ISOMETER® isoPV425 with coupling device AGH420

Insulation monitoring device for unearthed AC, AC/DC and DC systems (IT systems) for photovoltaic systems of up to AC 690 V/DC 1000 V

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Device features

- Insulation monitoring for unearthed AC and DC systems with galvanically connected rectifiers or inverters
- isoPV425 is always used in conjunction with the AGH420
- Two separately adjustable response ranges of 1…500 kΩ (Alarm 1, Alarm 2)
- Automatic adaptation to the system leakage capacitance up to 500 µF
- Measured value display via multi-functional LCD
- Measurement of the nominal system voltage (RMS) with undervoltage and overvoltage detection
- Measurement of DC voltages, system to earth (L+/PE and L-/PE)
- Alarm signalling via LEDs (AL1, AL2), display and alarm relays (K1, K2)
- N/C operation or N/O operation selectable
- Automatic device self test
- BMS interface (Bender measuring device interface) for data exchange with other Bender components; RS-485 electrically isolated Start-up delay, response delay and delay on release
- Password protection to prevent unauthorised changes being made to device settings
- Fault memory can be activated
- Connection monitoring

Approvals

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Product description

The isoPV425 ISOMETER® monitors the insulation resistance of unearthed AC/DC main circuits (IT systems) with mains voltages of AC, AC/DC 0…690 V or DC 0…1000 V.

DC components existing in AC/DC systems do not influence the operating characteristics. A separate supply voltage allows de-energised systems to be monitored too. The maximum permissible system leakage capacitance is 500µF.

Application

- AC, DC or AC/DC main circuits
- Solar systems with directly connected inverters
- Solar systems with high system leakage capacitances
- Solar systems with high but slow voltage fluctuations
- Systems including switched-mode power supplies

Function

The currently measured insulation resistance is indicated on the LC display. The response value of the Isometer is factory-set to AL1 10 kΩ and AL2 5 kΩ. When the value falls below the preset response values, 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 configurable 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 return to their initial position. The point of fault L+, L- or the symmetrical insulation resistance is indicated on the display. In the menu, the alarm relays can also be assigned 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. Device parameters are assigned via LCD, the control buttons on the front of the device or the BMS interface.

Connection monitoring

The connections to the electrical system (L1/+ / L2/-) and earth (E/KE) as well as the connecting leads from the insulation monitor to the coupling device are periodically monitored every 24 hours after pressing the test button and connecting the supply voltage. In case of interruption of a connecting lead, the alarm relay K2 switches, the LEDs ON/AL2/AL1 flash and a message appears on the LC display as follows:

"E.0x" for a fault in the connecting leads between both devices or system fault,

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

"E.01" for a fault in the connecting leads to PE.

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

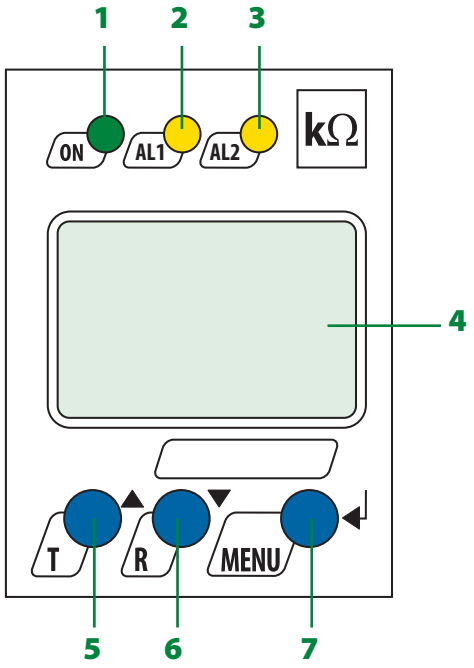
Measurement method

The ISOMETER® isoPV425 uses the AMP and PCP measurement method.

Standards

The ISOMETER® of the isoPV425 series complies with the requirements of the device standards: DIN EN 61557-8 (VDE 0413-8), IEC 61557-8, ASTM F 1669M-96 (2007).

Operating elements



1 - Power On LED "ON", (flashes in case of interruption of the connecting leads E/KE or L1(+)/ L2(-) or system fault.

2 - Alarm LED "AL1", lights when the value falls below the set response value Alarm 1 and flashes in case of interruption of the connecting leads E/KE or L1(+)/L2(-), system faults and in case of overvoltage (can be activated).

3 - Alarm LED "AL2", lights when the value falls below the set response value Alarm 2 and flashes in case of interruption of the connecting leads E/KE or L1(+)/L2(-), system faults and in case of undervoltage (can be activated).

4 - LC display

5 - Test button "T": To call up the self test.

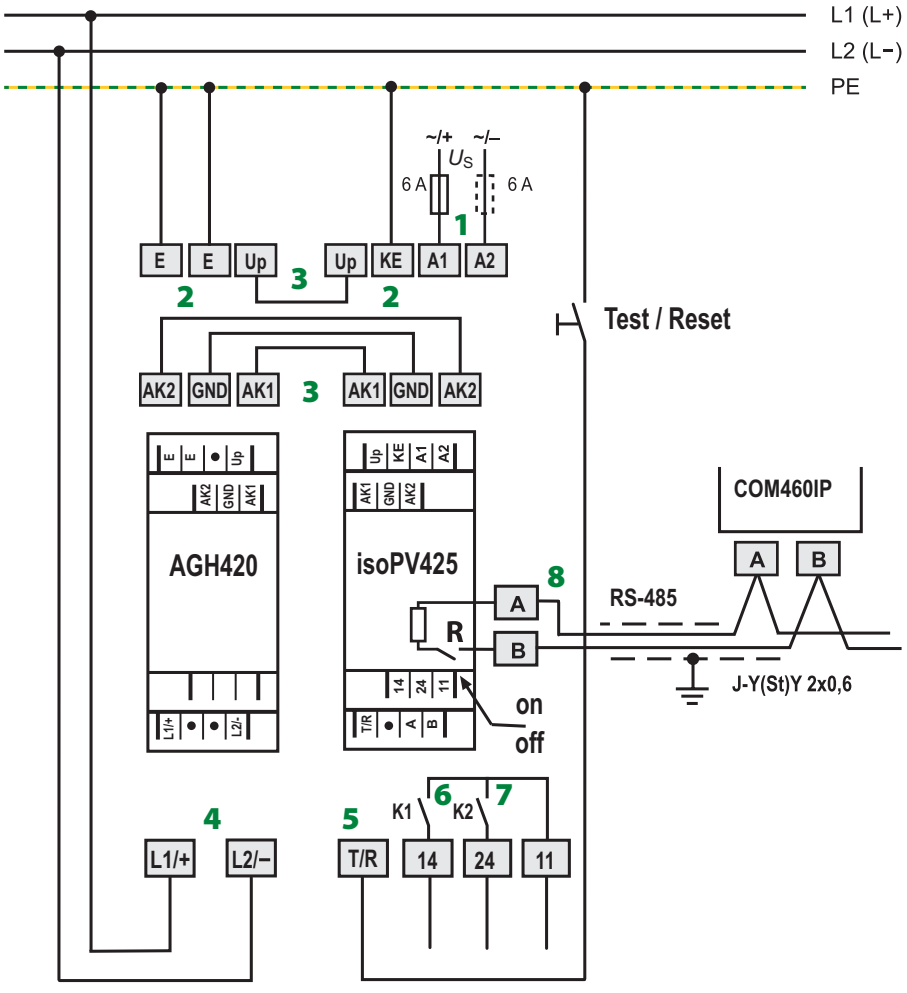
Arrow up button:
To change parameters, move upwards in the menu.

6 - Reset button "R": To delete stored fault alarms

Arrow down button:
parameter change, to move down in the menu

7 - "MENU" button: to call up the menu system.
Enter button: to confirm parameter changes

Wiring diagram



1 - Connection to the supply voltage via fuse (line protection). If being supplied from an IT system, both lines have to be protected by a fuse.

2 - Connect each terminal separately to PE

3 - Connect the terminals of AGH420 to the corresponding terminals of the isoPV425, for detailed description refer to the wiring info below the wiring diagram.

4 - Connection to the AC or DC system to be monitored

5 - Connection for the external combined test and reset button

6 - Connection to alarm relay K1

7 - Connection to alarm relay K2

8 - Connection RS-485 (BMS bus) with terminating switch *R* (on/off)
Example: Connection of a BMS-Ethernet gateway COM460IP

Technical data ISOMETER® isoPV425

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

Rated insulation voltage	250 V
Rated impulse withstand voltage/pollution degree	4 kV/3
Protective separation (reinforced insulation) between	
(A1, A2) - (AK1, GND, AK2, Up, KE, T/R, A, B) - (11, 14, 24)	
Voltage tests according to IEC 61010-1	2.21 kV

Supply voltage

Versorgungsspannung U_S	AC 100…240 V/DC 24…240 V
Tolerance of U_S	-20…+15 %
Frequency range U_S	47…63 Hz
Power consumption	≤ 3 W, ≤ 11 VA

IT system being monitored

Nominal system voltage U_n	via AGH420

Response values

Response value R_{an1} (Alarm 1)	2…500 kΩ (10 kΩ)*
Response value R_{an2} (Alarm 2)	1…490 kΩ (5 kΩ)*
Relative uncertainty	± 15 %, at least ±1 kΩ
Hysteresis	25 %, at least 1 kΩ
Undervoltage detection	30 V…1.14 kV (off)*
Overvoltage detection	31 V…1.15 kV (off)*
Relative uncertainty	± 5 %, at least ± 5 V
Hysteresis	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_{on}	0…99 s (0 s)*
Displays, memory	
Display	LC display, multi-functional, not illuminated
Display range measured value insulation resistance	1 kΩ…1 MΩ
Operating uncertainty	± 15 %, at least ±1 kΩ
Display range measured value nominal system voltage	30 V…1.15 kV RMS
Operating uncertainty	± 5 %, at least ± 5 V
Display range measured value system leakage capacitance at R_F > 10 kΩ	1…500 µF
Operating uncertainty	± 10 %, at least ± 2 µF
Password	off/0…999 (0, off)*
Fault memory alarm relay	on/(off)*

Interface

Interface/protocol	RS-485/BMS
Baudrate	9.6 kbit/s
Cable length	0…1200 m
Recommended cable (shielded, 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 N/O contact, common terminal 11
Operating principle	N/C operation or N/O operation (N/O operation)*
Contact 11-14	Alarm 1
Contact 11-24	Alarm 2
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:	
during operation	-25…+70 °C
during transport	-40…+85 °C
during storage	-25…+70 °C
Climatic class acc. to IEC 60721:	
Stationary use (IEC 60721-3-3)	3K5 (except condensation and formation of ice)
Transport (IEC 60721-3-2)	2K3 (except condensation and formation of ice)
Long-term storage (IEC 60721-3-1)	1K4 (except condensation and formation of ice)
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
Wiring of the terminals Up, AK1, GND, AK2:	
refer to technical data of AGH420, under the heading “Connection”	
Connection properties for all other terminals:	
rigid	0.2…2.5 mm² (AWG 24…14)
flexible without ferrules	0.2…2.5 mm² (AWG 24…14)
flexible with ferrules	0.2…1.5 mm² (AWG 24…16)
Stripping length	10 mm
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
Documentation number	D00028
Weight	≤ 150 g

( )* = factory setting

Technical data coupling device AGH420

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

Rated insulation voltage	1000 V
Rated impulse voltage/pollution degree	8 kV/3
Protective separation (reinforced insulation) between	(L1/+, L2/-) - (AK1, GND, AK2, Up, E)
Voltage test acc. to IEC 61010-1	4.3 kV

IT system being monitored

Nominal system voltage U_n	DC 0…1000 V, AC 0…690 V
Nominal system voltage U_n (UL508)	DC 0…600 V, AC 0…600 V
Tolerance of U_n	AC +15 %
Tolerance of U_n	DC +10 %
Frequency range of U_n	DC, 15…460 Hz

Measuring circuit

Measuring voltage U_m	± 45 V
Measuring current I_m (at $R_f = 0\ \Omega$)	≤ 400 µA
Internal DC resistance R_i	≥ 120 kΩ
Impedance Z_i at 50 Hz	≥ 120 kΩ
Permissible system leakage capacitance	≤ 500 µF

Environment/EMC

EMC	IEC 61326-2-4
Ambient temperatures:	
during operation	-25…+70 °C
during transport	-40…+85 °C
during 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 (except condensation and formation of ice)
Long-term storage (IEC 60721-3-1)	1K4 (except condensation and formation of ice)
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
Single cables for terminals Up, AK1, GND, AK2:	
Cable lengths	≤ 0.5 m
Connection properties	≥ 0.75 mm²
4-core cable for the terminals Up, AK1, GND, AK2:	
Cable lengths:	≤ 5 m
Connection properties	2.5 mm²
Connection properties for all other terminals:	
rigid	0.2…2.5 mm² (AWG 24…14)
flexible without ferrules	0.2…2.5 mm² (AWG 24…14)
flexible with ferrules	0.2…1.5 mm2 (AWG 24…16)
Stripping length	10 mm
Opening force	50 N
Test opening, diameter	2.1 mm

Other

Operating mode	continuous operation
Mounting	cooling slots must be ventilated vertically
Distance to adjacent devices, Un > 800 V	≥ 30 mm
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

Ordering information

Supply voltage[1] U_S		Nominal voltage U_n		System leakage capacitance	Type	Art. No.
DC	AC	DC	AC			
24…240 V	100…240 V, 47…63 Hz	0…1000 V	0…690 V	≤ 500 µF	isoPV425-D4-2 with AGH420	B 7103 6303

Device version with screw terminals on request.

[1] Absolute values

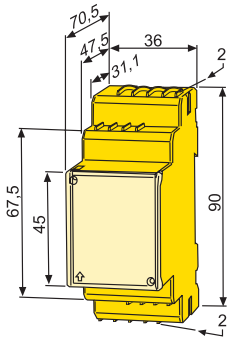
Accessories

Type designation	Art. No.
Mounting clip for screw mounting (1 piece per device)	B 9806 0008

Dimension diagram XM420

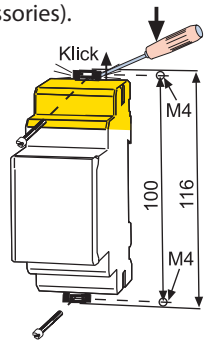
Dimensions in mm

Open the front plate cover in direction of arrow!



Screw mounting

Note: The above mounting clip is an accessory and must be ordered separately (see accessories).



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