

ISOMETER® isoMED527

Line isolation monitor for medical applications





Product description

The ISOMETER® isoMED527 is an insulation monitoring device for monitoring medical IT systems. It continuously monitors the insulation resistance (R_F) as well as the load current and temperature of the IT system transformer.

The device has connections to the mains to be monitored, to the supply voltage and to sensors such as measuring current transformers and temperature sensors. Two relay outputs are also available for alarm forwarding. An RS-485 interface is used to communicate and parameterise the device via the Bender Smart Connect protocol (BSC).

Alarms are output via the LEDs on the front of the device, via the relay outputs and via the RS-485 interface. An NFC interface enables parameterisation via the Bender Connect app.

Device features

- Monitoring of the Insulation Resistance (R_F) in a medical IT system
- Preconfigured response value for the Insulation Resistance (R_F)
- Connection monitoring
- Voltage measurement per outer conductor to earth and total voltage with adjustable response values for overvoltage and undervoltage
- Functional earth monitoring with adjustable response value
- Measurement of the system leakage capacitance up to 5 μF
- Alarm display via the LEDs AL1 and AL2
- Alarm output via alarm relay and/or RS-485 interface at a suitable point
- NC or NO current behaviour of the relays selectable
- Start-up, response and release delay adjustable
- NFC interface for parameterisation via Bender Connect App
- RS-485 interface with Bender Smart Connect protocol (BSC)
- Load current and temperature monitoring for IT system transformers

Functional description

The ISOMETER® isoMED527 monitors medical IT systems. It measures the insulation resistance R_F between the active conductors and the earth of a medical IT system as a preset measured value. Monitoring this measured value is required by law and meets the requirements of the relevant standards for medical IT systems. The preset response values are not below the limits specified in the standards.

As soon as a response value is undershot, the LEDs on the front of the device display the currently measured insulation resistance. The numerical display of the actual measured value and visual and acoustic signals when a response value is undershot are always also displayed on a connected remote alarm indicator and test unit. In addition, the load current and temperature of the IT system transformer are monitored. Alarms and measured values are made available to other bus participants via the RS-485 interface.

The device supports insulation fault localisation in combination with the EDS551. It does not require a test current generator due to the new *isoNAP* measuring method.

Depending on the configuration and if function module A is activated, impedance (Z), mains leakage capacitance (C), total hazard current (THC) and mains voltage can optionally be measured, displayed and used for additional warning messages. These functions are not required by standards and are not necessary for standard-compliant monitoring, but they provide a more complete picture of the condition of the medical IT system.

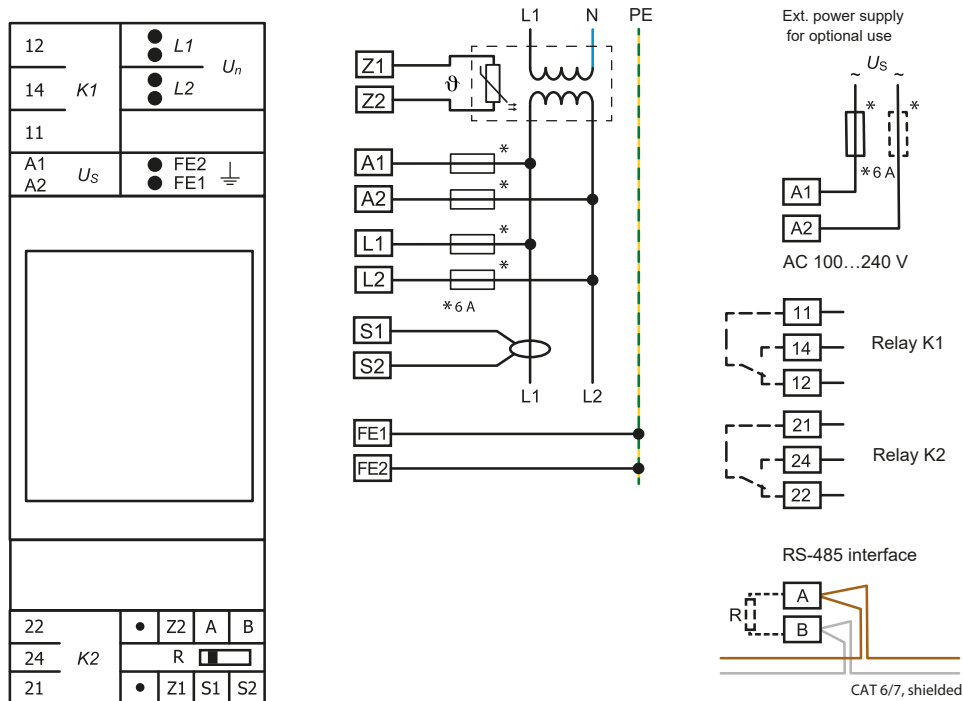
The measured and calculated parameters are assigned to defined alarms. These are defined:

- Insulation resistance
- Impedance
- System leakage capacity
- Total Hazard Current (THC)
- Overvoltage and undervoltage of the mains voltage
- Transformer overload
- Overtemperature of the transformer
- Functional earth monitoring

Furthermore, the messages and alarms are output via relays **K1** and **K2**. The relays can be configured by the user via the connected remote alarm indicator and test unit or via the interfaces.

Wiring diagram isoMED527

Connect the device according to the wiring diagram:



ADVICE

Rout the FE1 and FE2 cables separately.
Terminate the RS-485 bus at both ends.

Connections overview

		Terminal	Connection
top		A1, A2	Supply voltage
		11, 14, 12	Relay K1
		FE1, FE2	Seperate connections to functional earth (PE) (with sepearte lines)
		L1, L2	Connection to the system to be monitored
bottom		21, 24, 22	Relay K2
		•, •	Connection not in use
		Z1, Z2	Connection to temperature sensor
		A, B	RS-485 interface
		ON (R)	Termination RS-485 interface
		S1, S2	Connection to current transformer

Technical data

Isolation coordination acc. to IEC 61010-1/IEC 61010-2-30

Definitions

Measuring circuit (IC1)	L1, L2
Supply circuit (IC2)	A1, A2
Output circuits (IC3)	11, 12, 14
Output circuits (IC4)	21, 22, 24
Control circuit (IC5)	(FE1, FE2), (●, Z2, A, B), (●, Z1, S1, S2)

Rated voltage	240 V
Overvoltage category	III
Area of application	see "EMC", page 6

Rated impulse voltage

IC1/(IC2-5)	4 kV
IC2/(IC3-5)	4 kV
IC3/(IC4-5)	4 kV
IC4/IC5	4 kV

Rated insulation voltage

IC1/(IC2-5)	250 V
IC2/(IC3-5)	250 V
IC3/(IC4-5)	250 V
IC4/(IC5)	250 V
Pollution degree	2

Protective separation (reinforced insulation) between

IC1/(IC2-5)	overvoltage category III, 300 V
IC2/(IC3-5)	overvoltage category III, 300 V
IC3/(IC4-5)	overvoltage category III, 300 V
IC4/(IC5)	overvoltage category III, 300 V

Voltage test (routine test) according to IEC 61010-1

IC2/(IC1, IC3-5)	AC 2.2 kV
IC3/(IC1, IC4-5)	AC 2.2 kV
IC4/(IC1, IC5)	AC 2.2 kV

Supply voltage

Connection	A1, A2
Supply voltage range U_s	AC 100...240 V
Tolerance of U_s	-30...+15 %
Frequency range of U_s	50...60 Hz
Frequency range tolerance of U_s	±5 %
Power consumption	≤ 11 VA
Inrush current (< 5 ms)	< 20 A

Measuring circuit

Measuring voltage U_m	±24 V
Measuring current I_m at $R_F, Z_F = 0 \Omega$	≤ 300 μ A
Internal resistance R_i, Z_i	≥ 500 k Ω
Permissible extraneous DC voltage U_{ig}	≤ 276 V
Permissible system leakage capacitance C_e	≤ 5 μ F

IT system to be monitored

Nominal system voltage range U_n	AC 100...240 V
Tolerance of U_n	-30...+10 %
Frequency range F_n	50...60 Hz
Tolerance F_n	±5 %

Response values

Isolation resistance (R)

Measuring range	1 k Ω ...1 M Ω
Response value R_{an}	50...500 k Ω
Step width	1 k Ω
Response uncertainty R_{an}	
up to 500 nF	±10 %, min. ±1 k Ω
up to 3 μ F	±20 %
up to 5 μ F	±40 %
Hysteresis R_{an}	10 %

Impedance (Z)

Measuring range	1 k Ω ...1 M Ω
Response value Z_{an}	off, 50...500 k Ω
Step width	1 k Ω
Response uncertainty Z_{an}	±10 %, min. ±1 k Ω
Hysteresis Z_{an}	10 %

Total Hazard Current (THC)

Measuring range	1...10 m
Response value THC_{main}	off, 1...5 mA
Step width	1 mA
Response uncertainty THC_{main}	±10 %, min. ±100 μ A
Hysteresis THC_{main}	10 %

Capacitance (C)

Measuring range	0...5 μ F
Response value C_e	off, 25 nF...5 μ F
Step width	100 nF
Response uncertainty C_e	±10 %, min. ±10 nF
Hysteresis C_e	10 %

Loop resistance (R_{FE})

Measuring range	150...1000 Ω
Response value R_{FE}	150...1000 Ω
Step width	10 Ω
Response uncertainty R_{FE}	±20%
Response time connection monitoring FE1	≤ 30 s
Hysteresis R_{FE}	10 %

Voltage monitoring ($U_{< >}$)

Measuring range	70...276 V
Response value $U_{< >}$	off, 70...276 V
Step width	1 V
Response uncertainty $U_{< >}$	±2 %
Hysteresis $U_{< >}$	±5 V

Time behaviour *

Response time t_{an} at $R_F = 0.5 \times R_{an}$ and $C_e = 0.5 \mu$ F according to IEC 61557-8	≤ 5 s
Start-up delay t_{start}	0...1800 s
Response delay t_{on}	0...1800 s
Delay on release t_{off}	0...1800 s
Step width	1 s
Recovery time	< 0.4 s

* Response times do not apply to total hazard current (THC)

Operation

Display	Status LED, ALARM LED, Channel LED
Button T/R	Functions: Reset, Test, NFC, Address setting, Write protection
DIP switch (Termination)	on, off

Connections

Connection with pluggable push-in terminals

Terminals	(A1, A2) (11, 14, 12) (21, 24, 22)
Connectivity	
rigid	0.2...2.5 mm ²
flexible without plastic sleeve	0.25...2.5 mm ²
flexible with plastic sleeve	0.25...2.5 mm ²
Stripping length	10 mm
Conductor cross-section (AWG)	24-12

Terminals	(L1, L2), (FE1, FE2), (●, Z2, A, B), (●, Z1, S1, S2)
Connectivity	
rigid	0.2...1.5 mm ²
flexible without plastic sleeve	0.25...1.5 mm ²
flexible with plastic sleeve	0.25...0.5 mm ²
Stripping length	9 mm
Conductor cross-section (AWG)	24-16

Connection with pluggable screw terminals

Terminals	(A1, A2) (11, 14, 12) (21, 24, 22)
Connectivity	
rigid	0.2...2.5 mm ²
flexible without plastic sleeve	0.2...2.5 mm ²
flexible with ferrule	0.25...2.5 mm ²
Stripping length	7 mm
Torque	0.5...0.6 Nm
Conductor cross-section (AWG)	24-12
Terminals	(L1, L2), (FE1, FE2), (●, Z2, A, B), (●, Z1, S1, S2)
Connectivity	
rigid	0.2...1.5 mm ²
flexible without plastic sleeve	0.25...1.5 mm ²
flexible with plastic sleeve	0.25...0.5 mm ²
Stripping length	7 mm
Torque	0.22...0.25 Nm
Conductor cross-section (AWG)	28-16

Switching elements

Number of switching elements	2 changeover contacts
Terminals	(11, 14, 12) (21, 24, 22)
Operating mode	n/c operation, n/o operation
Electrical life at rated conditions	10,000 switching cycles

Contact data acc. to IEC 60947-5-1

Utilisation category	AC-13 / AC-14 / DC-12 / DC-12 / DC-12 / DC-12
Rated operational voltage	240 V / 240 V / 24 V / 48 V / 110 V / 220 V
Rated operational current	2 A / 2 A / 1 A / 0.5 A / 0.2 A / 0.1 A
Minimum contact rating ¹⁾	10 mA at AC/DC ≥ 10 V

¹⁾ Refers to relays that were not operated with high contact currents.

Interfaces

RS-485 interface

Connection terminal	A, B
Protocol	Bender Smart Connect (BSC)
Baudrate	protocol-dependent, max. 115.2 kbit/s
Parity	even, no, odd
Stop bits	1/ 2/ auto
Cable length (at 19.2 kbit/s)	≤ 900 m
Cabletype: twisted pair, shield	CAT6/CAT7 (min. AWG23)
connected to PE on one side	alternatively: J-Y(St)Y min 2 x 0.8
Terminating resistor (internal)	120 Ω (0.25 W)
Device address, Bender Smart Connect	1...247

NFC interface

Frequency	13.56 MHz
Transmission power (modulating; at a distance of 0 m, for example) ¹⁾	0 W

- ¹⁾
- When used as intended, the device does not emit any radio waves.
 - EMC interference can cause communication failures in the NFC interface.

Connection CT

Connection terminal	S1, S2
Types	off, STW2, STW3, STW4
Max. cable length (recommended)	10 m
Response value	off, 1...50 A, 10...100 A, 10...200 A
Response time overload (from 50% to 120%)	≤ 5 s
Response time for converter monitoring	≤ 5 s
Response tolerance	±5 %
Hysteresis	4 %

Connection temperature measurement

Terminal	Z1, Z2
Maximum length of connection cable (recommended)	10 m
PTC resistor acc. to DIN 44081	
Maximum number for connection	6
Response value	4 kΩ
Release value	1.6 kΩ
Response uncertainty	±10 %
Response time for connection monitoring	< 5 s
PT100 (no series or parallel connections)	
Response value	50...150 °C
Hysteresis	10 %
Response uncertainty	±5 %
Response time for connection monitoring	< 5 s

Bi-metal switch

Operating mode	SPST-NC (normally closed)
Set point direction	rising (when exceeding)

Environment/EMC

EMC	IEC 61326-2-4
Maximum operating altitude	2000 m AMSL

Ambient temperatures

Operating temperature	-25...+55 °C
Transport	-40...+85 °C
Long-term storage	-40...+70 °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

Other

Operating mode	Continuous operation
Mounting	Cooling slots must be ventilated vertically
Degree of protection (DIN EN 60529)	IP20
Enclosure material	Polycarbonate
DIN rail mounting	TS35 acc. to IEC 60715
Flammability class	UL 94 V-0
Documentation number	D00521
Weight	≤ 130 g

Standards and approvals

Standards

The isoMED527series complies in accordance with the following standards.

- IEC 61557-8
- IEC 60364-7-710

Approvals



Open-source software

For a list of the open-source software used see our [Homepage](#).

Declarations of conformity

Bender GmbH & Co. KG hereby declares that the device covered by the Radio Equipment Directive complies with Directive 2014/53/EU. The full text of the EU Declaration of Conformity is available at the following internet address:

- [EU-Declaration of conformity isoMED527](#)

Ordering details

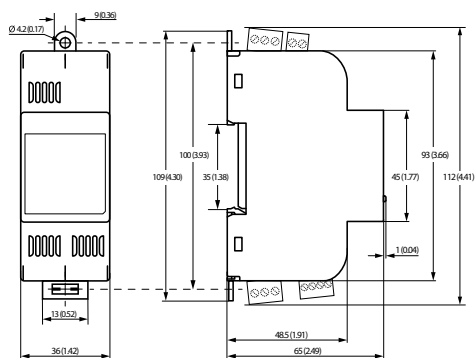
Type	Supply voltage U_s	Art. No.
isoMED527-L-2	AC 100...240 V	B81625521
isoMED527-L-2 incl. functional module A	AC 100...240 V	B81625524

Accessories

Type	Description	Art. No.
CP305-IO	Remote alarm indicator	B95100051
LIM/IMD plug kit 2DU screw	Optional	B80609202
LIM/IMD plug kit 2DU plug-in	Included in delivery	B80609203
STW2 Transformer Load Monitoring Device	1...50 A	B942709
STW3 Transformer Load Monitoring Device	10...100 A	B98021000
STW4 Transformer Load Monitoring Device	10...200 A	B98021001

Dimension Diagram

Device with plug-in terminals (push-in)



Dimensions in mm (inch)



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Subject to change!
The specified standards take into account the
edition valid until 08.2026 unless otherwise
indicated.