

ISOMETER® isoMED427P

Insulation monitoring device with integrated load and temperature monitoring and locating current injector for insulation fault location systems for medical IT systems



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Device features

- Insulation monitoring for medical IT systems
- Adjustable response value for insulation monitoring
- Locating current injector for insulation fault location systems
- Load and temperature monitoring for IT system transformers
- Adjustable load current response value
- Temperature monitoring with PTC thermistor or bimetal switch
- Self monitoring with automatic alarm
- PE connection monitoring
- Internal/external test button
- LEDs: Power On, Alarm 1, Alarm 2
- Configurable alarm relay: N/O or N/C operation selectable
- Compact two-module enclosure (36 mm)
- BMS interface

Approvals



Product description

The ISOMETER® isoMED427P monitors the insulation resistance of unearthed AC circuits (medical "IT systems"). At the same time, the load current and temperature of the IT system transformer is monitored.

In combination with EDS series insulation fault locators and the appropriate measuring current transformers, the isoMED427P is designed to set up the respective equipment for insulation fault location.

Application

Medical IT system in accordance with IEC 60364-7-710, IEC 61557-8, IEC 61557-9 and DIN VDE 0100-710

Function

The isoMED427P monitors the insulation resistance as well as the temperature and load current of the IT system transformer in medical IT systems. In addition, the connections to PE, to the measuring current transformer and to the temperature sensor are monitored. The actual measured value is indicated on the LCD. By pressing the "▲" or "▼" – buttons, additional measured values can be displayed.

Alarms are indicated on the LC display via LEDs and an additional identification.

Parameters are assigned to the device via LCD or the function keys on the front of the device.

Insulation monitoring

The isoMED427P uses the AMP measurement method, which is also able to detect DC faults. When the value of the insulation resistance falls below the set response value, the alarm relay K1 switches and the alarm LED "AL1" lights. When the insulation resistance exceeds the release value (response value plus hysteresis), the alarm relay returns to its initial position and the alarm LED "AL1" goes out.

Insulation fault location is carried out with insulation fault evaluators of the EDS... series and the respective measuring current transformers. Once an insulation fault is detected by isoMED427P, the insulation fault location process is started automatically or manually. The isoMED427P generates a test current the amplitude of which is dependent on the existing system voltage and the insulation fault. In the case of insulation faults of low resistance, the locating current is limited to 1 mA by the isoMED427P. The locating current pulse flows from the isoMED427P via the live parts to the point of fault. From there, it flows via the insulation fault and the earth conductor (PE) back to the isoMED427P. This locating current pulse is then detected by the measuring current transformers located in the insulation fault path, and is evaluated by the EDS... insulation fault locators. When the locating current in the measuring current transformer exceeds the response value, the associated alarm LED at the EDS... lights up indicating the faulty sub-circuit. This information is also indicated at the respective MK alarm indicator and test combination. By assigning the measuring current transformers to the respective circuit, the point of fault can easily be detected from a central position.

Load current and temperature monitoring

The load current is monitored using an STW2 measuring current transformer, temperature is monitored by means of temperature switch or a PTC thermistor in accordance with DIN 44081.

When the response value is exceeded, the alarm LED "AL2" lights up. The required temperature sensors are already incorporated in Bender transformers.

Alarm relays

The alarm relay switches when an alarm, a device error occurs or in the case of voltage failure. The factory-programmed operating principle can be re-programmed.

Standards

The ISOMETER® of the isoMED427P series complies with the requirements of the device standards: IEC 60364-7-710, IEC 61557-8, IEC 61557-9 and DIN VDE 0100-710.

Alarm messages LEDs

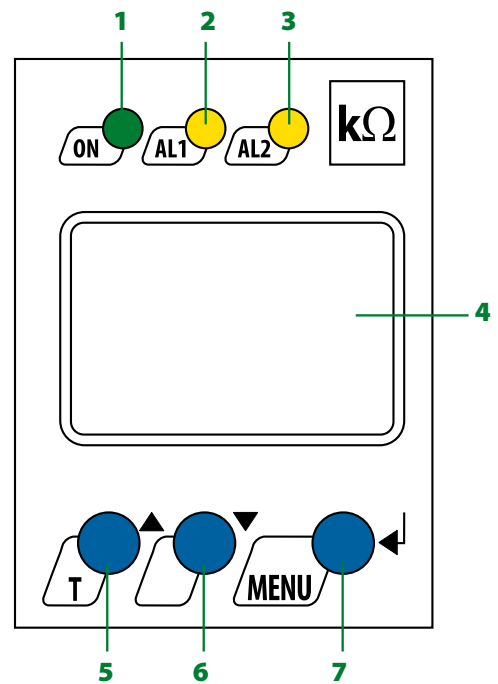
	isoMED427P		
	"ON"	"AL1"	"AL2"
Operation	■	-	-
System fault*	flashing	flashing	flashing
Insulation fault	■	■	-
Overcurrent	■	-	■
Overtemperature	■	-	■

* Detailed alarm information on LCD

Test function/connection monitoring

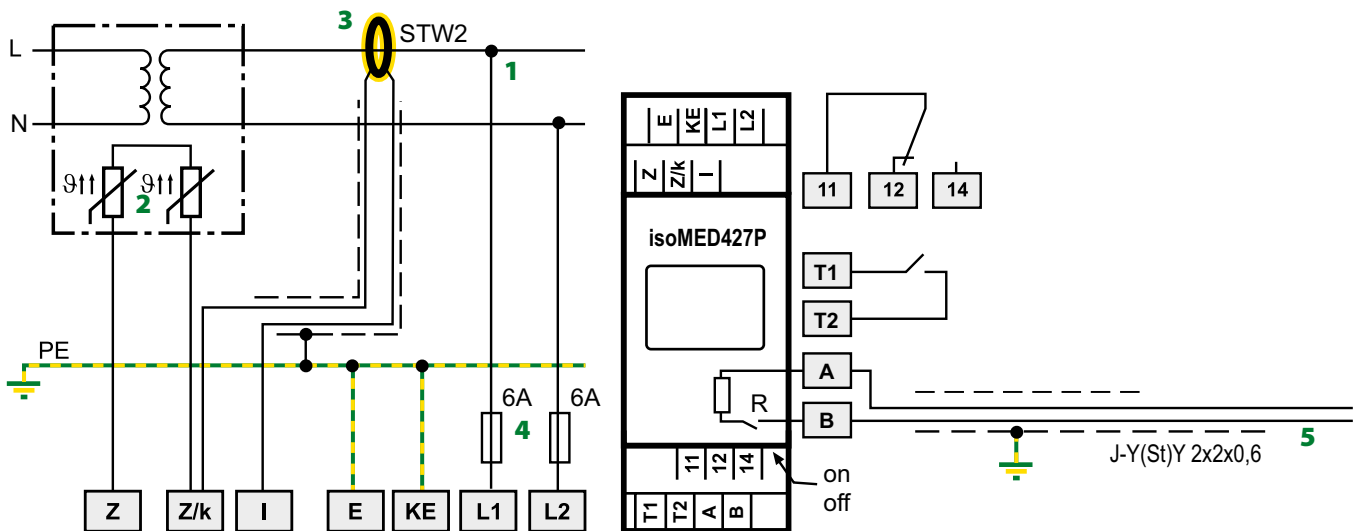
A self test is carried out once supply voltage is fed and later at hourly intervals. During the self test, the internal device functions, the connections to PE (E/KE) and the connections to the current transformer are monitored for interruption and short-circuit. In the event of a fault, the alarm relay K1 switches and the LEDs ON/AL1/AL2 flash. The respective error code appears on the LC display. After eliminating the fault, the alarm relay automatically switches to its initial position. By pressing the test button, the device functions and also the relay function will be tested.

Operating elements



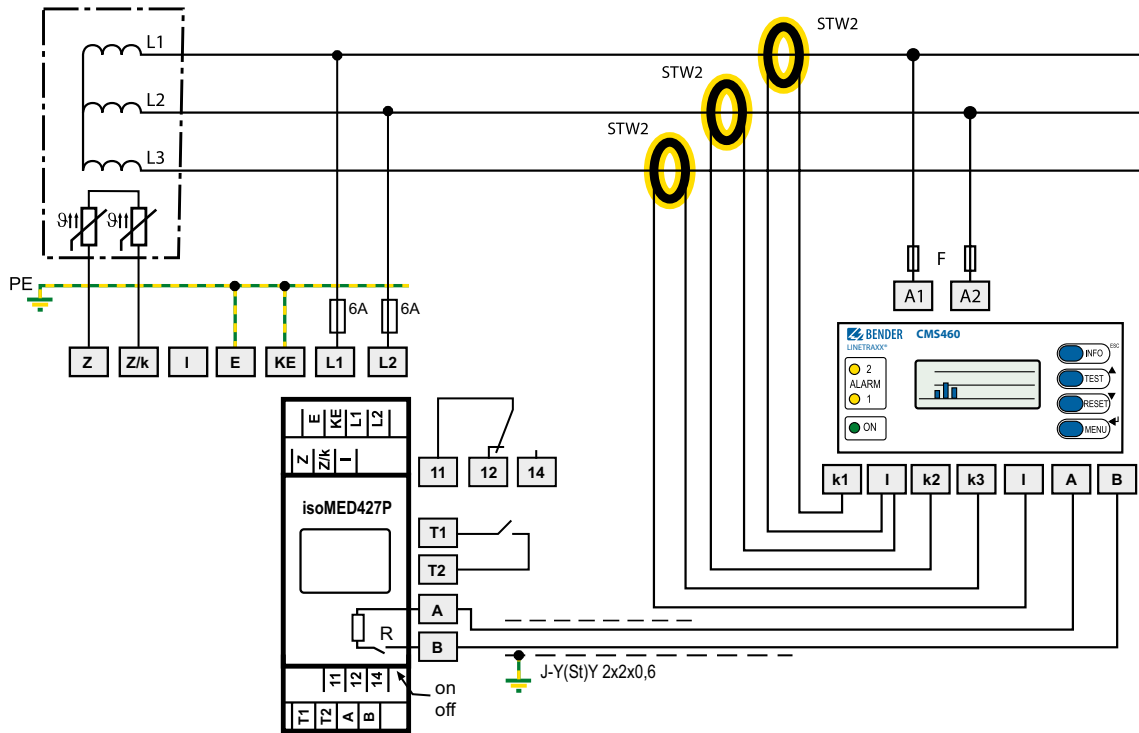
- 1 - Power On LED
- 2, 3 - Alarm LEDs "AL1", "AL2"
- 4 - LC display
- 5 - "TEST" button (>2s): to call up the self test.
Arrow up button: parameter change to move up in the menu
- 6 - Arrow down button: parameter change to move down in the menu
- 7 - "MENU" button (> 2s): to call up the menu system.
Enter button: to confirm parameter change

Wiring diagram

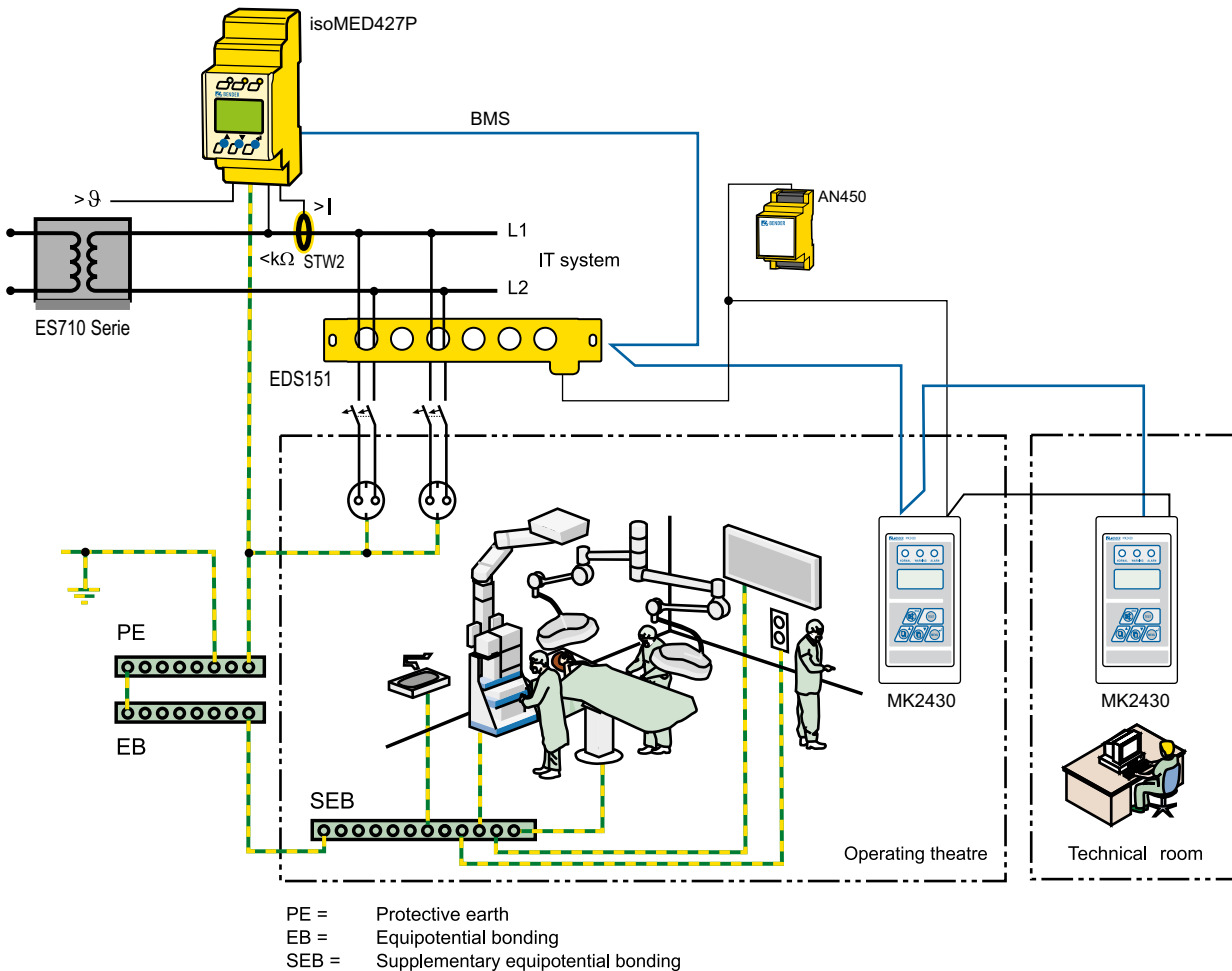


- 1 - Connection to the IT system to be monitored = supply voltage U_S via fuse
- 2 - Temperatur sensor
- 3 - Measuring current transformer for load current monitoring
- 4 - Line protection by a fuse in accordance with IEC 60364-4-43 (6 A fuse recommended). In case of supply (L1/L2) from an IT system, both lines have to be protected by a fuse.
- 5 - Serial interface BMS

Wiring diagram isoMED427P with CMS460-D4



Application example



Technical data

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

Rated insulation voltage	250 V
Rated impulse voltage/pollution degree	4 kV/3
Protective separation (reinforced insulation) between (L1, L2, E, KE, T1, T2, A, B, Z, Z/k, I) - (11, 12, 14)	
Voltage test acc. to IEC 61010-1	2.21 kV

Voltage supply

Supply voltage U_S	= U_n
Power consumption	≤ 6,5 VA

IT system being monitored acc. to IEC 60364-7-710

Nominal system voltage U_n	AC 70...264 V
Nominal frequency f_n	47...63 Hz

Insulation monitoring acc. to IEC 61557-8

Response value R_{an}	50...500 kΩ (50 kΩ)*
Relative uncertainty	±10 %
Hysteresis	25 %
Response time t_{an} at $R_F = 0.5 \times R_{an}$ and $C_e = 0.5 \mu F$	≤ 5 s
Response time for PE connection monitoring	≤ 1 h
Permissible system leakage capacitance C_e	5 μF

Measuring circuit

Measuring voltage U_m	±12 V
Measuring current I_m (at $R_F = 0 \Omega$)	≤ 50 μA
Internal DC resistance R_i	≥ 240 kΩ
Impedance Z_i at 50 Hz	≥ 200 kΩ
Permissible extraneous DC voltage U_{f0}	≤ DC 300 V

Locating current injector acc. to IEC 61557-9

Locating current	≤ 1 mA
Test pulse/break	2/4 s

Load current monitoring

Response value, adjustable	5...50 A (7 A)*
Relative uncertainty	± 5 %
Hysteresis	4 %
Nominal frequency f_n	47...63 Hz
Setting values load current measurement:	
Transformer	3150 VA 4000 VA 5000 VA 6300 VA 8000 VA 10000 VA
/alarm 1~	14 A 18 A 22 A 28 A 35 A 45 A
Response time overload, (50 % to 120 %)	< 5 s
Response time for measuring current transformer monitoring	at restart, test or every 1 h

Temperature monitoring:

Response value (fixed value)	4 kΩ
Rated frequency f_n	47...63 Hz
Release value (fixed value)	1.6 kΩ
PTC resistors acc. to DIN 44081	max. 6 in series
Relative uncertainty	± 10 %
Response time overtemperature	< 2 s
Response time connection fault PTC resistors	< 2 s

Displays, memory

LC display	multifunctional, not illuminated
Measured value insulation resistance	10 kΩ...1 MΩ
Operating uncertainty	± 10 %, ± 2 kΩ
Measured value load current (as % of the set response value)	10 %...199 %
Operating error	± 5 %, ± 0.2 A
Password	on, off/0...999 (off, 0)*

Interface

Interface/protocol	RS-485/BMS
Baud rate	9.6 kbit/s
Cable length	0...1200 m
Cable (twisted in pairs, one end of shield connected to PE)	recommended: J-Y(St)Y min. 2 x 0.8
Terminating resistor	120 (0.25 W), internal, switchable
Device address, BMS bus	2...90 (3)*

Interfaces for measuring current transformer STW2 and temperature sensor

Cable lengths:	
single wire > 0.5 mm ²	≤ 1 m
single wire, twisted > 0.5 mm ²	≤ 10 m
twisted in pairs, shielded > 0.5 mm ²	≤ 40 m
Cable (shield on one side connected to PE)	recommended: J-Y(St)Y min. 2 x 0.6

Switching elements

Number	1 changeover contact				
Operating principle	N/C operation or N/O operation (N/C operation)*				
Electrical endurance, number of cycles	10000				
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
Minimum contact rating	1 mA at AC/DC 10 V				

Environment/EMC

EMC	IEC 61326-2-4
Operating temperature	-25...+55 °C
Classification of climatic conditions acc. to IEC 60721:	
Stationary use (IEC 60721-3-3)	3K5 (no condensation, no formation of ice)
Transport (IEC 60721-3-2)	2K3
Long-term 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

Connection

Connection type	push-wire terminals
Connection properties	
rigid	0.2...2.5 mm ² (AWG 24...14)
flexible without ferrule	0.75...2.5 mm ² (AWG 19...14)
flexible with ferrule	0.2...1.5 mm ² (AWG 24...16)
Stripping length	10 mm
Opening force	50 N
Test opening, diameter	2.1 mm

Other

Operating mode	continuous operation
Position of normal use	any
Degree of protection, internal components (DIN EN 60529)	IP30
Degree of protection, terminals (DIN EN 60529)	IP20
Enclosure material	polycarbonate
Flammability class	UL94V-0
DIN rail mounting acc. to	IEC 60715
Screw mounting	2 x M4 with mounting clip
Documentation number	D00043
Weight	≤ 150 g

()* = factory setting

Ordering information

Supply voltage $U_s = U_n$ ¹⁾	Type	Art. No.
AC		
70...264 V, 47...63 Hz	isoMED427P-2	B 7207 5301

¹⁾ Absolute values of the voltage range

Accessories

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

Suitable system components

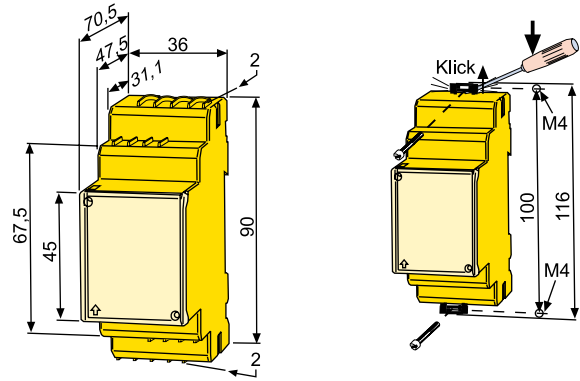
Type designation	Type	Page
Measuring current transformers	STW2	B 942 709
Temperature sensor (PTC)	ES0107	B 924 186
Three phase load monitor	CMS460-D4-2	B 9405 3030
Mounting frame	XM420	B 990 994

Dimension diagram XM420

Dimensions are given in mm
Open the front plate cover in direction of arrow!

Screw fixing

Note: The upper mounting clip must be ordered separately (see "Accessories").



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