ISOMETER® isoES425

Insulation monitoring device for unearthed AC, AC/DC and DC systems (IT systems) for energy storage devices up to AC/DC 400 V

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Device characteristics

- Insulation monitoring for unearthed systems AC/DC
- Measurement of the mains voltage (r.m.s.) with undervoltage and overvoltage detection
- Measurement of DC voltages system to earth (L1+/PE und L2-/PE)
- Automatic adaptation to the system leakage capacitance up to 100 µF
- Selectable start-up delay, response delay and delay on release
- Two separately adjustable response value ranges of 1…990 kΩ (Alarm 1, Alarm 2)
- Alarm signalling via LEDs (AL1, AL2), a display and alarm relays (K1, K2)
- Automatic device self test with connection monitoring
- N/C operation or N/O operation of the relays selectable
- Measured value indication via multi-functional LCD
- Fault memory can be activated
- RS-485 (galvanically isolated) including the following protocols:
  - BMS interface (Bender measuring device interface) for data exchange with other Bender components
  - IsoData (for continuous data output)
- Password protection to prevent unauthorised parameter changes

Approvals

Product description

The ISOMETER® isoES425 monitors the insulation resistance of unearthed AC, AC/DC and DC systems (IT systems) for energy storage devices up to AC/DC 400 V.
The DC-supplied components existing in AC/DC systems do not influence the operating characteristics. The isoES425 is used to monitor and indicate the connection to earth during network operation. When operated as an isolated system, the isoES425 takes over the monitoring of the isolated system (IT system).

Application

- Monitoring the earth connection during network operation and monitoring the electrical installation during isolated operation.

Function

The currently measured insulation resistance is indicated on the LC display. This way any changes, for example when outgoing circuits are connected to the system, can be recognised easily. When the value falls below the preset response value, the response delay "t_{on}" starts. Once the response delay "t_{on}" has elapsed, the alarm relays "K1/K2" switch and the alarm LEDs "AL1/AL2" light up. By means of two separately adjustable response values/alarm relays, the messages can be evaluated separately. If the insulation resistance exceeds the release value (response value plus hysteresis), the alarm relays switch back to their initial position. The point of fault L+, L- or the symmetrical insulation resistance is indicated on the display. It is also possible to assign the alarm relays to the point of fault. If the fault memory is enabled, the alarm relays remain in the alarm state until the reset button is pressed or until the supply voltage is switched off. The device functions can be checked using the test button. Parameters are assigned via LC display or the control buttons on the front of the device.

Connection monitoring

There are 3 options to monitor the connections to the system (L1(+)/L2(-)) and earth (E/KE): automatically every 24 h, by pressing the test button and when supply voltage is applied. In case of line interruption, the alarm relay K2 switches, the LEDs ON/AL1/AL2 flash and a message appears on the LC display:

"E.02" for a fault in the connection to the system,

"E.01" for a fault in the connection to PE,

"E.0x" for a system fault.

After eliminating the fault, the alarm relays switch back to their initial position either automatically or by pressing the reset button.

Measurement method

The ISOMETER® isoES425 uses the AMP and PCP measurement method.

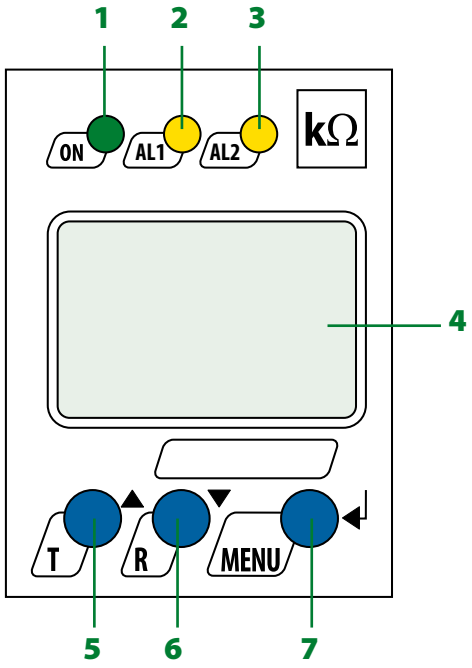
Standards

The ISOMETER® isoES425 series complies with the requirements of the device standards:

- DIN EN 61557-8 (VDE 0413-8): 2015-12 / Ber1: 2016-12
- IEC 61557-8:2014 / Cor1: 2016

AC/DC

Operating elements



1 - LED “ON” (operation LED) flashes in case of interruption of the connecting wires E/KE, L1(+)/L2(-) or system faults.

2 - Alarm LED “AL1” lights when the values fall below the set response value alarm 1 and flashes in case of interruption of the connecting wires E/KE, L1(+)/L2(-) or system faults.

3 - Alarm LED “AL2” lights when the values fall below the set response value alarm 2 and flashes in case of interruption of the connecting wires E/KE, L1(+)/L2(-) or system faults.

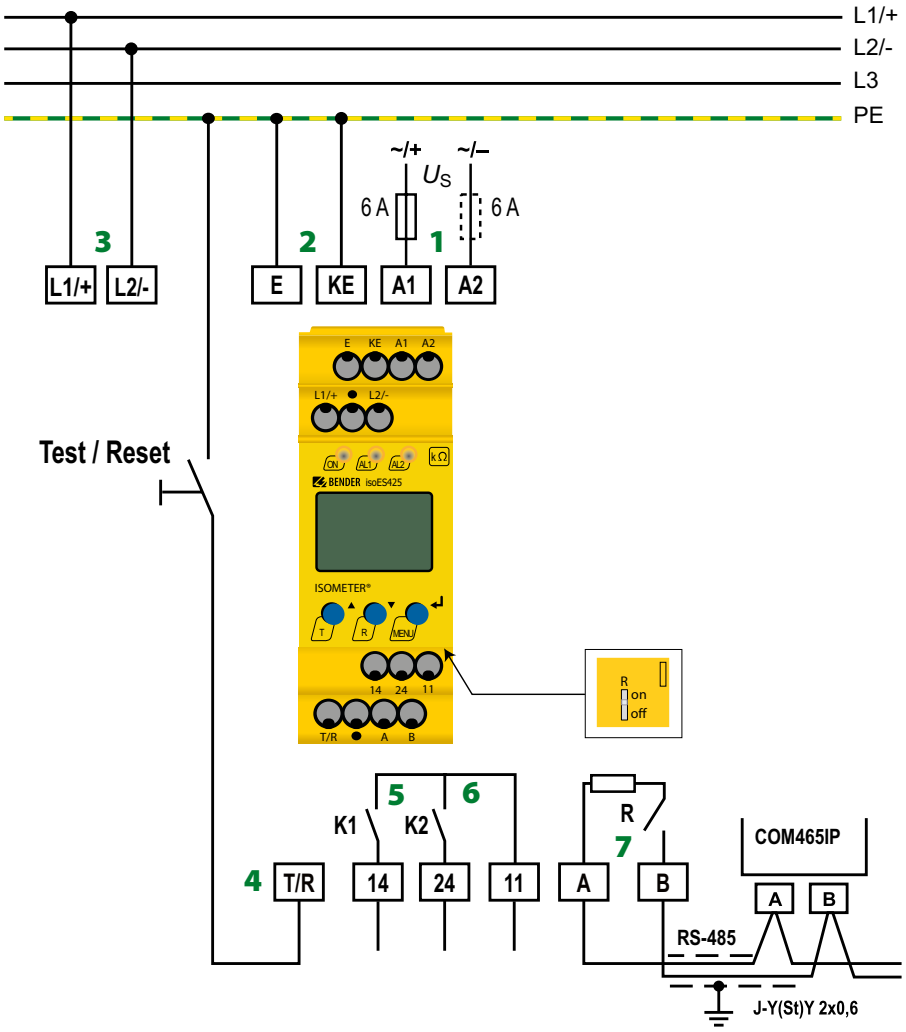
4 - LC display

5 - Test button “T”: to call up the self test
Arrow up button: to change parameters, to move upwards in the menu

6 - Reset button “R”: to delete stored insulation fault alarms
Down button: to change parameters, to move downwards in the menu

7 - Menu button “MENU”: to call up the menu system
Enter button: to confirm parameter changes

Wiring diagram



1 -	A1, A2	Connection to the supply voltage via a fuse. If supplied from an IT system, both lines have to be protected by a fuse.*
2 -	E, KE	Connect each terminal separately to PE: The same wire cross section as for A1, A2 is to be used.
3 -	L1/+, L2/–	Connection to the AC or DC system to be monitored.
4 -	T/R	Connection for external combined test and reset button.
5 -	11, 14	Connection to alarm relay K1
6 -	11, 24	Connection to alarm relay K2
7 -	A, B	RS-485 communication interface with selectable terminating resistance.

* **For UL applications:**
Only use 60/75°C copper lines! For UL and CSA applications, it is mandatory to use fuses rated over 5 A to protect the supply voltage.

Technical data

Insulation coordination acc. to IEC 60664-1/IEC 60664-3

Definitions:	
Measuring circuit (IC1)	L1/+, L2/-
Supply circuit (IC2)	A1, A2
Output circuit (IC3)	11, 14, 24
Control circuit (IC4)	E, KE, T/R, A, B
Rated voltage	400 V
Overvoltage category	III
Rated impulse withstand voltage:	
IC1/(IC2-4)	6 kV
IC2/(IC3-4)	4 kV
IC 3/(IC4)	4 kV
Rated insulation voltage:	
IC1/(IC2-4)	400 V
IC2/(IC3-4)	250 V
IC 3/IC4	250 V
Pollution degree	3
Protective separation (reinforced insulation) between:	
IC1/(IC2-4)	Overvoltage category III, 600 V
IC2/(IC3-4)	Overvoltage category III, 300 V
IC 3/(IC4)	Overvoltage category III, 300 V
Voltage tests (routine test) acc. to IEC 61010-1:	
IC2/(IC3-4)	DC 2.2 kV
IC 3/(IC4)	AC 2.2 kV

Supply voltage

Supply voltage U_s	AC 100…240 V/DC 24…240 V
Tolerance of U_s	-30…+15 %
Frequency range U_s	47…63 Hz
Power consumption	≤ 3 W, ≤ 9 VA

IT system being monitored

Nominal system voltage U_n	3(N)AC, AC 0…400 V/DC 0…400 V
Tolerance of U_n	25%
Frequency range of U_n	DC, 15…460 Hz

Measuring circuit

Measuring voltage U_m	± 12 V
Measuring current I_m at R_F	≤ 110 µA
Internal resistance R_i	≥ 115 kΩ
Permissible leakage capacitance C_e	≤ 100 µF
Permissible external DC voltage U_{fg}	≤ 700 V

Response values

Response value R_{an1}	2…990 kΩ (69 kΩ)*
Response value R_{an2}	1…980 kΩ (23 kΩ)*
Operating uncertainty R_{an}	± 15 %, at least ±1 kΩ
Hysteresis R_{an}	25 %, at least 1 kΩ
Undervoltage detection U	10…499 V (off)*
Overvoltage detection U	11…500 V (off)*
Operating uncertainty U	± 5 %, at least ± 5 V
Frequency dependent operating uncertainty ≥ 400 Hz	-0.015 %/Hz
Hysteresis U	5 %, at least 5 V

Time response

Response time t_{an} at R_F= 0.5 x R_{an} and C_e=1 µF acc. to IEC 61557-8	≤ 10 s
Start-up delay t	0…10 s (0 s)*
Response delay t_{on}	0…99 s (0 s)*
Delay on release t_{off}	0…99 s (0 s)*

Displays, memory

Display	LC display, multi-functional, not illuminated
Display range measured value insulation resistance (R_F)	1 kΩ…4 MΩ
Operating uncertainty	± 15 %, at least ±1 kΩ
Display range measured nominal system voltage value (U_n)	0…500 V r.m.s
Operating uncertainty U	± 5 %, at least ± 5 V
Display range measured leakage capacitance value for R_F > 10 kΩ	0…105 µF
Operating uncertainty	± 15 %, mindestens ± 2 µF
Password	off/0…999 (0, off)*
Fault memory alarm message	on/(off)*

Interface

Interface/protocol	RS-485/BMS, isoData
Baud rate	BMS (9.6 kBit/s), isoData (115.2 kBits/s)
Cable length (9.6 kBits/s	≤ 1200 m
Cable: twisted pair, shield connected to PE	min. J-Y(St)Y 2x0.6
Terminating resistor	120 Ω (0.25 W), internal, can be connected
Device address, BMS bus	3…90 (3)*

Switching elements

Switching elements	2 x 1 NO contacts, common terminal 11
Operating principle	N/C operation/N/O operation (N/C operation)*
Electrical endurance, number of cycles	10000

Contact data acc. to IEC 60947-5-1:

Utilisation category	AC-12	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	2 A	1 A	0.2 A	0.1 A
Minimum contact rating	1 mA at AC/DC ≥ 10 V				

Environment/EMC

EMC	IEC 61326-2-4,

Ambient temperatures:

Operation	-25…+70 °C
Transport	-40…+85 °C
Storage	-25…+70 °C

Climatic class acc. to IEC 60721:

Stationary use (IEC 60721-3-3)	3K5 (without condensation and icing)
Transport (IEC 60721-3-2)	2K3 (without condensation and icing)
Long-time storage (IEC 60721-3-1)	1K4 (without condensation and icing)

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

Connection

Connection type	Push-wire terminal
Nominal current	≤ 10 A
Conductor sizes	AWG 24-14
Stripping length	10 mm
rigid	0.2…2.5 mm²
flexible without ferrules	0.75…2.5 mm²
flexible with ferrules, with/without plastic collar	0.25…2.5 mm²
Multiple conductor, flexible with TWIN ferrule with plastic sleeve	0.5…1.5 mm²
Opening force	50 N
Test opening, diameter	2.1 mm

Other

Operating mode	Continuous operation
Mounting	Cooling slots must be ventilated vertically
Degree of protection, built-in components (DIN EN 60529)	IP30
Degree of protection, terminals (DIN EN 60529)	IP20
Enclosure material	Polycarbonate
DIN rail mounting acc. to	IEC 60715
Screw fixing	2 x M4 with mounting clip
Weight	≤ 150 g

( )* = Factory setting

Ordering information

Nominal system voltage U_n	Supply voltage U_S		System leakage capacitance C_e	Type	Art. no.
AC/DC	AC	DC			Push-wire terminal
0…400 V, 15…460 Hz	100…240 V, 47…63 Hz	24…240 V	< 100 µF	isoES425-D4-4	B71037020

Accessories

Description	Art. no.
Mounting clip for screw mounting (1 piece per device)	B 9806 0008

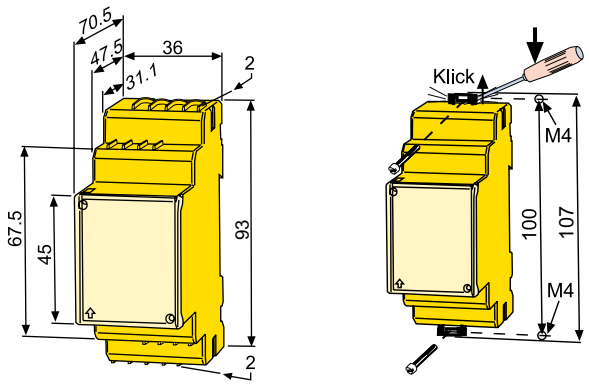
Dimension diagram XM420

Dimensions in mm

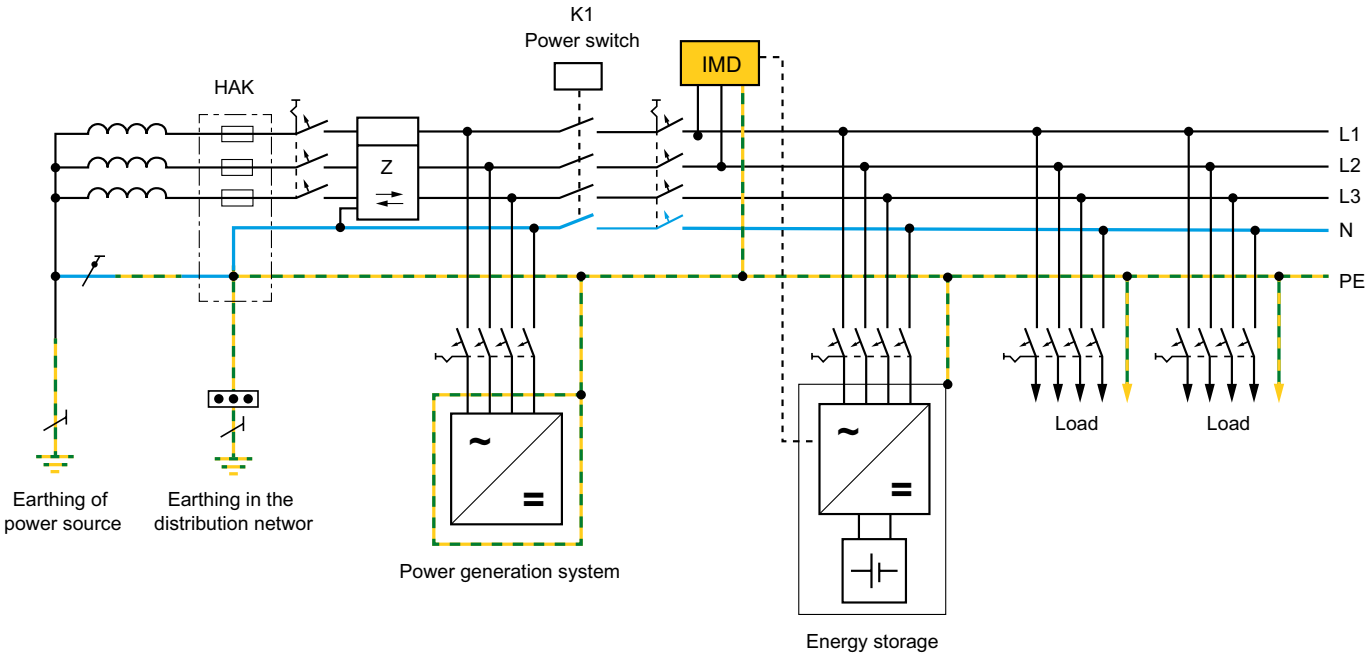
Open the front plate cover in direction of arrow!

Screw mounting

Note: The upper mounting clip must be ordered separately (see ordering information).

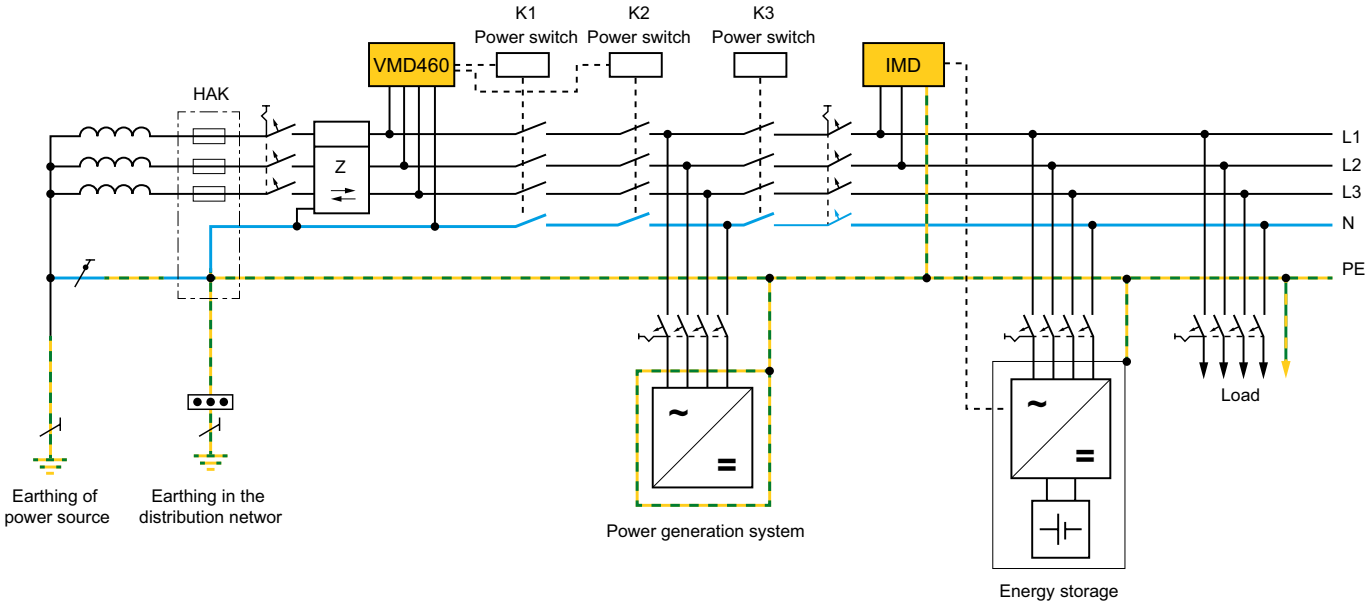


Application example energy storage < 30 KW



Application principle acc. to VDE application guide VDE-AR-E 2510-2

Application example energy storage > 30 KW



Application principle acc. to VDE application guide VDE-AR-E 2510-2

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