

ISOMETER® isoMED427x-(PT)

Insulation monitoring device for medical applications



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



ISOMETER® isoMED427P

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



i The Lloyd's Register certification is only valid for the spring-type terminal version of the isoMED427P-2 (B72075301).

Product description

ISOMETER®s of the isoMED427x-(PT) series monitor the insulation resistance of a medical IT system with AC 70...264 V. In addition, the load current and the temperature of the IT system transformer are monitored. Alarms and measured values are provided to other bus devices via the BMS interface. For display and signalling purposes, the use of special alarm indicator and test combinations is recommended.

After detection of an insulation fault, the internal locating current injector of the isoMED427P-(xx) models enables insulation fault location. The use of special devices of the EDS series is recommended to locate the insulation fault.

Devices of the isoMED427x-(PT) series do not require an additional supply voltage. The maximum permissible system leakage capacitance is 5 µF.

In order to meet the requirements of applicable standards, customised parameter settings must be made on the equipment in order to adapt it to local equipment and operating conditions. Please heed the limits of the range of application indicated in the technical data.

Application

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

Function

During regular operation, the display shows the present insulation resistance. Use the arrow-up or arrow-down button to display the present load current in %. The isoMED427P-PT also displays the present transformer temperature. If the insulation resistance falls below the response value, the AL1 LED signals an insulation fault. AL2 lights up if the load current is too high or the temperature of the monitored IT system transformer is too high. The alarm relay K1 signals all alarm categories. In addition, a bus signal is provided at terminals A, B for insulation fault locators as well as alarm indicator and test combinations.

The detected insulation fault activates the internal locating current injector for insulation fault location if the EDS function was previously enabled in the menu (factory setting = off). A positive and a negative locating current pulse is injected into the monitored IT system alternately for 2 s each. There is a 4 s pause between positive and negative pulse.

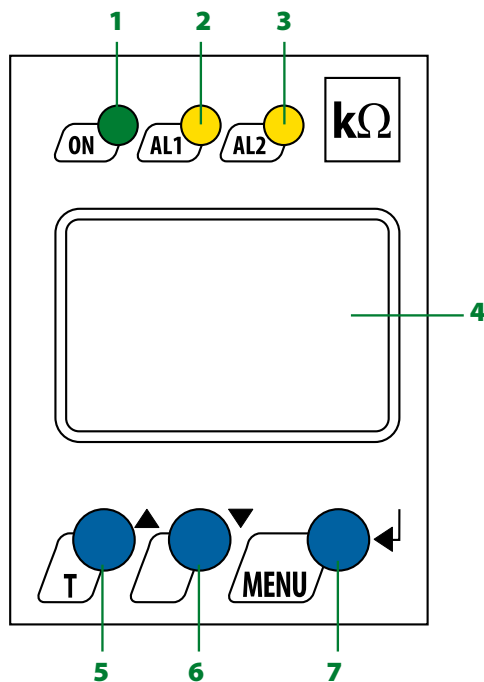
The isoMED427P-(PT) models can only be operated as BMS slave. Therefore, the alarm indicator and test combination or the respective insulation fault locator take over the master function. BMS masters always have BMS address 1.

Standards

The ISOMETER® of the isoMED427x-(PT) series complies with the requirements of the device standards:

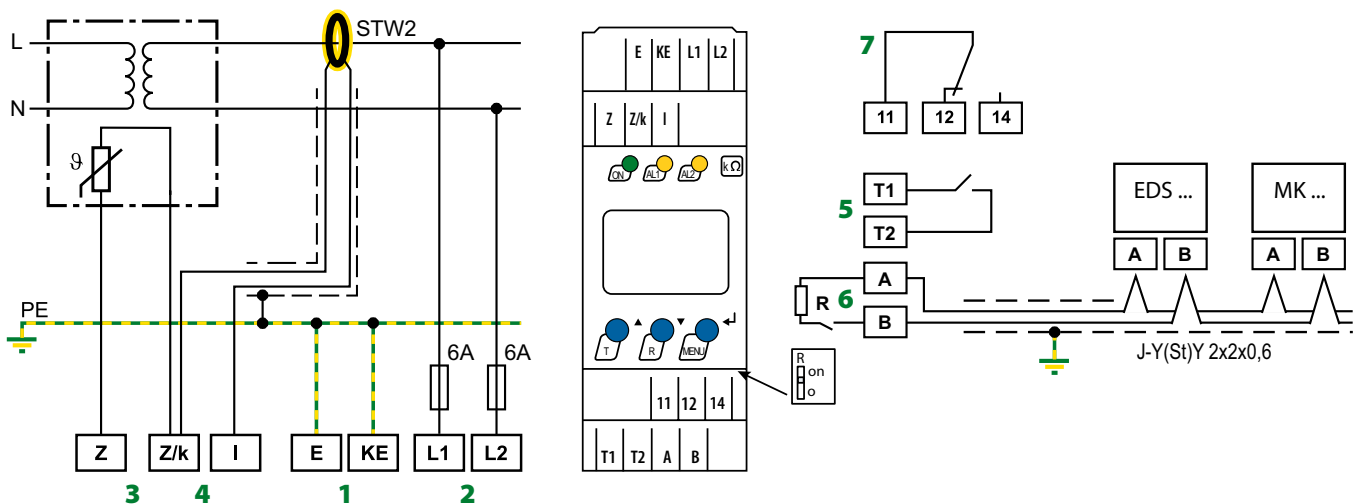
- DIN EN 61557-8 (VDE 0413-8): 2015-12/Cor1: 2016-12
- DIN EN 50155: 2018-05
- EN 45545-2:2016
- IEC 61557-8: 2014/COR1: 2016
- EN61373 cat I class B

Operating elements



- 1 - Power on LED
- 2 - Alarm LED 1 is lit: Below response value R_{an}
- 3 - Alarm LED 2 is lit: Response value % / or/and °C exceeded
- 4 - LC-Display
- 5 - "T": Start a self test (2 s)
▲ : Menu item up / increase value
- 6 - ▼ : Menu item down / decrease value
- 7 - Start menu mode (2 s)
Enter button:
(< 1.5 s): ConArm menu item, submenu item, value.
(> 2 s): Return to the next higher menu level

Wiring diagram



- 1 - E, KE Separate connection of E and KE to PE
- 2 - L1, L2 Connection to the IT system to be monitored; supply voltage (see nameplate) via 6 A fuse
- 3 - Z, Z/k Connection to temperature sensor acc. to DIN44081 (isoMED427x)
Connection to temperature sensor PT100 (isoMED427P-PT)
- 4 - Z/k, I Connection to measuring current transformer (STW2)
- 5 - T1, T2 Connection to external test button
- 6 - A, B RS-485 interface, terminate connection to R switch (on/o>), when the device is connected to the bus end.
- 7 - 11, 12, 14 Alarm relay K1

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

Measuring circuit (IC1)	L1, L2
Control circuit (IC2)	E, KE, Z, Z/k, I, T1, T2, A, B
Output circuit (IC3)	11, 12, 14
Rated voltage	250 V
Overvoltage	category III
Operating altitude	< 2000 m AMSL
Rated impulse voltage	
IC1/(IC2-3)	4 kV
IC2/IC3	4 kV
Rated insulation voltage	
IC1/(IC2-3)	250 V
IC2/IC3	250 V
Pollution degree	3
Protective separation between	
IC1/(IC2-3)	Overvoltage category III, 300 V
IC2/IC3	Overvoltage category III, 300 V
Voltage test (routine test) according to IEC 61010-1 (IC1-2)/IC3	2.2 kV

Supply voltage

Supply voltage U_s	100...240 V
Tolerance U_s	-30...+10 %
Power consumption	≤ 3 W

Monitored IT system

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

Insulation monitoring acc. to IEC 61557-8: 2007-01

Response value R_{an}	50...500 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 connection monitoring PE	≤ 1 h
Permissible system leakage capacitance C_e	max. 5 YF

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_{iq}	≤ DC 300 V

Load current monitoring

Response value adjustable	5...50 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
I_{alarm1}	14 A / 18 A / 22 A / 28 A / 35 A / 45 A
Response time, overload (50 % to 120 %)	< 5 s
Response time, CT monitoring	at restart, test or every 1 h

Temperature monitoring**isoMED427x**

Sensor	PTC resistors acc. to DIN 44081 (max. 6 in series)
Response value	4 kΩ
Release value	1.6 kΩ
Relative uncertainty	± 10 %
Response time, overtemperature	< 2 s

isoMED427P-PT

Sensor	PT100 (no series or parallel connections)
Response value	50...150 °C
Hysteresis	10 %
Relative uncertainty	± 5 %
Response time, overtemperature	< 5 s

Displays, memory

Display	LC display, multi-functional, not illuminated
Display range measured value insulation resistance (R_F)	10 kΩ...1 MΩ
Operating uncertainty	±10 %, ±2 kΩ
Measured value load current (as % of the set response value)	10 %...199 %
Operating uncertainty	±5 %, ±0.2 A
Password	off, on [0...999]

Interface

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

Switching elements

Number	1 changeover contact
Operating principle	N/C operation / N/O operation
Electrical endurance under rated operating conditions	10 000 cycles

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 load	10 mA/DC 5 V

Environment/EMC

EMC	IEC 61326-2-4
Operating temperature	-25...+55 °C

Classification of climatic conditions acc. to IEC 60721

(related to temperature and relative humidity)

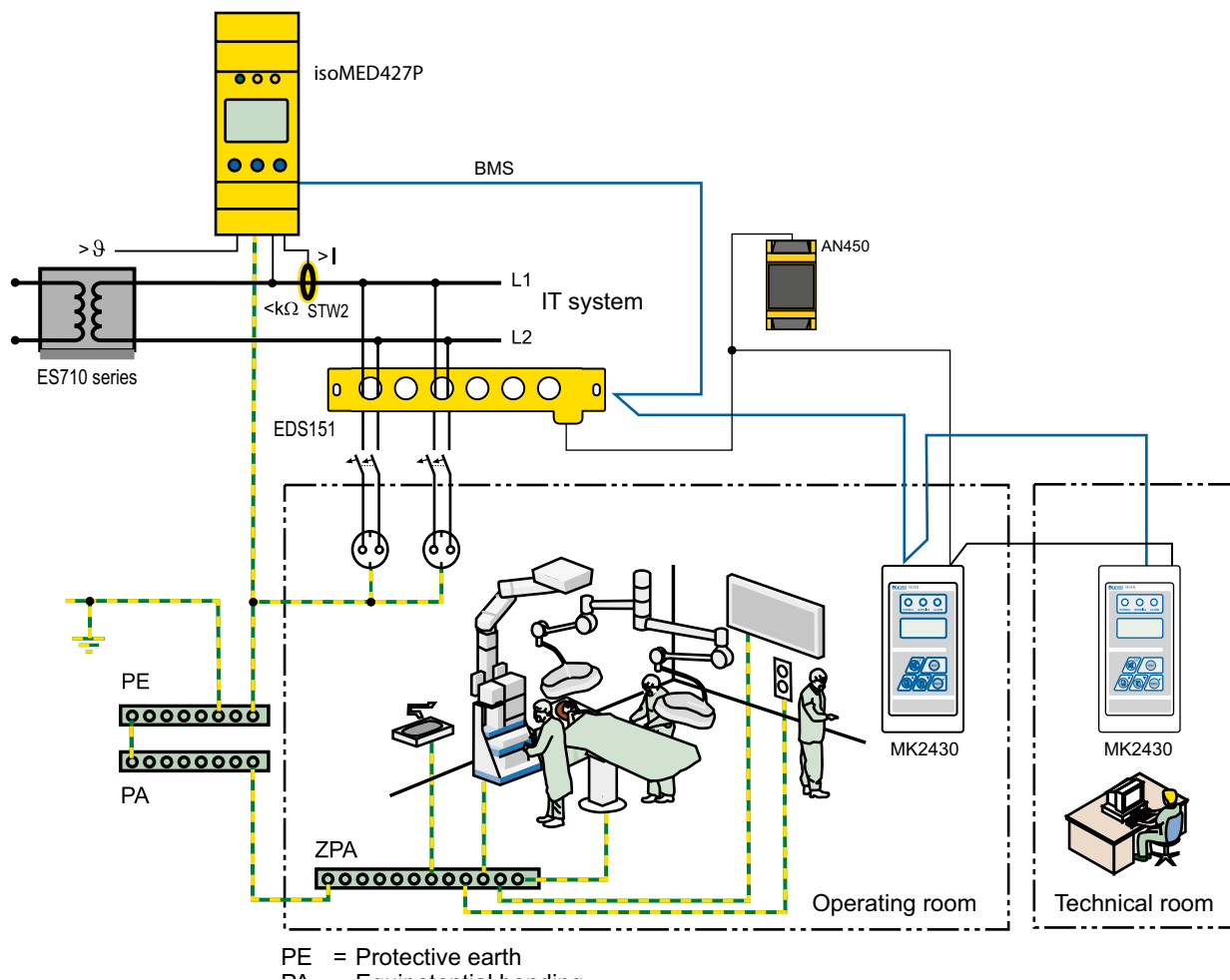
Stationary use (IEC 60721-3-3)	3K22
Transport (IEC 60721-3-2)	2K11
Long-term storage (IEC 60721-3-1)	1K22

Classification of mechanical conditions acc. to IEC 60721

Stationary use (IEC 60721-3-3)	3M11
Transport (IEC 60721-3-2)	2M4
Long-term storage (IEC 60721-3-1)	1M12

Connection		Other	
Connection type	Push-wire terminals	Operating mode	Continuous operation
Nominal current	≤ 10 A	Position of normal use	Any
Stripping length	10 mm	Degree of protection, built-in components (DIN EN 60529)	IP30
Opening force	50 N	Degree of protection, built-in components (DIN EN 60529)	IP20
Test opening, diameter	2.1 mm	Enclosure material	Polycarbonate
Connection properties:		Flammability class	UL94V-0
rigid	0.2...2.5 mm ² (AWG 24...14)	DIN rail mounting	IEC 60715
flexible without ferrule	0.75...2.5 mm ² (AWG 19...14)	Screw mounting	2 x M4
flexible with ferrule	0.2...1.5 mm ² (AWG 24...16)	Software versions	D643 V1.0x (isoMED427-2) D355 V1.0x (isoMED427P-2) D644 V 1.0x (isoMED427P-PT)
Connection type	Screw-type terminals	Weight	≤ 150 g
Nominal current	≤ 10 A	Factory settings isoMED427x-(PT)	
Tightening torque	0.5...0.6 Nm (5...7 lb-in)	Response value R_{an}	50 kΩ (< R)
Cross section	AWG 24...12	Response value I_{alarm}	7 A (> I)
Stripping length	8 mm	Response value °C	4 kΩ (fixed value for isoMED427x) 120 °C (configurable for isoMED427P-PT)
Connection properties:		Operating principle K1	N/C operation (n.c.)
rigid / flexible	0.25...2.5 mm ²	BMS address	3
Flexible with ferrules with/without plastic sleeve	0.25...2.5 mm ²	Automatic insulation fault location	off, deactivated
Multi-conductor rigid/flexible	0.2...1.5 mm ²	Password	0, disabled
Multi-conductor flexible with ferrule without plastic sleeve	0.25...1.5 mm ²	CT monitoring	on, activated
Multi-conductor flexible with TWIN ferrule with plastic sleeve	0.25...1.5 mm ²	Termination	off, deactivated (120 Ω)

Application example



Ordering information

Supply voltage U_s	Type	Art. No.	
		Screw-type terminal	Push-wire terminal
AC 70...264 V, 47...63 Hz	isoMED427-2	B92075306	B72075306
	isoMED427P-2 ¹⁾	B92075301	B72075301
	isoMED427P-PT	B92075307	B72075307

¹⁾ Only this device has a Lloyds Register approval

Accessories

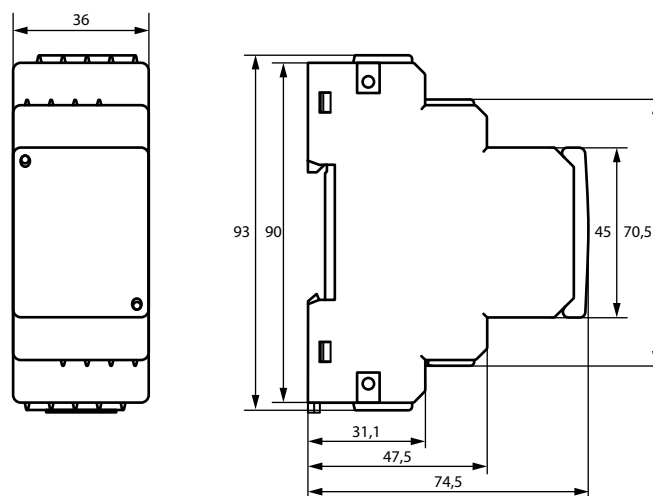
Type designation	Art. No.
Mounting clip for screw mounting (1 piece per device)	B98060008

Passende Systemkomponenten

Type designation	Type	Art. No.
Measuring current transformers	STW2	B942709
Temperature sensor (PTC)	ES0107	B924186
Mounting frame	XM420	B990994

Dimension diagram XM420

Dimensions are given in mm



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