EN Manual

ISOMETER® iso685-D
AC/DC
iso685W-D
iso685-S
iso685W-S

Insulation Monitoring Device for IT AC systems with galvanically connected rectifiers and inverters and for IT DC systems

iso685_D00022_04_M_XXEN/01.2016

1.1 Explanation of symbols and notes

This manual is intended for qualified personnel working in electrical engineering and electronics!
To make it easier for you to understand and revisit certain sections of text and instructions in this manual, we have used symbols to identify important instructions and information.

DANGER: This signal word indicates that there is a high risk of danger that will result in electrocution or serious injury if not avoided.

WARNING: This signal word indicates a medium risk of danger that can lead to death or serious injury if not avoided.

CAUTION: This signal word indicates a low level risk that can result in minor or moderate injury or damage to property if not avoided.

NOTE: This symbol denotes information intended to assist the user in making optimum use of the product.

1.2 Intended use

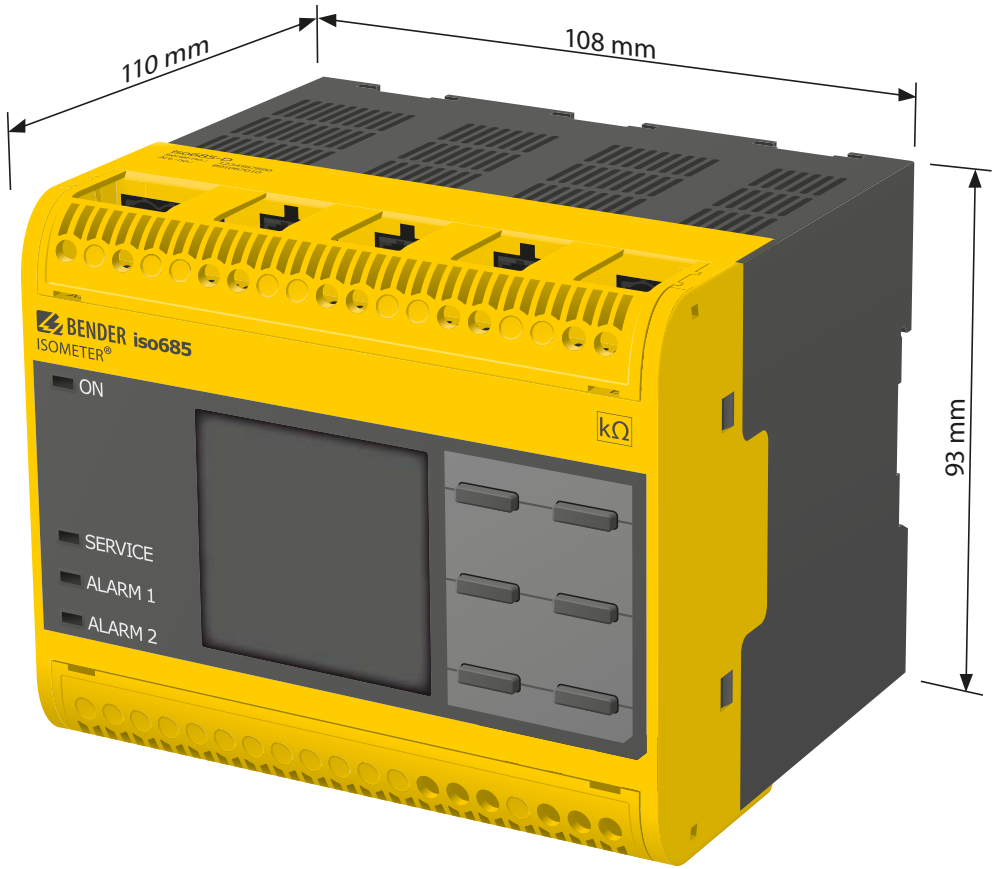
The ISOMETER® iso685-D and iso685-S monitors the insulation resistance of unearthed AC/DC main circuits (IT systems) with mains voltages of AC 0…690 V or DC 0…1000 V. The nominal voltage range U_n can be extended via coupling devices. DC components existing in AC/DC systems do not influence the operating characteristics. Due to the separate supply voltage, de-energised systems can also be monitored. The maximum permissible system leakage capacitance is 0…1000 µF, depending on the profile.
Eine andere oder darüber hinausgehende Benutzung gilt als nicht bestimmungsgemäß. The Bender companies shall not be liable for any losses or damage resulting from improper use. Intended use implies:

The observation of all information in the operating manual.
Compliance with test intervals.

When using ISOMETER®s in IT systems, make sure that only one active ISOMETER® is connected in each interconnected system. If IT systems are interconnected via coupling switches, make sure that ISOMETER®s not currently used are disconnected from the IT system and deactivated. Sind IT-Systeme über Kapazitäten oder Dioden gekoppelt, kann dies die Isolationsüberwachung beeinflussen, so dass hier eine zentrale Steuerung der verschiedenen ISOMETER® eingesetzt werden muss.

As a basic principle, our "General Conditions of Sale and Delivery" shall apply. At the latest, these shall be available to the operator when the contract is concluded.

3.1 Dimensions



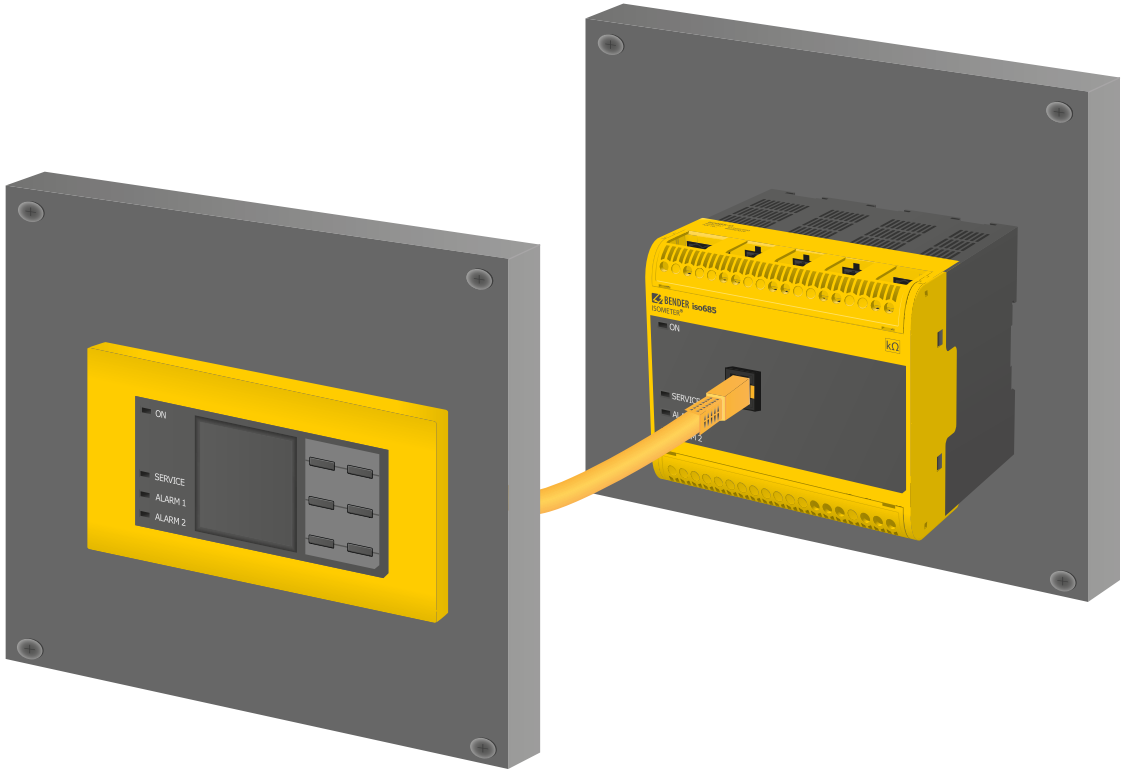
3.2 Device variants

iso685-D: Device version iso685-D features a high-resolution graphical LC display and operating controls for direct operation of the device functions.

iso685-S: Device version iso685-S neither features a display nor operating controls. It can only be used in combination with FP200 and operated via this front panel.

Option "W": The device variants with option "W" for extreme climatic and mechanical stresses are optionally available.

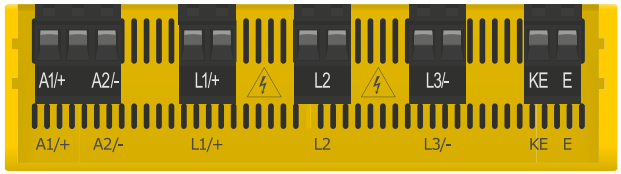
ISOMETER® iso685-D



ISOMETER® iso685-S with front panel FP200 connected via an RJ45 cable

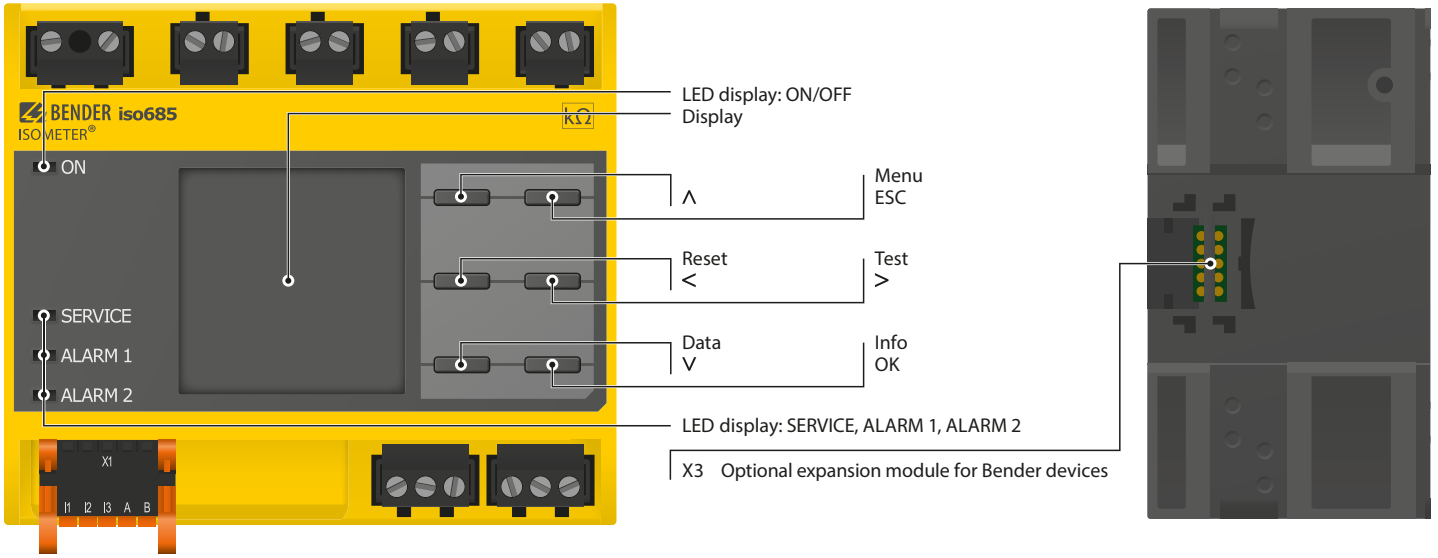
3.3 Connections and panel

Top

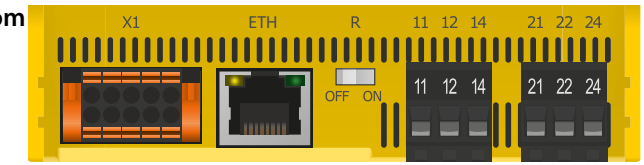


A1/+, A2/-	Connection to the power supply voltage U_s
L1/+	Connection to the IT system to be monitored
L2	Connection to the IT system to be monitored
L3/-	Connection to the IT system to be monitored
KE, E	Connection to PE

Front



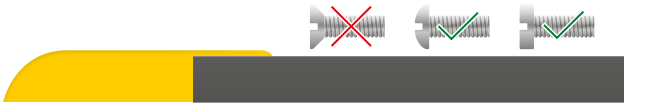
Bottom

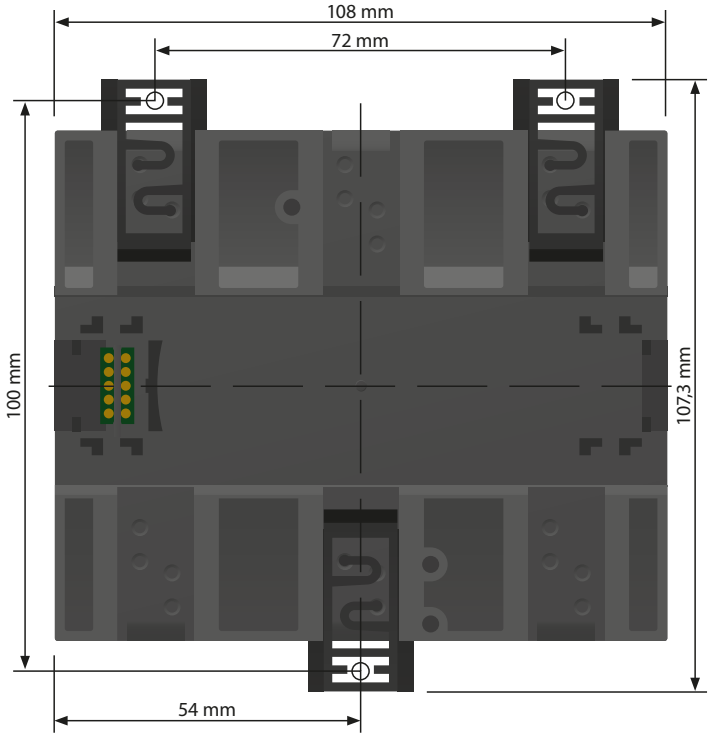


X1	Digital interface
ETH	Ethernet interface
R	Selectable resistance R
11 12 14	Connector for alarm relay 1
21 22 24	Connector for alarm relay 2

4.1 Screw mounting

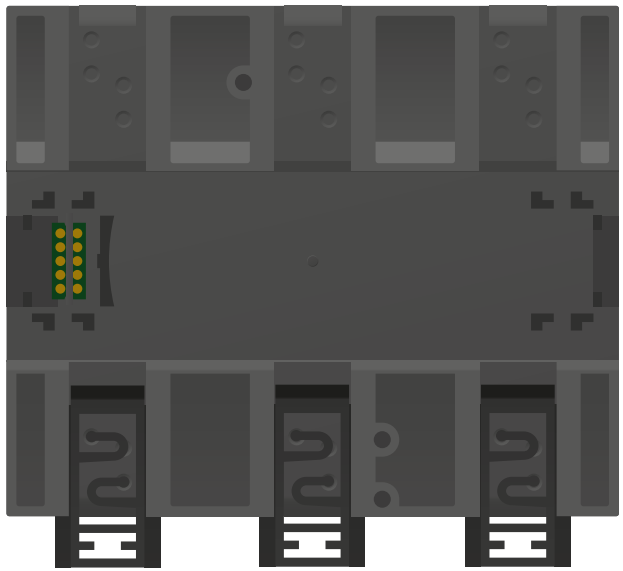
15. Fix the three mounting clips delivered with the device (two of them packed separately) manually or using a tool, as illustrated below.
16. Drill the mounting holes for the M4 thread according to the dimensioned drilling template.
17. Fix the ISOMETER® iso685-D using three M4 screws.





4.2 DIN rail mounting

1. Fix the three mounting clips delivered with the device (two of them packed separately) manually or using a tool, as illustrated below.
2. Fix the ISOMETER® iso685-D/-S onto the DIN rail until it snaps into place.



5.1 Connection conditions

Consider the minimum distance to adjacent devices:
lateral 0 mm, top 20 mm, bottom 20 mm.

DANGER

Risk of electric shock!
Nominal voltages up to 1000 V may be present on the terminals L1/+ to L3/- which can be lethal. Make sure that the terminal covers are properly mounted and clicked in before you use the device.

DANGER

Risk of electric shock!
High voltage is applied to the terminals which can be lethal if directly contacted. If the device is connected via the terminals L1/+, L2, L3/- to an IT system that is live,-for operational reasons, terminals KE and E must not be disconnected from th protective earth conductor (PE).

WARNING

Warning of insulation monitoring devices that do not work correctly!
Connect the terminals KE and E individually to the protective earth conductor PE.

CAUTION

Risk of injury from sharp-edged terminals!
Risk of lacerations.
Touch the enclosure and the terminals with due care.

CAUTION

Ensure disconnection from the IT system!
When insulation or voltage tests are to be carried out, the device must be isolated from the system for the test period. Otherwise the device may be damaged.

CAUTION

Risk of property damage due to unprofessional installation!
If more than one insulation monitoring device is connected to a conductively connected system, the system can be damaged. If several devices are connected, the device does not function and does not signal insulation faults. Make sure that only one insulation monitoring device is connected in each conductively connected system.

CAUTION

Risk of property damage due to unprofessional installation!
The connecting lines L1/+, L2, L3/- to the system to be monitored must be carried out as spur lines. Inadmissible load current can result in damage to property and personal injury. Do not run any load current through the terminals.

Check proper connection!
Prior to commissioning of the installation, check that the device has been properly connected and check the device functions. Perform a functional test using an earth fault via a suitable resistance.

Prevent measurement errors!
When the AC system being monitored contains galvanically coupled DC circuits, take into consideration that: an insulation fault can only be detected correctly when the rectifier valves carry a minimum current of > 10 mA.

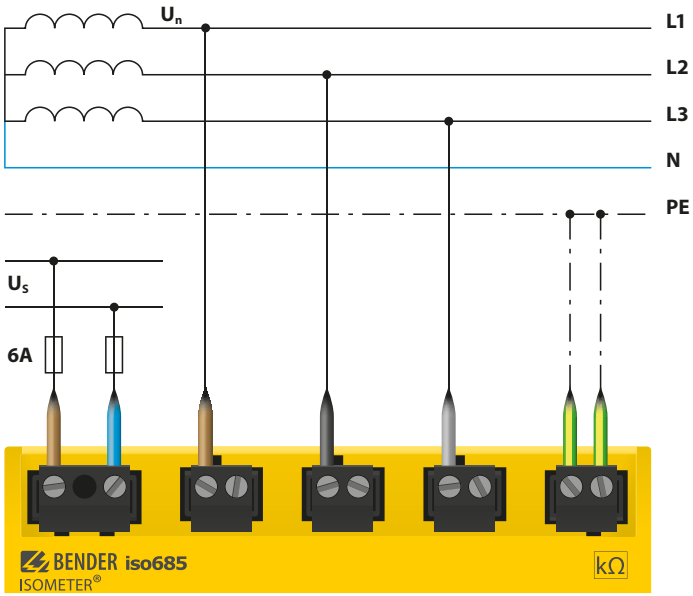
For UL applications:
Only use 60/70°C copper lines!
UL and CSA application require the supply voltage to be protected via 5-A fuses.

5.2 Connection to a 3(N)AC system/system type 3AC

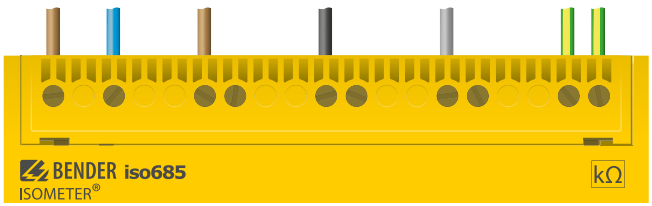
WARNING

Risk of injury, fire and damage to property due to a short-circuit!

According to DIN VDE 0100-430,devices used to protect against a short-circuit when terminals L1/+, L2 und L3/- are coupled to the IT system to be monitored can be omitted if the wiring is carried out in such a manner as to reduce the risk of a short-circuit to a minimum. Ensure short-circuit-proof and earth-fault-proof wiring.



Position the terminal cover and click it into place

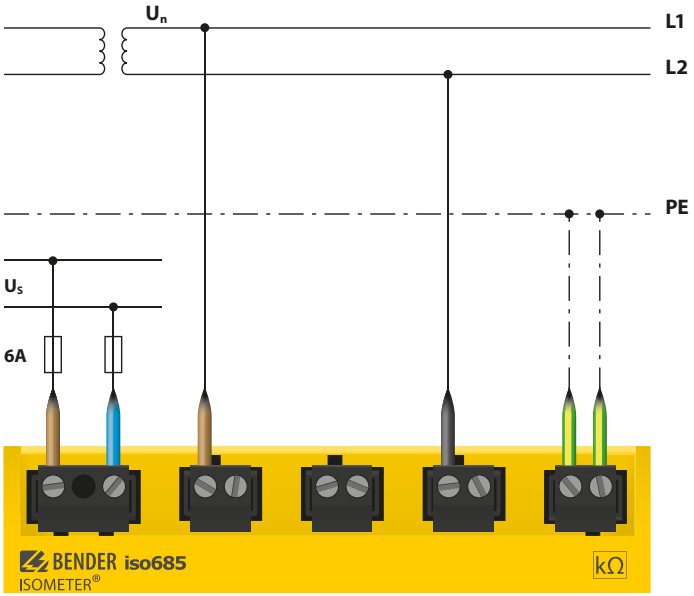


5.3 Connection to an AC system/system type AC

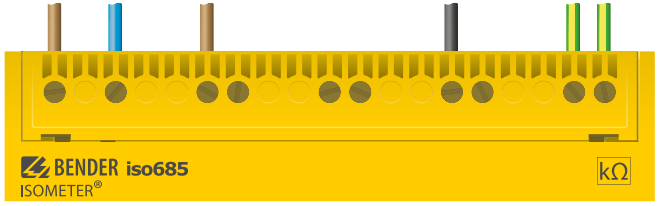
WARNING

Risk of injury, fire and damage to property due to a short-circuit!

According to DIN VDE 0100-430,devices used to protect against a short-circuit when terminals L1/+, L2 und L3/- are coupled to the IT system to be monitored can be omitted if the wiring is carried out in such a manner as to reduce the risk of a short-circuit to a minimum. Ensure short-circuit-proof and earth-fault-proof wiring.



Position the terminal cover and click it into place

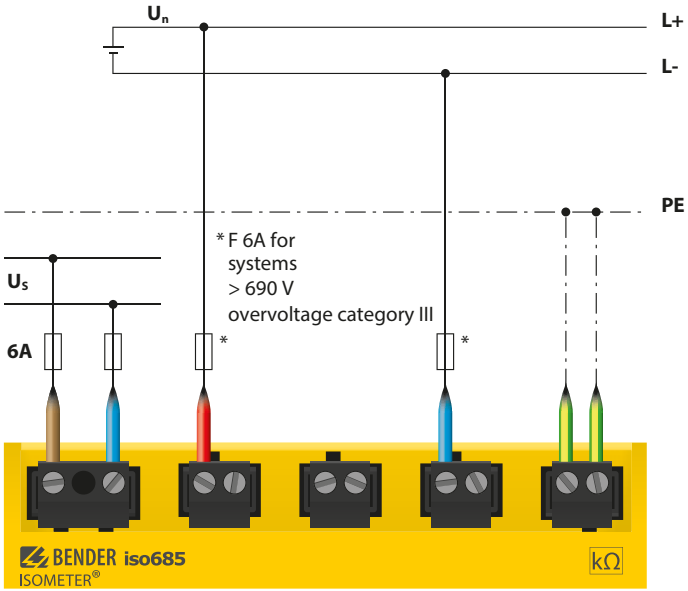


5.4 Connection to a DC system/system type DC

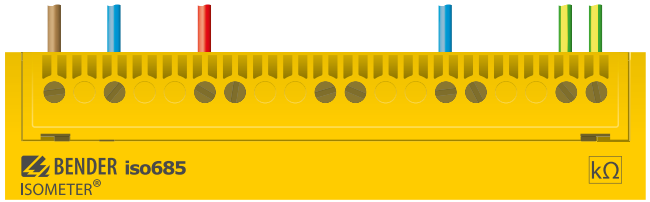
WARNING

Risk of injury, fire and damage to property due to a short-circuit!

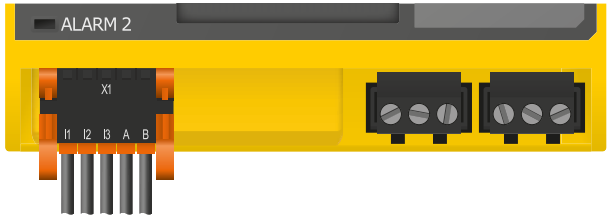
According to DIN VDE 0100-430,devices used to protect against a short-circuit when terminals L1/+, L2 und L3/- are coupled to the IT system to be monitored can be omitted if the wiring is carried out in such a manner as to reduce the risk of a short-circuit to a minimum. Ensure short-circuit-proof and earth-fault-proof wiring.

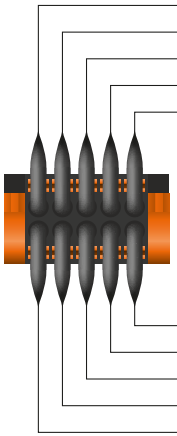


Position the terminal cover and click it into place



5.5 Connection to the X1 interface



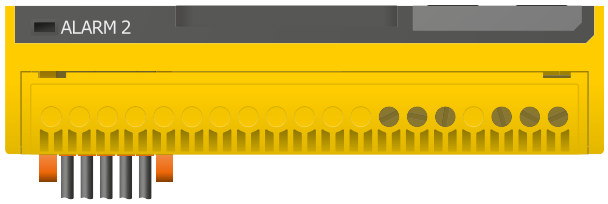


I1 Input 1
I2 Input 2
I3 Input 3
A RS-485 A
B RS-485 B

⊥ Ground
M+ Analogue output
Q2 Output 2
Q1 Output 1
+ + 24 V

Electrical overload protection
Auto shut-off in the event of a short circuit and transients (resettable)

Position the terminal cover and click it into place

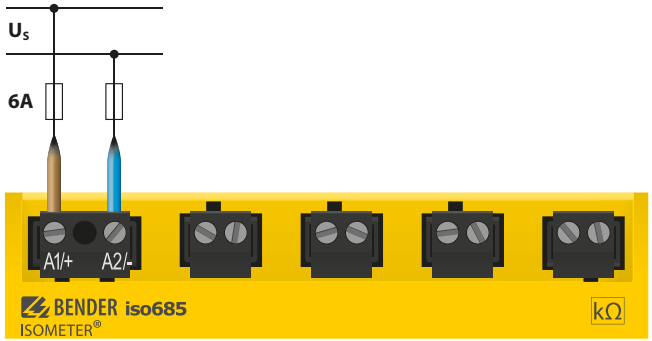


5.6 Connection to the supply voltage

5.6.1 Connection to A1/+, A2/-

CAUTION

Danger of damage to property due to faulty connections!
The device can be damaged if the unit is simultaneously connected to the supply voltage via the X1 interface, and A1/+, A2/- terminals. Do not connect the device simultaneously via X1, and A1/+, A2/- to different supply voltages.



5.6.2 Connection to X1

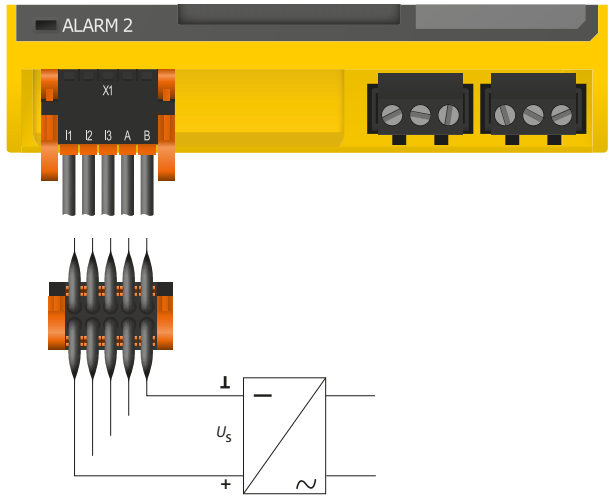
External Power supply for powering the ISOMETER® via terminal X1 must fulfil immunity and emission standards of the required application. For wiring longer than 1 m the use of a shielded cable is prescribed.

CAUTION

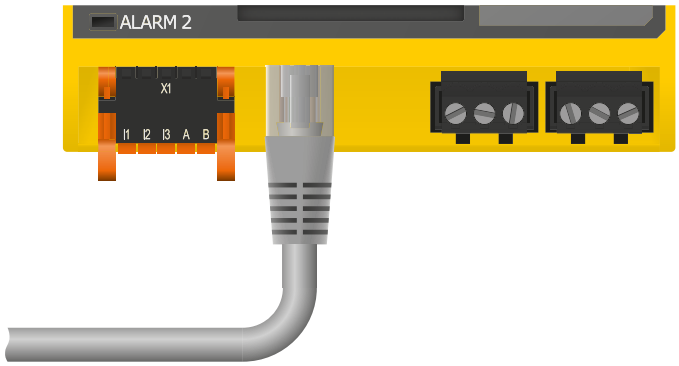
Danger of damage to property due to faulty connections!
The device can be damaged if the unit is simultaneously connected to the supply voltage via the X1 interface, and A1/+, A2/- terminals.Do not connect the device simultaneously via X1, and A1/+, A2/- to different supply voltages.

CAUTION

Danger of damage to property due to incorrect nominal voltage!
When the device is powered via the X1 interface, the nominal voltage must be 24 V otherwise the unit may be damaged. kann. Only connect to a nominal voltage of 24 V to the X1 interface.

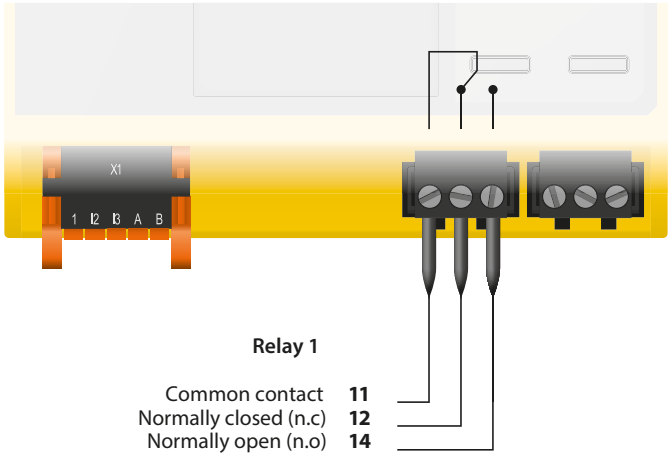


5.7 Connection to the Ethernet interface

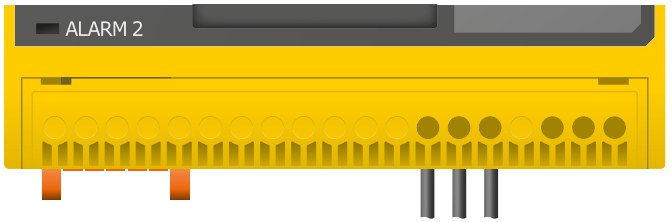


Position the terminal cover and click it into place

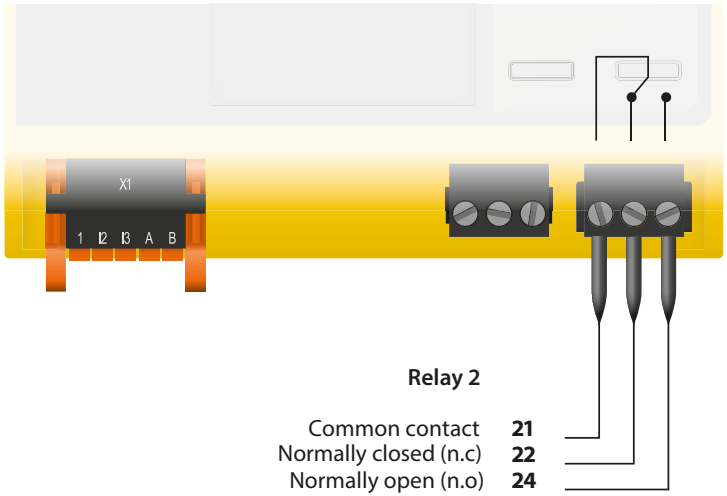
5.8 Connection to the relay -1 interface (11 12 14)



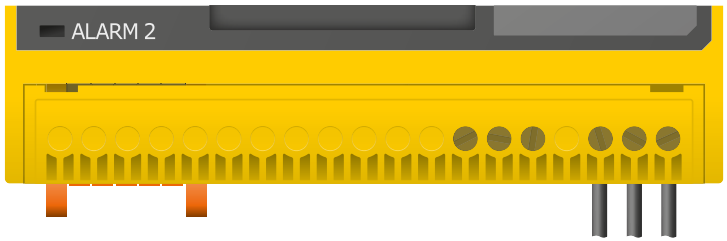
Position the terminal cover and click it into place



5.9 Connection of the relay-2 interface (21 22 24)

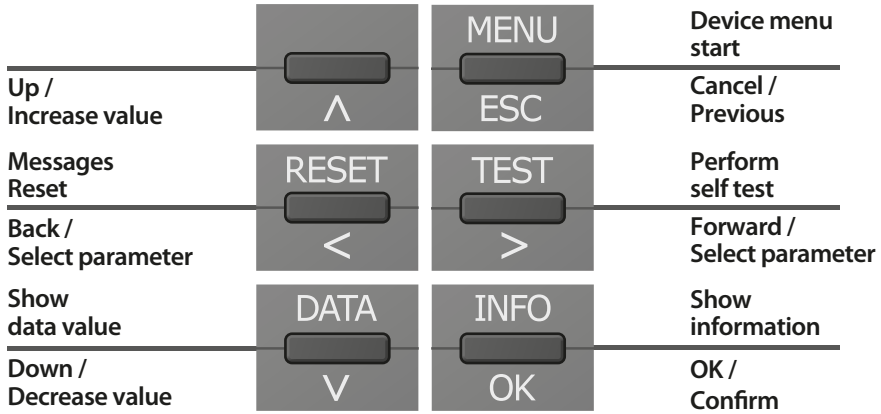


Position the terminal cover and click it into place



6.1 Device buttons

You can adjust the device settings in the respective menu using the menu buttons. Depending on the menu entry, one of the options displayed below are assigned to the buttons. The individual functions are:



6.2 General initial commissioning process

1. Check that the ISOMETER® iso685-D has been properly connected to the system to be monitored.
2. Connect the supply voltage to the ISOMETER® iso685-D. Adjust the devicce using the commissioning wizard. The ISOMETER® then performs a 4-step self test during which the alarm relays are not checked. After completion of the test, the measured insulation resistance is shown on the display. If the value exceeds the response values indicated in the lowest line of the display, the message "OK" will additionally be displayed.
3. Check the ISOMETER® iso685-D in the system being monitored, e.g. using a suitable resistance to earth.

Observe the device status!
The device is in the alarm state until initial commissioning has been complete.

After setting the response value R_{an2} for Alarm 2, the device starts a self test, makes the first measurement and outputs the measured insulation resistance values of the IT system being monitored. After this, the commissioning of the device is complete.

6.3 Initial commissioning

Check network function!
When the device is integrated into a network, the influence on the network has to be checked with the device switched on and off.

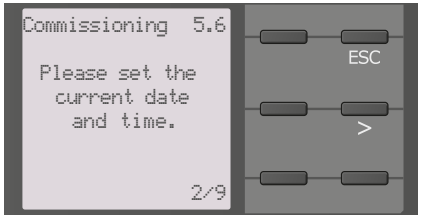
Follow the instructions of the commissioning wizard on the display.

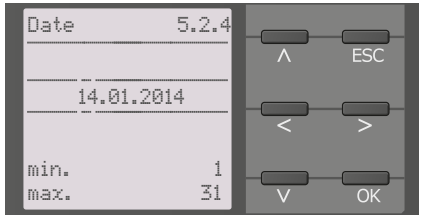
6.3.1 Set language

The language selected here will be used in the menu and for device messages.

6.3.2 Set time and date

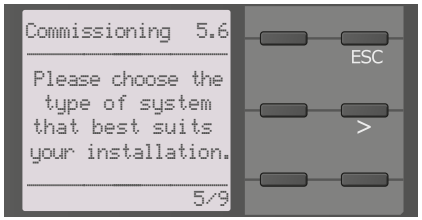
Alarm messages in the history memory and the insulation resistance value over time can only be assigned correctly to the isoGraph when the date and time are set correctly.

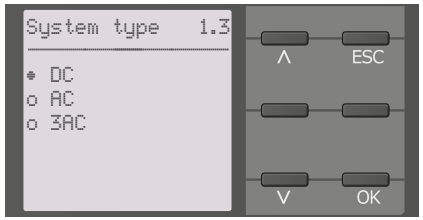




6.3.3 Set system type

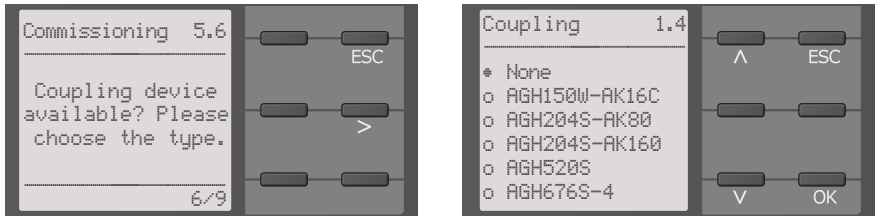
By setting the system type the insulation monitoring device can be optimally adapted to the system to be monitored. The system type is essential information for the insulation monitoring device in order to determine the insulation resistance correctly.





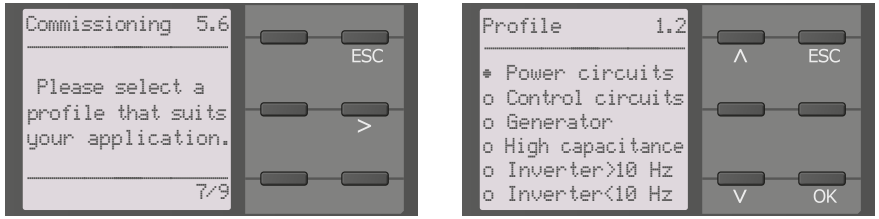
6.3.4 Select a coupling device

A coupling device connected to the insulation monitoring device (to increase the nominal system voltage) must be programmed here. The measurement of the insulation resistance takes into account the parameters of the connected coupling device. If no coupling device is available, press OK.



6.3.5 Set profile

In order to adapt the insulation monitoring device optimally to the system to be monitored, select a profile here that suits your system. For an overview of the profiles refer to "Profile overview" on page 38. The profile "power circuits" is suitable for most IT systems.

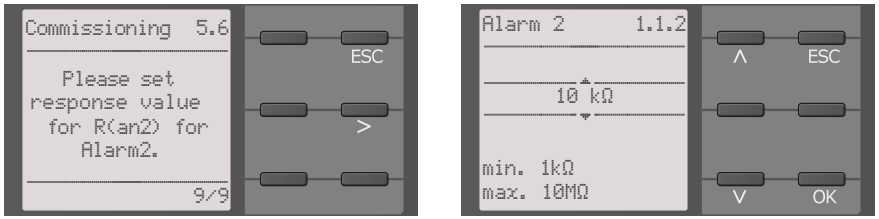


6.3.6 Set response value R_{an1} for Alarm 1

You can set the prewarning response value here.
A value of 100 Ω/V is recommended for prewarning.

6.3.7 Set response value R_{an2} for Alarm 2

You can set the response value for the main alarm here.
A value of 50 Ω/V is recommended for the main alarm.



6.4 Recommissioning

If the device has already been put into operation before, the self test will be started shortly after the supply voltage has been connected. Start the commissioning wizard using the menu path:

Menu/Device settings/Commissioning

This menu can be used to modify settings made previously.

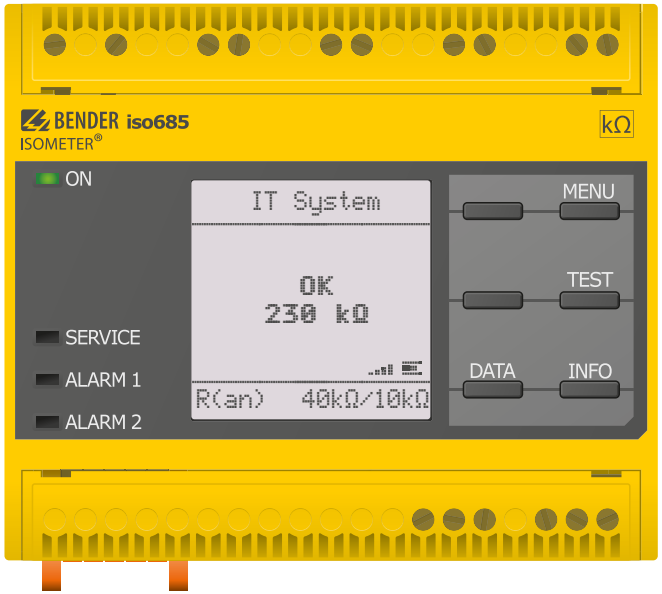
Observe the device status!
The device changes from the alarm state to normal state after completing initial commissioning and initial measurement by adhering to the response values set.

7.1 Standard display

In normal operation the ISOMETER® iso685-D displays the message **OK** and below the currently measured insulation resistance.

	The signal quality of the measurement suits the selected profile.
	The signal quality of the measurement does not suit the selected profile. Select a suitable profile.
	Update period between the test pulses

In the bottom line of the display, the set limit values for R(an) are indicated. In the example below, the set limit values are R_{an1}=40 kΩ and R_{an2}=10 kΩ.



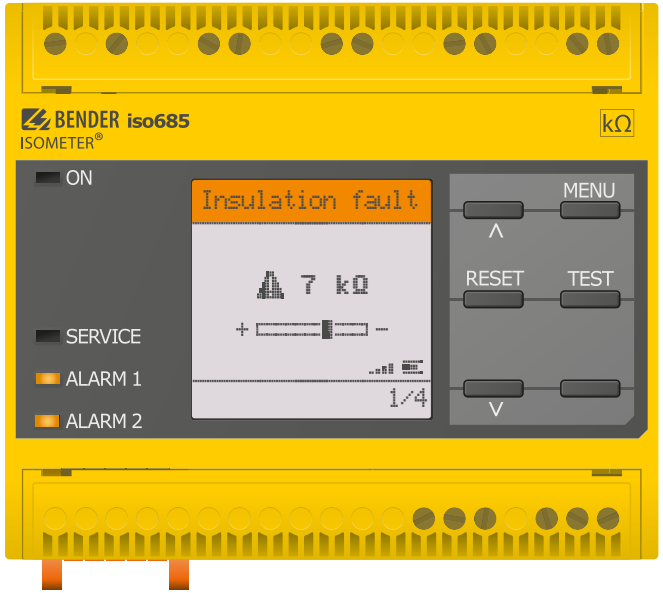
7.2 Fault display (active)

An active fault is displayed by ⚠. The upper part of the display will become orange and displays the fault message.

Depending on the type of fault, the LEDs ALARM 1, ALARM 2 or SERVICE are activated.

In the example below, the insulation resistance still is 7 kΩ. Since the values R_{an1}=40 kΩ and R_{an2}=10 kΩ both are below the set response value, ALARM 1 and ALARM 2 have been triggered.

If several fault messages occur, navigate through the faults using the ∨ and ∧ button.



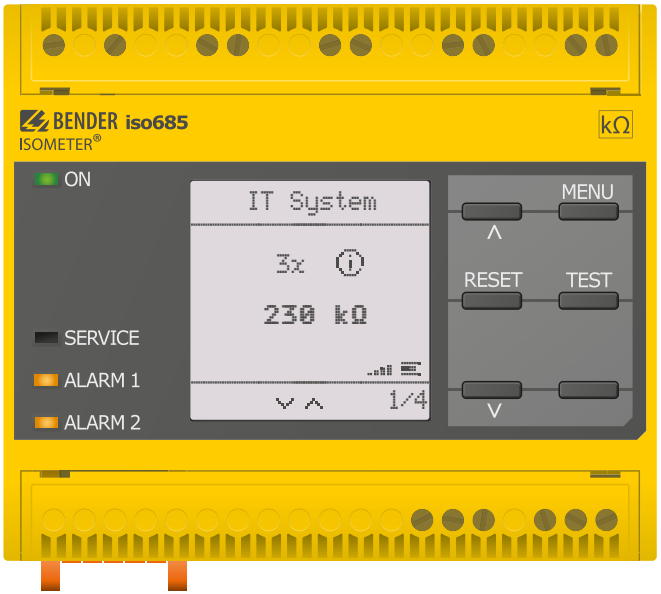
If the value falls below R_{an1} in a DC system or a DC shift is recognised in an AC system, additional detailed information regarding the DC shift will be displayed, as illustrated above.

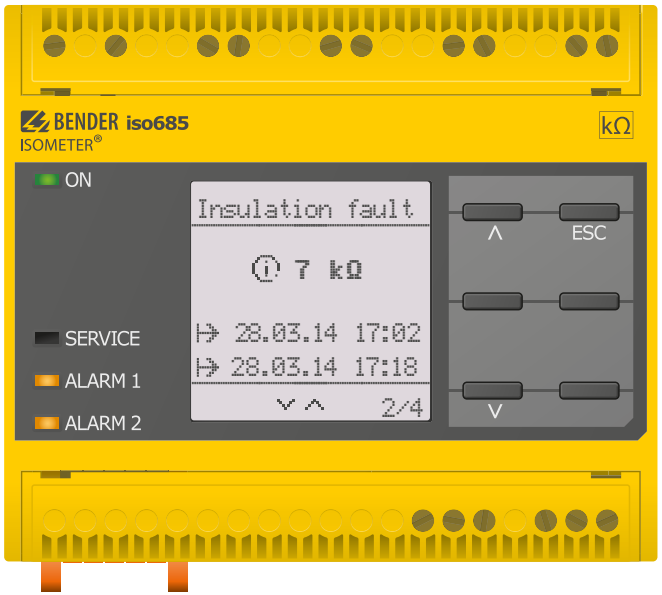
7.3 Fault display (inactive)

An inactive fault is displayed by ⓘ. If several faults have occurred, the number of faults will also be indicated.

This message means that there has been a fault in the past but the device is no longer in fault condition.

If several fault messages occur, navigate through the faults using the ∨ and ∧ button. In addition to the type of fault and the associated alarm value when the fault has occurred and how long it has been active will be shown.



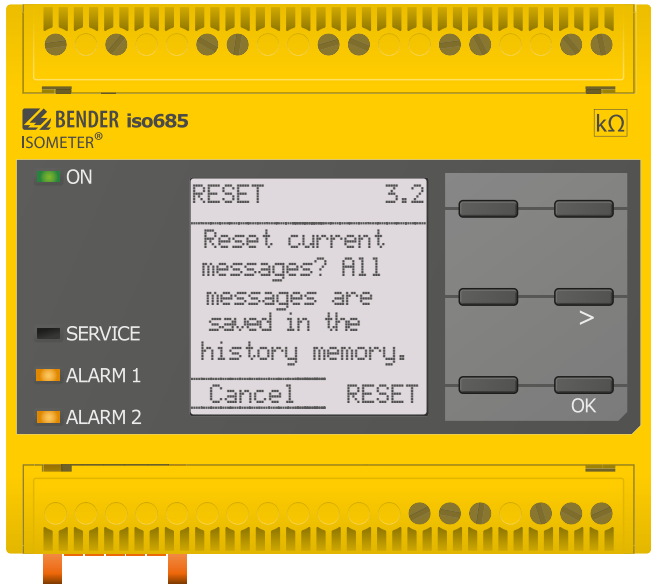


7.4 Acknowledge fault memory

In order to acknowledge the fault message and return to the iso685-D ISOMETER®'s standard display, all faults must be acknowledged by means of the reset button.

This means that fault messages can only be reset when the cause of the fault has been eliminated.

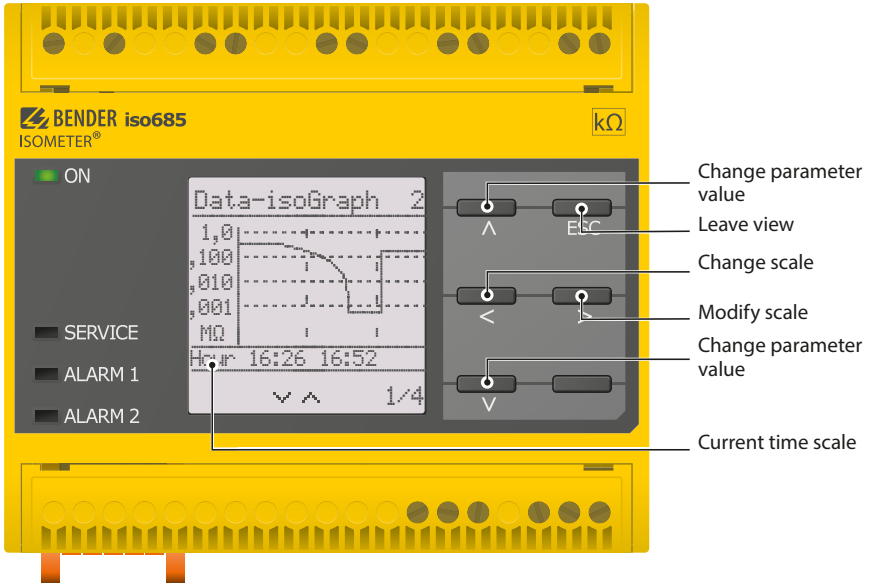
Press the reset button, then > and OK to clear the fault memory. The ISOMETER® iso685-D then returns to the standard display.



7.5 Data-isoGraph

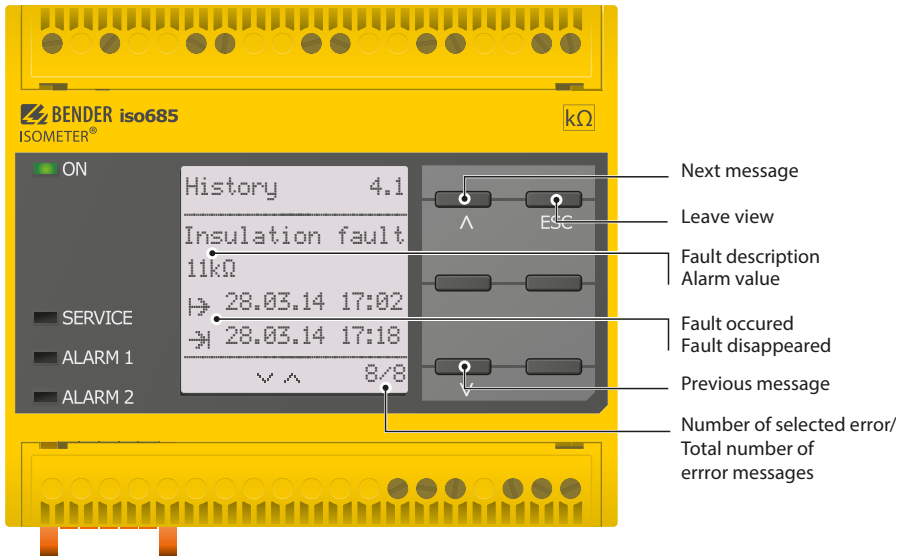
The isoGraph represents the chronological sequence of the insulation resistance over time. This graphical representation can be displayed over the following time periods: hour, day, week, month and year.

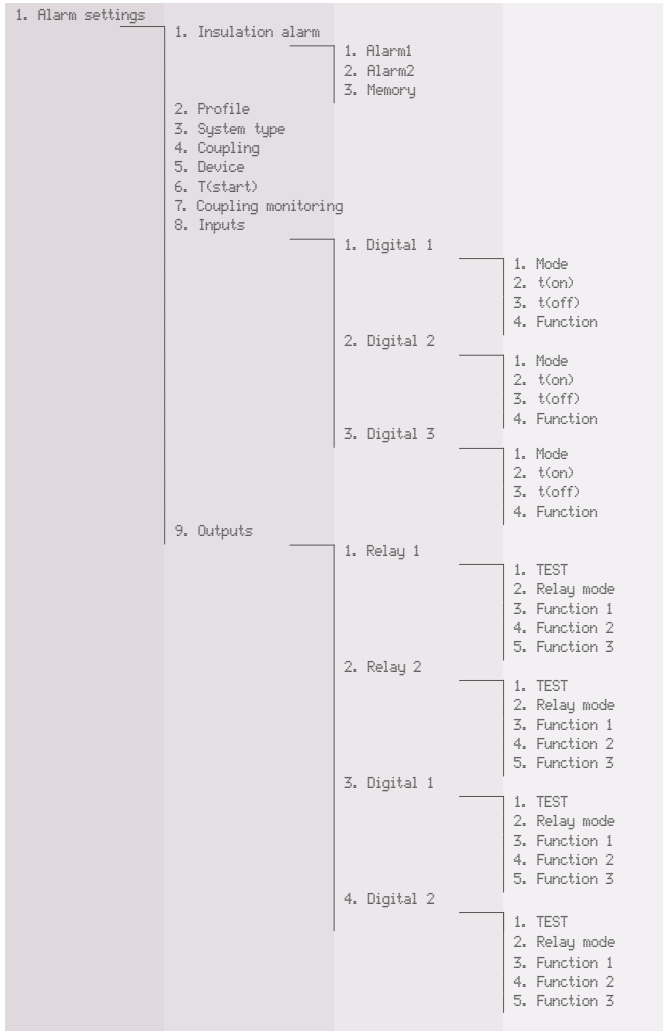
The measured values for individual representations are stored in a separate memory. Up to 100 measured values are available to represent each graph and the resolution of each graph is determined by these values.

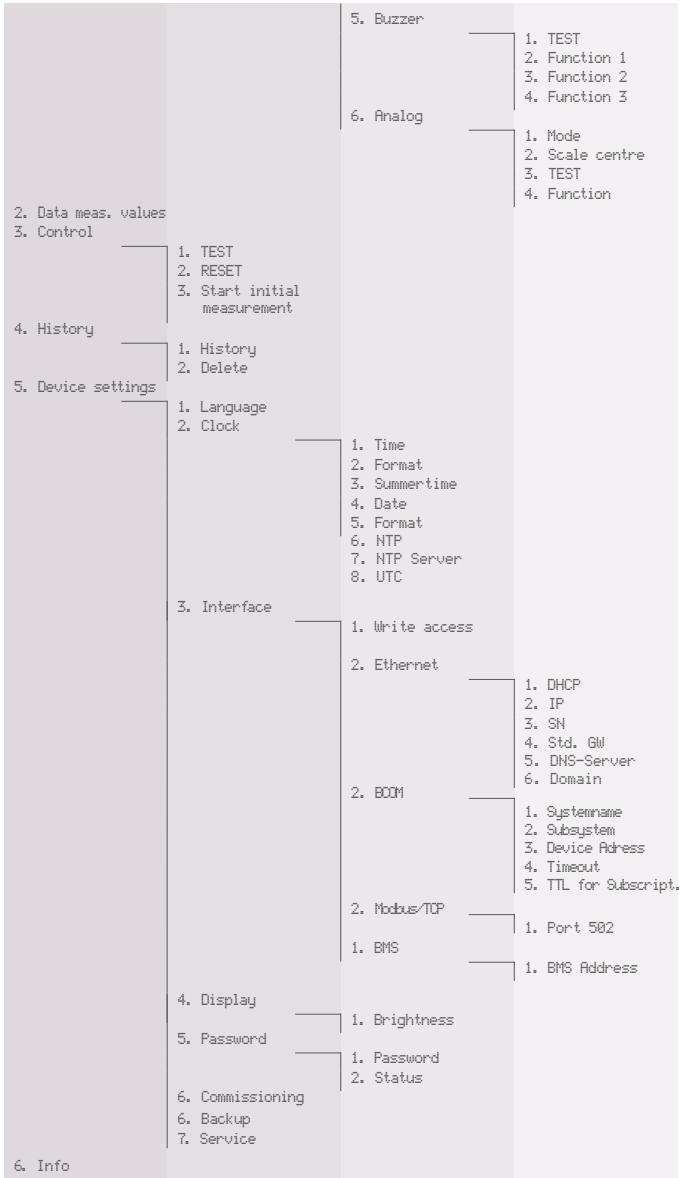


7.6 History memory

Up to 1023 alarm messages and device errors are stored in the history memory with date and time stamp. When the history memory is deleted, the minimum insulation resistance R_{min} will then be reset (refer to "Data measured values" on page 22).




1. Alarm settings
1. Insulation alarm
1. Alarm1
2. Alarm2
3. Memory
2. Profile
3. System type
4. Coupling
5. Device
6. T(start)
7. Coupling monitoring
8. Inputs
1. Digital 1
1. Mode
2. t(on)
3. t(off)
4. Function
2. Digital 2
1. Mode
2. t(on)
3. t(off)
4. Function
3. Digital 3
1. Mode
2. t(on)
3. t(off)
4. Function
9. Outputs
1. Relay 1
1. TEST
2. Relay mode
3. Function 1
4. Function 2
5. Function 3
2. Relay 2
1. TEST
2. Relay mode
3. Function 1
4. Function 2
5. Function 3
3. Digital 1
1. TEST
2. Relay mode
3. Function 1
4. Function 2
5. Function 3
4. Digital 2
1. TEST
2. Relay mode
3. Function 1
4. Function 2
5. Function 3


5. Buzzer
1. TEST
2. Function 1
3. Function 2
4. Function 3
6. Analog
1. Mode
2. Scale centre
3. TEST
4. Function
2. Data meas. values
3. Control
1. TEST
2. RESET
3. Start initial measurement
4. History
1. History
2. Delete
5. Device settings
1. Language
2. Clock
1. Time
2. Format
3. Summertime
4. Date
5. Format
6. NTP
7. NTP Server
8. UTC
3. Interface
1. Write access
2. Ethernet
1. DHCP
2. IP
3. SN
4. Std. GW
5. DNS-Server
6. Domain
2. BOOM
1. Systemname
2. Subsystem
3. Device Adress
4. Timeout
5. TTL for Subscript.
2. Modbus/TCP
1. Port 502
1. BMS
1. BMS Address
4. Display
1. Brightness
5. Password
1. Password
2. Status
6. Commissioning
6. Backup
7. Service
6. Info

1.0 Alarm settings

The limit values for the insulation resistances of Alarm 1 and Alarm 2 can be specified in the alarm settings menu and can be adapted to the iso685-D ISOMETER® user profile. A device password is required for entering the settings. You can adjust the following functions:

1.1 Insulation alarm

In the "Insulation alarm" menu you can set the iso685-D ISOMETER® limit values for ALARM 1 and ALARM 2:

1.1.1 Alarm 1

For ALARM 1 an insulation resistance of 1 kΩ…10 MΩ can be set irrespective of ALARM 2.

1.1.2 Alarm 2

For ALARM 2 an insulation resistance of 1 kΩ…10 MΩ can be set irrespective of ALARM 1.

1.1.3 Fault memory

Automatic reset of inactive faults at the outputs of relay 1, relay 2, digital output 1, digital output 2:

•on	If a fault becomes inactive, the programmed outputs remain in fault condition until they are reset manually.
•off	If a fault becomes inactive, the programmed outputs automatically change the state.

1.2 Profile

Adapt the applicabilty of the ISOMETER® iso685-D to your system profile. For a description of the profiles refer to "Profile overview" on page 38.
You may select:

•Power circuits	Suitable for most IT systems.
•Control circuits	Not recommended for voltages >230 V.
•Generator	
•High capacitance	
•Inverter > 10 Hz	
•Inverter <10 Hz	

1.3 System type

Adapt the ISOMETER® iso685-D to the IT system to be monitored. You may select:

•DC

•AC

•3AC

1.4 Coupling

Adapt the ISOMETER® iso685-D to the requirements of Bender coupling devices. For a description about the connection of coupling devices refer to "Coupling devices" on page 43. You may select:

•None

•AGH150W-AK160

•AGH204S-AK80

•AGH204S-AK160

•AGH520S

•AGH676S-4

1.5 Device

Set the iso685-D ISOMETER®'s insulation resistance measurement function to avtive or inactive:

*Active	The device is active.
*Inactive	The device DOES NOT measure the insulation resistance, the message Device inactive appears on the display. The IT system is NOT being monitored!

1.6 T(Start)

The ISOMETER® iso685-D can be operated with a startup delay of 0…120 seconds. The startup is delayed until the first measurement takes place.

1.7 Coupling monitoring

The ISOMETER® iso685-D continuously monitors the coupling of energised systems. The coupling of deenergised systems is monitored at 8 hour intervals. This monitoring function can be activated or deactivated.

*on	Coupling monitoring is activated.
*off	Coupling monitoring is deactivated.

1.8 Inputs

The ISOMETER® iso685-D provides a total of three inputs.

1.8.1 Digital 1

The following parameters can be set for the digital input:

1.8.1.1 Mode

The operating mode for the digital input can be set to the following values. For a description of the operating modes refer to "Digital input mode" on page 39. You may select:

*active high

*active low

1.8.1.2 t(on)

The response time t(on) after a switch-off signal can be set between 100 and 300 milliseconds. For a description of the operating modes refer to "Digital input mode" on page 39.

1.8.1.3 t(off)

The response time t(off) after a switch-off signal can be set between 100 milliseconds and 300 seconds. You will find a description of the operating modes under "Digital input mode" on page 39.

1.8.1.4 Function

The parameters for the digital input functions of the ISOMETER® iso685-D can be set differently:

*off	Digital input without function
*TEST	Device self test
*RESET	Reset of fault and alarm messages
*Deactivate device	The device DOES NOT measure the insulation resistance, the message Device inactive appears on the display. The IT system is NOT being monitored!
*Start initial measurement	All recorded measurements are discarded and a new measurement will be started

1.8.2 Digital 2

See Digital 1 under 1.8.1

1.8.3 Digital 3

See Digital 1 under 1.8.1

1.9 Outputs

The ISOMETER® iso685-D provides a total of six outputs:
The following parameters can be set for the outputs:

1.9.1 Relay 1

The following parameters can be set for each relay:

1.9.1.1 TEST

The functional test of the relay can be activated or deactivated. This only applies to the manual test and not to the cyclic device self test:

•on	The manual test checks the relay's switching function
•off	The manual test does not check the relay's switching function

1.9.1.2 Relay mode

The relay mode can be adapted to the application:

•N/C	Normally closed- N/C operation contacts11-12-14 / 21-22-24 (The alarm relay is energised in normal operation).
•N/O	Normally open - N/O operation contacts 11-12-14 / 21-22-24 (The alarm relay is de-energised in normal operation).

1.9.1.3 Function 1

Select the appropriate setting for function 1. The following parameters can be set. For a detailed functional description refer to "Description of the output functions" on page 40:

- •off
- •Iso. Alarm 1
- •Iso. Alarm 2
- •Connection fault
- •DC- Alarm
- •DC+ Alarm
- •Symmetrical alarm
- •Device error
- •Common alarm
- •Measurement ended
- •Device inactive

1.9.1.4 Function 2

See function 1 under 1.9.1.3

1.9.1.5 Function 3

See function 1 under 1.9.1.3

1.9.2 Relay 2

See relay 1 under 1.9.1

1.9.3 Digital 1

The following parameters can be set for each of the digital outputs:

1.9.3.1 TEST

The functional test of the digital output can be activated or deactivated. This only applies to the manual test and not to the cyclic device self test:

•on	The manual test changes the status of the digital output.
•off	The manual test does not change the status of the digital output.

1.9.3.2 Mode

The operating mode for the digital output can be set to the following values. For a detailed functional description refer to "Digital output modes" on page 40:

•Active

•Passive

1.9.3.3 Function 1

See function 1 under 1.9.1.3

1.9.3.4 Function 2

See function 1 under 1.9.1.3

1.9.4 Digital 2

See Digital 1 under 1.9.3

1.9.5 Buzzer

The following parameters can be set for the buzzer:

1.9.5.1 TEST

The functional test of the buzzer can be activated or deactivated. This only applies to the manual test and not to the cyclic device self test:

•on	The manual test activates the buzzer sound.
•off	The manual test does not activate the buzzer sound.

1.9.5.2 Function 1

See function 1 under 1.9.1.3

1.9.5.3 Function 2

See function 1 under 1.9.1.3

1.9.5.4 Function 3

See function 1 under 1.9.1.3

1.9.6 Analog

The following parameters can be set for the analogue output:

1.9.6.1 Mode

The operating mode for the analogue output can be set to the values listed below. For a detailed functional description refer to "Description of the analogue output" on page 41:

•0–20 mA

•4–20 mA

•0–400 µA

•0–10 V

•2–10 V

1.9.6.2 Midscale

Select the appropriate midscale. The following parameters can be set. For a detailed description refer to "Description of the analogue output" on page 41.

- *Linear
- *28 kΩ
- *120 kΩ

1.9.6.3 TEST

The functional test of the analogue output can be activated or deactivated. In this way, the analogue output is adjusted once for the entire range. This only applies to the manual test and not to the cyclic device self test:

*on	The manual test checks the analogue output function.
*off	The manual test does not check the analogue output function.

1.9.6.4 Function

Select the appropriate setting for function 3. The following parameters can be set. For a detailed description refer to "Function" on page 42.

- *Insulation value
- *DC shift

2.0 Data measured values

The ISOMETER® iso685-D stores certain measured values for a specific period of time. You can view these data in the "Data meas. value" menu. Navigate through the different views using the ^ and v buttons:

*Data – isoGraph	Displays the insulation resistance and chronological sequence. See "Device communication" on page 36.
*Data – Insulation	Displays the actual insulation resistance, the minimum insulation resistance measured and the system leakage capacitance.
*Data – IT system	Displays the system phase-to-phase voltages and the system frequency.
*Data – IT system	Displays the system phase-to-earth voltages.

3.0 Control

In the control menu you can start a manual test reset, reset alarm messages and start an initial measurement:

*TEST	Manual device test.
*RESET	Reset of fault and alarm messages
*Start initial measurement	All recorded measurements are discarded and a new measurement will be started

4.0 History

In the history menu, the faults detected by the ISOMETER® iso685-D are displayed. For a detailed functional description refer to "History memory" on page 26:

*History	Overview of faults that have occurred.
*Delete	Reset the history memory.

5.0 Device settings

The device settings menu allows you to configure the basic settings for the ISOMETER® iso685-D:

5.1 Language

Choose the language to be displayed by the ISOMETER® iso685-D. For example, you can set the languages:

*Deutsch

*English

*...

5.2 Clock

In the clock menu you can set the display format of time and date for the ISOMETER® -D:

5.2.1 Time

Based on the selected time format you can set the current time to display 24-hour or 12-hour notation (am/pm).

5.2.2 Format (time)

Select the appropriate time format to be displayed:

*12 h	12-hour notation am/pm.
*24 h	24-hour notation

5.2.3 Summertime

Summer time can be considered in the following settings:

*off	No automatic change between summertime and standard time.
*DST	Daylight Saving Time Automatic change between summer and standard time according to North American regulation. North American summer time begins on each second Sunday in March at 02:00 local time by setting the clock forward by one hour from 2:00 to 03:00 local time. Summertime always ends the first Sunday in October at 03:00 local time by setting the clock back 1 hour from 3:00 to 2:00.
*CEST	Central European Summer Time Automatic change between summertime and standard time according to Central European regulation. Central European summer time begins on each last Sunday in March at 02:00 Uhr CEST by setting the clock forward by one hour from 2:00 to 03:00. Central European summer time always ends on the last Sunday in October at 03:00 CEST by setting the clock back 1 hour from 3:00 to 2:00.

5.2.4 Date

Based on the selected date format you can set the current date.

5.2.5 Format (date)

Select the appropriate date format you want to be displayed:

*dd.mm.yy	day, month, year
*mm-dd-yy	month, day, year

5.2.6 NTP

Choose whether you want to synchronise the current time via NTP:

*on

*off

5.2.7 NTP server

Set the NTP server.

5.2.8 UTC

Set the time according to UTC (coordinated world time). For Germany, set +1 for wintertime (MEZ) and +2 for summertime (MESZ).

5.3 Interface

Set the parameters for the connection of other device to the ISOMETER® in the interface menu:

5.3.1 Write access

Set whether the device can be parameterised externally via Modbus or web server. Displaying and reading out data via Modbus and web server will always work, regardless of this setting.

*Allow	Allow external parameter setting
*Deny	Deny external parameter setting

5.3.2 Ethernet

Set the parameters for communication with other devices via the Ethernet interface.

5.3.2.1 DHCP

Decide whether you want to use the DHC protocol:

*on

*off

5.3.2.2 IP

Set the appropriate IP address.

5.3.2.3 SN

Set the appropriate subnet mask.

5.3.2.4 Std. GW

If you use a standard gateway, enter the IP address here.

5.3.2.5 DNS server

If you use a DNS server, enter the server's IP address.

5.3.2.6 Domain

Enter the domain.

5.3.3 BCOM

Set the parameters for communication with other devices via BCOM.

5.3.3.1 System name

Set the system name of the network in which the devices are located. In order to guarantee that all devices are able to communicate via BCOM, all devices must have the same system name.

5.3.3.2 Subsystem

Set the subsystem name of the network in which the devices are located. The devices can communicate with subsystems of the same or different subsystem address.

5.3.3.3 Device address

Assign a device address. Each device must have a different address to distinguish one device from another in the system and ensure correct communication.

5.3.3.4 Timeout

Set the timeout for messages between 100 ms…10 s.
This time specification defines the maximum permissible time for a device to respond.

5.3.3.5 TTL for subscription

Set a time between 1 s…1092 min.
This time defines the intervals at which the ISOMETER® sends messages to e.g. a gateway. Essential messages (e.g. insulation alarm or substantial value changes) are always sent immediately.

5.3.4 Modbus/TCP

Set the parameters for communication with other devices via Modbus/TCP.

5.3.4.1 Port 502

Decide whether you want to use Modbus/TCP:

- *on
- *off

5.3.5 BMS

For Retrofit only. For further information please contact the Bender-Service.

5.4 Display

Adjust the brightness for the iso685-D ISOMETER®'s display here.

5.4.1 Brightness

Adjust the brightness for the display between 0 and 100 %.

5.5 Password

Use the password function to protect the device parameters against unauthorised adjustment. The default password is 0000.

5.5.1 Password

Enter an individual four-digit password.

5.5.2 Status

Decide whether you want to use the password query:

*on	Password query active
*off	Password query inactive

5.6 Commissioning

Open the iso685-D ISOMETER®'s commissioning wizard again in the commissioning menu.

5.7 Backup

In the data backup menu device settings can be saved or device settings you have already saved can be restored.

- *Save
- *Restore

5.8 Service

The service menu can only be accessed by Bender Service staff.

6.0 Info

You can view the iso685-D ISOMETER®'s current settings in the Info menu. Navigate through the different views using the ^ and v buttons:

*Info – Device	Device name, serial number, article number
*Info – Version	Software version measurement technique, software version HMI
*Info – Measurement technique	Selected profile, selected system type
*Info – Clock	Time, date, summer time
*Info – Ethernet	IP address, DHCP status, MAC address

9.1 Ethernet interface

The Ethernet interface can be used for communication with Modbus, web server and BCOM.

9.2 BCOM

BCOM is intended for communication of Bender devices via Ethernet

All devices that communicate over BCOM must have the same system name. Devices can be organised in subsystems. Each device requires an individual device address.

For more information regarding BCOM, refer to the BCOM manual (D00256) on http://www.bender.de/manuals.

When address 0 has been set for the communication via BCOM the device can be accessed via the network (e. g. for parameter setting, etc.) but it cannot communicate with other devices.

9.3 Modbus/TCP

Modbus is an international widely spread protocol for data transfer.

All measured values, messages and parameters are stored in virtual register addresses. Data can be read out with a read command on a register address. With a write command, data can be written into a register address.
The register addresses of the individual measured values und parameters can be found in the annex "Modbus configuration“ of the ISOMETER® iso685 (D00022) on http://www.bender.de/manuals.

A maximum of 5 TCP/IP connections can be used simultaneously.

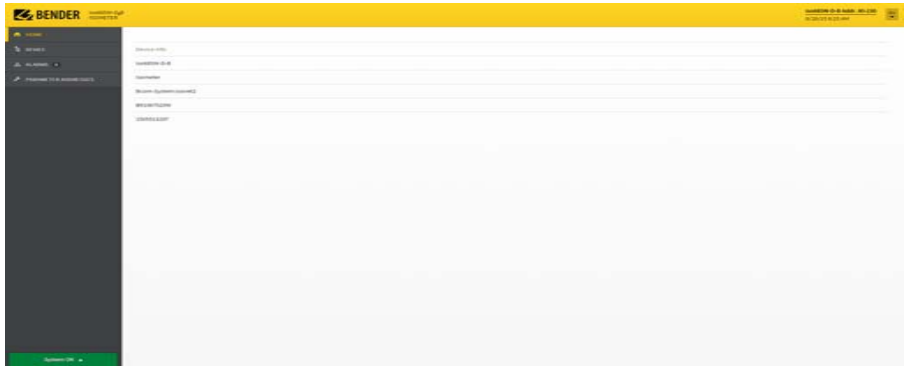
In order to be able to parameterise the device externally via Modbus, the menu item "Allow" must have been set in the "Write access" menu (see “Write access” on page 34).

9.4 Web server

The web server of the device ISOMETER® iso685 represents the device functions graphically. The web server can be used to read out measured values and also for parameter setting.

A maximum of 5 TCP/IP connections can be used simultaneously.

Only one device may access the web server at the same time. If several devices try to access the web server it may result in timeouts.



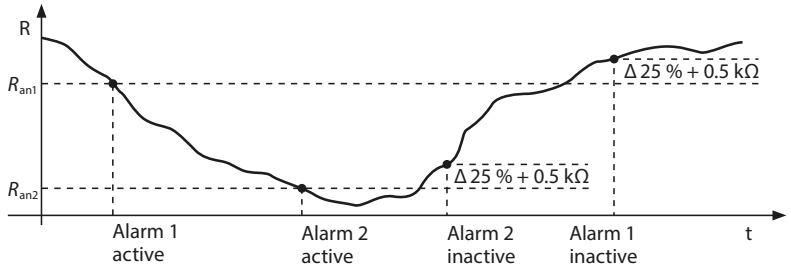
10.1 Profile overview

	Nominal system voltage	Power frequency	System leakage capacitance	Measuring voltage	Description
Power circuits	AC 0…690 V/ DC 0…1000 V	15…460 Hz	0…150 µF	± 50 V	Main circuits without dynamic frequency changes. The universal profile is suitable for all systems primarily with constant system frequencies and extraneous DC voltages. When using inverters and dynamic frequency control, select inverters > 10 Hz or inverters < 10 Hz.
Control circuits	AC 0…230 V/ DC 0…230 V	15…460 Hz	0…150 µF	± 10 V	This profile is used to reduce the measurement voltage to ± 10 V in control systems with lower nominal voltages in order to reduce the impact on sensitive switching elements.
Generator	AC 0…690 V	50…60 Hz	0…5 µF	± 50 V	This profile allows the realisation of a very fast measuring time, e.g. as required for generator monitoring. Furthermore, this profile can be used to support fast fault localisation in an IT system. The generator profile is suitable for AC systems containing DC components.
High capacitance	AC 0…690 V/	15…460 Hz	0…1000 µF	± 50 V	For systems with high leakage capacitances, e.g. ship applications, the impact of leakage capacitances on the measuring result can be significantly reduced by selecting this profile.
Inverter > 10 Hz	AC 0…690 V/ DC 0…1000 V	10…460 Hz	0…20 µF	± 50 V	This profile is used for systems with dynamic frequency control by inverters in the range 10 to 460 Hz in order to optimise the measurement with respect to the measuring time and quality.
Inverter <10 Hz	AC 0…690 V/ DC 0…1000 V	1…460 Hz	0…20 µF	± 50 V	For systems involving extremely low frequency control in the range of up to 1...460 Hz and very low and continuously changing extraneous DC voltages due to dynamic load conditions in an IT system, continuous insulation monitoring can be optimised using this profile.

response times see "Diagrams" on page 48.

10.2 Settings Insulation Alarm

Activation or deactivation of the two alarm levels R_{an1} (Alarm 1) and R_{an2} (Alarm 2) are illustrated in the following graphic:
An alarm will become inactive as soon as +25 % +0.5 kΩ of the set operating value is exceeded.

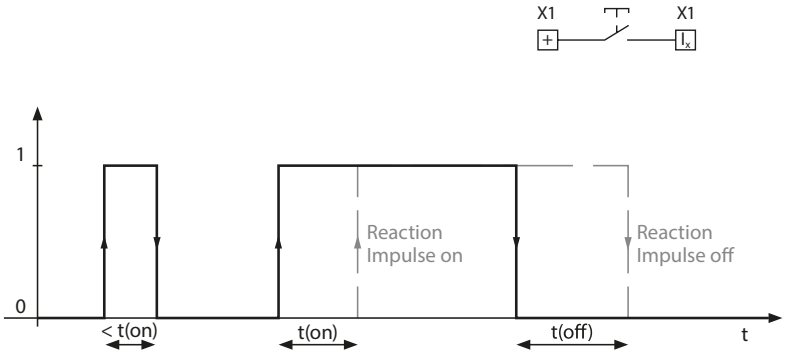


10.3 Digital input mode

The operating mode for the digital input can be set to the following values:

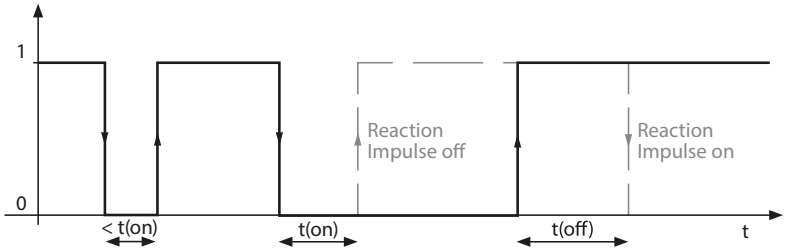
*high active

Response time t(on) / t(off) after a switch-on signal.



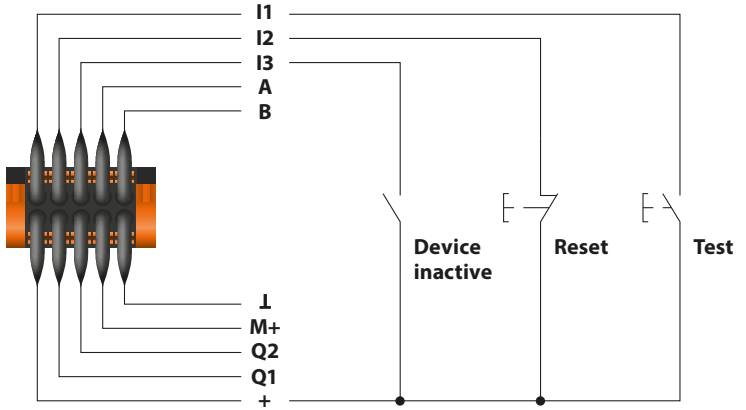
*active low

Response time t(on) / t(off) after a switch-off signal.



10.4 Typical digital input circuits

The digital inputs can be wired as follows:



10.5 Digital output modes

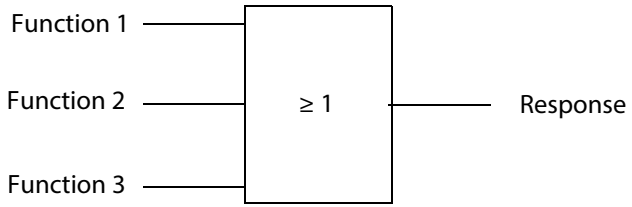
The following settings can be used to set the operating mode for the digital output:

•Active	In the active mode + 24 V will be applied across the output.
•Passive	In the passive mode the output of the applied potential switches to ground.

Observe the maximum output current!
Maximum output current in case of internal voltage supply via A1/+ and A2/-: 200 mA in total to X1.
Maximum output current in case of external voltage supply via X1+: 1 A per output.

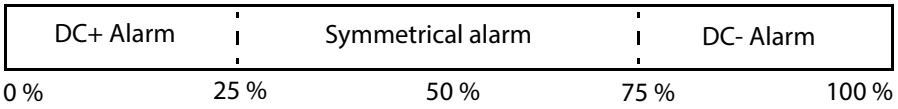
10.6 Description of the output functions

Three functions can be assigned to one output. The functions are linked to an OR operator:



The following output functions are possible:

•off	The function is not used.
•Iso. Alarm 1	The status of the output changes when the value falls below the set response value Ran1.
•Iso. Alarm 2	The status of the output changes when the value falls below the set response value Ran2.
•Connection fault	The status of the output changes when one of the following connection fault occurs: • No low-resistance connection between the line conductors. • No low-resistance connection between the terminals E and KE to earth (PE). • The connected load resistor for the voltage output is too low. • The load connected to the current output is too high. • The sum of the external loads to X1 is too high, resp. operation is outside the temperature limit 0…+55 °C.
•DC- Alarm	The status of the output changes in case of an earth fault in the direction of DC- when 75% of the value are exceeded. This does not concern symmetrical faults. This function will only be carried out when the value falls below the response value R_{an1} and when the nominal system voltage is U_n ≥50 V.
•DC+ Alarm	The status of the output changes in case of an earth fault in the direction of DC+ when 25% of the value are exceeded. This does not concern symmetrical faults. This function will only be carried out when the value falls below the response value R_{an1} and when the nominal system voltage is U_n ≥50 V.
•Symmetrical alarm	The status of the output changes in the event of a resistance ratio between DC+ and DC- of 25 % to 75 %.

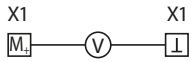


*Device error	The status of the output changes in the event of an internal device error.
*Common alarm	The status of the output changes on the occurrence of any alarm and fault messages (Iso. Alarm 1 & 2, DC- / DC+ Alarm, symmetrical alarm, connection and device faults).
*Measurement ended	The status of the output changes at the end of the initial measurement.
*Device inactive	The status of the output changes when the device has been deactivated via a digital input or the control menu.

10.7 Description of the analogue output

10.7.1 Mode

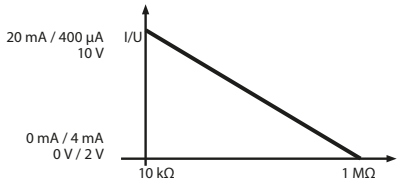
The following values can be set for the operating mode of the analogue output.

Current output	
*0-20 mA	Permissible load ≤ 600 Ω
*4-20 mA	Permissible load ≤ 600 Ω
*0-400 µA	Permissible load ≤ 4 kΩ
Voltage output	
*0-10 V	Permissible load ≥ 1 kΩ
*2-10 V	Permissible load ≥ 1 kΩ

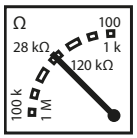
10.7.2 Midscale

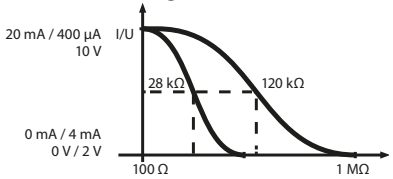
Select the appropriate midscale. The following parameters can be set:

*Linear — The switching signal is linear to the insulation resistance in the indicated measuring range.



*28 kΩ
*120 kΩ — The switching signal is analogue to the mid scale of 28 kΩ or 120 kΩ on a measuring instrument.





Calculation of the insulation resistance using the analogue output:

$$R_F = \frac{(A_2 - A_1) * R_{SKM}}{A_3 - A_1} - R_{SKM}$$

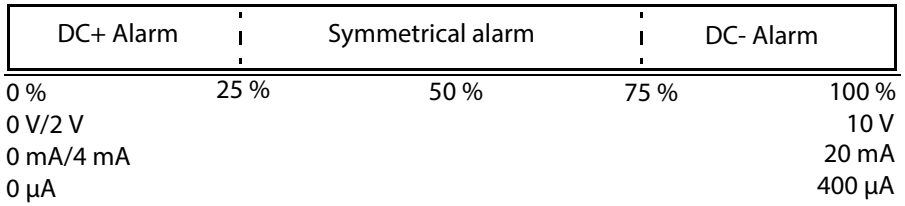
R_{SKM}= 28 kΩ or 120 kΩ/midscale
A_3= Measured analogue output
R_F= Insulation in kΩ

Lower value Analogue output A_1	**Upper value Analogue output A_2**
0 mA	20 mA
4 mA	20 mA
0 µA	400 µA
0 V	10 V
2 V	10 V

10.7.3 Function

Select the appropriate setting for function . The following parameters can be set:

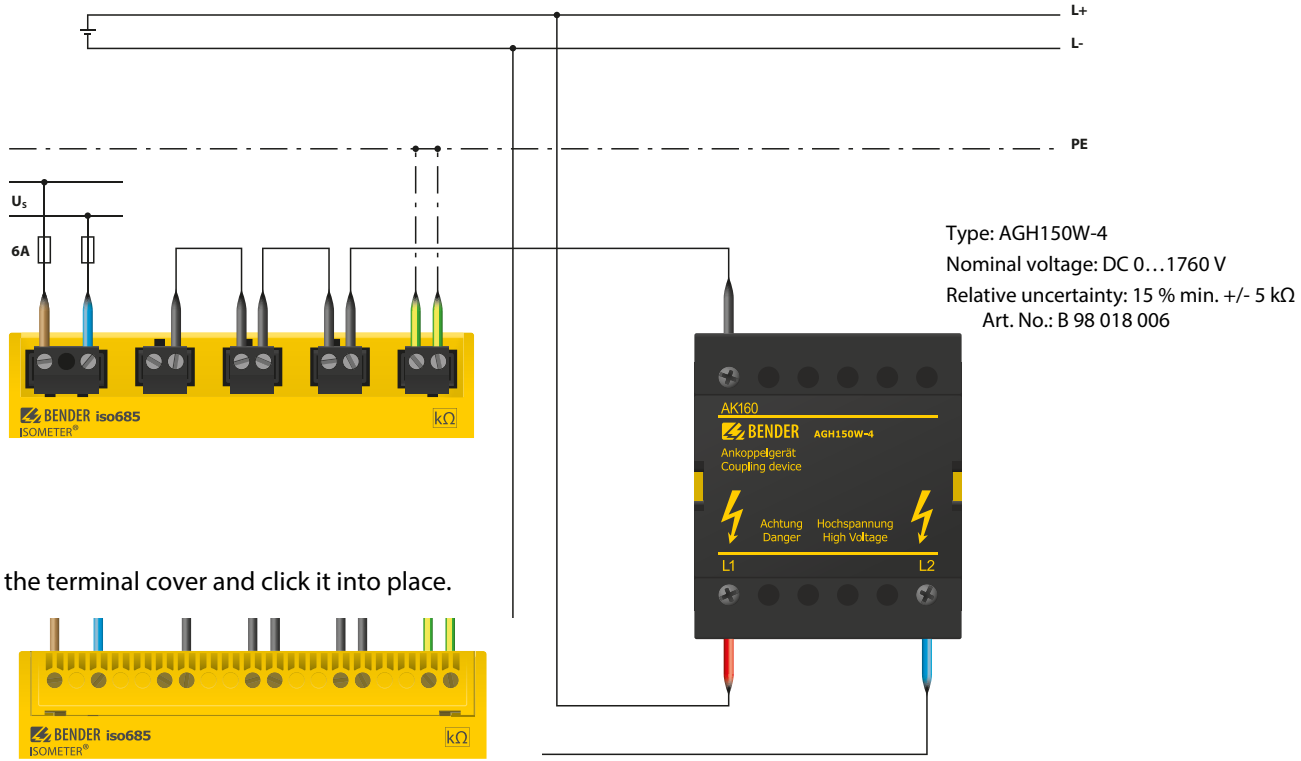
*Insulation value	Depending on the measured insulation value, an analogue current or voltage signal is provided at the output.
*DC shift	Depending on the measured DC shift, an analogue current or voltage signal is provided at the output. This setting can only be used when Linear is selected in the menu "Mid-scale"..



If a coupling device is selected during the commissioning or in the device menu, the ISOMETER® automatically sets the system type to 3AC. This setting must not be changed.

If the ISOMETER® is operated with a coupling device, this device must be specified in the commissioning assistant during commissioning or in the device menu later on.

11.1 Connection using the AGH150W-4(DC)



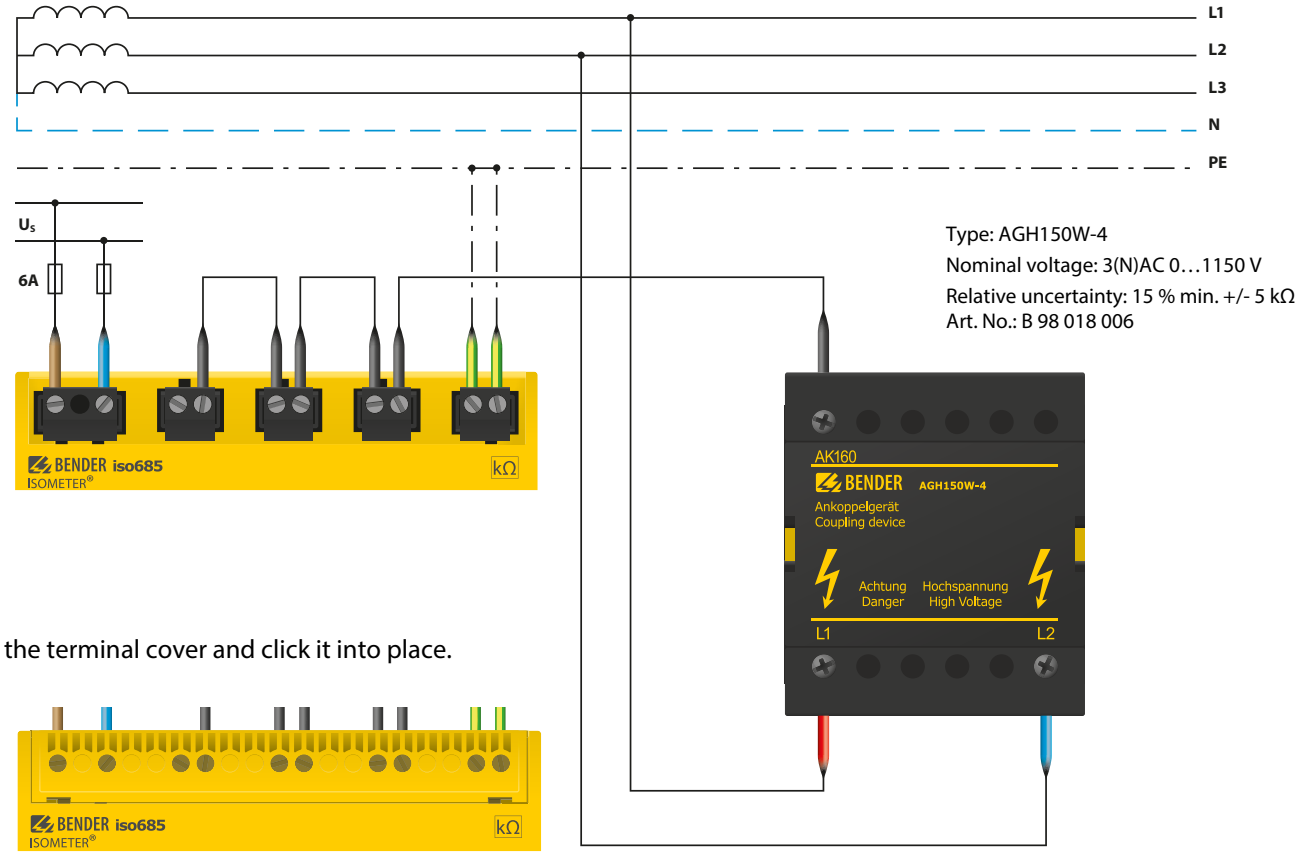
Type: AGH150W-4
Nominal voltage: DC 0…1760 V
Relative uncertainty: 15 % min. +/- 5 kΩ
Art. No.: B 98 018 006

Position the terminal cover and click it into place.

DANGER

Risk of electric shock!
The coupling device is operated with high voltage, which can be life-threatening in case of direct contact. Make sure that only electrically skilled persons work on or with the device. Read the operating manual of the coupling device carefully.

11.2 Connection using the AGH150W-4 (3(N)AC)



Type: AGH150W-4
Nominal voltage: 3(N)AC 0…1150 V
Relative uncertainty: 15 % min. +/- 5 kΩ
Art. No.: B 98 018 006

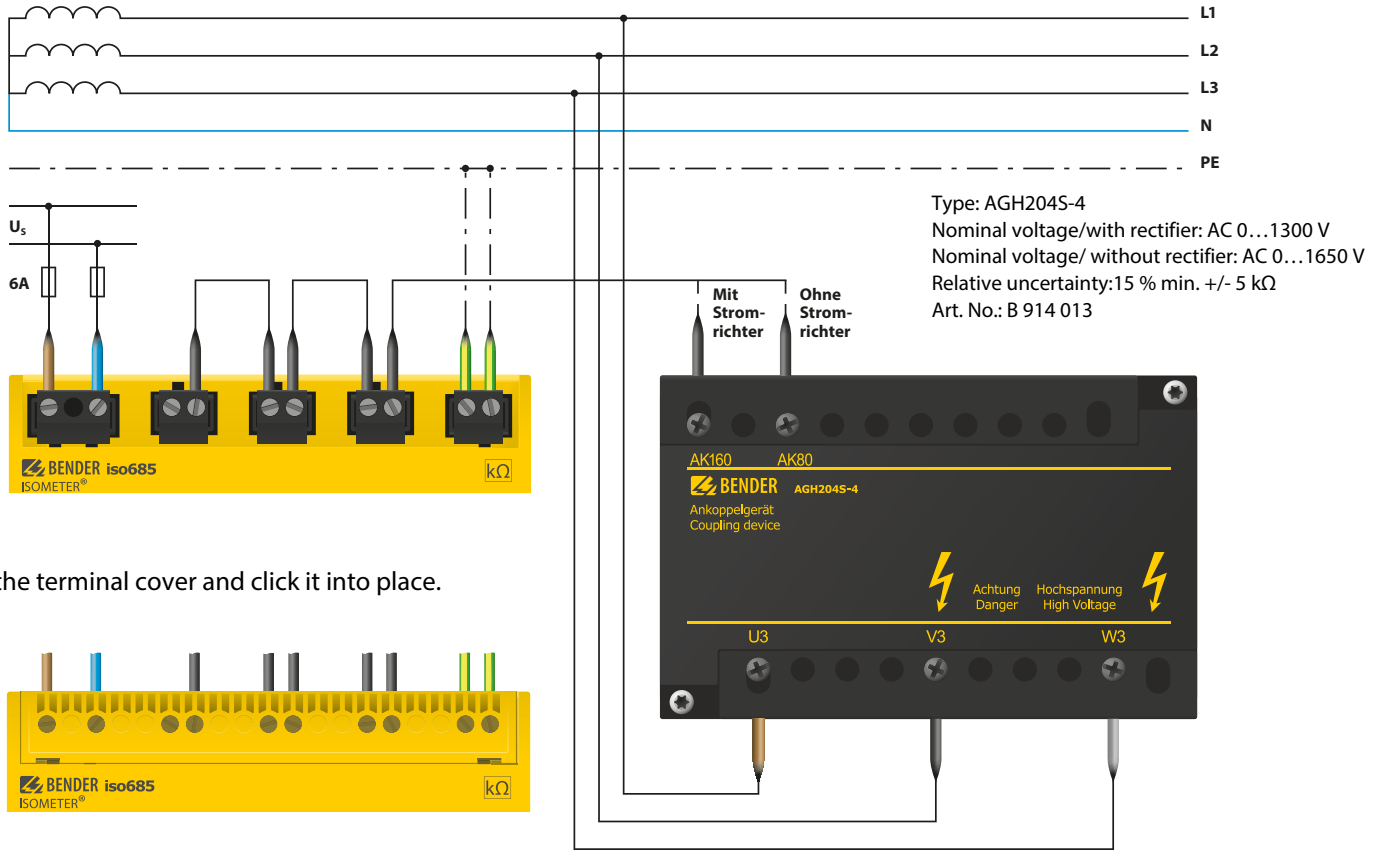
Position the terminal cover and click it into place.

DANGER

Risk of electric shock!

The coupling device is operated with high voltage, which can be life-threatening in case of direct contact. Make sure that only electrically skilled persons work on or with the device. Read the operating manual of the coupling device carefully.

11.3 Connection using theAGH204S-4



Type: AGH204S-4
Nominal voltage/with rectifier: AC 0…1300 V
Nominal voltage/ without rectifier: AC 0…1650 V
Relative uncertainty:15 % min. +/- 5 kΩ
Art. No.: B 914 013

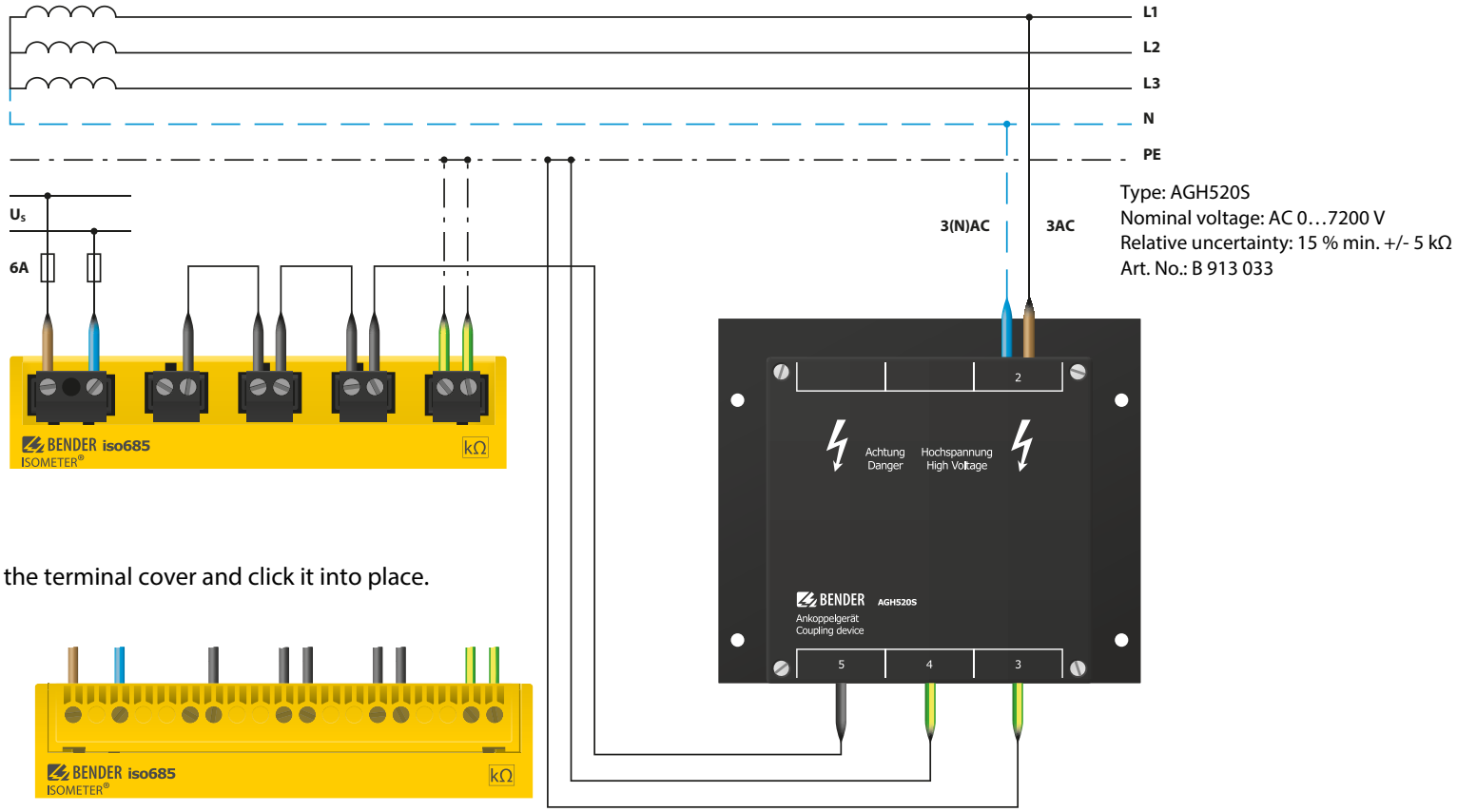
Position the terminal cover and click it into place.

DANGER

Risk of electric shock!

The coupling device is operated with high voltage, which can be life-threatening in case of direct contact. Make sure that only electrically skilled persons work on or with the device. Read the operating manual of the coupling device carefully.

11.4 Connection using the AGH520S



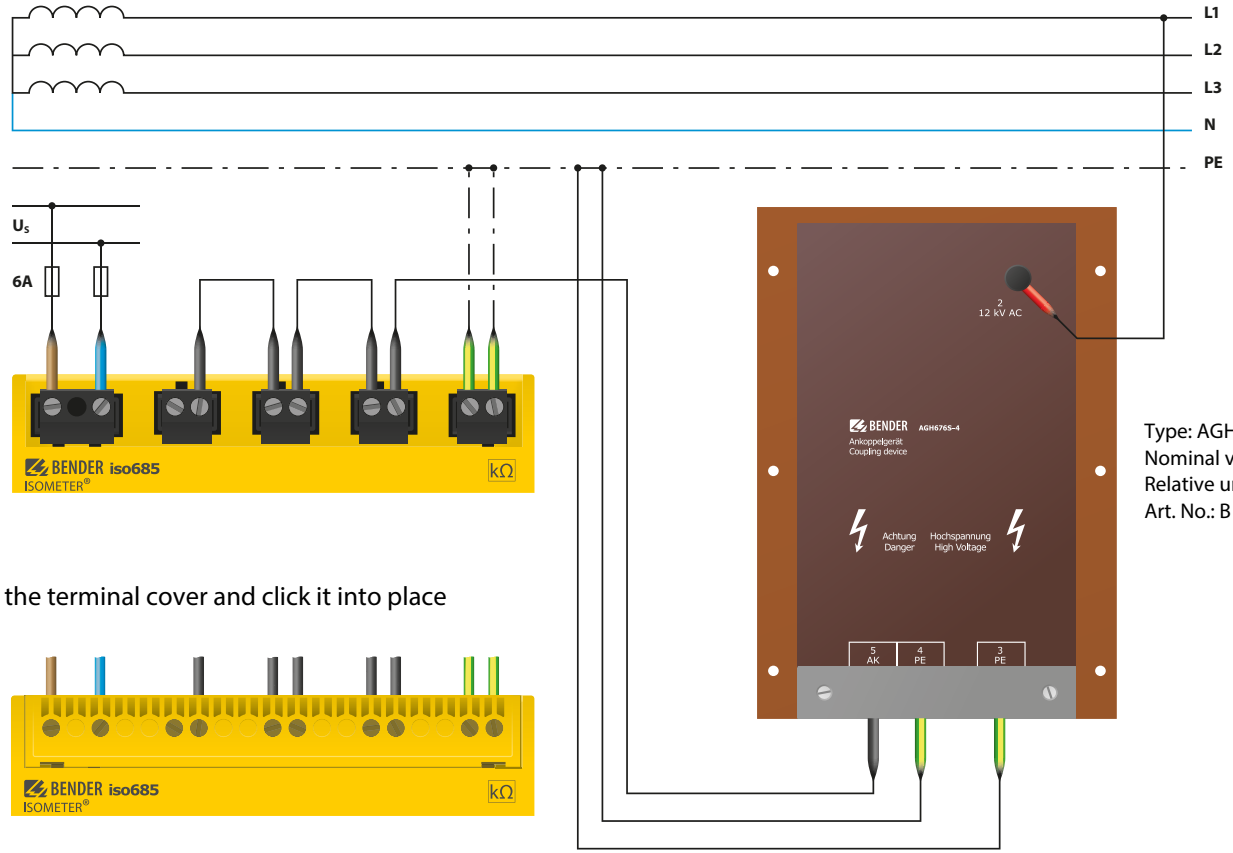
Position the terminal cover and click it into place.

DANGER

Risk of electric shock!

The coupling device is operated with high voltage, which can be life-threatening in case of direct contact. Make sure that only electrically skilled persons work on or with the device. Read the operating manual of the coupling device carefully.

11.5 Connection using the AGH676S-4



Type: AGH676S-4
Nominal voltage: AC 12 kV
Relative uncertainty: 15 % min. +/- 5 kΩ
Art. No.: B 913 055

Position the terminal cover and click it into place

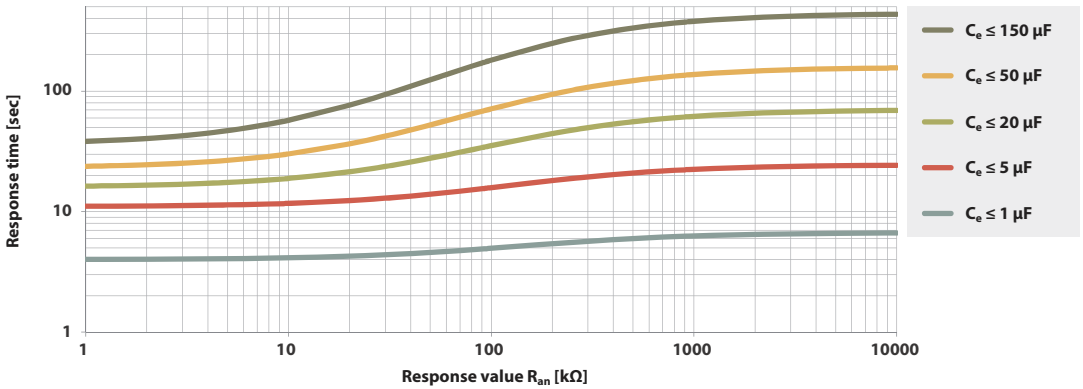
DANGER

Risk of electric shock!

The coupling device is operated with high voltage, which can be life-threatening in case of direct contact. Make sure that only electrically skilled persons work on or with the device. Read the operating manual of the coupling device carefully.

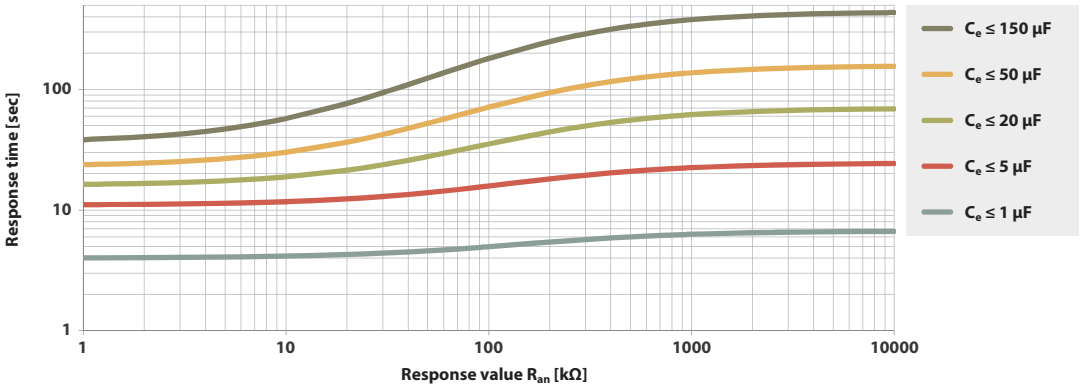
12.1 Response time profile power circuits

Response time as a function of the response value (R_{an}) and system leakage capacitance (C_e) according to IEC 61557-8 (U_n = AC 690 V, f_n = 50 Hz)



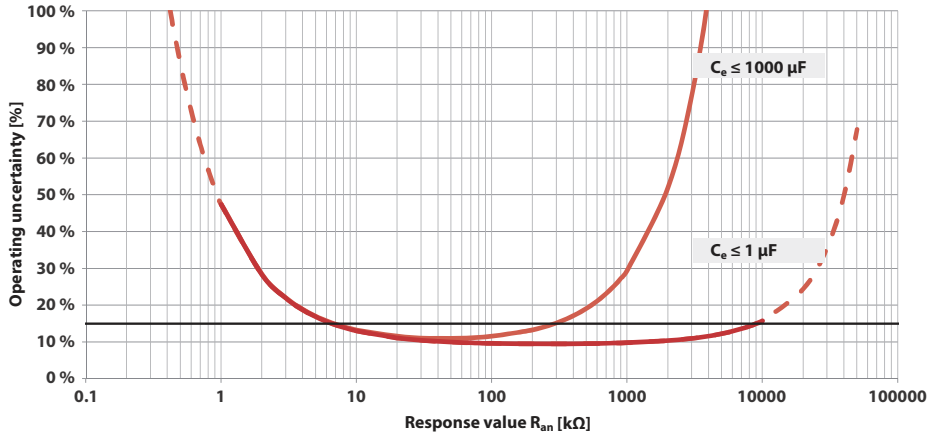
12.2 Response time profile control circuits

Response time as a function of the response value (R_{an}) and system leakage capacitance (C_e) according to IEC 61557-8 (U_n = AC 690 V, f_n = 50 Hz)



12.7 Relative uncertainty

Relative uncertainty as a function of the response value (R_{an}) and system leakage capacitance (C_e) according to IEC 61557-8 (U_n = AC 690 V, f_n = 50 Hz)



13. Alarm messages

Alarm message	Description	Actions	Reference	LED indicators
Check L1-L2-L3 for correct connection!	No low-resistance connection between the line conductors	• Check the wiring of the terminals L1/+, L2 and L3/- to the IT system • Press the test button • Check mains voltage • Check the fuses	Chapter 5	ALARM 1 + ALARM 2 flash alternately
Check E-KE connections for interruptions.	No low-resistance connection between the terminals E and KE to earth (PE)	• Check the wiring of the terminals E and KE to earth (PE) • Press the test button	Chapter 5	ALARM 1 + ALARM 2 flash in common mode
Service mode active!	The device is in maintenance condition	• Contact Bender Service		SERVICE lights up
Profile does not suit the application!	Wrong profile selected for this application	• Check measured system capacitance resp. system frequency in the Info menu • Select another profile taking the characteristics into consideration	Chapter 10.1/ menu 1.2	
No DHCP server found!	Connection problem at the Ethernet interface	• Check cable connection at the Ethernet interface. • Check the DHCP server's availability. • Check the DHCP's interface configuration in the device/see menu 5.3.2.1		
Check time and date!	Time and date have not yet been set.	• Set local time and date (in case of voltage failure a buffer for three days)	Chapter 8/menu 5.2	
Load at Dig. Out too high! I_L ≤200 mA @ 0…+55°C	The sum of the external loads to X1 is too high, or operation is outside the temperature limit 0…+55 °C	• Check load at X1.+, X1.Q1 and X1.Q2 • Check ambient temperature	Chapter 10.5	
Device error x	Internal device error	• Press the test button • Switch the supply voltage on and off • Contact Bender Service		SERVICE lights up

14.1 Data in tabular form

()* = Factory setting

Insulation coordination

Rated insulation voltage (IEC 60664-1) ..... 1000 V
Rated impulse voltage (IEC 60664-1) ..... 8 kV
Overvoltage category III
Pollution degree (U_n <690 V) 3
Pollution degree (U_n <1000 V) 2
Protective separation (reinforced insulation) between..... (A1, A2) - (11, 12, 14) - (21, 22, 24) - [(L1/+, L2, L3/-), (E, KE), (X1, ETH)]
Voltage test, routine test (IEC 61010-1)..... 4.3 kV

Supply voltage

Supply via A1/+, A2/-:
Supply voltage range U_s..... AC/DC 100 . . . 240 V
Tolerance of U_S ..... AC -15 . . . +10 %
..... DC -15 . . . +15 %
Frequency range of U_s ..... DC, 47 . . . 460 Hz
Power consumption typically 50 Hz (460 Hz)..... 5.7 W/20 VA (7.9 W/45.5 VA)
Supply via X1:
Supply voltage U_s ..... DC 24 V
Tolerance of U_s..... DC -20 . . . +25 %

IT system being monitored

Nominal system voltage range U_n ..... AC 0 . . . 690 V
..... DC 0 . . . 1000 V
Tolerance of U_n ..... AC/DC +15 %
Frequency range of U_n..... DC, 1 . . . 460 Hz

Response values

Response value R_{an1} (Alarm 1) ..... 1 kΩ . . . 10 MΩ (40 kΩ)*
Response value R_{an2} (Alarm 2) ..... 1 kΩ . . . 10 MΩ (10 kΩ)*
Relative uncertainty (acc. to IEC 61557-8) dependent on the profile, ±15 %, at least ±1 kΩ
Hysteresis..... 25 %, mind. 1 kΩ

Time response

Response time t_{an} at R_F = 0.5 x R_{an} (R_{an} = 10 kΩ) and C_e = 1 µF according to IEC 61557-8 .....
..... profile dependent, typ. 4 s (see diagrams)
Startup delay $T_{startup}$ ..... 0 . . . 120 s (0 s)*

Measuring circuit

Measuring voltage U_m ..... profile dependent, ±10 V, ±50 V (see profile overview)
Measuring current I_m ..... ≤ 403 µA
Internal resistance R_i ,Z_i..... ≥ 124 kΩ
Permissible extraneous DC voltage U_{fg} ..... ≤ 1200 V
Permissible system leakage capacitance C_e ..... profile dependent, 0 . . . 1000 µF

Measuring ranges

Measuring range f_n ..... 10 . . . 460 Hz
Tolerance measurement of f_n ..... ±1 % ±0.1 Hz
Voltage range measurement of f_n ..... AC 25 . . . 690 V
Measuring range U_n(without external coupling device)..... AC 25 . . . 690 V
..... DC 25 . . . 1000 V
Voltage range measurement of U_n..... AC/DC > 10 V
Tolerance measurement of U_n ..... ±5 % ±5 V
Measuring range C_e..... 0 . . . 1000 µF
Tolerance measurement of C_e..... ±10 % ±10 µF
Frequency range measurement of C_e ..... DC, 30 . . . 460 Hz
Min. insulation resistance measurement of C_e ..... depending on the profile and coupling mode, typ. > 10 kΩ

Display

Graphic display 127 x 127 pixel, 40 x 40 mm
Display range measured value..... 0.1 kΩ . . . 20 MΩ

LEDs

ON (operation LED) ..... green
SERVICE..... yellow
ALARM 1..... yellow
ALARM 2..... yellow

Digital inputs

Number 3
Operating mode, adjustable ..... active high, active low
Functions ..... none, test, reset, start measurement, deactivate device
Voltage ..... Low DC -3 . . . 5 V, High DC 11 . . . 32 V

Digital outputs

Number 2
Operating mode, adjustable active, passive
Functions none, Alarm 1, Alarm 2, connection fault, Alarm DC+, Alarm DC-, symmetrical insulation fault, device error, common alarm, measurement complete, device inactive
Voltage passive ..... DC 0 . . . 32 V, active DC 0/19.2 . . . 32 V
Max. current internal sum X1 ..... max. 200 mA
Max. current external per channel ..... max. 1 A

Analogue output

Number 1
Operating mode ..... linear, midscale point 28 kΩ/120 kΩ
Functions ..... insulation value, DC shift
Current, voltage 0...20 mA (< 600 Ω), 4 . . . 20 mA (< 600 Ω), 0 . . . 400 µA (< 4 kΩ), 0 . . . 10 V (>1 kΩ), 2 . . . 10 V (>1 kΩ)
Tolerance related to the current/voltage final value ..... ± 20 %

Interfaces

Field bus:
Interface/protocol ..... web server/Modbus TCP/BCOM
Data rate ..... 10/100 Mbit/s, autodetect
Max. number of Modbus requests ..... <100/s
Cable length ..... ≤ 100 m
Connection RJ45
IP address ..... DHCP/manual* 192.168.0.5*
Network mask 255.255.255.0*
BCOM address system-1-0
Function ..... communication interface

Sensor bus:

Interface/protocol RS-485/BMS
Data rate ..... 9.6 kBaud/s
Cable length ..... ≤ 1200 m
Cable: twisted pair, one end of shield connected to PE: ..... J-Y(St)Y min. 2x0.8
Connection terminals X1.A, X1.B
Terminating resistor ..... 120 Ω, can be connected internally
Device address, BMS bus ..... 1 . . . 90 (3)*

Switching elements

Number of switching elements ..... 2 changeover contacts
Operating mode ..... N/C operation*/N/O operation
Contact 11-12-14 ..... None, Alarm 1, Alarm 2, connection fault, Alarm DC-, Alarm DC+, symmetrical insulation fault, device error, common alarm, measurement complete, device inactive
Contact 21-22-24 ..... None, Alarm 1, Alarm 2, connection fault, Alarm DC-, Alarm DC+, symmetrical insulation fault, device error, common alarm, measurement complete, device inactive
Electrical endurance under rated operating conditions, number of cycles 10.000
Contact data acc. to IEC 60947-5-1:
Utilisation category ..... AC-13 / AC-14 / DC-12 / DC-12 / DC-12
Rated operational voltage ..... 230 V / 230 V / 24 V / 110 V / 220 V
Rated operational current ..... 5 A / 3 A / 1 A / 0.2 A / 0.1 A
Rated insulation voltage ≤ 2000 m NN ..... 250 V
Rated insulation voltage ≤ 3000 m NN ..... 160 V
Minimum contact rating ..... 1 mA at AC/DC ≥ 10 V

Environment/EMC

EMC ..... IEC 61326-2-4 (1
Ambient temperatures:
Operating temperature ..... -25 . . . +55 °C
Transport ..... -40 . . . +85 °C
Long-term storage ..... -25 . . . +70 °C
Classification of climatic conditions acc. to IEC 60721:
Stationary use (IEC 60721-3-3) ..... 3K5 (except condensation and formation of ice)
Transport (IEC 60721-3-2) 2K3
Long-time storage (IEC 60721-3-1) 1K4
Classification of mechanical conditions acc. to IEC 60721:
Stationary use (IEC 60721-3-3) 3M4
Transport (IEC 60721-3-2) 2M2
Long-term storage (IEC 60721-3-1) 1M3
Area of application ..... ≤3000 m NN

Connection

Connection type ..... pluggable screw terminal or push-wire terminal
Screw-type terminal:
Nominal current ..... ≤10 A
Tightening torque ..... 0.5 . . . 0.6 Nm (5 . . . 7 lb-in)
Conductor sizes ..... AWG 24-12
Stripping length ..... 7 mm
rigid/flexible ..... 0.2 . . . 2.5 mm^2
flexible with ferrules, with/without plastic collar ..... 0.25 . . . 2.5 mm^2
Multiple conductor, rigid ..... 0.2 . . . 1 mm^2
Multiple conductor, flexible ..... 0.2 . . . 1.5 mm^2
Multiple conductor, flexible with ferrule without plastic sleeve ..... 0.25 . . . 1 mm^2
Multiple conductor, flexible withTWIN ferrule with plastic sleeve ..... 0.5 . . . 1.5 mm^2
Push-wire terminal:
Nominal current ..... ≤10 A
Conductor sizes ..... AWG 24-12
Stripping length ..... 10 mm
rigid/flexible ..... 0.2 . . . 2.5 mm^2
flexible with ferrules, with/without plastic collar ..... 0.25 . . . 2.5 mm^2
Multiple conductor, flexible withTWIN ferrule with plastic sleeve ..... 0.5 . . . 1.5 mm^2
Push-wire terminals X1:
Nominal current ..... ≤8 A
Conductor sizes ..... AWG 24-16
Stripping length ..... 10 mm
rigid/flexible ..... 0.2 . . . 1.5 mm^2
flexible with ferrule without plastic sleeve ..... 0.25 . . . 1.5 mm^2
flexible with TWIN ferrule with plastic sleeve ..... 0.25 . . . 0.75 mm^2

Other

Operating mode ..... continuous operation
Mounting display oriented, cooling slots must be ventilated vertically
Degree of protection internal components IP40
Degree of protection terminals IP20
DIN rail mounting acc. to ..... IEC 60715
Screw fixing ..... 3 x M4 with mounting clip
Enclosure material ..... polycarbonate
Flammability class V-0
Dimensions (W x H x D) ..... 108 x 93 x 110 mm
Weight ..... < 390 g

Option "W" data different from the standard version

Classification of climatic conditions acc. to IEC 60721:
Operating temperature ..... -40 . . . +70 °C
Staionary use (IEC 60721-3-3) ..... 3K5 (condensation and formation of ice possible)
Classification of mechanical conditions acc. to IEC 60721:
Stationary use (IEC 60721-3-3) 3M7

[1] This is a class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

14.2 Option "W"

Devices with the suffix "W" feature increased shock and vibration resistance. The electronics is covered with a special varnish to provide increased protection against mechanical stress and moisture.

Combination sensor variant iso685 with FP200:
The requirements of Option "W" will only be fulfilled when the sensor variant iso685 is mounted on DIN rail and connected to the FP200 via the patch cable.
Also refer to Quickstart FP200.

14.3 Standards and certifications

The ISOMETER® has been developed in compliance with the following standards:

- DIN EN 61557-8 (VDE 0413-8)

Quality System Certified ISO 9001

CE

c UL us LISTED
only for iso685-D
B 91067010

14.4 Ordering details

Type	Supply voltage U_S	Art. No.
iso685-D	AC 100…240 V; 47…460 Hz DC 24 V, 100…240 V	B 91067010
iso685W-D*	AC 100…240 V; 47…460 Hz DC 24 V, 100…240 V	B 91067010W
Combination iso685-S + FP200	AC 100…240 V; 47…460 Hz DC 24 V, 100…240 V	B 91067210
Combination iso685W-S + FP200W*	AC 100…240 V; 47…460 Hz DC 24 V, 100…240 V	B 91067210W

* Option "W": Increased shock and vibration resistance 3K5, 3M7; -40…+70 °C

Accessories

Description	Art. No.
iso685 Mechanical accessories comprising: Terminal cover and 2 mounting clips*	B 91067903
iso685 Plug kit, screw terminals*	B 91067901
iso685 plug kit, with push-wire terminals	B 91067902
IP65 cover forf FP200	B 98060005
BB bus 6TE	B 98110001

* included in the scope of delivery

Suitable system components

Description	Type	Art. No.
Suitable measuring instruments SKMP**: 28 kΩ,120 kΩ Current values: 0…400 µA, 0…20 mA (additonal information here)	7204-1421	B 986 763
	9604-1421	B 986 764
	9620-1421	B 986 841
Display for front plate mounting	FP200	B 9106 7904
	FP200W	B 9106 7904W
iso685-S (only in combination with FP200)	Supply voltage: AC 100…240 V; 47…460 Hz DC 24 V, 100…240 V	B 91067110
iso685W-S* (only in combination with FP200)	Supply voltage: AC 100…240 V; 47…460 Hz DC 24 V, 100…240 V	B 91067110W

* Option "W": Increased shock and vibration resistance 3K5, 3M7; -40…+70 °C
** SKMP = midscale point