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ISOMETER® isoEV425 with coupling device AGH420

Insulation monitoring device for unearthed DC circuits (IT systems) for charging electric vehicles

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Insulation monitoring device for unearthed DC circuits (IT systems) for charging electric vehicles

ISOMETER® isoEV425

Device features

- Insulation monitoring for DC charging stations (mode 4 according to IEC 61851-23) for charging electric vehicles
- Mains voltage DC 0…1100 V and AC 0…793 V
- Two separately adjustable response ranges of 1…500 kΩ (Alarm 1, Alarm 2)
- Two factory-set response values
- Leakage capacitance ≤ 5 µF
- Continuous monitoring of system/earth connections
- Measurement of the nominal system voltage (RMS) with undervoltage and overvoltage detection
- Measurement of DC voltages, system to earth (L+/PE and L-/PE)
- LEDs: Power On, Alarm 1, Alarm 2
- Internal test/reset button
- Two alarm relays with single pole (one N/O contact each)
- N/O or N/C operation, selectable
- Fault memory behaviour, selectable
- Self monitoring with automatic alarm
- Multi-functional LC display
- Start-up delay, response delay and delay on release
- Password protection to prevent unauthorised changing of parameters
- RS-485 interface
- Compact two-module enclosure (36 mm) plus coupling in a two-module enclosure
- Quick wiring by push-wire terminals

Approvals

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Product description

The ISOMETER® of the isoEV425 series monitor the insulation resistance of unearthed DC-charging stations for electric vehicles (IT systems) DC 0…1100 V DC from the charging station to the motor (AC 0…793 V).

Due to a separate supply voltage de-energised systems can also be monitored.

Application

- DC charging stations for electric vehicles according to IEC 61851-23

Function

The currently measured insulation resistance is indicated on the LC display. The ISOMETER®s are factory-set to two response values 100 kΩ/500 kΩ. If the reading is below the selected response value, the response delay "t_{on}" begins. Once the response delay "t_{on}" has elapsed, the alarm relays "K1/K2" and the alarm LEDs "AL1/AL2" light up. By means of the two isolated response values/alarm relays, messages can be evaluated separately. When the insulation resistance exceeds the relase value (response value plus hysteresis), the alarm relays switch back to 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 connection lines from the Isometer® to the coupling device are periodically monitored every 24 hours or after pressing the test button or connecting the supply voltage. In case of interruption of a connecting lead , the alarm relay K2 switches, the LEDs ON/AL1/AL2 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.

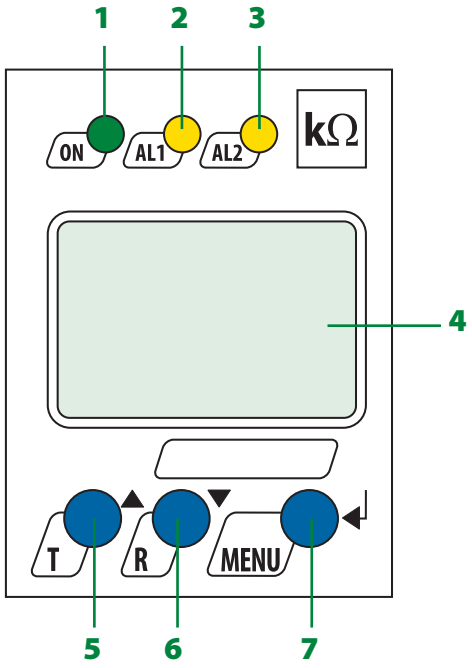
Measurement method

The ISOMETER® isoEV425 works with different measurement methods adapted to the application with a maximum response time of 10 s.

Standards

The ISOMETER® of the isoEV425 series complies with the requirements of the device standards: DIN EN 61557-8 (VDE 0413-8), IEC 61557-8

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.

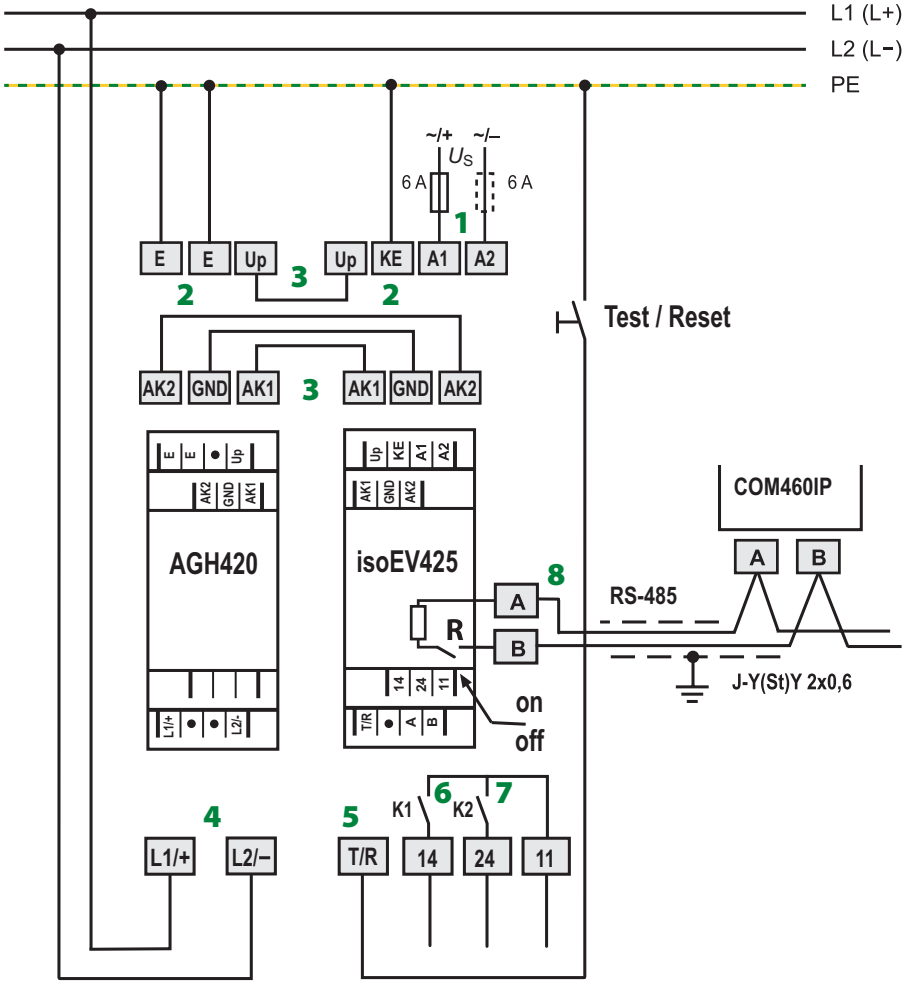
Arrow up button:
To change parameters, move upwards in the menu.

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 isoEV425, 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® isoEV425

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

Rated insulation voltage	250 V
Rated impulse voltage	4 kV
Overvoltage category	III
Degree of pollution	3
Protective separation (reinforced insulation) between	(A1, A2) - (AK1, GND, AK2, Up, KE, T/R, A, B) - (11, 14, 24)
Voltage tests, routine test (IEC 61010-1)	2.2 kV

Supply voltage

Supply voltage range U_S	AC 100…240 V / DC 24…240 V
Tolerance of U_S	-20…+15 %
Frequency range of U_S	47…63 Hz
Power consumption	≤ 3 W, ≤ 9 VA

IT system being monitored

Nominal system voltage U_n with AGH420	AC 0…690 V/DC 0…1000 V
Tolerance of U_n	AC +15 %, DC +10 %
Nominal system voltage Un with AGH420 (UL508)	AC/DC 0…600 V
Frequency range of U_n	DC, 40…460 Hz
Permissible system leakage capacitance	≤ 5 µF

Response values

Response value R_{an1} (Alarm 1)	2…500 kΩ (500 kΩ)*
Response value R_{an2} (Alarm 2)	1…490 kΩ (100 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 < 200 Hz	± 5 %, at least ± 5 V
Frequency dependent relative uncertainty ≥ 200 Hz	- 0.03 % / Hz
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_{off}	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 < 200 Hz	± 5 %, at least ± 5 V
Frequency dependent operating uncertainty ≥ 200 Hz	-0.03% / Hz
Display range measured value system leakage capacitance at R_F > 10 kΩ	1 µF…10 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	-40…+70 °C
during transport	-40…+70 °C
during storage	-40…+70 °C
Climatic class acc. to IEC 60721	
Stationary use (IEC 60721-3-3)	3K7 (except condensation and formation of ice)
Transport (IEC 60721-3-2)	2K4 (except condensation and formation of ice)
Long-term storage (IEC 60721-3-1)	1K5 (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
Connection properties:	
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
Connection type	terminals Up, AK1, GND, AK2
Wiring of the terminals Up, AK1, GND, AK2:	refer to technical data of AGH420, under the heading „Connection“

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	D00126
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	8 kV
Degree of pollution	3
Overvoltage category	III
Protective separation (reinforced insulation) between	(L1/+, L2/-) - (AK1, GND, AK2, Up, E)
Voltage test, routine test (IEC 61010-1)	4.3 kV

IT system being monitored

Nominal system voltage U_n	AC/DC 0…1000 V
Tolerence of U_n	AC/DC +10 %
Nominal system voltage U_n (UL508)	AC/DC 0…600 V

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

Environment/EMC

EMC	IEC 61326-2-4
Ambient temperatures:	
during operation	-40…+70 °C
during transport	-40…+70 °C
during storage	-40…+70 °C
Classification of climatic conditions acc. to IEC 60721:	
Stationary use (IEC 60721-3-3)	3K7 (except condensation and formation of ice)
Transport (IEC 60721-3-2)	2K4 (except condensation and formation of ice)
Long-term storage (IEC 60721-3-1)	1K5 (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
Connection properties:	
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
Connection type	terminals Up, AK1, GND, AK2
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

Other

Operating mode	Continuous operation
Mounting	cooling slots must be ventilated vertically
Distance to adjacent devices, U_n > 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		Type	Art. No.
AC	DC		
100…240 V, 47…63 Hz	24…240 V	isoEV425-D4-4 with AGH420	B 7103 6401

Device version with screw terminals on request.
[1] Absolute values

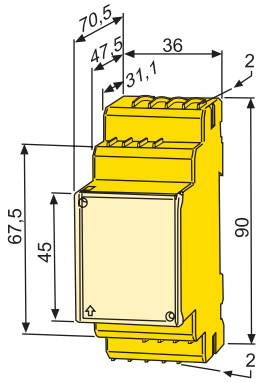
Accessories

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

Dimension diagram XM420

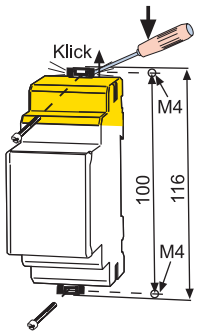
Dimensions in mm

Open the front plate cover in direction of arrow!

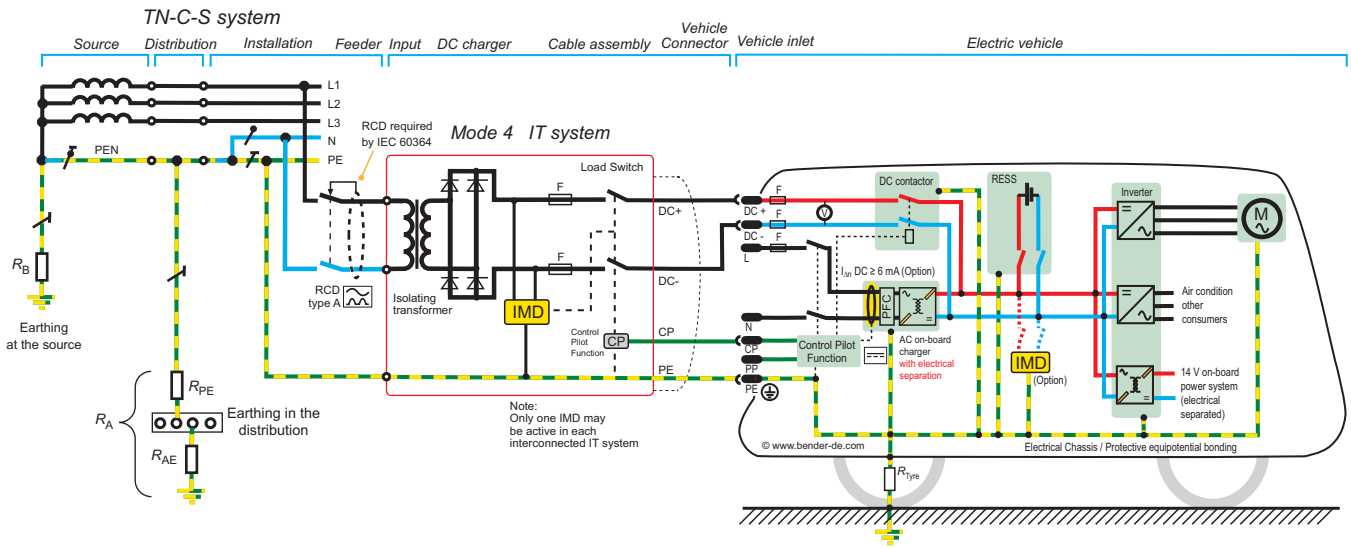


Screw mounting

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



Example of application



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