BENDER
The Power in Electrical Safety©

ISOMETER® IR427

with alarm indicator and test combination MK7

Insulation monitoring device with integrated load and temperature monitoring for medical IT systems in accordance with IEC 60364-7-710, IEC 61557-8 and DIN VDE 0100-710

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ISOMETER® IR427

Alarm indicator and test combination MK7

Device features

ISOMETER® IR427

- Insulation monitoring for medical IT systems
- Load and temperature monitoring for IT system transformers
- Adjustable response value for insulation monitoring
- Adjustable load current response value
- Integrated voltage monitoring for four alarm and test combinations MK7
- Temperature monitoring with PTC thermistor or bimetal switch
- Connection monitoring earth
- LEDs: Power On, Alarm 1, Alarm 2
- Internal/external test button
- Configurable alarm relay: N/O or N/C operation selectable
- Self monitoring with automatic alarm
- Compact two-module enclosure (36 mm)
- Four-wire interface for four alarm indicator and test combinations MK7

Remote alarm indicator and test combination MK7

- Easy-to-clean front foil surface
- Label field
- Panel frame alpine white
- Alarm LEDs: Power On, insulation fault overload, overtemperature
- Test button, mute button
- Standard flush-mounting enclosure 66 mm

Product description

The ISOMETER® of the IR427 series is designed to monitor the insulation resistance of AC circuits (medical IT systems). At the same time, the load current and temperature of the IT system transformer can be monitored.

Application

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

Function

The insulation monitoring device monitors the insulation resistance, the load current and the temperature of the IT system transformer. In addition, the connections to earth, the measuring current transformer and the temperature sensor connections are monitored. The currently measured value is indicated on the LC display. By pressing the "▲" or "▼" keys, other 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 AMP measuring principle, also detects 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.

Load current and temperature monitoring

The load current is monitored via the measuring current transformer STW2; the temperature is monitored via a temperature (Bimetal) switch or a PTC Thermistor according to DIN 44081. When the response value is exceeded, the alarm LED "AL2" lights. The required temperature sensors are already incorporated in BENDER transformers.

Alarm relays

The alarm relay switches on the occurrence of an alarm or in case of voltage failure (N/C operation). The operating principle can be changed.

Alarm messages LEDs

	IR427			MK7			
	"ON"	"AL1"	"AL2"	ON	Ins. fault	Overload	Overtemp.
Operation	■	–	–	■	–	–	–
System fault[1)]	flashing	flashing	flashing	flashing	flashing	flashing	flashing
Insulation fault	■	■	–	■	■	–	–
Overcurrent	■	–	■	■	–	■	–
Overtemperature	■	–	■	■	–	–	■
No communication betw. IR 427+MK7	–	–	–	flashing	–	–	–

[1)] Detailed alarm information on LCD

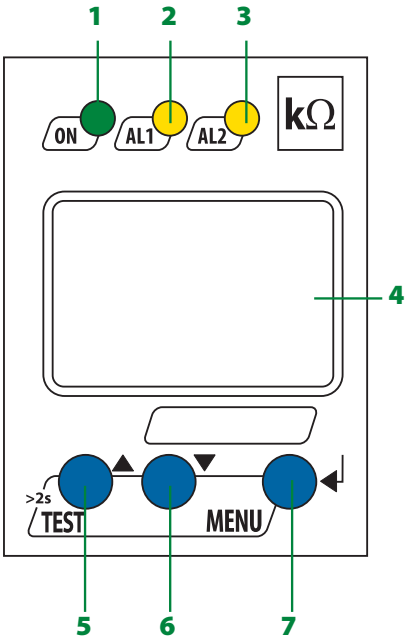
Test function/connection monitoring

The device carries out a self test when supply voltage is fed and later at hourly intervals. During the self test, the internal device functions, the connections to earth (E/KE) and the current transformer connections are monitored for interrruption 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, on the IR427 or on the MK7, the device functions and also the relay function will be tested.

Standards

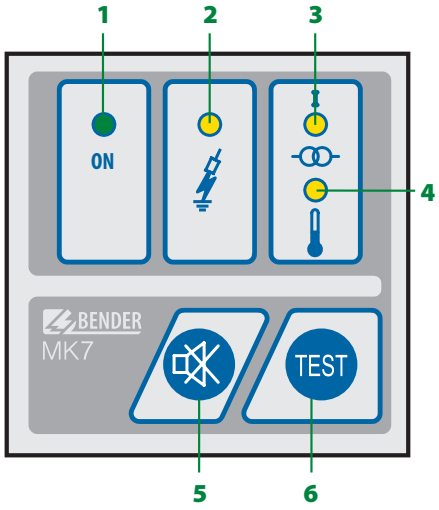
The ISOMETER® of the IR427 series complies with the requirements of the device standards: IEC 60364-7-710, IEC 61557-8 and DIN VDE 0100-710.

Operating elements



IR427

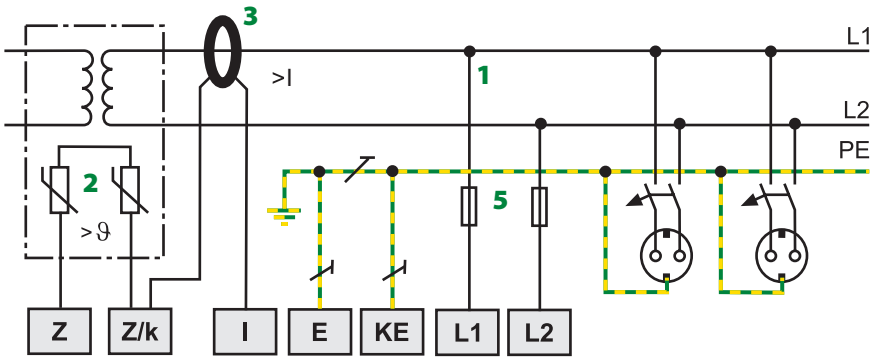
1 - Power ON LED
2,3 - Alarm LEDs "AL1", "AL2"
4 - LC display
5 - TEST button (> 2s): Call up the self test
Arrow up key: parameter change
to move up in the menu
6 - Arrow down key: parameter change
to move down in the menu
7 - MENU key (> 2s):
To call up the menu system
Enter key: To confirm
parameter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

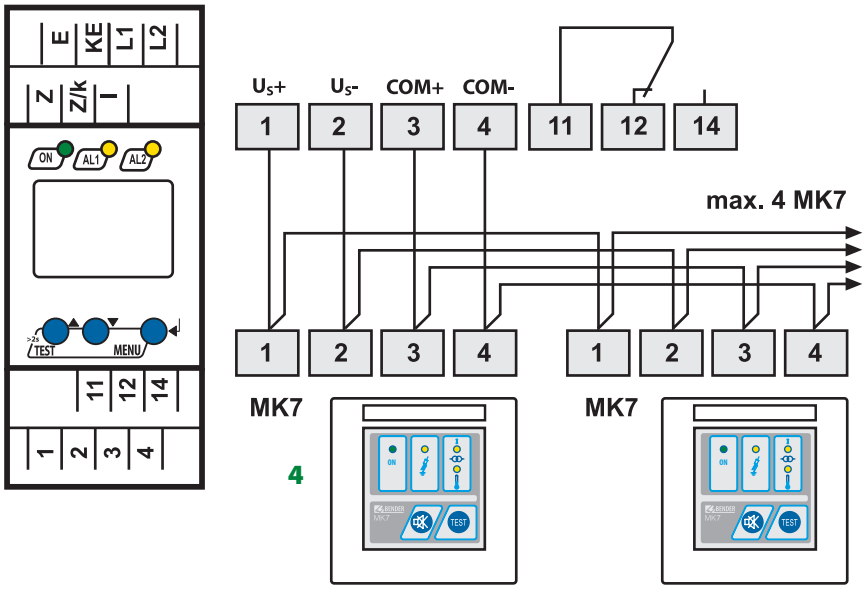


MK7

1 - Power On LED "ON"
2 - Insulation fault LED
3 - Overload LED
4 - Overtemperature LED
5 - Mute button
6 - Test button "TEST"

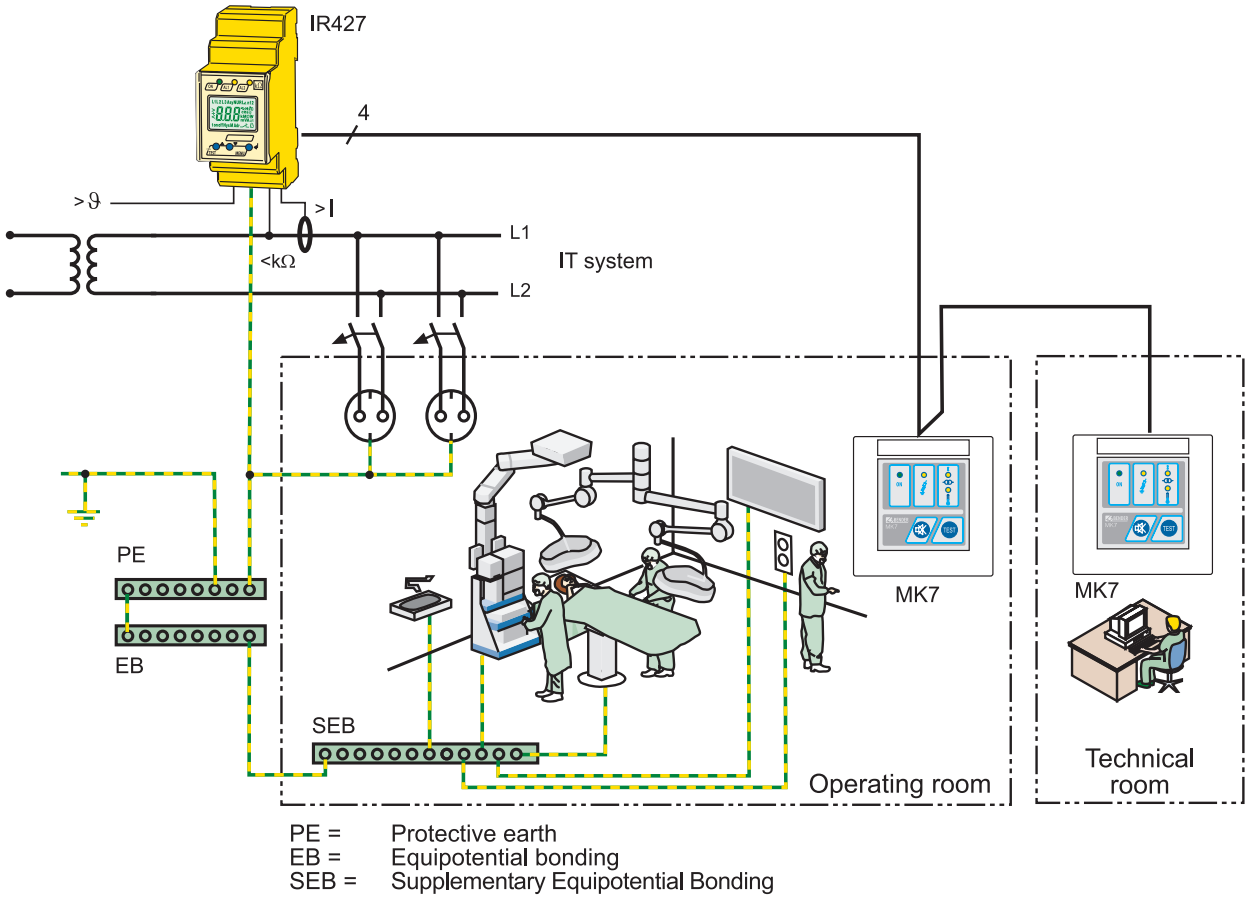
Wiring diagram





1 - Connection to the IT system being monitored = supply voltage U_S via fuse
2 - Temperature sensor
3 - Measuring current transformer for load current monitoring
4 - Connection alarm indicator and test combination MK7 (max. 4 pieces)
5 - 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.

Application example



Ordering information

Supply voltage U_S		Nominal system voltage U_n[1]	Type	Art. No.
AC	DC	AC		
70…264 V, 42…460 Hz	–	70…264 V, 42…460 Hz	IR427-2	B 7207 5300
–	18…28 V	–	MK7 Remote alarm indicator and test combination	B 9510 0201

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
MK-cavity-wall-box-60mm	B 95100203

Suitable system components

Type designation	Type	Art. No.
Measuring current transformers	STW2	B 942 709
Temperature sensor (PTC)	ES0107	B 924 186
Mounting frame	XM420	B 990 994

Technical data ISOMETER® IR427

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

Rated insulation voltage	250 V
Rated impulse voltage/pollution degree	2.5 kV/3
Protective separation (reinforced insulation) between (11, 12, 14)	(L1, L2, E, KE, 1, 2, 3, 4 Z, Z/k, l) -
Voltage test acc. to IEC 61010-1	2.21 kV

Supply voltage

Supply voltage U_S	$= U_n$
Power consumption	≤ 4 VA

IT system being monitored

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

Insulation monitoring

Response value R_{an}	50…500 kΩ (50 kΩ)*
Relative uncertainty	±10 %
Hysteresis	25 %
Response time t_{an} at $R_F = 0.5$ x R_{an} and $C_e = 0.5$ µF	≤ 5 s
Permissible system leakage capacitance C_e	≤ 5 µF

Measuring circuit

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

Load current monitoring

Response value, adjustable	5…50 A (7 A)*
Relative uncertainty	± 5 %
Hysteresis	4 %

Setting values load current measurement:

Transformer	3150 VA	4000 VA	5000 VA	6300 VA	8000 VA	10000 VA
I_{alarm} 1~	14 A	18 A	22 A	28 A	35 A	45 A

Temperature monitoring:

Response value (fixed value)	4 kΩ
Release value (fixed value)	1.6 kΩ
PTC resistors acc. to DIN 44081	max. 6 in series

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 uncertainty	± 5 %, ± 0.2 A
Password	on, off/0…999 (off, 0)*

Interface for MK7

Cable length, twisted in pairs, shielded	200 m
Cable (twisted in pairs, one end of shield connected to PE)	recommended: J-Y(St)Y min. 2 x 0.8

Power supply (terminals 1 and 2):

U_{off}	DC 24 V
I_{max} (max. 4 MK7)	80 mA

Communication (terminal 3 and 4):

Interface/protocol	RS-485/proprietary, no BMS
Terminating resistor	120 (0.25 W), internal, switchable

Cable lengths for the connection of the measuring current transformer STW2 and the temperature sensor

single wire > 0.5 mm²	≤ 1 m
single wire, twisted > 0.5 mm²	≤ 10 m
twisted in pairs, twisted > 0.5 mm²	≤ 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 (except condensation and formation of ice)
Transport (IEC 69721-3-2)	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
Storage (IEC 60721-3-1)	1M3

Connection

Connection type	push-wire terminals
Connection properties	
rigid/flexible	0.2…2.5 mm² (AWG 24…14)
Flexible with ferrule	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
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
Screw mounting	2 x M4
DIN rail mounting acc. to	IEC 60715
Software version	D288 V1.0x
Instruction leaflet	TBP201007
Weight	≤ 150 g

( )* = Factory setting

Technical data MK7

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

Rated insulation voltage	50 V
Rated impulse voltage/pollution degree	500 V/3

Supply voltage

Supply voltage U_S	DC 18…28 V
Power consumption	0.5 VA

Environment/EMC

EMC	IEC 61326
Operating temperature	-10…+55 °C
Classification of climatic conditions acc. to IEC 60721:	
Stationary use (IEC 60721-3-3)	3K5 (except condensation and formation of ice)
Transport (IEC 69721-3-2)	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
Storage (IEC 60721-3-1)	1M3

Connection

Connection	screw-type terminals
Connection properties	
rigid/flexible	0.2…2.5 mm² (AWG 24…14)
Flexible with ferrule	0.2…1.5 mm² (AWG 24…16)
Stripping length	8 mm

Other

Operating mode	continuous operation
Position of normal use	any
Degree of protection, internal components (IEC 60529)	IP30
Degree of protection, terminals (IEC 60529)	IP20
Front plate colour	alpine white
Flush-mounting enclosure, diameter (included in the scope of delivery)	66 mm
Weight (including mounting frame)	≤ 80 g

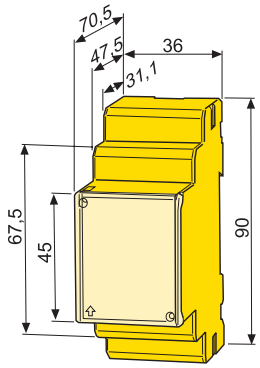
Dimension diagram IR427

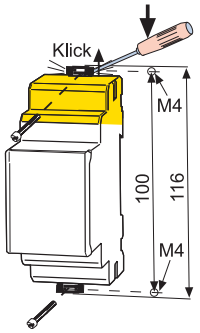
Dimensions are given in mm

Open the front plate cover in direction of arrow!

Screw fixing

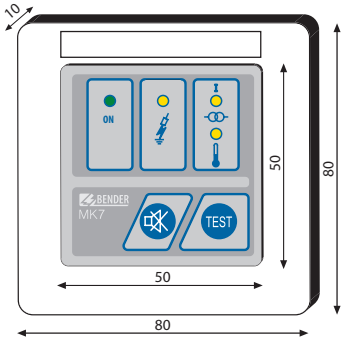
Note: Pull out the mounting clip for screw mounting.

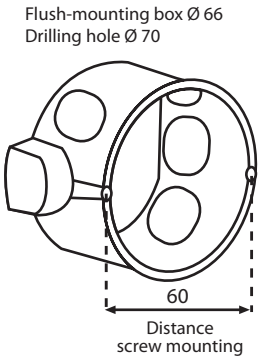




Dimension diagram MK7 and flush-mounting enclosure

Dimensions are given in mm





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