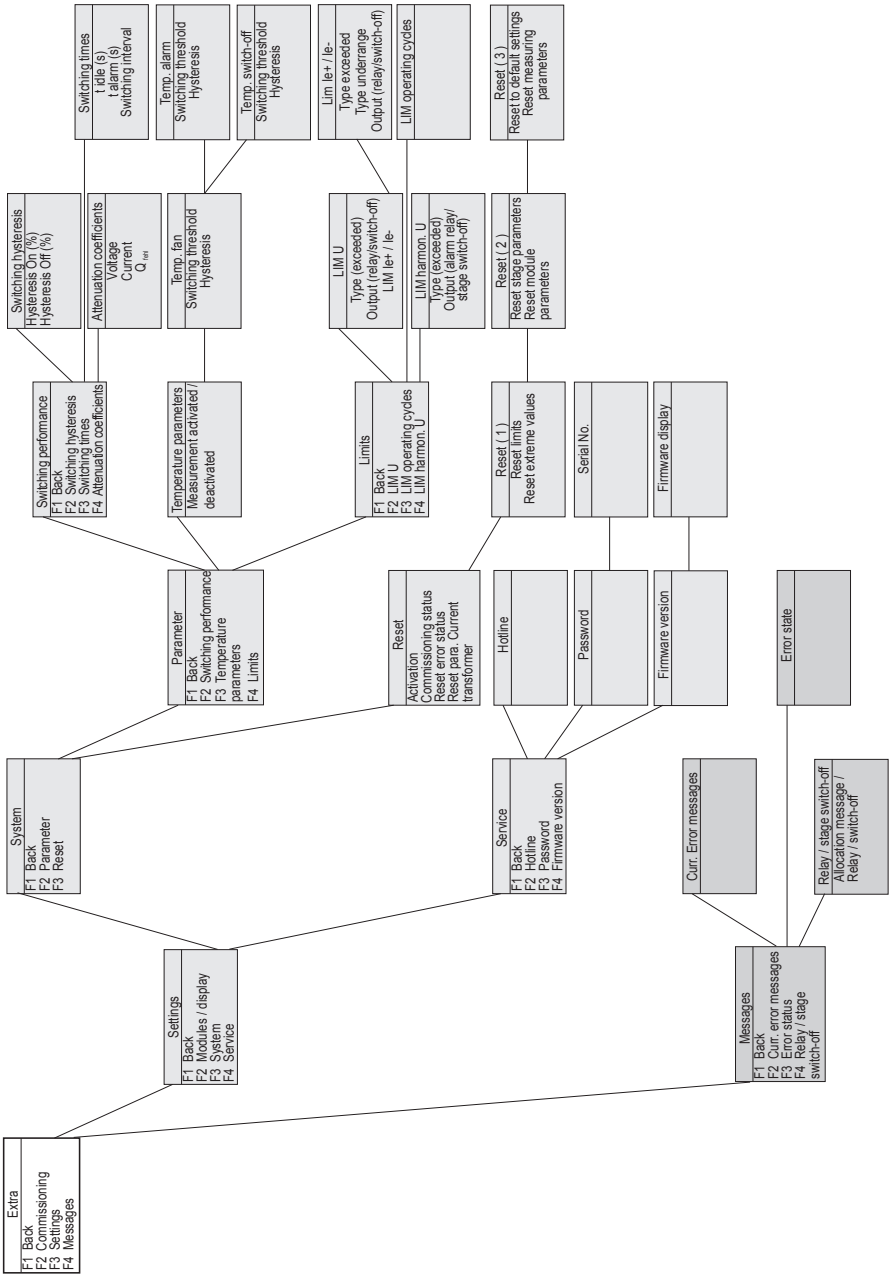
Combination filter
Special
Jump acc. to system type
Setting per stage
Discharge time/detuning
Discharge time
Detuning
Discharge time/detuning
Discharge time
Detuning 1
Detuning 2
Discharge time
Discharge time
Operating cycles
Operating cycles
Number of overtemp. switch-offs
Reset
Special outputs
Fan
Alarm relay
System type
System type
Firmware display
Module scan
Delete module
Assign cabinet No.
Module detection on/off
LCD parameters
Language
Runtime / clock
Clock / date
Daylight saving time



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Definition of terms:

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

⅄	Star voltage
⍙	Delta voltage
⍐	Inductive
⍗	Capacitive
↑	Switch on
↓	Switch off
→	Scroll through main menu or submenu
↰	Return
↓	Submenu or parameter selection
+	Value input
?	Selection
⍜	Energy recovery (generator operation)
!	Warning message
✎	Edit
⍀	Switching (make or break)
⍋	Maximum value
⍒	Minimum value
Max	Display and processing of maximum values
Mom	Display of momentary values
Para	Return for configuration
EDIT	Perform configuration
cosϕ	Fundamental power factor
cosPhi	Fundamental power factor
Target	Target cosine phi currently set
U ph-n	Voltage phase / neutral conductor
I ph-n	Current phase / neutral conductor
Ie	Induced current of the compensation unit
Freq	Grid frequency
PΣ	Active power – total (3-phase)

SPQ Σ	Apparent power / active power / reactive power - total (3-phase)
Harm. U	Voltage harmonics (distortion factor)
Harm. I	Current harmonics (distortion current strength)
Lim	Limit value
DF	Attenuation coefficient
Module	Module management
YES	Confirmation to save configuration
NO	Discard configuration
SCAN	Scan mode (search mode) for module search and eBus address assignment
Mode	Switching mode of stages
Firmware	Operating software of the measuring module or display module
Setup	Device configuration
Mess.	Error messages and error state
Displ.	Operating system of display module
1ph	monophase (for induced current measurement)
3ph	three-phase (for induced current measurement)
Basic para	Basic parameters (submenus)
S→	Expansion cabinets 2 to 6
]|[U	Measuring voltage transformer prim./sec.
]|[I	Main current transformer prim./sec.
Learn	Learning function stage power
Bus	Bus parameters
LCD	LCD parameters (display module)
Dfact	Attenuation coefficient (switching interval stages)
Lan.	Language of text display (display module)
Code	Password protection
Reset	Reset function extreme values and configuration
Temp	Enable temperature measurement
Serv	Customer service address

Operating messages for individual switching stages:


= switching stage number
= stage is switched off
= in automatic operation mode


= switching stage number
= stage is switched off
= and no stage power configured


= switching stage number
= stage is switched on
= in automatic operation mode


= no compensation stage (other mode)
= switched off
= fan


= switching stage number
= stage is switched off
= in manual operation


= no compensation stage (other mode)
= switched on
= fan


= switching stage number
= stage is switched on
= in manual operation


= no compensation stage (other mode)
= not switched (no fault)
= alarm relay


= switching stage number
= stage is switched off
= and not available


= no compensation stage (other mode)
= switched, i.e. fault exists
= alarm relay

Settings:

Damping (DC)	=	Reduction of the display fluctuations; the measuring cycle of the controller is not influenced
Idle time (t-idle)	=	Starts at compensation; after the idle time has expired, the next switching action follows
Alarm delay (t-alarm)	=	Concerns the FTS message ("facility too small"), i.e. all stages are hooked up, but the set alarm CosPhi is not reached. After the set time has expired, an alarm message is issued
Hysteresis (Hyst.)	=	Refers to the smallest available stage power and the overcompensation or undercompensation, i.e. the hooking up or switching off starts at the percentage set
Switch damping	=	The time set defines the interval between two switching actions.
Operating cycle limit	=	When the set value is reached, a message is issued. This value is based on the details from the contactor manufacturer.
Switch-off threshold (Lim-U)	=	Overvoltage switch-off to protect the facility, i.e. switching off the stages starts when the set limiting value is exceeded (hysteresis = 1% of the measurement voltage)
Switch-off threshold LIM Ie +	=	Overcurrent limiting value in induced current measurement
Switch-off threshold LIM Ie -	=	Undercurrent limiting value in induced current measurement

5.3 Setting range of the parameters configurable:

Primary voltage	1 V to 9999 kV Ph-Ph
Secondary voltage	100 V to 500 V Ph-Ph
Primary current	1 A to 99.99 kA
Secondary current	1 and 5 A
Rotary field U	L1N, L2N, L3N, L12, L23, L31
Rotary field I	L1, L2, L3, -L1, -L2, -L3
Consumption target cosφ	ind. 0.80 to cap. 0.80
Recovery target cosφ	ind. 0.80 to cap. 0.80
FTS alarm cosφ	ind. 0.50 to cap. 0.50
Current attenuation coefficient	0 to 6
Voltage attenuation coefficient	0 to 6
Attenuation coefficient Q_{miss}	0 to 6
Idle time	0 to 300 sec.
Alarm relay time	0 to 3000 sec.
Hysteresis connection	70 to 150 %
Hysteresis disconnection	70 to 150 %
Switching interval	0 to 10 sec.
Operating cycle limit	0 to 99990
Cabinet No.	1 to 6
Stage power	0 bis 999.9 kvar inductive or capacitive
Discharge time	0 to 900 sec.
Detuning	0, 5.5, 7, 8, 12.5, 14 %
Stage switching mode	Automatic, manual off, manual on
Harmonics monitoring	0 to 99%, deactivatable
Overvoltage switch-off	dependent on primary voltage
Overcurrent switch-off	110% to 200%
Undercurrent switch-off	0 to 90%
THD limit	0 to 10%
Operating point fan	0 to 70°C / hysteresis = 0°C to 25°C
Operating point alarm	0 to 70°C / hysteresis = 0°C to 25°C
Operating point overtemperature	0 to 70°C / hysteresis = 0°C to 25°C
Scanning frequency	Automatic, fixed 50 Hz, fixed 60 Hz
Password	No password (9999, meaning all functions are accessible)
Language display	German / English
Contrast setting	60% to 100%

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5.4 Device configuration

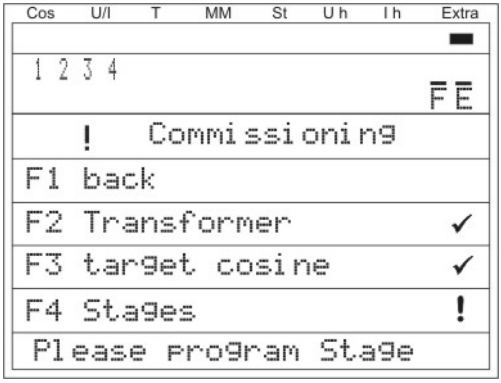
The menu navigation of the **multicomp 5D6** is self-explanatory.

The operator is guided and supported by the device through operating instructions displayed for the respective situation. The following terms are available for programming:

Para	Return for configuration
EDIT	Perform configuration
↓	Submenu or parameter selection
+	Value input
?	Selection
YES	Confirmation to save configuration
NO	Discard configuration
↰	Return

5.5 Start menu Commissioning

If the **multicomp 5D6** is being commissioned for the first time, the menu Extra / Commissioning is displayed as the start screen (after the initialization phase) after setting up the supply voltage for the **multicomp 5D6**.

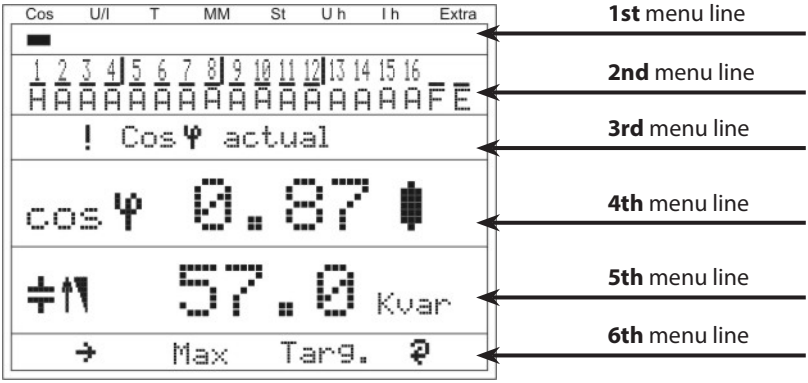


This display is used for the **Initial commissioning** of the controller, where all the necessary settings can be made.

Note

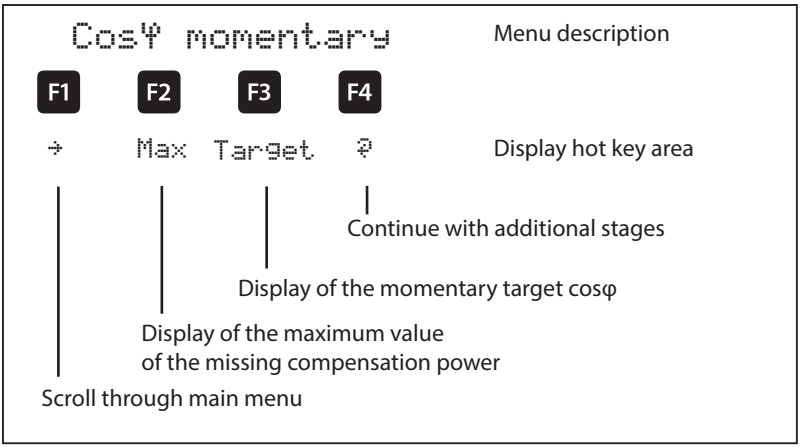
These settings are described in detail in the menu item Extra / Commissioning

5.6 Main menu Cosφ



The display is divided into various menu lines. The number of lines depends on the main menu or submenu item selected:

1st menu line:	Shows which of the eight main menus is being displayed
2nd menu line:	Status display of the output lines; modules are identified by vertical lines
3rd menu line:	Description of the menu and messages currently displayed
4th+**5th** menu line:	Value display for the current menu
6th menu line:	Navigation in the menu displayed



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Display as example:

Main menu:	= cosφ momentary
Stage switching mode:	= Stage 1 manual mode on Stages 2 to 12 automatic mode on Stages 13 to 16 automatic mode off
Fan:	= on
Alarm relay:	= on
Error message:	= exists (!)
Menu description:	= cosφ momentary
Measured cosφ:	= 0.87 inductive
Switching on / off:	= Switching on, since capacitor power is missing
Missing compensation power	= 57.0 kvar
Additional modules	= existing ( )

By pressing the F2 button, you can display the **maximum value of the missing compensation power**.

The value is displayed in kvar, with time and date stamp. The value is only displayed if all available stages are switched on and the configured alarm CosPhi is not reached when the set alarm delay time has elapsed.

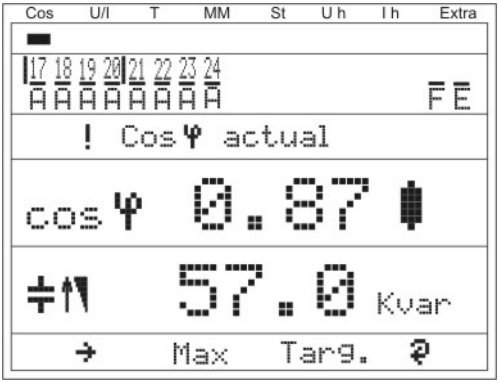
The respective value is a maximum value (maximum indicator function) accumulated during the alarm delay time.

As soon as the value is entered, the status message
E12 facility too small is displayed in the Messages submenu with a **time stamp and kvar specification**.

Note

The value displayed here is the **mean value of the set alarm delay time**. I.e. **this** value and the **maximum value of the missing compensation power** can be different.

After pressing the F4 (⚲) button, the following is displayed in the hot key area:



Display as example:

Main menu:	= cosφ momentary
Stage switching mode:	= Stages 17 to 24 automatic mode on
Fan:	= on
Alarm relay:	= on
Error message:	= exists (!)
Menu description:	= cosφ momentary
Measured cosφ:	= 0.87 inductive
Switching on / off:	= Switching on, since capacitor power is missing
Missing compensation power	= 57.0 kvar

Note

This window is only displayed if more than three additional relay modules are scanned (which can be seen from the button designation ⚲ over F4)

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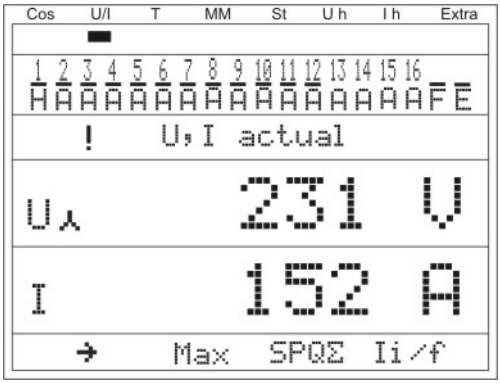
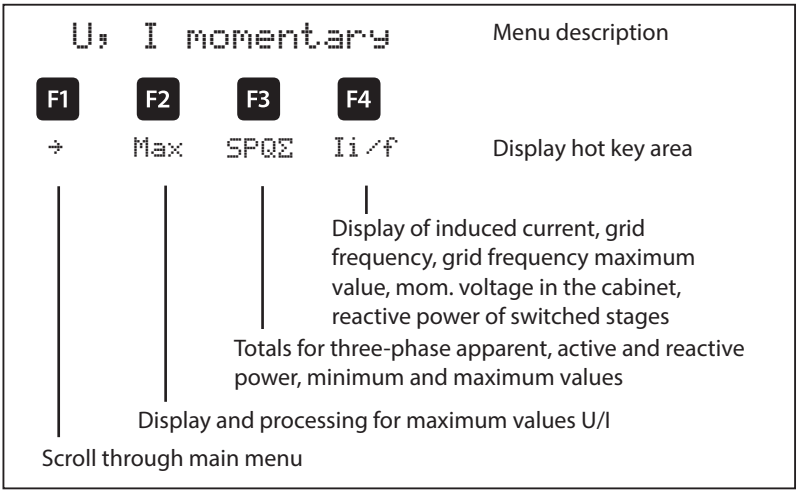
5.7 Main menu Voltage / current

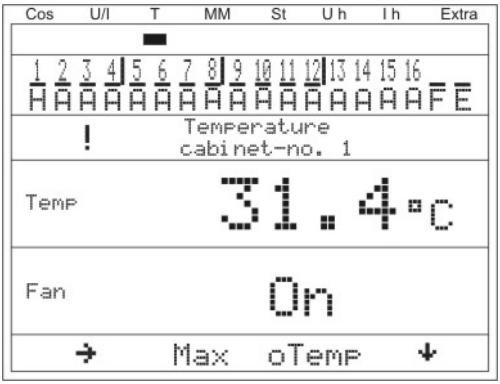


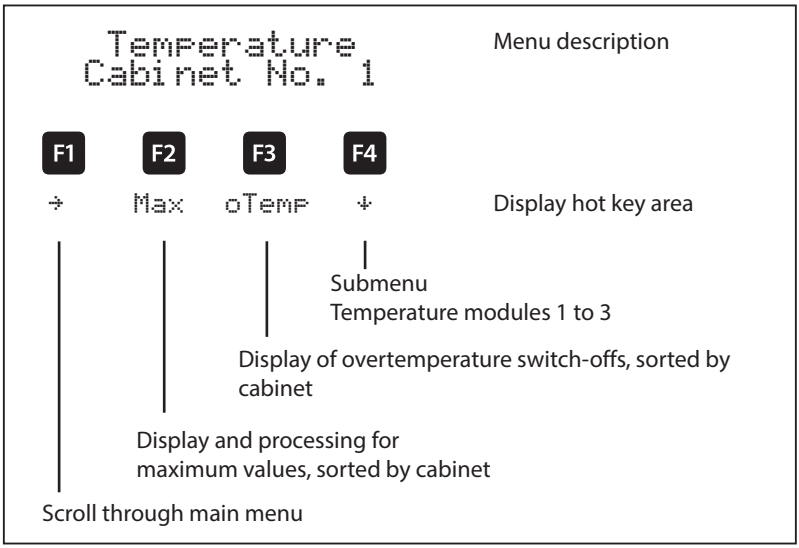


Display as example:

Phase voltage	= 231 V
Apparent current monophase	= 152 A

5.8 Main menu Temperature

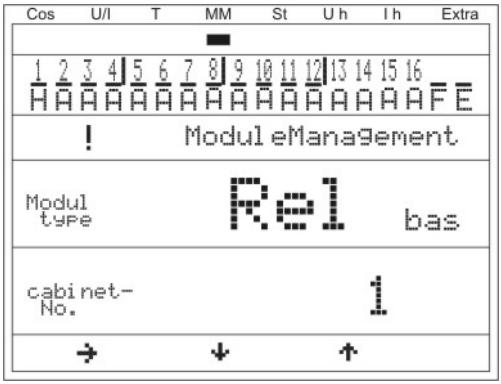


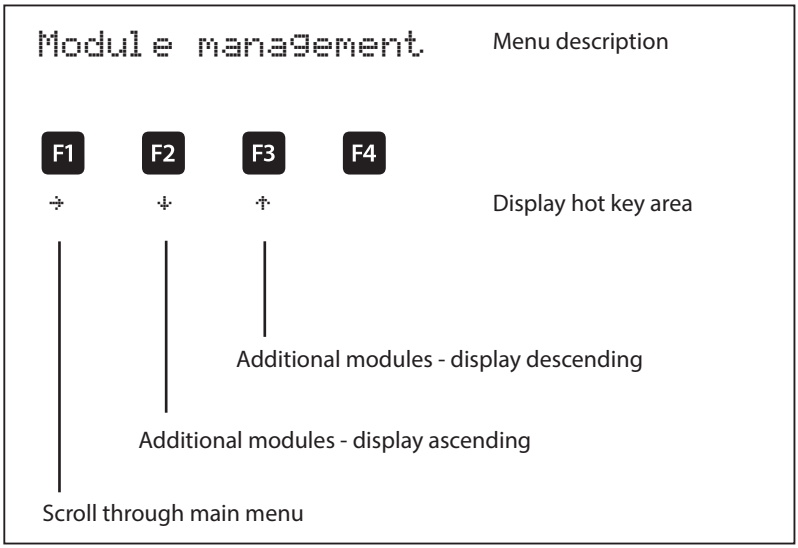


Display as example:

Cabinet No.:	= 1
Temperature measured	= 31.4 °C
Fan status:	= switched on

5.9 Main menu Module management

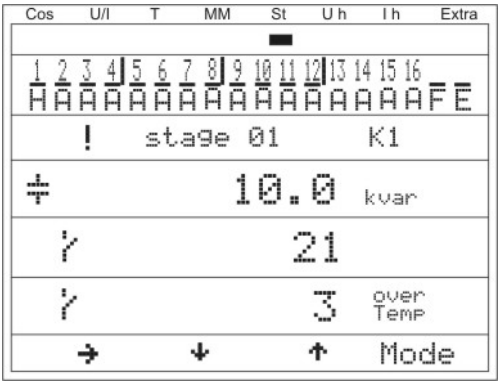


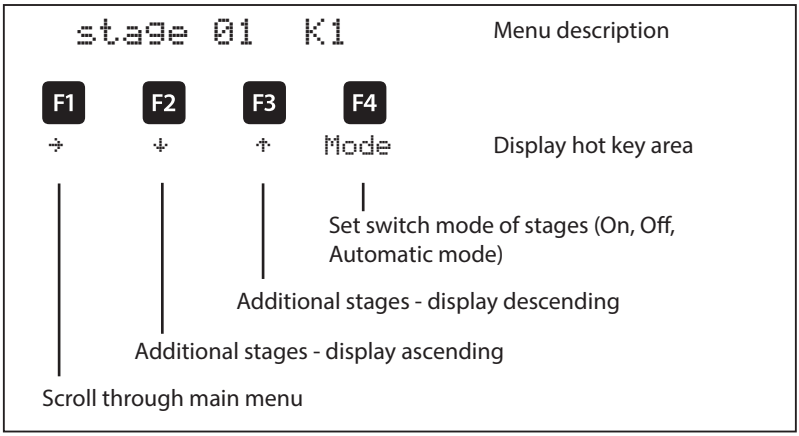


Display as example:

Module:	= Temperature module controller (basic module)
Cabinet assignment:	= fitted in cabinet No. 1

5.10 Main menu Stages





Display as example:

Stage No. and connection terminal:	= Stage 01, terminal K1 at the basic module (for the 1st additional module, the description would be terminal M1K1)
Stage type:	= capacitor stage
Stage power:	= 10 kvar
Operating cycles:	= 21
Overtemperature switch-offs:	= 3

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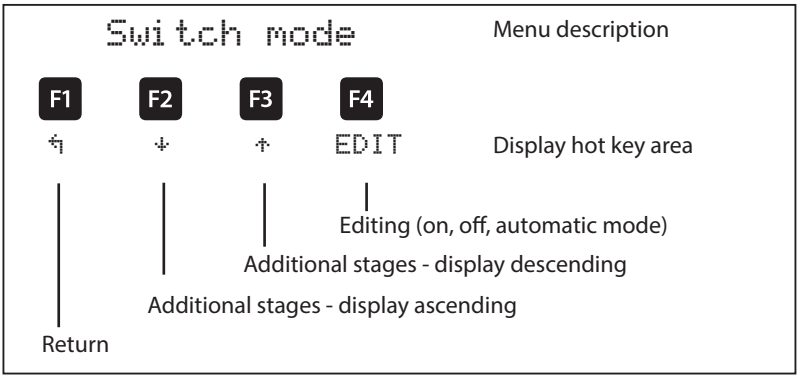
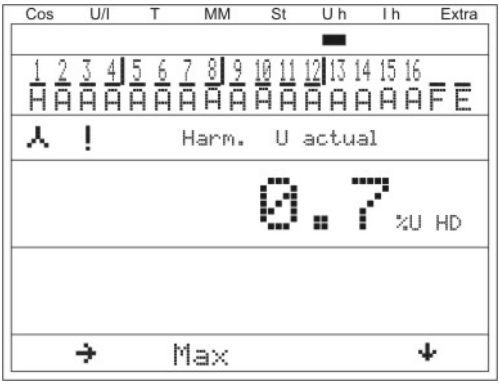
5.10.1 Submenu Mode

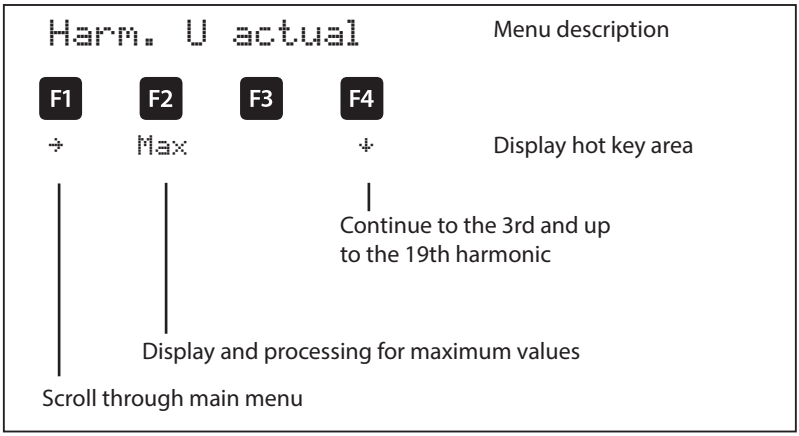


Note

Due to the monitoring of the stage resonance frequency, it is possible to use the Locking mode.

5.11 Main menu U h voltage distortion factor

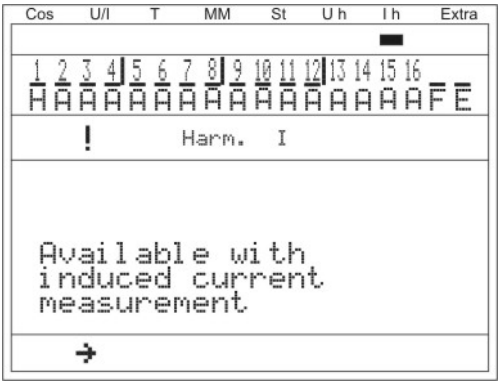


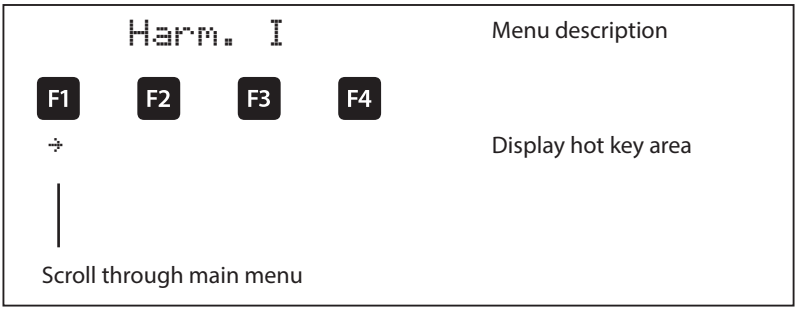


Display as example:

Total harmonics of measuring voltage :	= 0.7%

5.12 Main menu I h distortion current strength



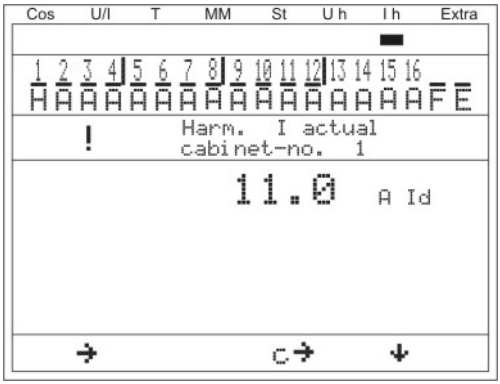


Note

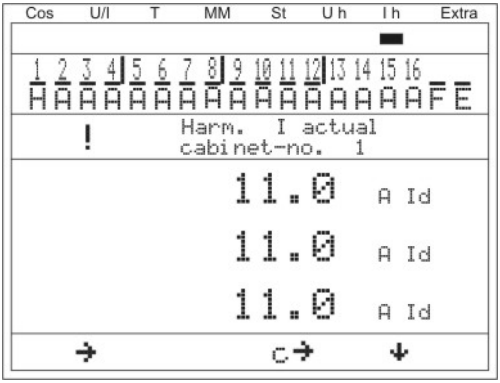
This menu is only available for induced current measurement (has to be activated in the menu Commissioning ➔ Transformer ➔ Induced current transformer ➔ Para)!

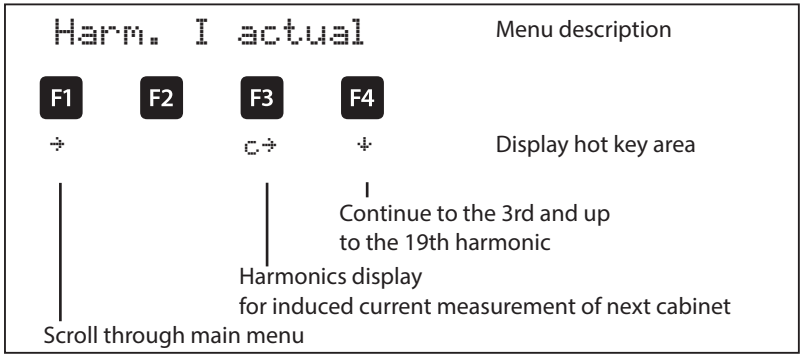
Please check whether the induced current measurement module has already been scanned.

In case an induced current measurement is activated (e.g. **monophase** induced current measurement), the following window appears:



In case of a **three-phase** induced current measurement, the following window is displayed:

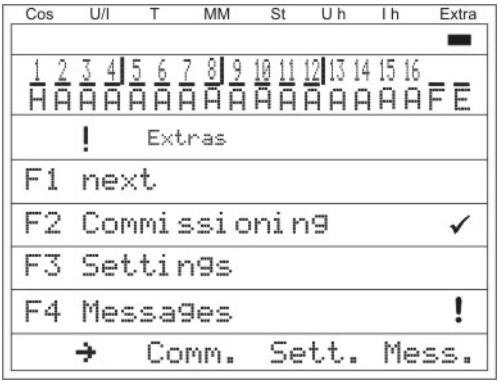


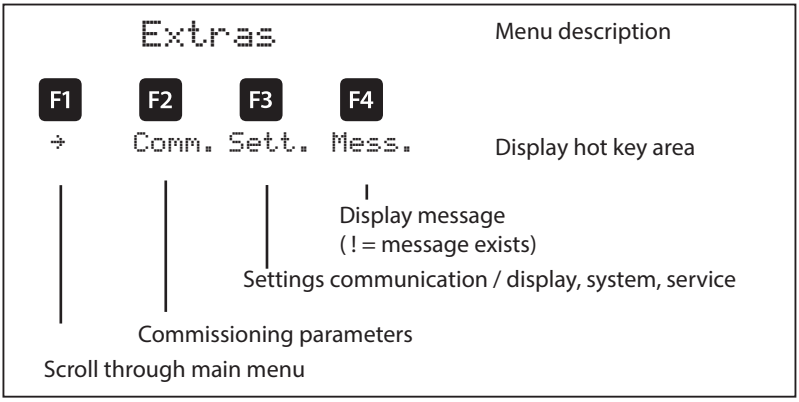


Display as example:

Cabinet No.:	= S1
Induced current measurement:	= three-phase
Harmonic	= total Id
Harmonic current L1:	= 11 A
Harmonic current L2:	= 11 A
Harmonic current L3:	= 11 A

5.13 Main menu Extra





Note

Before commissioning of the device, it has to be ensured that all available additional modules have been scanned!

The Commissioning submenu contains the following items:

1. **Transformer settings (current, induced current, voltage)**
   - a. Main current transformer
     - i. Primary current
     - ii. Secondary current
     - iii. Phase allocation
   - b. Induced current transformer
     - i. Activate, monophase or three-phase
     - ii. Primary current cabinet 1
     - iii. Secondary current cabinet 1
     - iv. Primary voltage energy measuring module cabinet 1
     - v. Secondary voltage energy measuring module cabinet 1
     - vi. Continue with cabinets 2 to 6
   - c. Voltage transformer
     - i. Primary voltage
     - ii. Secondary voltage
     - iii. Phase allocation
     - iv. Zero-point creator
2. **Target cosine settings**
   - a. Target cosφ for power consumption
   - b. Target cosφ for power recovery
   - c. Alarm cosφ for FTS message ("facility too small")
3. **Stage settings**
   - a. Auto configuration mode
   - b. Stage parameters
     - i. Stage selection
     - ii. Stage power
     - iii. Cabinet No.
     - iv. Discharge time
     - v. Detuning
     - vi. Operating cycles
     - vii. Overtemperature switch-offs
     - viii. System type
     - ix. Special outputs (fans / alarm relays)
   - c. Rated values (rated voltage Ph-Ph, grid frequency)

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The Settings submenu contains the following items:

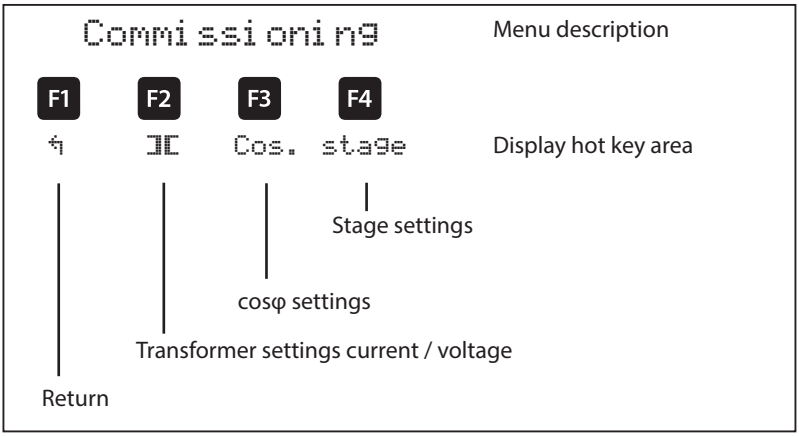
1. Module management / bus parameters / display
2. System
3. Service

The Messages submenu contains the following items:

1. Active error messages
2. Error state messages

3. Assignment of message
   a. Alarm relay
   b. Stage switch-off

5.13.1 Commissioning



5.13.1.1 Submenu Transformer settings

The Transformer settings submenu contains the following items:

1. Main current transformer
2. Induced current transformer
3. Voltage transformer

Under the item **Main current transformer**, the primary and secondary current, as well as phase allocation of the main current transformer must be specified.

Under the item **Induced current transformer**, the primary and secondary current of the induced current transformer must be specified. These settings have to be individually made for each cabinet! For operation of an energy measuring module, you can also set the primary voltage and secondary voltage of the energy measuring module here.

For the item Main current transformer, the primary and secondary current, as well as phase allocation must be specified. Additionally, you can activate the zero-point creator here.

The Main current transformer submenu contains the following items:

1. Primary current
2. Secondary current
3. Phase allocation of the main current

For the items **Primary current** and **Secondary current**, the respective parameter for the current transformer must be defined, e.g. transformer 1000/5A stands for a primary current of 1000A and a secondary current of 5A.

The input field ranges from 1A to 99.99kA for a primary current and 1A or 5A for the secondary current.

For the **phase allocation of the main current transformer**, the main current measurement phase must be specified, e.g. phase I = L1. For a false polarity transformer connection, the input can be given as phase I = -L1 (the minus sign means that k and l are interchanged).

The Voltage transformer submenu contains the following items:

1. Primary voltage
2. Secondary voltage
3. Phase allocation of measuring voltage
4. Zero-point creator

For the items **Primary voltage** and **Secondary voltage**, the respective

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parameter for the voltage transformer must be defined, e.g. transformer 10,000/100V stands for a primary voltage of 10,000V and a secondary voltage of 100V.

The input field ranges from 1V to 9,999kV for the primary voltage and 100V or 500V for the secondary voltage.

For the item **Phase allocation of measuring voltage**, the phase of the measuring voltage must be given, e.g. phase U = L1N.
For a phase/phase measurement, the entry would for instance be L23.

Using the item **Zero-point creator**, the controller can be activated via a zero-point creator.

For energy supply networks with outer conductor connected to the earth potential, suitable control gear with electrical isolation (e.g. voltage transformer) must be used.

These transducer adapters (zero-point creator) are suitable for creating a virtual low-impedance neutral point for the device in a three-phase network without neutral conductor.

In the 700 V variant, this also serves to adapt the measuring voltage to the device.

Make sure that the device is configured for the operation with a zero-point creator.

Transformers are available in the following variants:

Version 400/100:	Primary:	400 V phase-to-phase voltage
	Secondary:	100 V phase-to-phase voltage

Version 700/100:	Primary:	700 V phase-to-phase voltage
	Secondary:	100 V phase-to-phase voltage

5.13.1.2 Submenu Target cosine

The Target cosine submenu contains the following items:

1. Target cosφ for power consumption
2. Target cosφ for power recovery
3. Alarm cosφ (message when alarm cosφ is not reached after set alarm delay time)

For the items **Target cosφ** for **power consumption** and **Target cosφ** for **power recovery**, a value from inductive 0.80 to capacitive 0.80 can be entered.

If **active power recovery** is detected,
this is signaled by the G symbol in the display.

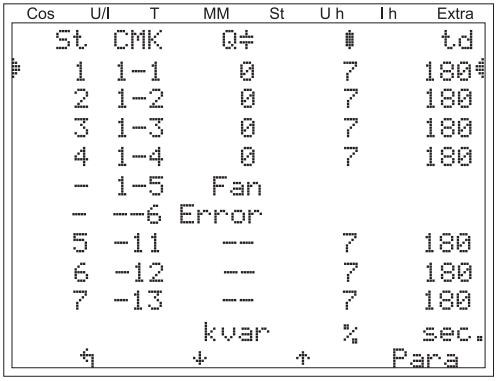
Under the item **Alarm cosφ**, a value from inductive 0.50 to capacitive 0.50 can be entered.

5.13.1.3 Submenu Stages

The **Stages** submenu contains the following items:

1. Auto configuration mode (only for use of an induced current measuring module or energy measuring module.)
2. Stage parameters direct input
3. Rated values

In the overview of available stages
(item 2. Stage parameters direct input), the following window is displayed at initial commissioning:



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Under the item Auto configuration mode, you can start automatic monitoring of the connected capacitor stages under the menu item
Extra ➔ Commissioning ➔ Stages ➔ Auto configuration mode ➔ Start.

First, the configured parameters are displayed.
If needed, they can be corrected here or, if they are already correct, confirmed with F3 (Ok). After the last confirmation, all capacitor stages are switched off, and the auto configuration mode can be started. During the procedure, the stages are switched on individually, and the stage power is determined. This can be interrupted by pressing F2 (Stop) at any time. The progress is illustrated in the status display. Along with this, the connected capacitor stages are hooked up one after the other. From the current consumption measured, the **multicomp 5D6** determines the corresponding stage power. After successfully determining the stage power, the result is displayed and can be saved by confirming it (press button F4 (Return) repeatedly, until the prompt **Save parameters Yes / No** appears). If measurement errors have occurred, they can be discarded, and the mode restarted.

A prerequisite for performing the auto configuration mode is, however:

1. Measurement via induced current transformer and current measuring module **multisio 1D2-4CI** or energy measuring module **multimess 1D4**
2. Correct configuration of the primary and secondary voltage
3. Correct configuration of the primary and secondary current of the induced current transformer
4. Correct configuration of the primary and secondary voltage of the energy measuring module
5. Possible additionally connected relay modules must be detected and stored with the help of the menu item Settings➔ Modules / display ➔ Module management
6. The capacitive or inductive stages have to be connected

If all these prerequisites are met, the auto configuration mode of the stage powers can be started.

Under the item **Stage parameters direct input**, all stage parameters can also be entered manually.

The following parameters are available:

1. Stage power from 0.00 to 999.9 kvar

2. Capacitive or inductive stage

3. Cabinet No. 1 to 6

4. Discharge time 0, 3, 30, 60, 300, 600, 900 sec.

5. Detuning 0, 5.5, 7, 8, 12.5, 14 %

6. Operating cycle reset

7. Overtemperature switch-off reset

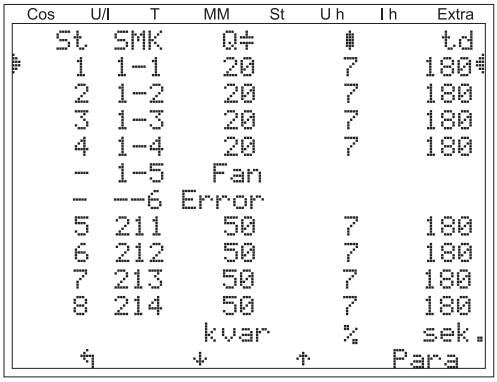
8. System type standard, combination filter, special

9. Special outputs fans / alarm relays programmable for terminals K5 (45) and C/S (30, 31). These outputs are by default assigned to fan and alarm relay, can however also be used as capacitor stages.

Note

Note: The alarm relay is by default configured as a NC contact but can also be reconfigured as a NO contact in the stage configuration in visual energy.

For a completely configured controller, the following window appears:



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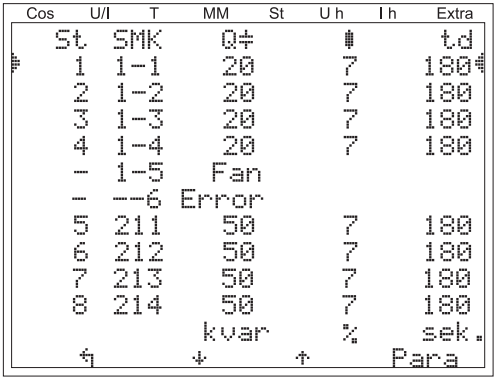
The following abbreviations apply:

St	Stage
CMK	C = Cabinet No. M = Module No. (module MULTI-RO) K = Capacitor stage output
Q≒	Compensation power of stage, in kvar
≒	Stage detuning in % or indication of inductive compensation stage (in the stage overview window)
td	Stage discharge time in seconds
≒ ≒	Cursor for stage selection with ↑ or ↓

Description of special outputs (K5, S) configuration as capacitor stage:

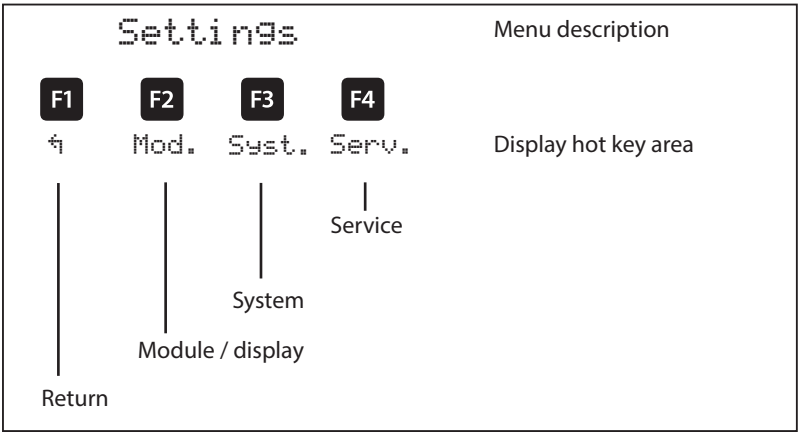
Menu Extra ➔ Commissioning ➔ Stages ➔ Stage parameters:

After pressing the button F3 (stage), the following is displayed in the hot key area:



With the button F2 (↓), select the item Fan or Alarm and start the entry by pressing F4 (Para) and EDIT. You can only choose between fan and stage or alarm relay, stage and fan. Subsequently, leave the configuration menu by pressing F1 repeatedly and accepting the changes by pressing F3 (Yes).

5.13.2 Settings



5.13.2.1 Submenu Modules / display

The Modules / display submenu contains the following items:

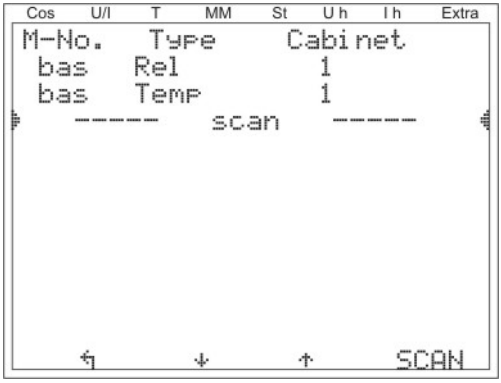
1. Module management

2. Bus parameters

3. Display / Language

Under the item **Module management**, the additionally connected modules (relay module multisio 2D2-4RO, temperature module **multisio 2D2-1TI2RO**, current measuring module **multisio 1D2-4CI** and energy measuring module **multimess 1D4**) can be scanned, deleted and configured.

Description of the module scan:



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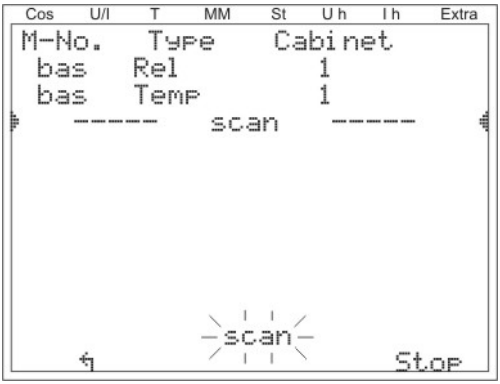
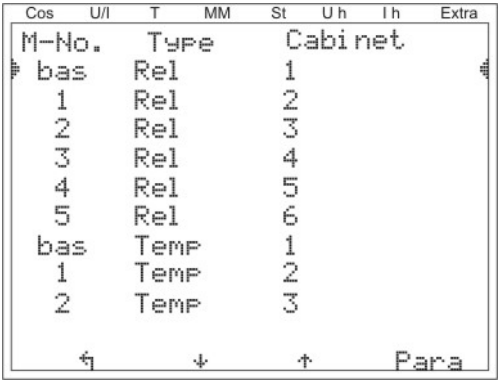


Press the button F2 (↓) to select the entry Scan and start scanning by pressing F4 (SCAN).

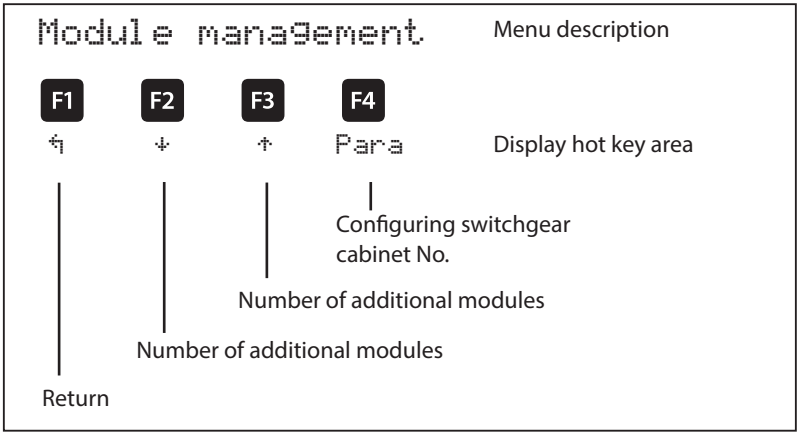
As long as scan is flashing, you can set the first module (and all subsequent modules to be scanned) into scanning mode using the Scan button on the modules (**see Appendix / Additional modules**). The module is then detected by the controller and allocated to the relevant cabinet.

As soon as all additional modules are read, the scanning mode is to be stopped by pressing F4 . The list of modules can now be checked for completeness by pressing the buttons F2 (↓) and F3 (↑). The cabinet allocation can be changed with F4 (Para).

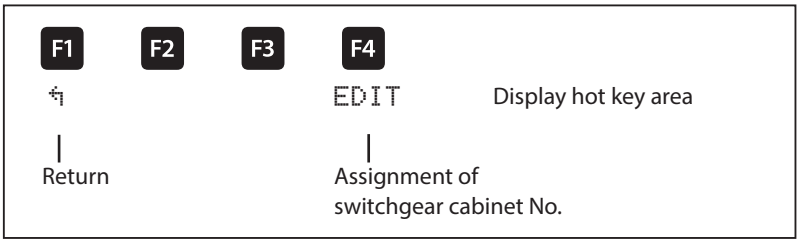
Display example after module scan:



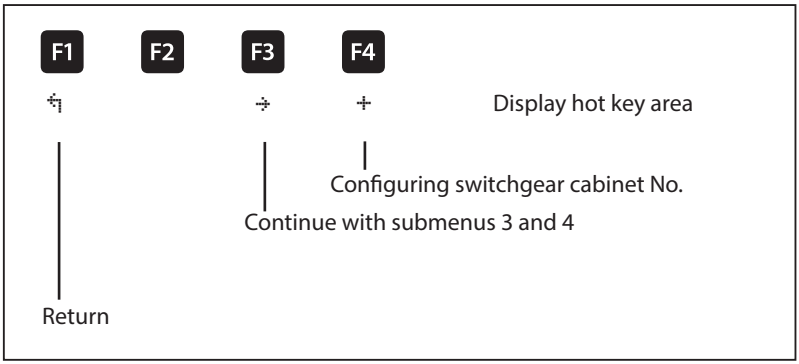
For previously set modules, the switchgear cabinet allocation can be changed by pressing F4 . Additional modules can be displayed and configured using F2 (↓) and F3 (↑).



After pressing the F4 (Para) button, the following is displayed in the hot key area:



After pressing the F4 (EDIT) button, the following is displayed in the hot key area:



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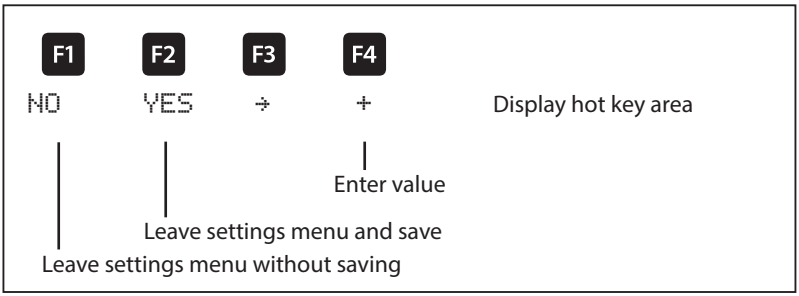
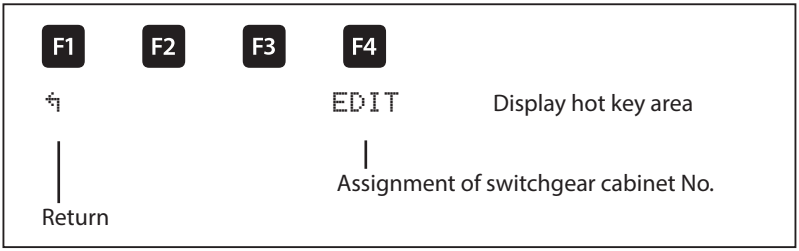
Submenu 3: Module detection (flashing on and off). Here, the corresponding module can be set to flashing mode for unambiguous allocation.

Submenu 4: Module type display and current firmware version of the module. For example, Temp is entered for the temperature input module, 2.00 as the firmware version and r007 as the firmware version release.

After pressing the F4 (+) button, the following is displayed:



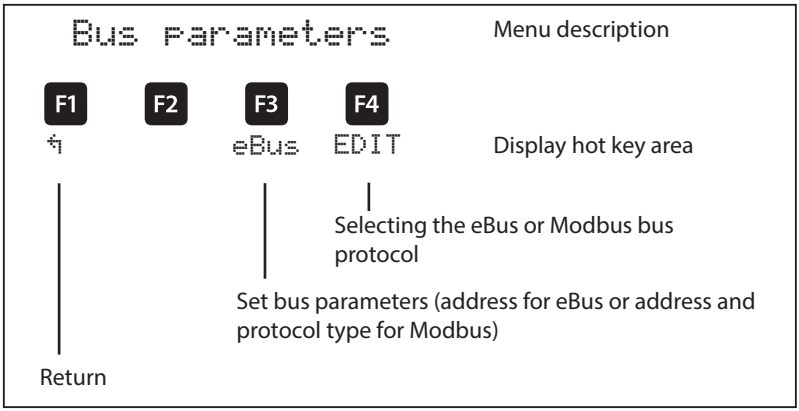
After pressing the F4 or F2 button, the following is displayed:



Note

Additional modules - see appendix for function of the module DIP switches and module scan buttons!

With the item **Bus parameters**, bus operation is configured (KBR eBus and Modbus). Here, the bus address for the KBR eBus and the bus address and protocol type for the Modbus can be set.



Parameter	
Bus	= eBus or Modbus

Bus address 0 to 9999 for KBR eBus

Bus address 1 to 247 for Modbus

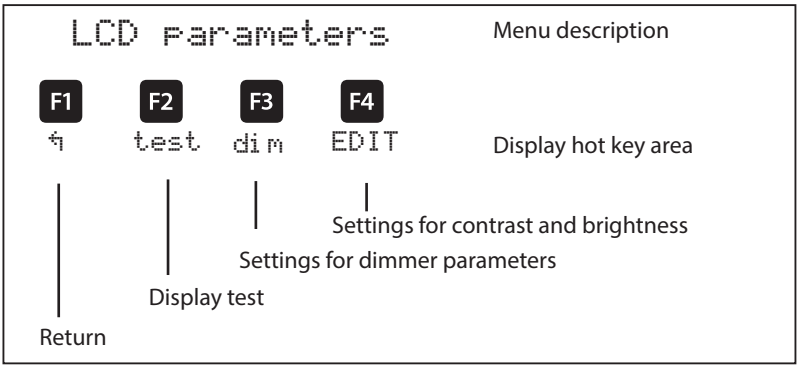
Baud rate and bus protocol on Modbus:

ASCII or RTU
4800, 9600 or 19200 baud
even, odd or no parity

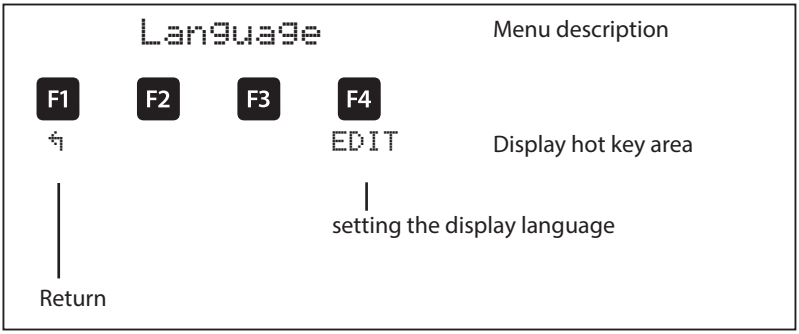
Note

After adjusting the bus type (KBR eBus or Modbus), the controller is restarted, i.e. all hooked up capacitor stages are discarded and hooked up again.

With the item Display / language, the settings for the external LCD display and the user language German / English can be selected. In addition, the time setting can be made here and the total operating time for the controller can be queried. The setting to switch daylight saving time / standard time can be made here.

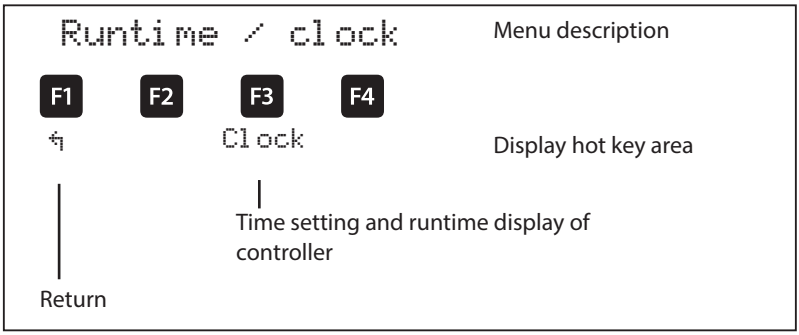


Parameter	
LCD	= Contrast and brightness



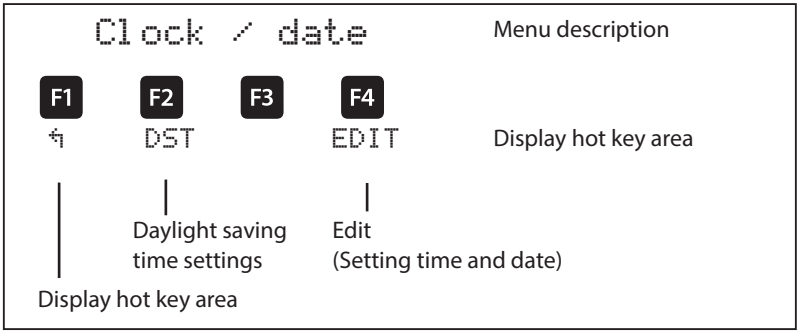
Parameter	
Language	= German / English

Runtime and clock:



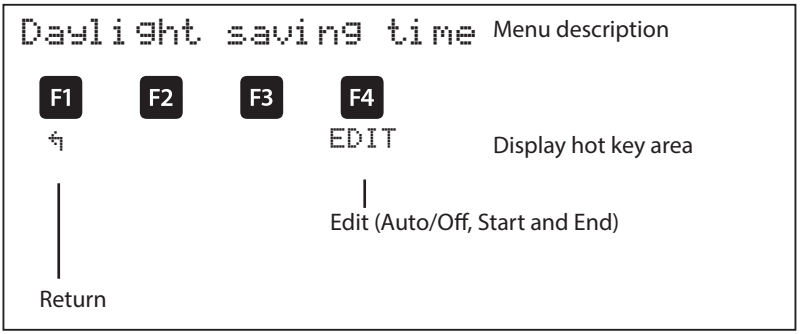
Parameter	
Runtime	= Total operating time of controller
Clock	= Time setting

After pressing the F3 (clock) button, the following is displayed in the hot key area:



Parameter	
Clock time / date	= Time (hh:mm) and date (dd:mm:yyyy)

After pressing the F2 (DST) button, the following is displayed in the hot key area:



Parameter	
Daylight saving time	= Auto (automatic adjustment), Off (adjustment disabled) Start month and end month

5.13.2.2 Submenu System

The System submenu contains the following items:

1. Parameters
2. Reset

For the item Parameters, the switching performance, temperature parameters and limiting values can be adjusted.

The switching performance comprises the following options:

Switch-on and switch-off hysteresis		Input in %, in relation to the stage power of the smallest available capacitor stage
Switching times:	Idle time after compensation	Input in seconds (0 to 300 sec.)
	Alarm delay for FTS message	Input in seconds (3 - 3000 sec.) until the message **F**acility **T**oo **S**mall is displayed, i.e. the alarm cosφ has not been reached after the set time has elapsed.
	Switching interval	Input in seconds (0 to 10 sec.). Here, it is specified at which interval the capacitor stages must be hooked up if the compensation power is insufficient to achieve the set target cosφ.
	Attenuation coefficients	The attenuation coefficients (0 to 6) serve for reduction of the display fluctuations; the measuring cycle of the controller is not influenced.

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The **temperature parameters** contain the basic enabling and disabling of the temperature measurement and the switching performance resulting from this. In addition, the operating point and hysteresis for the fan switch and the operating point and hysteresis for the overtemperature switch-off can be set here. The following parameters are available for operating points and hystereses:

Operating point fan	= 0 to 70°C / hysteresis = 0°C to 25°C
Operating point alarm	= 0 to 70°C / hysteresis = 0°C to 25°C
Operating point overtemperature	= 0 to 70°C / hysteresis = 0°C to 25°C

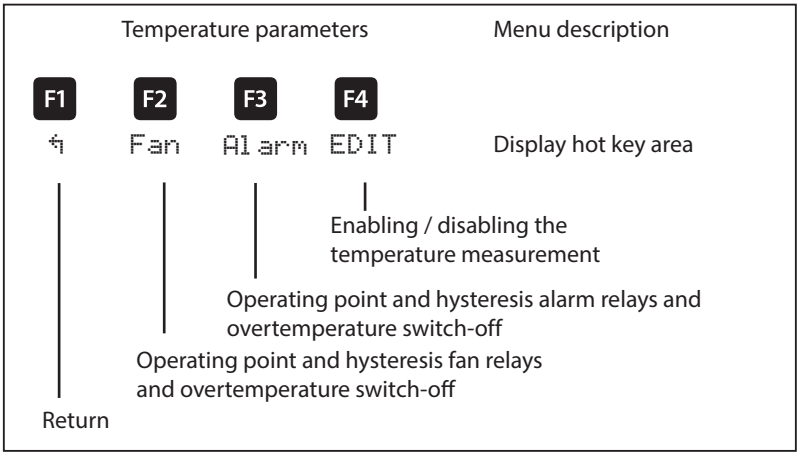
The default settings are:

Operating point fan	= 28°C / hysteresis 5°C
Operating point alarm	= 45°C / hysteresis 5°C
Operating point overtemperature	= 48°C / hysteresis 5°C

This means that the fan switches on when 28°C are exceeded and switches off again when the temperature drops below 23°C. The overtemperature alarm is triggered when 45°C are exceeded and is reset when the temperature drops below 40°C. The overtemperature stage switch-off is activated when 48 °C are exceeded. After the temperature has dropped below 43 °C, the stages are, if required, hooked up again after the discharge time has elapsed.

The overtemperature switch-offs for the individual stages are added together for subsequent determination whether there are temperature problems and, if so, in which cabinet.

Temperature measurement, incl. enabling:



Parameter	
Temperature measurement	= active / inactive
Operating point fan	= 0 to 70°C / hysteresis = 0°C to 25°C
Operating point alarm	= 0 to 70°C / hysteresis = 0°C to 25°C
Operating point overtemperature	= 0 to 70°C / hysteresis = 0°C to 25°C

Note

The set temperature operating points and hysteresis are equally valid for the controller basic module and the additionally connected temperature modules!

Moreover, limiting values are available for the overvoltage switch-off of the system, monitoring of the stage contactor operating cycles, monitoring of the individual current consumption of the stages and of entire cabinets as well as the switch-off of stages if voltage harmonics are too high.

The setting range of the overvoltage switch-off goes up to 150% of the

measuring voltage, i.e. for a programmed measuring voltage of 400V Ph/Ph primary, the setting range is 230V to 346V Ph/N. The setting range is dependent on the programmed primary measuring voltage.

When the limit for the overvoltage switch-off is exceeded, the hooked up compensation stages are immediately switched off. After the temperature has dropped below the limit by 1% (of the limit) the compensation stages are hooked up again after the discharge time has elapsed.

The configuration and function of the induced current limits is described in the menu "Functions of the controller in the secureC safety and maintenance concept" at the beginning of the user manual.

Note

The default setting for the overvoltage limit is, for a measuring voltage of 230V PH-N, about 10% more, i.e. 253 V PH-N. In case of operation via voltage transformer, the limit has to be set accordingly higher.

Example: For a voltage transformer of 500V PH-PH primary and 230 V PH-PH secondary, the limit has to be set to 550V PH-PH (500 V PH-PH + 10% (=50 V) equals 550 V PH-PH).

This limit has to be configured manually!

The limit of the capacitor contactor operating cycles is used as an indication for customers that the capacitor contactor could be worn out due to the number of switching actions accumulated. However, the message E09 LIM operating cycles does not affect the function of the compensation system at all. It is used merely as a "maintenance instruction".

Switching cycle counting is always activated. However, the message E09 LIM operating cycles is only displayed when the system is defined as the standard system, meaning that all stages are switched via contactors.

In case of a special system (combination of contactors and thyristor switches), this message is suppressed. If the switching cycle counting limit is set to 0, there is no message display, either.

The limit of the harmonic switch-off on the one hand refers to the total of all measuring voltage harmonics (LIM harm. U HD), on the other hand, limits may be assigned for each harmonic separately (3rd to 13th harm. U). The programming range lies between 0 and 99%.

Furthermore, you can set whether the alarm relay should switch in case a limit is violated, stages should be switched off, or both. In addition, harmonics monitoring can be disabled here.

Under the item Reset, there are various methods of resetting the programmed parameters of the controller. This has the advantage that not all programmed parameters are deleted at the same time, but only a specific range.

The following reset options are available:

1. **Commissioning reset:** You can reset the parameters to the commissioning status, i.e. error state and current transformer ratio are deleted.
2. **Reset limits:** For Ph/N and Ph/Ph voltage, voltage harmonics as well as induced current monitoring.
3. **Reset extreme values:** All maximum and minimum values detected are deleted at the same time (for an overview of maximum and minimum values, see list).
4. **Reset of stage parameters:** The stage parameters stage power, cabinet No., discharge time, detuning, operating cycle alarm limit, system type, special outputs fans / alarm relays are deleted together for all stages.
5. **Reset module parameters:** All scanned temperature, relay and induced current measurement modules are deleted.
6. **Reset to default settings:** Here, the programmable parameters are reset to default settings A list of the settings can be found under Technical data.
7. **Reset measuring parameters:** The current and voltage transformer settings are reset, along with the attenuation coefficients U, I and Q, the transformer settings of the induced current measurement module and the energy measuring module, the rated voltage as well as the rated frequency.

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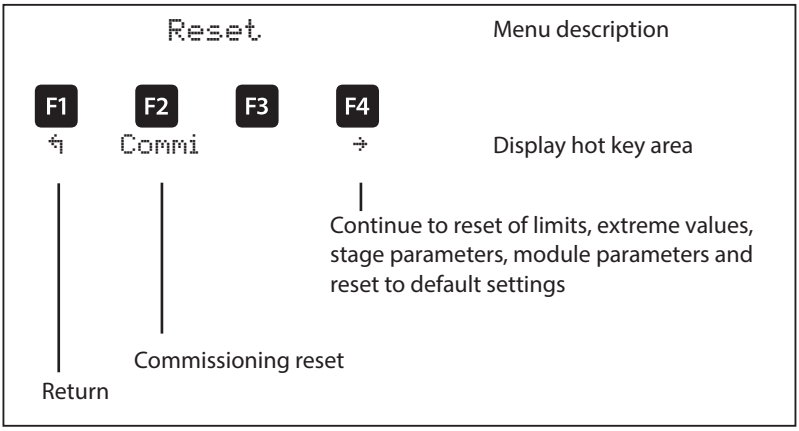
Reset functions:



Parameter	
Reset:	Commissioning reset, limits, extreme values, stage parameters, module parameters, reset to default settings and reset of measuring parameters

Overview of the extreme values (maximum and minimum)
that can partially only be read out via KBR eBus or Modbus:

Extreme values	Output	
Maximum: Voltage PH-N	Display	Bus
Maximum: Voltage PH-PH	Display	Bus
Maximum: Current (main current)	Display	Bus
Maximum: cos Phi		Bus
Maximum: Power factor		Bus
Maximum: Voltage distortion factor	Display	Bus
Maximum: Total apparent power	Display	Bus
Maximum: Total active power	Display	Bus
Maximum: Total reactive power	Display	Bus
Maximum: Voltage 3rd harmonic	Display	Bus
Maximum: Voltage 5th harmonic	Display	Bus

(continued) Overview of extreme values

Extreme values	Output	
Maximum: Voltage 7th harmonic	Display	Bus
Maximum: Voltage 9th harmonic	Display	Bus
Maximum: Voltage 11th harmonic	Display	Bus
Maximum: Voltage 13th harmonic	Display	Bus
Maximum: Voltage 15th harmonic	Display	Bus
Maximum: Voltage 17th harmonic	Display	Bus
Maximum: Voltage 19th harmonic	Display	Bus
Maximum: Total harmonic currents		Bus
Maximum: Current 3rd harmonic		Bus
Maximum: Current 5th harmonic		Bus
Maximum: Current 7th harmonic		Bus
Maximum: Current 9th harmonic		Bus
Maximum: Current 11th harmonic		Bus
Maximum: Current 13th harmonic		Bus
Maximum: Current 15th harmonic		Bus
Maximum: Current 17th harmonic		Bus
Maximum: Current 19th harmonic		Bus
Maximum: Grid frequency	Display	Bus
Maximum: Missing compensation power	Display	Bus
Maximum: Hooked up compensation power		Bus
Maximum: Temperature value main unit	Display	Bus
Maximum: Temperature value module 1	Display	Bus
Maximum: Temperature value module 2	Display	Bus
Maximum: Temperature value module 3	Display	Bus
Maximum: Temperature value module 4	Display	Bus
Maximum: Temperature value module 5	Display	Bus
Minimum: Voltage PH-N		Bus
Minimum: Voltage PH-PH		Bus

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(continued) Overview of extreme values

Extreme values	Output	
Minimum: Current (main current)	Display	Bus
Minimum: cos Phi		Bus
Minimum: Power factor		Bus
Minimum: Grid frequency		Bus
Minimum: Missing compensation power		Bus
Minimum: Hooked up compensation power		Bus
Minimum: Apparent power	Display	Bus
Minimum: Active power	Display	Bus
Minimum: Reactive power	Display	Bus
Minimum: Temperature value main unit		Bus
Minimum: Temperature value module 1		Bus
Minimum: Temperature value module 2		Bus
Minimum: Temperature value module 3		Bus
Minimum: Temperature value module 4		Bus
Minimum: Temperature value module 5		Bus

5.13.2.3 Service submenu

The Service submenu contains the following items:

1. Hotline
2. Password
3. Firmware version

Under the item **Hotline**, the service address and telephone hotline of **KBR GmbH in Schwabach**, Germany, can be displayed.

Under the item **Password**, changes to the controller parameters can be protected with a password. The password can be any 4-digit number code. **The controller is defaulted with the code 9999, i.e. all functions of the device are available.**

Additionally, the internal device serial number is displayed in this menu.

Information on password protection of secureC:

5 passwords are managed. To each password, an additional password number is assigned.

The following types are possible:

Possible password types	
1. User password	Freely selectable password from 0001 to 9999 Assigned password number: 00
2. Master password	Password 1976, assigned by KBR Assigned password number: 00
3. KBR password	Password assigned by KBR, only valid in combination with the password number Assigned password number: 01 to 25
4. Day password	Temporary password, valid for 1 day, generated by KBR Assigned password number: 01 to 25
5. License code	For complete activation, generated by KBR (existing password is deleted) Assigned password number: 41

After locking with the secureC password (KBR password), level 1 is displayed. This means that no operation specific parameters can be changed.

secureC cannot be unlocked with the master password 1976.

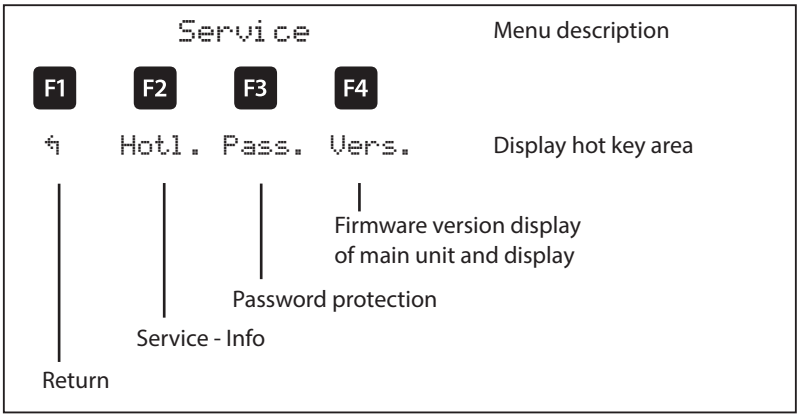
On a controller locked on level 1, only the following parameters are accessible:

LCD parameters	Language settings
Time	Bus parameters
Main current transformer parameters	Target cosine phi

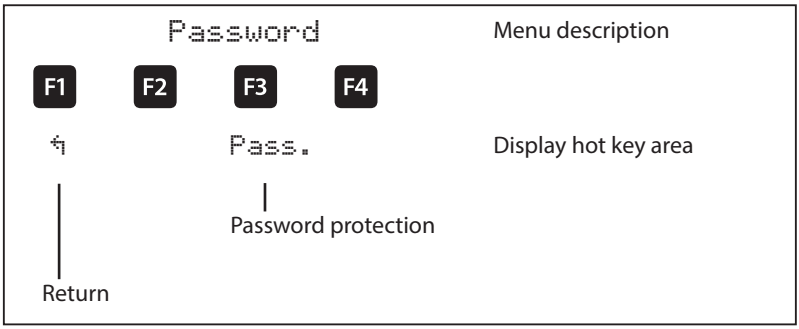
If both the secureC password and customer password are activated, the locking level is displayed. After entry of the customer password, level 1 is displayed.

If a locked controller is activated and no entries are made for 5 minutes, it is locked again.

Hotline (service / information):



Password protection:

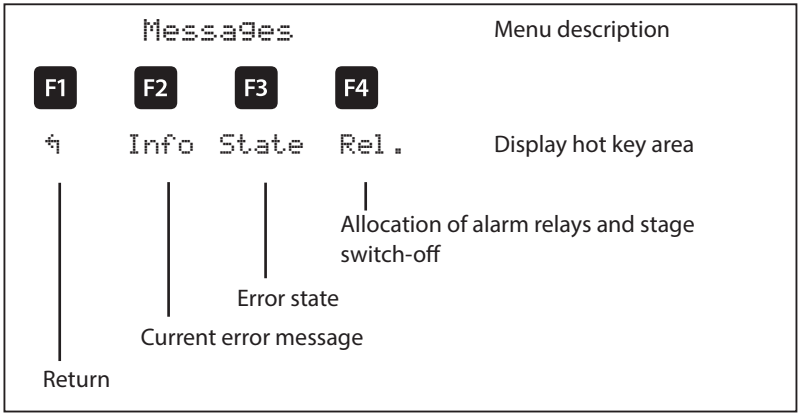


Parameter	
Code	= 4-digit number combination, release code 9999 means that all functions of the unit are available.

Under the item Firmware version, the firmware states of the controller and the separate LC display can be shown. Here, the term BS stands for Basic, 5.00 for the firmware version and r001 for the release of the firmware version of the basic module, 5.00 stands for the firmware version and r001 for the current release of the firmware version of the display module.

The firmware version of possible connected additional modules can be displayed via the module configuration under Extra ➔ Settings ➔ Modules / display ➔ Module management.

5.13.3 Messages



5.13.3.1 Submenu Messages

The Messages submenu contains the following items:

1. Current error messages

2. Error state messages

3. Relay / stage switch-off

Under the item **current error messages**, error messages are displayed that are temporary and do not have to be acknowledged, since they are shown for only as long as the error occurs. An exception to this is the message FTS ("facility too small"), which is both displayed as an error message and a status message.

Under the item **Error state messages**, messages that must be deleted manually are shown. This is intended to make sure that these messages, which are relevant for the flawless operation of the system, do not go unnoticed.

The following status and error messages can be displayed:

Status messages (must be acknowledged)

E01	Power failure has occurred
E02	A limit has been violated
E05	Reset has been performed
E09	Operating cycles of a stage above limiting value (contactor stage)
E10	Limit violation of voltage
E11	Current direction (k and l of the current transformer interchanged)
E12	Facility too small (FTS)
E13	Battery voltage critical
E14	Parameter error (default value replaces incorrect value)
E15	Input overload (current or voltage at the basic module)

Error messages (do not have to be acknowledged)

E17	No measuring voltage	Alarm relay stage switch-off
E19	Stage power?	Alarm relay
E20	Facility too small (FTS)	Alarm relay
E21	Limit violated	Alarm relay
E22	Limit violated, stage switch-off active	Alarm relay stage switch-off
E23	Stage switch-off temperature reached on at least one temperature sensor (stage switch-off always active)	Alarm relay
E24	Alarm temperature exceeded on any temperature sensor, short circuit or broken wire	Alarm relay
E25	No measuring current (for light load operation, the stages are switched off after one hour)	Alarm relay

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(continued) Error messages

E25	No measuring current (for light load operation, the stages are switched off after one hour)	Alarm relay
E26	Capacitor current too high (with induced current measurement)	Alarm relay
E27	Check fuse (for induced current measurement, no current increase due to connection of a stage)	Alarm relay
E28	Loss of capacitance	Alarm relay
E29	Contactor defect (current does not decrease when stage is switched off)	Alarm relay
E30	Stage locked due to induced current error	Alarm relay
E31	Induced current limit violated	
E33	Relay module 1 cannot be reached	Alarm relay
E34	Relay module 2 cannot be reached	Alarm relay
E35	Relay module 3 cannot be reached	Alarm relay
E36	Relay module 4 cannot be reached	Alarm relay
E37	Relay module 5 cannot be reached	Alarm relay
E38	Temperature module 1 cannot be reached	Alarm relay
E39	Temperature module 2 cannot be reached	Alarm relay
E40	Temperature module 3 cannot be reached	Alarm relay
E41	Temperature module 4 cannot be reached	Alarm relay
E42	Temperature module 5 cannot be reached	Alarm relay
E43	Induced current module 1 cannot be reached	Alarm relay
E44	Induced current module 2 cannot be reached	Alarm relay
E45	Induced current module 3 cannot be reached	Alarm relay
E46	Induced current module 4 cannot be reached	Alarm relay
E47	Induced current module 5 cannot be reached	Alarm relay
E48	Induced current module 6 cannot be reached	Alarm relay

Under the item Relay / stage switch-off, an action acc. to the preceding list can be activated or deactivated when one of the error messages E17 to E48 is displayed.

For the error message E24 Alarm temperature exceeded on any temperature sensor, short circuit or broken wire, an additional note is displayed in the main menu Temperature:

SC = Short circuit
BR = Broken wire
NA = Temperature measurement not activated

6 Basic device configuration

The menu navigation of the multicomp 5D6 is self-explanatory.

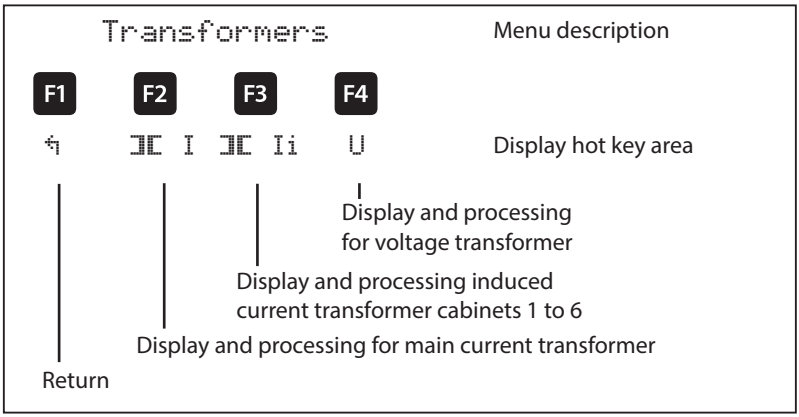
The operator is guided and supported by the device through operating instructions displayed for the respective situation.

As an example of the basic configuration procedure, the functions in the menu Commissioning are used.

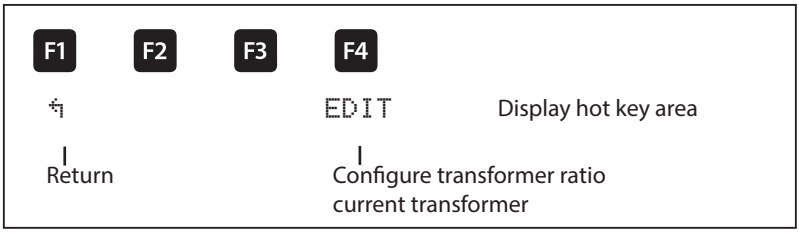
Menu item: Transformer

6.1 Set transformer ratio

After pressing the F2 (⊐I) button, the following is displayed in the hot key area:



After pressing the F2 (⊐I I) button, the following is displayed in the hot key area:



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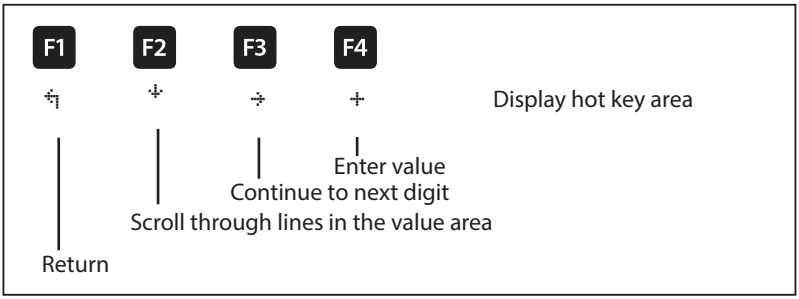
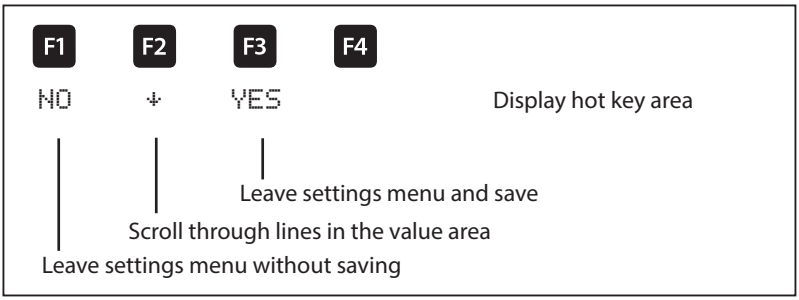
After pressing the F2 (EDIT) button, the following is displayed in the hot key area:



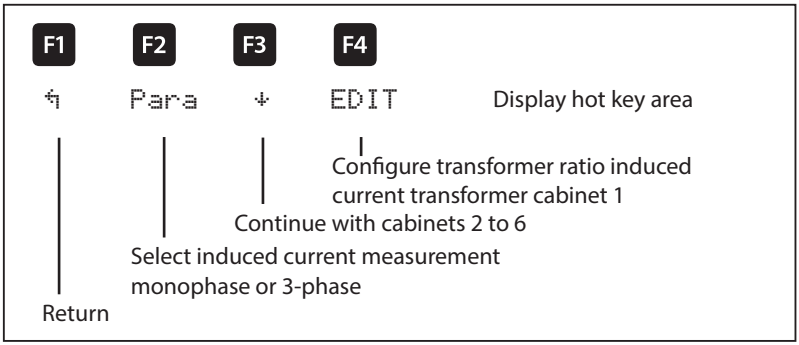
If the setting was changed, the following display appears after the third line in the hot key area if the ↓ key (scrolling function) is pressed:



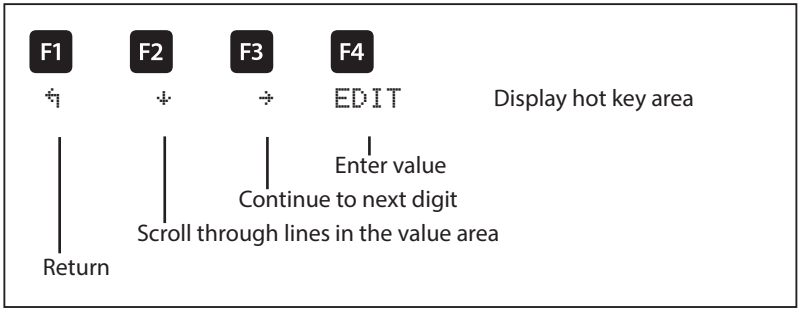
Note

The settings for the voltage transformer are identical!

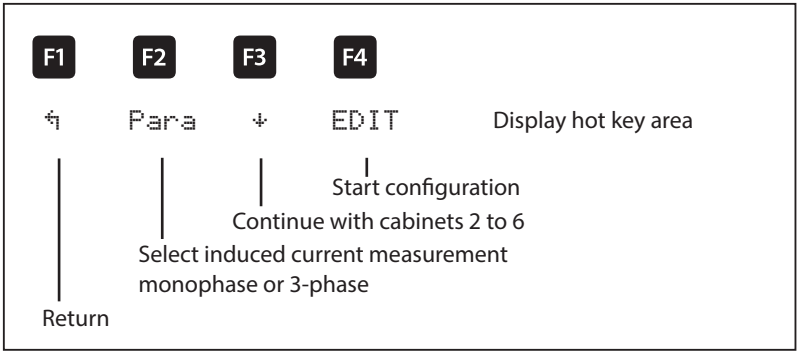
After pressing the F3 (⅀ Ii) button, the following is displayed in the hot key area:



After pressing the F4 (EDIT) button, the following is displayed in the hot key area:



If the setting was changed, the following display appears after the second line in the hot key area if the ↓ key (scrolling function) is pressed:



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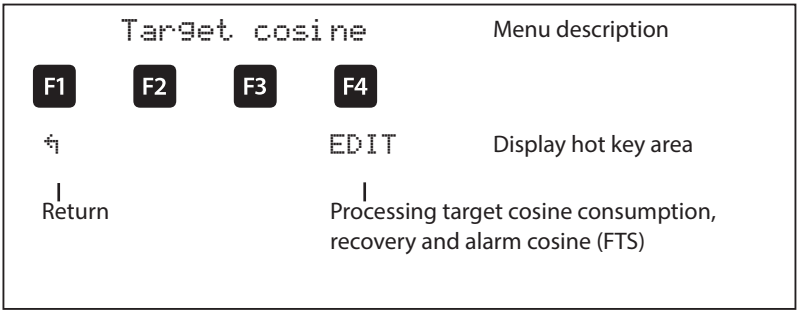
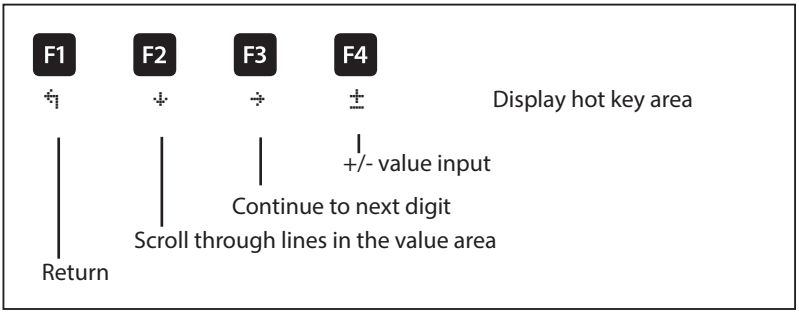
6.2 Set target cosφ

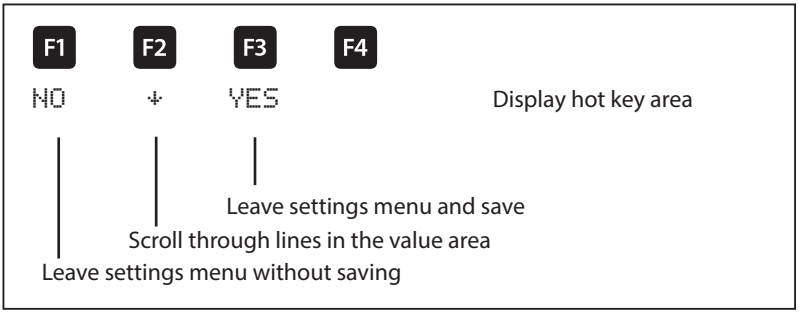
After pressing the F3 (Cos.) button, the following is displayed in the hot key area:



After pressing the F4 (EDIT) button, the following is displayed in the hot key area:



If the setting was changed, the following display appears after the third line in the hot key area if the ↓ key (scrolling function) is pressed:



6.3 Notes on detecting errors

Undercompensation, not enough stages are switched on.

Check controller for error displays. If target cos phi is set to 0.8 capacitive, capacitors need to be switched on. If the system is not over dimensioned, almost all stages need to be switched on.

Check the main fuse and group fuses of the system. For the correct values, refer to the enclosed documents. The group fuses must have at least 1.7 times the value of the capacitor power.

If the fuses blow despite being correctly selected, the groups must be checked individually for excessive current input and for defective contactors.

Undercompensation, all stages are switched on.

The existing system is not sufficient (e.g. due to new inductive consumers).

Please contact your local representative (extend your system). For the service telephone number, see the cover sheet of this user manual or menu item Extra / submenu 7.

Overcompensation, too many stages are switched on.

Check the controller settings (target cos phi capacitive?).

Transformer connected incorrectly?

Controller switches too often, in particular at low load (at the weekend, during the night):

Check the transformer ratio configuration.

Switch on a small stage permanently (manually), if required.

If no cause of error is found, please call your local representative. The phone number can be found on the cover sheet of this user manual or in the menu item Extra / Service submenu.

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6.3.1 System and safety devices maintenance

In order to ensure proper function and a long service life of your system, the following checks have to be performed after commissioning and then once a year!

- Check and retighten all connections. In the initial period of operation, bolted joints may become loose due to thermal stress.
- Check fuses, safety devices and switching equipment. Contactors are wearing parts. If the contactor is intact, switching must take place without excessive formation of sparks.
- Check the controller behavior in automatic mode.
- Examine the cooling air conditions (fans, temperature monitoring function):
  - The temperature relay of the controller switches on the fans at 28°C,
  - Temperature monitoring switches the system off via controller at 48°C.
- Clean filter mats, depending on the degree of soiling.
- Visual inspection of capacitors for leaks (a reliable encapsulation of the dielectric is a prerequisite for the long life of the capacitor).
- Examine the current input and capacitor terminal voltage every three months.
- Inspect the reactive energy consumption by means of the electricity bill.

6.3.2 Limit temperatures

Valid for systems in cabinets:

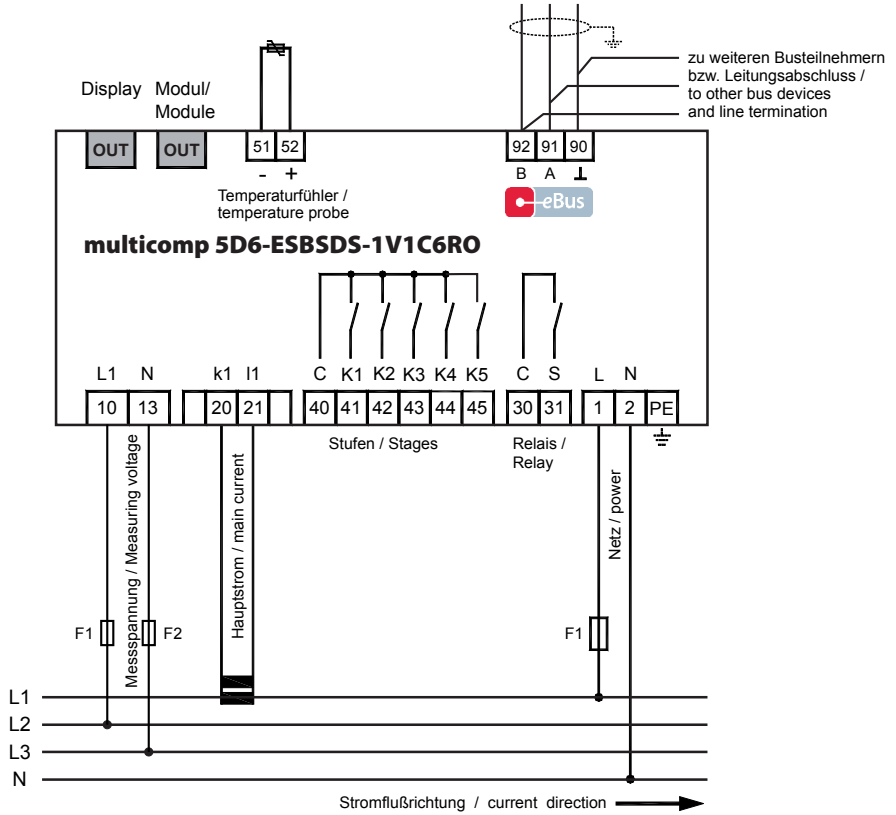
+ 35° C in a 24-hour average

+ 20° C in annual average

+ 40° C short-term highest value

- 10° C lowest value

The above information particularly applies to detuned systems. The input current and the temperature of these systems must be checked regularly, so that an overload of the capacitors can be detected at an early stage. A higher input current can be caused by an increasing proportion of harmonics or by a change in capacitance of the capacitors.



For voltage supply, see nameplate

7 Technical data

7.1 Measuring and display values

Voltage	Actual value of a measuring interval	Phase–0 or phase–phase, depending on configuration
	Units	[V, kV, MV] display is switched automatically
	Measuring range	0.00kV to 10.00 MV
Current (apparent current)	Actual value of a measuring interval	Actual value per phase
	Units	[A;kA] display is switched automatically
	Measuring range	0.00A to 10.00kA
Frequency	Grid frequency measurement	f_{net} ; measured with network correction
	Units	[Hz]
	Measuring range	40.....70Hz
Apparent power	Calculation	S_{total} ; three-phase
	Units	[VA; kVA; MVA; TVA]; display is switched automatically
	Measuring range	0.00VA to 200TVA
Active power	Calculation	P_{total} ; three-phase
	Units	[W; kW; MW; TW]; display is switched automatically
	Measuring range	0.00W to 200TW
Reactive power	Calculation → ind. & cap.	Q_{total} ; distinction between ind./cap.
	Units	[Var; kvar; Mvar]; display is switched automatically
	Measuring range	0.00VAr to 200TVAr
Cosφ (fundamental component shift)	Calculation → ind. & cap.	cosφ; distinction between ind./cap. cosφ in the display
	Measuring range	Cosφ 0.1 ind. → 1 → 0.1cap.
Power factor	Measuring range	0.00 to 1.00, can only be read out via Bus
Temperature	Measuring range	-20°C to 100°C ±2°C
Harmonics	Distortion factor (THD) for voltage	Voltage: KF-U
	Partial distortion factors	3rd; 5th; 7th; 9th; 11th; 13th; 15th; 17th and 19th Harmonics of the voltage
	Units	[%]
	Measuring range	0.00% to 100%
Harmonics of the current	Current harmonics Total of the current harmonics	3rd; 5th; 7th; 9th; 11th; 13th; 15th; 17th and 19th current harmonic for each phase: I_{tot}
	Units	[A]
	Measuring range	0.00A to 999.9kA

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7.2 Measuring accuracy

Current	± 2 % / ± 1 digit
Voltage	± 2 % / ± 1 digit
Power	± 4 % / ± 1 digit
Power factor	± 2 % / ± 1 digit
Frequency	± 0.1 Hz / ± 1 digit

7.3 Measuring principle

Reading	64 measured values per period
A/D converter	10 bit
Measurement of U and I	simultaneous recording of measured values for U and I;
Update speed (complete measuring cycle)	~ 330 ms
Calculation of harmonics	DFT with 64 points per period
Frequency measurement	Mode: Voltage measured between phase Lx – N / Ly); correct frequency measurement due to network correction

7.4 Device memory

Data storage		512KB RAM, volatile
Program and parameter memory		256 kB flash
Memory type		Ring buffer
Extreme values (max./min.)		The highest values that have occurred (maximum indicator function) since switching on power supply or manually deleting extreme value
Event memory	Memory size	4096 events
Operation logbook	Memory size	512 entries
Limit violations	Acquisition time	≥ 550 ms

7.5 Power supply

Power supply	85 – 265V AC/DC 50/60 HZ; 15VA

7.6 Hardware inputs

Measuring input for voltage	Terminals 10 and 13	57.75V... 500V...600V AC, intended for max. 500V AC rated voltage; over 500V AC PH-PH to 30.00KV AC PH-PH with auxiliary voltage transformer
	Input impedance	at least 2.5 MOhm
	Measuring range	programmable
Temperature input	Measuring range	-20°C to 100°C ± 2°C
	- Connection for PT1000 temperature sensor	
Current measuring input	Terminals 20 and 21	0.05A...5A...6A AC (for x/5A transformer), intended for max. 5A AC rated current 0.01A...1A...1.2A AC (for x/1A transformer), intended for max. 1A AC rated current
	Power consumption	≤ 2VA per input at 6A
	Measuring range	programmable

7.7 Hardware outputs

Relay outputs	Switching stages	5 on basic device, one of these can be configured as fan
	Switching capacity	250V (AC) / 2A per relay
Alarm relay	Switching capacity	250V (AC) / 2A floating, configurable as fans or switching stage
Interface	Serial interface	RS-485
	Bus protocol	KBR Energy bus / Modbus
	Transmission speed	38400 baud, can be selected on Modbus
	Addressing	Can be addressed up to address 9999 for KBR eBus, scan mode can be activated on the device
		Bus addresses for Modbus 1 to 247; can be configured on the device
Display and configuration interface	Serial interface	RS-485 (RJ12)
Module bus interface	Serial interface	RS 485 (RJ12) for ready-made KBR system cable (6 pole modular cable, unshielded) max. length 30 m if placed accordingly

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Connection elements		Plug terminals
Permissible cross section of connection lines		2.5 mm² (bus connection and temperature sensor 1.5mm²)
Measuring voltage inputs	Fuse protection	max. 6 A
Measuring current input	Fuse protection	NONE!!! Always short-circuit current transformer terminals k and l prior to opening the circuit!
Control voltage input	Fuse protection	max. 6 A
Relay output	Fuse protection	max 2A medium time-lag
BUS connection	Connection material	For proper operation, please only use shielded twisted-pair cables; e.g. J-Y(St)Y EIB 2x2x0.8
Transformer connection	Connections	see connection chart
BUS connection	Pins for BUS connection via RS-485	Device MULTIMASTER or interface adapter Terminal 90 (⊥) →pin ⊥ → see software manual Terminal 91 (A) →pin A → see software manual Terminal 92 (B) →pin B → see software manual

7.8 Mechanical data

Mounting 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. 650 g

7.9 Standards and miscellaneous

Ambient conditions	Standards	DIN EN 60721-3-3/A2: 1997-07; 3K5+3Z11; (IEC721-3-3; 3K5+3Z11)
	Operating temperature	-5°C … +55°C
	Humidity	5% … 95%, non-condensing
	Storage temperature	-25°C … +70°C
Electrical safety	Standards	DIN EN 61010-1/A2: 1996-05; (IEC1010-1/A2)
	Protection class	I, in accordance with DIN EN 61010-/A2: 1996-05
	Overvoltage category	CAT III: U_{PH-PH} up to 400V
	Degree of protection	IP20 in accordance with DIN EN 40050 part 9: 1993-05
	Electromagnetic compatibility	DIN EN 61000-6-3: 2005-06; (IEC 61000-6-3) DIN EN 61000-6-2: 2000-03; (IEC 61000-6-2)
Password protection	4 digit code	If password protection is active, deleting and configuring parameters on the device is disabled.

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7.10 Default settings after reset

Primary voltage / secondary voltage	400 V / 400 V Ph - Ph
Primary current / Secondary current	1000 A / 5 A
Cosφ 1 (target Cosφ)	inductive 0.95
Cosφ 2 (target Cosφ for energy recovery)	inductive 1.00
Cosφ 3 (alarm Cosφ for FTS message)	inductive 0.92
Attenuation coefficient for current and voltage	2
Temperature measurement	Active
Operating point fan	28°C, hysteresis 5°C
Operating point alarm	45°C, hysteresis 5°C
Operating point emergency switch-off	48°C, hysteresis 5°C
Idle time	30 sec.
Alarm relay time	1200 sec.
Alarm relay	NC contact
Hysteresis connection	70% of smallest available stage
Hysteresis disconnection	100% of smallest available stage
Switch attenuation (stage interval)	8 sec.
Switching cycle limit	80,000
Stage power	No stage power programmed
Stages	System type standard
	Discharge time 60 sec.
	Detuning 7 %
	Cabinet No. 1
	Stage 5 as fan
Harmonics monitoring	Enabled, THD 8%, error message is displayed
Induced current measurement	Disabled
Password	9999 / all functions can be accessed
Limiting value overvoltage switch-off	Active, 253 V Ph-N, stages switch off, error message is displayed

Unaffected by a RESET:

Bus address
Date and time
Language

8 Appendix

8.1 General technical data of the modules (without multimess 1D4)

Power supply:	Via module bus	24VDC / ca. 2W
	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 if placed accordingly
	Transmission speed	38400 Bps
	Bus protocol	KBR module bus
Mechanical data:		
Mounting rail 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
Standards and miscellaneous:		
Ambient conditions	Standards	DIN EN 60721-3-3/A2: 1997-07; 3K5+3Z11; (IEC721-3-3; 3K5+3Z11)
	Operating temperature	-5°C ... +55°C
	Humidity	5% ... 95%, non-condensing
	Storage temperature	-25°C ... +70°C

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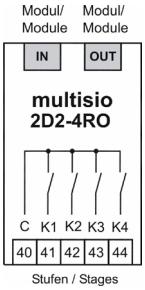
8.2 Relay output module multisio 2D2 4RO

8.2.1 Relay output module connection chart

Terminal assignment:
Terminal 40: Shared connection (C)
Terminal 41: Output relay 1 (K1)
Terminal 42: Output relay 2 (K2)
Terminal 43: Output relay 3 (K3)
Terminal 44: Output relay 4 (K4)
IN / OUT:
Module bus / supply voltage



8.2.2 Relay output module LED display

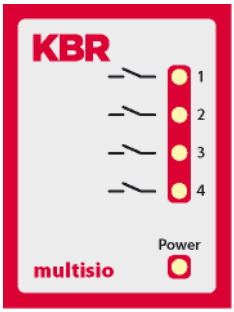
The LEDs at the relay output module indicate the current state of the relay output. If the output is active, the LED is lit.
If the output is passive, the LED is off.

In KBR eBus scanning mode, all 4 output LEDs are flashing.

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

The displays are:
LED1 for: Output relay 1 (K1) switched
LED2 for: Output relay 2 (K2) switched
LED3 for: Output relay 3 (K3) switched
LED4 for: Output relay 4 (K4) switched

Power LED: Operating voltage

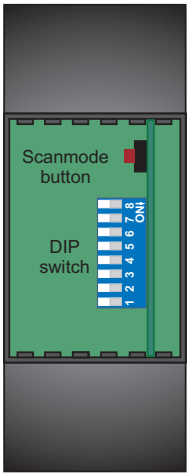


8.2.3 Function of the scan button

Note

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

Switch setting illustrated
OFF = white
ON = gray



8.2.4 Function of the DIP switches

In case of operation at the multicomp 5D6, the DIP switches have no function

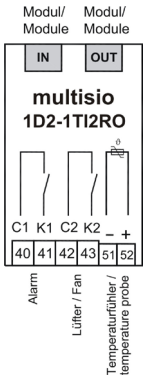
Module specific technical data:		
Hardware outputs:		
	5-pole plug terminal	
Voltage supply of the relay outputs:	Terminal 40	floating
4 relay outputs	Terminals 41 to 44	floating
	Contact capacity	500VA each, 2A, 250V 50/60Hz
	Overvoltage category	CAT II
Display	LED	4x message 1x operation display
Control unit	DIP switch	1x 8-fold
	Button	Scan button (module bus)

8.3 Temperature module multisio 2D2 1TI2RO

8.3.1 Temperature module connection chart

Terminal assignment

Terminal 40: Relay input Alarm
Terminal 41: Relay input Alarm
Terminal 42: Relay input Fan
Terminal 43: Relay output Fan
Terminal 51: Temperature input - PT1000
Terminal 52: Temperature input + PT1000
IN / OUT: Module bus / supply voltage



Note

The module relay outputs are designed as floating outputs.

8.3.2 Temperature module LED display

In KBR eBus scanning mode, all 4 input LEDs are flashing. In the module detection mode, the input LEDs generate a running light.

The displays are:

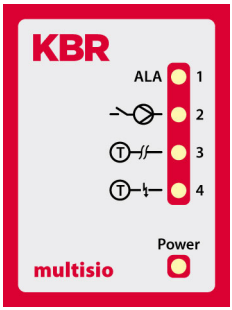
LED1 on: Alarm relay switched (contact open)

LED2 on: Fan relay closed

LED3 on: Temperature sensor not connected

LED4 on: Short circuit on temperature sensor

Power LED: Operating voltage

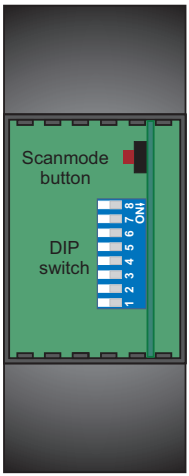


8.3.3 Function of the scan button

Note

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

Switch setting illustrated
OFF = white
ON = gray



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8.3.4 Function of the DIP switches

In case of operation at the multicomp 5D6, the DIP switches have no function

Module specific technical data:		
Hardware inputs:		
Temperature inputs	Measuring range	-20°C to +100°C +/- 2°C
	2-pole plug terminal	for PT-1000 sensor
Hardware outputs:		
2 relay outputs	4-pole plug terminal	floating
	Contact capacity	500VA each, 2A, 250V and 50/60Hz
	Overvoltage category	CAT II
Display	LED	4x message, 1x operation display
Control unit	DIP switch	1x 8-fold
	Button	Scan button (module bus)

8.4 multisio 1D2-4CI current measuring module

Caution

The multisio 1D2-4CI may only be operated with current transformers connected upstream!

The transformers may not be secondarily grounded.

Up to the 690 V network (phase to phase voltage), the connected current transformers have to be designed for a test voltage of at least 2500 VAC for 1 minute.

8.4.1 Current measuring module connection chart

Terminal assignment

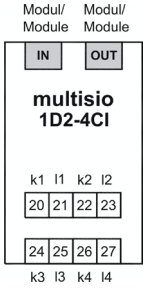
Upper terminal row:

Terminal 20: Current input k1

Terminal 21: Current input I1

Terminal 22: Current input k2

Terminal 23: Current input I2



Lower terminal row:

Terminal 24: Current input k3

Terminal 25: Current input I3

Terminal 26: Current input k4

Terminal 27: Current input I4

IN / OUT:

Module bus / supply voltage

Note

Connect the current transformers according to the terminal numbers, i.e. transformer 1 to terminal 20/21, transformer 2 to terminal 22/23 etc.! The current inputs of the module are not galvanically separated!

8.4.2 Current measuring module LED display

The power LED is flashing quickly in KBR eBus scanning mode, and slowly in module detection mode.

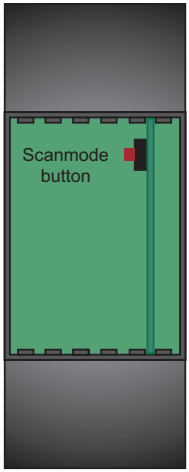
In normal operation, the LED is illuminated constantly.

Power LED: Operating voltage

8.4.3 Function of the scan button

Note

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



Module specific technical data:		
Hardware inputs:		
4 current measuring inputs	Measuring range	0 to 6A AC
	2x 4-pole plug terminals	Permissible cross section of connection lines 2,5 mm^2
Measuring current input	Fuse protection	NONE!!!
		Always short-circuit current transformer terminals k and l prior to opening the circuit!
	Overvoltage category	CAT II
Display	LED	1x operation display / status display
Control unit	Button	Scan button (module bus)

8.5 Technical data of the multimess 1D4 measuring module

8.5.1 Measuring accuracy

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

8.5.2 Measuring principle

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

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8.5.3 Device memory

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

8.5.4 Power supply

Measuring module power supply	50...230...280 VAC Ph-N, 3.2VA, 50/60 Hz provided by the measuring voltage
Module bus power supply	ext. 24VDC, 0.3W, via RJ12 module bus connector

8.5.5 Hardware inputs and outputs

8.5.5.1 Inputs

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

8.5.5.1 Outputs

Serial interface	Module bus	RS485 via RJ12 interface
	Baud rate	38400
	Addressing	Can be addressed using the display or visual energy (connection via multisio 3D2 ESBS gateway)

8.5.6 Electrical connection

Connection elements		Plug terminals
Permissible cross section of connection lines		2.5 mm^2
Measuring voltage inputs	Fuse protection	max. 6 A
Measuring current inputs	Fuse protection	NONE!!! Always short-circuit current transformer terminals k and l prior to opening the circuit!
Input control voltage		via measuring voltage
Module bus connection	Connection material	ready-made KBR system cable (6 pole modular cable, unshielded), max. length 30m if placed accordingly

8.5.7 Mechanical data

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

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8.5.8 Standards and miscellaneous

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

8.5.9 Commissioning of the multimess 1D4 with multicomp 5D6

For commissioning the multimess 1D4 at the multicomp 5D6, please proceed as follows:

1. Connect the measuring module to the multicomp 5D6 via the module bus interface.

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

3. At the multicomp display, select the menu Settings > Extra > Settings > Modules > Module management > Module.

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

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

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

The multicomp basic module now recognizes the measuring module and adds it to the list of modules connected. You can now scan further modules, which are automatically added to the module list or, by touching the stop button, end the scanning process. The multicomp 5D6 can manage a maximum number of six modules.

8.9.10 Connections

Terminals 10 to 13 (L1, L2, L3, N)	Measuring voltage. The power supply of the device is also provided by the measuring voltage. Please see the nameplate of the device for technical data.
Terminal 20 (k1) and 21 (I1), 22 (k2) and 23 (I2) 24 (k3) and 25 (I3)	Measuring inputs for current. The measuring inputs for current must be connected via current transformers x/1A AC or x/5A AC. When connecting transformers, pay attention to the energy flow direction and the correct assignment of measuring voltage inputs to the current transformers.

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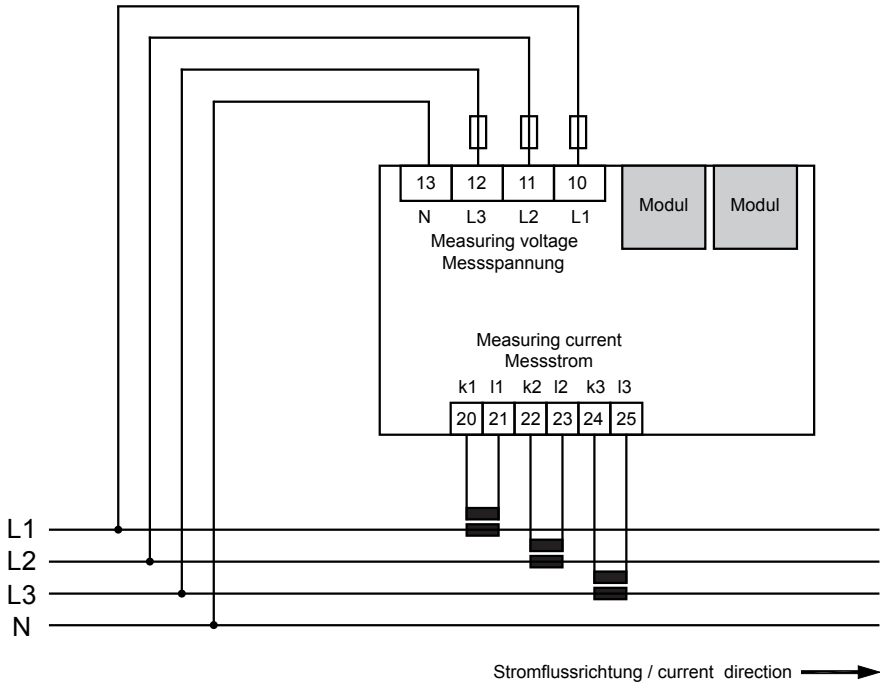
13
12
11
10
N
L3
L2
L1
Modul
Modul
Measuring voltage
Messspannung
Measuring current
Messstrom
k1 l1 k2 l2 k3 l3
20 21 22 23 24 25
L1
L2
L3
N
Stromflussrichtung / current direction

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KBR Energy Management

ERKLÄRUNG DER KONFORMITÄT
DECLARATION OF CONFORMITY
DÉCLARATION DE CONFORMITÉ

Wir **KBR GmbH Schwabach**
We/Nous (Name des Anbieters / supplier´s name / norm du fournisseur)

Am Kiefernschlag 7
D-91126 Schwabach

(Anschrift / address / addresse)

erklären in alleiniger Verantwortung, dass das (die) Produkt(e) /
declare under our sole responsibility that the product(s) / Déclarons sous notre seule responsabilité, ques le(s) produit(s)

multicomp 5D6-ESBSDS-1V1C6RO

(Bezeichnung, Typ oder Modell oder Seriennummer / name, type or model or serial number / nom, type ou modèle, N° de lot ou de série)

mit folgenden Europäischen Richtlinien übereinstimmt (übereinstimmen)
is (are) in conformity with the following directives / Répondet(ent) aux directives suivantes

	Niederspannungsrichtline Nr. **Low Voltage Directive No.** **Directive Basse Tension N°**	**EMV-Richtlinie Nr.** **EMV Directive No.** **EMV Directive N°**
***ab 16.01.2007 ***from 16st Jan. 2007 ***à partir du 16er janvier 2007	**2006/95/EG***** **2006/95/EC** **2006/95/CE**	**2004/108/EG***** **2004/108/EC** **2004/108/CE**

Dies wird nachgewiesen durch die Einhaltung folgender Norm(en)
This is documented by the accordance with the following standard(s) / Justifié par le respect de la (des) norme(s) suivante(s)

DIN EN 61010-1:2002;
DIN EN 61010-1/BL1:2002
DIN EN 61010-1/BL2:2004

DIN EN 61000-6-1:2007
DIN EN 61000-6-2:2006
DIN EN 61000-6-3:2007
DIN EN 61000-6-4:2007

(Titel und/oder Nr. sowie Ausgabedatum der Norm(en)
Title and/or number and date of issue of the standard(s)
Titre et/ou numéro et date d´édition de la (des) norme(s)

CE

Schwabach, 07.05.2012
(Ort und Datum der Ausstellung
Place and date of issue
Lieu et date de l´édition)

Geschäftsführer
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