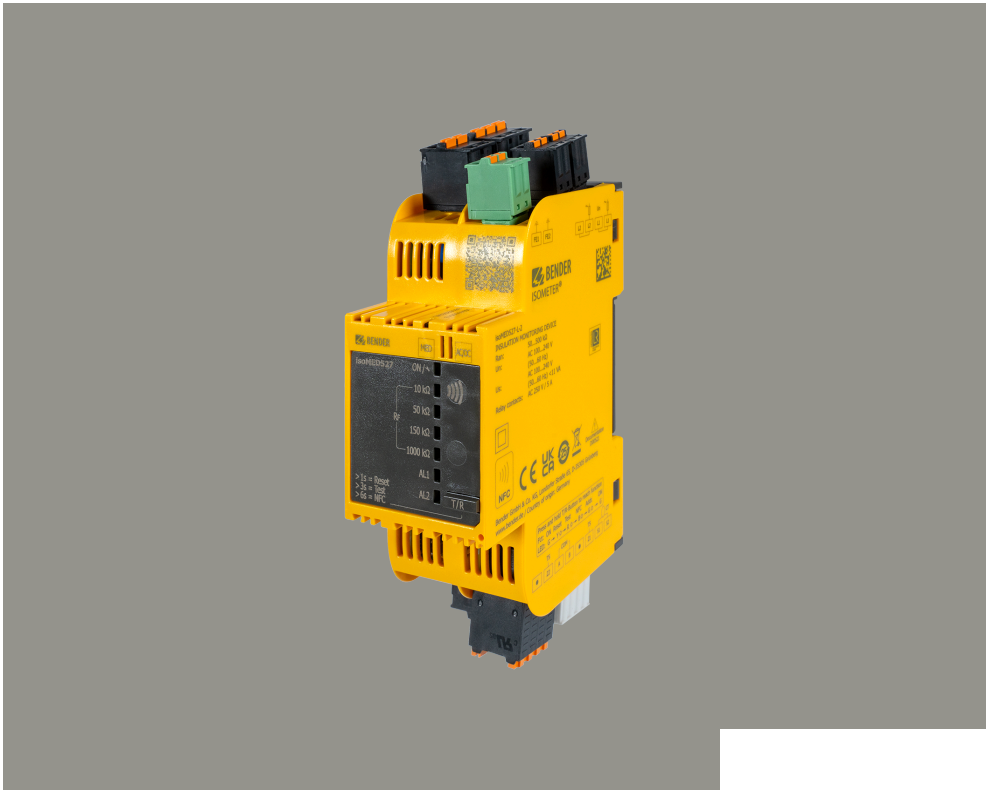
# ISOMETER® isoMED527

Insulation monitoring device for medical applications



isoMED527_D00521_00_M_XXEN/08.2026

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# 1 General information

## 1.1 How to use the manual

**ADVICE**
*This manual is intended for qualified personnel working in electrical engineering and electronics! Part of the device documentation in addition to this manual is the enclosed supplement "Safety instructions for Bender products".*

**ADVICE**
*Read the operating manual before mounting, connecting and commissioning the device. Keep the manual within easy reach for future reference.*

## 1.2 Indication of important instructions and information

**DANGER**
*Indicates a high risk of danger that will result in death or serious injury if not avoided.*

**WARNING**
*Indicates a medium risk of danger that can lead to death or serious injury if not avoided.*

**CAUTION**
*Indicates a low-level risk that can result in minor or moderate injury or damage to property if not avoided.*

**ADVICE**
*Indicates important facts that do not result in immediate injuries. They can lead to malfunctions if the device is handled incorrectly.*

*Information can help to optimise the use of the product.*

## 1.3 Service and Support

Information and contact details about customer service, repair service or field service for Bender devices are available on the following website: https://www.bender.de/en/service-support.

## 1.4 Training courses and seminars

Regular face-to-face or online seminars for customers and other interested parties:

https://www.bender.de/en/know-how/seminars

## 1.5 Delivery conditions

The conditions of sale and delivery set out by Bender GmbH & Co. KG apply. These can be obtained in printed or electronic formats.

## 1.6 Inspection, transport and storage

Check the shipping and device packaging for transport damage and scope of delivery. In the event of complaints, the company must be notified immediately. Please use the contact form at the following address: https://www.bender.de/en/service-support/take-back-of-old-devices/.

When storing the devices, observe the information under Environment / EMC in the technical data.

## 1.7 Warranty and liability

Warranty and liability claims for personal injury and property damage are excluded in the case of:

- improper use of the device
- incorrect mounting, commissioning, operation and maintenance of the device
- Failure to observe the instructions in this operating manual regarding transport, commissioning, operation and maintenance of the device
- unauthorised changes to the device made by parties other than the manufacturer
- non-observance of technical data
- Repairs carried out incorrectly
- the use of accessories or spare parts that are not provided, approved or recommended by the manufacturer
- Catastrophes caused by external influences and force majeure
- Mounting and installation with device combinations not approved or recommended by the manufacturer

This operating manual and the enclosed safety instructions must be observed by all persons working with the device. Furthermore, the rules and regulations that apply for accident prevention at the place of use must be observed.

## 1.8 Disposal of Bender devices

Electrical and electronic equipment must not be disposed of with unsorted household waste but must be collected separately from household waste.
The symbol of a crossed-out wheelie bin indicates the requirement for separate collection.

Before returning a used device, used batteries and accumulators that are not enclosed within the device, as well as lamps that can be removed without damage, must be separated from the device and disposed of separately.

Please observe the applicable national regulations regarding the disposal of waste electrical and electronic equipment.

Waste electrical and electronic equipment may contain personal data. The end user is responsible for deleting this data prior to disposal.

Bender GmbH & Co. KG is registered in the Waste Electrical and Electronic Equipment Register (EAR) under WEEE number DE 43 124 402. To fulfill its legal take-back and disposal obligations, Bender has established appropriate return and disposal options. Information on available collection points and the process for returning waste electrical and electronic equipment can be found at: https://www.bender.de/en/service-support/take-back-of-old-devices/

## 1.9 Safety

If the device is used outside the Federal Republic of Germany, the applicable local standards and regulations must be complied with. In Europe, the European standard EN 50110 applies.

**DANGER**

***Risk of fatal injury due to electric shock!***

*Touching live parts of the system carries the risk of:*

- *Electrocution due to electric shock*
- *Damage to the electrical installation*
- *Destruction of the device*

*Before installing the device and before working on its connections, make sure that the installation is de-energised.*

*Observe the rules for working on electrical systems.*

## 1.10 Cybersecurity

- Information on Bender's CRA conformity: https://www.bender.de/en/cert
- To report cybersecurity vulnerabilities, contact: psirt@bender.de

**CRA safety aspects during use**

| | |
|---|---|
| **RS-485 interface** | Communication via the RS-485 interface is not encrypted.<br>• Protect the bus as much as possible from unauthorised access (e.g., through physical shielding or access control).<br>• Please note the instructions for activating write protection in the Commissioning chapter. |
| **NFC interface** | With physical access to the device, parameters can be read and written using the Bender Connect app. A glass pane does not provide protection against unauthorised access.<br>• Prevent physical access, for example by means of access control. |
| **System access** | COMTRAXX® devices, SCADA systems, and comparable systems may only be accessible to authorised persons. |

# 2 Product description

## 2.1 Intended use

ISOMETER® in the isoMED527 series are used to monitor the insulation resistance $R_F$ of a medical IT system with a rated voltage of AC 100...240 V. The maximum permissible system leakage capacitance $C_e$ is 5 µF. The load current and the temperature of the IT system transformer are also monitored.

Alarms and measured values are made available to other bus devices via the RS-485 interface. The use of special remote alarm indicator and test combinations is recommended for display and alarming.

After detecting an insulation fault, the isoMED527 supports insulation fault localization. Due to the new *isoNAP* measuring method, no locating current generator is required. The use of the EDS551 is recommended for localising the insulation fault.

In order to meet the requirements of the 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.

The device is designed for applications involving low mechanical stress.

Do not make any unauthorised changes to the device. Only use spare parts and optional accessories sold or recommended by the manufacturer.

Caution: This equipment is not intended for use in residential environments and may not provide adequate protection to radio reception in such environments.

Intended use also includes

- the observation of all information in the manual and
- compliance with the test intervals in accordance with the relevant standards and operating rules.

*The messages of the device must be perceptible even if it is installed in a control cabinet.*

Any other use than that described in this manual is regarded as improper.

## 2.2 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

## 2.3 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.

## 2.4 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.

### 2.4.1 Insulation fault $R_F$

#### Measured value determination and display

The insulation fault $R_F$ is measured in *unearthed AC systems* and *AC systems superimposed with DC*. Measurements are taken in a range from 1 kΩ to 10 MΩ. The measured values are displayed in a range from 10 kΩ to 1000 kΩ via the value display LEDs.

#### Alarm threshold

The response value $R_{an}$ is available in the device for the alarm limit value. The response value is set via the RS-485 interface or the Bender Connect app. Limit value for the alarm.

The alarms can be assigned to the relays **K1** and **K2**.

#### Device behaviour in the event of an insulation fault

The following diagram shows the device's behaviour:

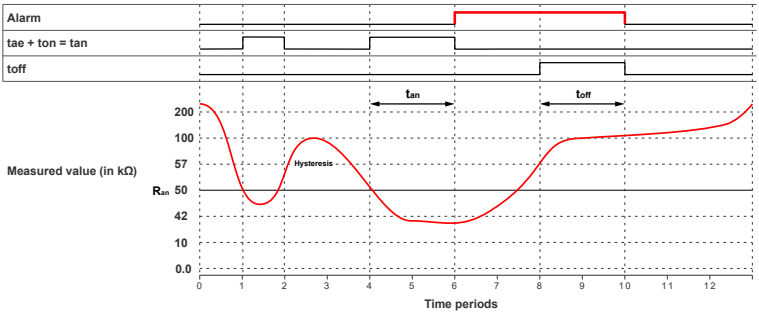



Figure 2-1: Response behaviour Insulation resistance

| Time period | Event | Reaction |
|---|---|---|
| **1-2** | The measured value falls **below** the response value $R_{an}$ for a period shorter than the set response time $t_{on}$ (plus device-specific operating time $t_{ae}$). | The device is not responding. |
| **4-6** | The measured value falls **below** the response value $R_{an}$ for a period longer than the set response time $t_{on}$ (plus $t_{ae}$) | The alarm LED lights up and assigned relays are energised. |
| **8-10** | The measured value **exceeds** the response value $R_{an}$ (plus hysteresis)for a period longer than the set response time $t_{on}$ (plus $t_{ae}$) | The alarm LED goes out and assigned relays are de-energised (from time segment 10).<br>The alarm is deleted when the error memory is deactivated. |

**ADVICE**

*The time between the occurrence of an error and the corresponding message is a maximum of 5 seconds. The same applies to the correction of the error – here too, the time until feedback is received must not exceed 5 seconds.*

### 2.4.2 IsoNAP measurement method

Identical to the previous methods, the *isoNAP* measurement method also superimposes a measurement voltage with a variable signal frequency on the unearthed IT system, measures it back, and evaluates it using a microcontroller.

In contrast to the *AMP* method, the capacitive network leakage current components do not act as a disturbance variable, but are part of the mathematical model that forms the basis of the evaluation. The insulation measurement is therefore not directly dependent on the decay of the dynamic current components. This enables significantly shorter measurement and feedback times. In addition, *isoNAP* provides measured values of the leakage capacitances in the system.

The *isoNAP* method can be used in AC and AC/DC networks. Like the network capacitance, the network voltage is also taken into account in the model, making the method even more robust against dynamic network voltages.

### 2.4.3 Connection monitoring L1/L2

The *connection monitoring L1/L2* continuously checks the impedance between the terminals **L1** and **L2** of the insulation monitoring device via the system to be monitored. If the impedance is too high, an alarm is triggered and indicated by the LEDs. The alarm can be assigned to the relays **K1** and **K2**.

### 2.4.4 Connection monitoring Functional Earth

The function *Connection monitoring Functional earth* continuously checks the resistance between the terminals **FE1** and **FE2**. If the resistance is too high, the alarm *Functional earth connection* is triggered and indicated by the LEDs. The alarm can be assigned to relays **K1** and **K2**.

### 2.4.5 Monitoring the IT system transformer

For temperature monitoring, the isoMED527 device analyses the resistance value of the temperature sensor. When the switching threshold of the bi-metal switch, PTC (4 kΩ) or the set temperature value (PT100) is reached, an overtemperature alarm is triggered.

**ADVICE**

*To avoid overloading the transformer, the load current and temperature must always be monitored in combination. Please refer to the wiring diagram.*

*Before commissioning, check whether the connected temperature sensor matches the configuration set in the device menu. Incorrect assignment can lead to incorrect temperature values and malfunctions.*

*Temperature values in °C are only issued when using the PT100 temperature sensor.*

### 2.4.6 Delay times $t_b$, $t$, $t_{ae}$, $t_{on}$ and $t_{off}$

The times $t_b$, $t$, $t_{ae}$, $t_{on}$, $t_{an}$ and $t_{off}$ described below delay the output of alarms. They can be set in the menu of a connected remote alarm indicator and test combination and via the interfaces with the Bender Connect app and COMTRAXX®.

The following times are defined:

- **Recovery time $t_b$**
  The recovery time $t_b$ is the time the device needs to be ready for measurement after the supply voltage $U_S$ has been connected. The value cannot be changed.
- **Start-up delay $t$**
  After the supply voltage $U_S$ has been connected, the measuring function is delayed by the set time $t$ plus the recovery time $t_b$.
- **Device-specific operating time $t_{ae}$**
  The response time of the device is defined by the time required by the device to record and utilize measured values (calculation). This time is not adjustable.
- **Response delay $t_{on}$**
  The response delay $t_{on}$ allows you to extend the response time of the device.
- **Total response time $t_{an}$**
  If the defined limit values are violated, the device requires the (total) response time $t_{an}$ to output the alarm. A set response delay $t_{on}$ is added to the device-specific operating time $t_{ae}$ and delays signalling:
  Total response time $t_{an} = t_{ae} + t_{on}$
  The alarm is not reported if it is present for less than the defined response delay.
- **Delay on release $t_{off}$**
  An alarm is maintained when the fault memory is deactivated until the measured value no longer violates the respective response value including hysteresis without interruption for the duration of the delay on release time.

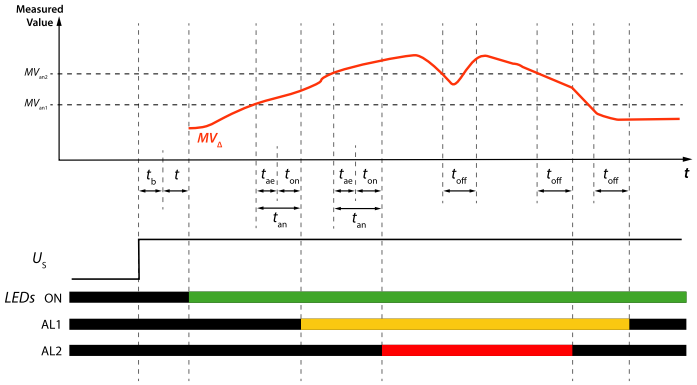



Figure 2-2: Overview of time behaviour

### 2.4.7 Message assignments for the alarm relays

The following messages can be assigned to the alarm relays:

| Function | State | Description |
|---|---|---|
| **Relay mode** | n/o principle \| n/c principle | • **n/c**<br>n/c operation of the contacts. In fault-free condition, the relay is energised.<br>• **n/o**<br>n/o operation of the contacts. In fault-free condition, the relay is de-energised. |
| **Test** | on \| off | This parameter determines whether the relay is actuated during a test. |
| **Alarm** | on \| off | The relay switches when a selected response value is violated. |
| **Device error** | on \| off | The relay switches if a device error exists. |
| **Connection fault** | on \| off | The relay switches when there is a connection fault. |

### 2.4.8 Self-test

After switching on the supply voltage, the device uses the self-test functions to permanently and automatically check all internal measuring functions, the components of the sequence control such as data and parameter memory as well as the connections to the IT system and to earth. You can also perform the self-test manually using the test button to check the function of the relays (depending on the configuration).

By pressing the **T/R** button (3...6 s) or executing the function *Test* on a connected remote alarm indicator and test combination or in the COMTRAXX® user interface, the device simulates an alarm status. In addition, the device performs a self-test at startup. If the alarm assignment is set, all LEDs light up and the outputs switch. The alarm messages are output via all device interfaces.

### 2.4.9 Factory setting

The factory settings are restored viaa remote alarm indicator and test combination or via the Bender Connect App. There are two options for restoring the factory setting:

- **Factory setting without interface parameters**
  After activating all changed settings are reset to the factory settings. The settings for the RS-485 interface are retained.
- **Factory setting with interface parameters**
  After activating all changed settings, including the settings for the RS-485 interface and the device address, are reset to the factory settings.

### 2.4.10 Device error

In the event of a device error, the status LED is lit up red. The error code can be queried via the RS-485 device interfaces.

### 2.4.11 Device identification

The device identification function is used to uniquely identify the device in the system. It can be triggered via the NFC or RS-485 interfaces.

After activation, the device switches to identification mode, in which all device LEDs light up one after the other. This cycle lasts 5 minutes and allows visual identification of the device that received the identification command.

The identification mode can be terminated at any time by briefly pressing the T/R button (approx. 1 second).

During identification, normal device functionality remains fully intact: alarm messages, measured values, and status information continue to be provided via the interfaces, relays, and - if activated - NFC. Only the LED display for error states is suppressed during identification mode.

# 3 Dimensions, mounting and connection

*Only skilled persons are permitted to carry out the work necessary to install, put into service and run a device or system.*

**DANGER**

***Risk of fatal injury due to electric shock!***

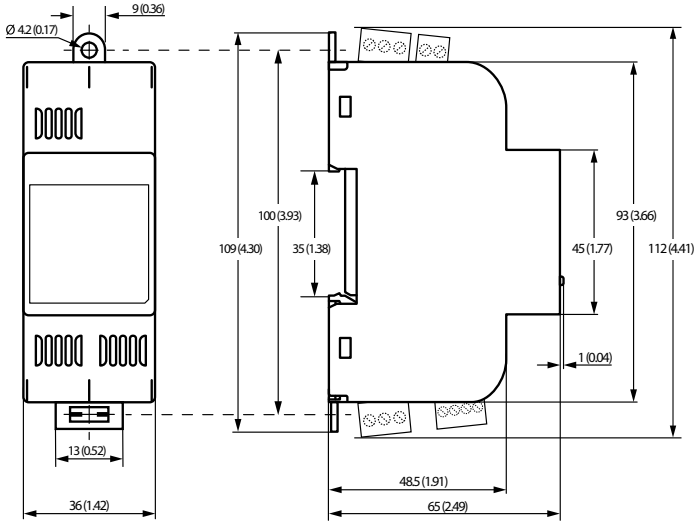
*Touching live parts of the system carries the risk of:*

- *Risk of electrocution due to electric shock*
- *Damage to the electrical installation*
- *Destruction of the device*

*Before installing the device and before working on its connections, make sure that the installation has been de-energised. The rules for working on electrical systems must be observed.*

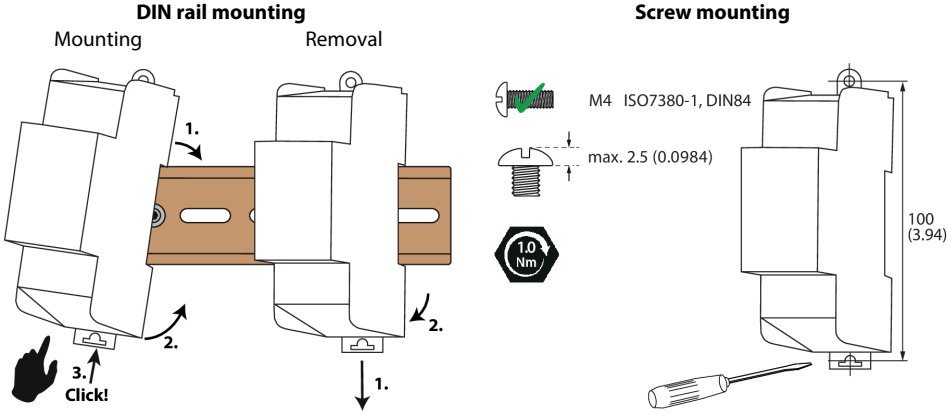
## 3.1 Dimension Diagram

**Device with plug-in terminals (push-in)**




*Dimensions in mm (inch)*

## 3.2 Mounting and removal




Dimensions in mm (inch)

## 3.3 Connection

### 3.3.1 Connection properties

**CAUTION**

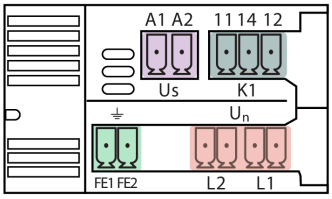
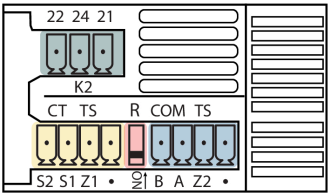
*a)* **Risk of injury from sharp-edged terminals!**
*Risk of lacerations. Handle enclosure and terminals with care.*

*b)* **Property damage due to improper installation!**

- *Make sure that only one insulation monitoring device is connected in each conductively connected system. If several devices are connected, the device does not work and does not signal insulation faults. This can damage the installation.*
- *High load currents can result in damage to property and personal injury. Therefore, do not apply any load current to the terminals.*
- *The connecting lines to the system to be monitored must be designed as spur lines.*
- *Failure to connect the device as illustrated in the manual leads to deviating technical data and function restrictions.*

*c)* **Ensure disconnection from IT system!**
*When insulation or voltage tests are to be carried out, the device must be isolated from the system for the test period. Otherwise the device may be damaged.*

### 3.3.2 Connections overview

| | | Terminal | Connection |
|---|---|---|---|
| top |  | A1, A2 | Supply voltage |
| | | 11, 14, 12 | Relay K1 |
| | | FE1, FE2 | Seperate connections to functional earth (PE) (with seperate 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 |

### 3.3.3 Wiring diagram isoMED527

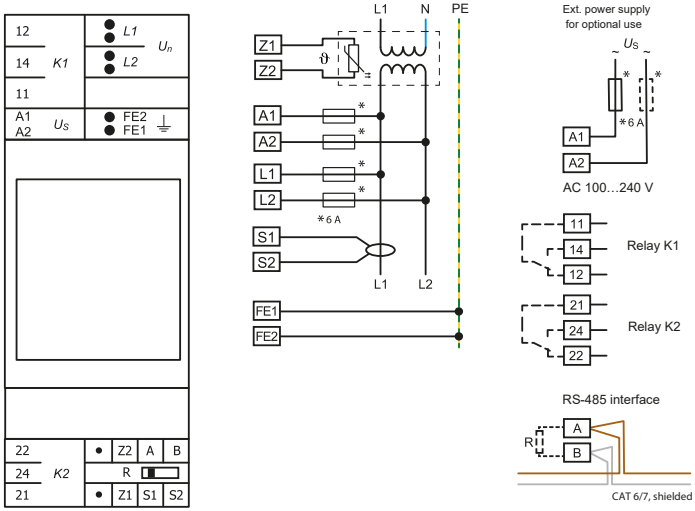
**DANGER**

***Risk of electrocution due to electric shock!***

*Serious injuries with possible fatal consequences.*

*If the device is connected to a live IT system via terminals L1, L2, terminals FE1 and FE2 must not be disconnected from the protective earth conductor (PE).*

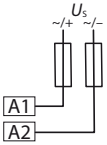
Connect the device according to the wiring diagram:




**CAUTION**

***Injuries, fires and property damage due to short circuits!***

*a) In accordance with the IEC 60364-4-43 standard, line protection must be provided for the connections to the supply voltage as follows:*




- *Fuses of 6 A are recommended.*
- *If supplied from an unearthed system, two back-up fuses must be used.*
- *If supplied from an earthed system, at least one back-up fuse must be used.*

*b) When connecting the terminals to the system to be monitored, you can dispense with protective devices if the line or cable is designed in such a way that the risk of a short circuit is kept to a minimum.*

- *Ensure short-circuit and earth-fault proof installation.*

**ADVICE**

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

# 4 Commissioning

**Functional test prior to commissioning**

Before commissioning, it is necessary to check that the ISOMETER® is properly connected. Carry out a functional test using a real earth fault via a suitable resistor.

**ADVICE**
*If an incorrect measuring current transformer is set, errors and measurement deviations may occur. Example: If STW2 is used, it must also be set in the menu. Check in the device menu whether the correct measuring current transformer is configured.*

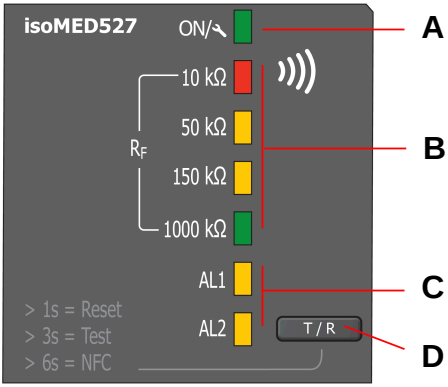
**ADVICE**
*If an incorrect temperature sensor is set, errors and measurement deviations may occur. Example: If the type PTC resistor acc. to DIN 44081 is used, it must also be set in the menu. Check in the device menu whether the correct temperature sensor is configured.*

**Enabling write protection**

Activate the write protection of the RS-485 interface via COMTRAXX®, CP305, or the Bender Connect app. Activation prevents unauthorized changes to device settings via the RS-485 bus line, via a gateway, or on a remote alarm indicator and test combination.

# 5 Operation

## 5.1 Control panel




| | Control panel |
|---|---|
| A | Status LED ON: Operating modes |
| B | Value display LEDs: 10, 50, 150, 1000 kΩ |
| C | Alarm LEDs: AL1 / AL2 |
| D | T/R button: Test/Reset/NFC/Adress/Write protection |

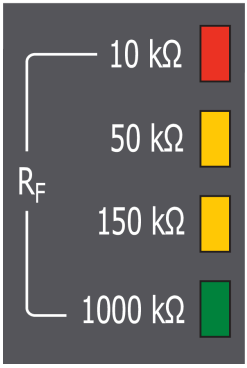
## 5.2 STATUS LED

Multicoloured display of various operating modes.


| LED | Operating mode |
|---|---|
| GREEN | START PHASE<br>Device booting after start<br>NORMAL OPERATION<br>Device in fault-free state |
| GREEN flashing | ADDRESS MODE |
| YELLOW | FAULT<br>• Leakage capacitance *C* exceeded<br>• Impedance fault *Z* underrun<br>• Total Hazard Current *THC* exceeded |
| YELLOW flashing | CONNECTION FAULT<br>• Connection fault system (L1/L2)<br>• Connection fault earth (FE1/FE2)<br>• Connection fault CT<br>• Connection fault temperature sensor |
| RED | DEVICE ERROR<br>Restart or replacement of the device required |
| RED flashing | NO RS-485 MASTER<br>RS-485 master is not connected |
| BLUE + GREEN flashing | NFC ACTIVE |

## 5.3 Measured value display LEDs

Measured value display of the insulation resistance.




| LED | Operating status |
|---|---|
| [10 kΩ] | $R_F$ value ≤ 10 kΩ |
| [50 kΩ] | $R_F$ value ≤ 50 kΩ |
| [150 kΩ] | $R_F$ value ≤ 150 kΩ |
| [1000 kΩ] | Lights up continuously for values > 150 kΩ |

## 5.4 ALARM LEDs

Display of AL1 and AL2

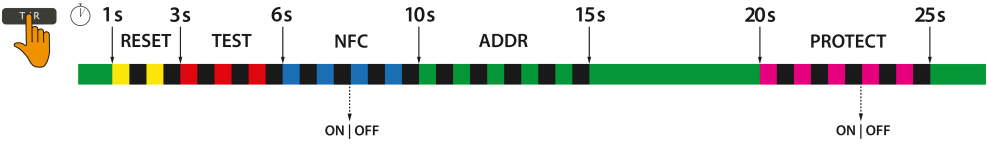

| LED | Operation state |
|---|---|
| AL1 | YELLOW: The insulation resistance has fallen below the response value.<br>YELLOW flashing: Overvoltage<br>RED flashing: Overtemperature, Over current, Connection fault temperature sensor |
| AL2 | YELLOW: The insulation resistance has fallen below the response value.<br>YELLOW flashing: Undervoltage |

## 5.5 T/R button

The T/R button activates different operating modes depending on how long it is pressed.


| Mode | Operating time | Status LED |
|---|---|---|
| RESET | 1…3 s | flashes yellow |
| TEST | 3…6 s | flashes red |
| NFC | 6…10 s | flashes blue |
| ADDR | 10…15 s | flashes green |
| PROTECT | 20…25 s | flashes violet |

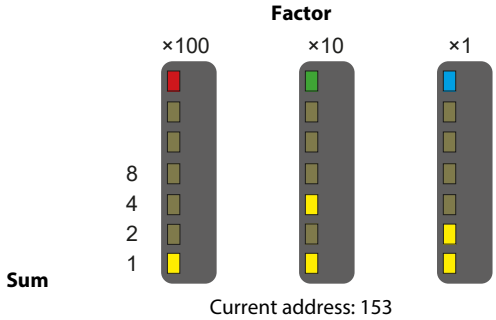
**Overview**



## 5.6 Function ADDR

### Description

The function **ADDR** switches the device to address setting mode for the RS-485 address. The channel indication LEDs and the status LED indicate the device's address. The digits are represented using BCD code.




Current address: 153

Addresses can only be entered within the valid address range. When there is no input for a period of 5 minutes, the device automatically exits the address setting mode. The device then uses the currently set RS-485 address.

### Enter address

How to enter an address:

1. Press and hold the **T/R** button until status LED flashes green (10…15 s).
   – After the **T/R** button is released, the status LED lights red.
2. Set HUNDREDS digit. Press **T/R** button briefly until the desired value appears. Press and hold **T/R** button once (> 2 s) to confirm.
   – After the **T/R** button is released, the status LED lights green.
3. Set TENS digit. Press **T/R** button briefly until the desired value appears. Press and hold **T/R** button once (> 2 s) to confirm.
   – After the **T/R** button is released, the status LED lights blue.
4. Set UNITS digit. Press **T/R** button briefly until the desired value appears. Press and hold **T/R** button once (> 2 s) to confirm.
5. To exit the address setting mode, press and hold **T/R** button once (2 s).
   – After the **T/R** button is released, the status LED lights green.

## 5.7 Function RESET

The function **RESET** resets stored alarm states and deactivates the limit hysteresis for this moment.

## 5.8 Function TEST

The function **TEST** simulates an alarm status for 5 seconds. During this period, the device has the following states:

- Display of the alarm value via the LEDs and the interface.
- The relay switches when the TEST signal assignment is active.
- The test status can be read out via the interface:

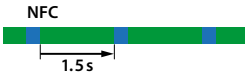
- 0 = no test
- 1 = internal test (triggered via T/R button)
- 2 = external test (triggered via Bender Smart Connect (BSC))

- For the duration of the test $t_{on}$ and $t_{off}$ are set to 0 s.

## 5.9 Function NFC

Press the **T/R** button for 6…10 seconds to activate or deactivate the NFC interface.

The NFC interface deactivates automatically after 5 minutes of inactivity.

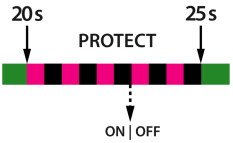



Status indication of normal operation with the NFC interface activated

## 5.10 Function PROTECT

The **PROTECT** button function changes the current activation status of the write protection if the **T/R** button is pressed for a period of 20...25 seconds.

- If the **T/R** button is pressed for at least 20 seconds, the status LED changes from steady green to flashing purple. This state remains for 5 seconds.
- If the**T/R** button is released during this period (5 seconds), the write access activation status changes from *enabled* to *disabled* or vice versa.




Status display of the PROTECT function

## 5.11 Menu settings isoMED527

- **Settings**
  - **Measuring point**
    - **Alarm settings**
      1. Insulation resistance
      2. Impedance
      3. Total Hazard Current (THC)
      4. Start-up delay
      5. Memory
    - **Connection monitoring**
      - Coupling
      - FE1/FE2 Response value
    - **Transformer current monitoring**
      - Transformer type
      - Connection monitoring
      - Response value
    - **Transformer temperature monitoring**
      - Temperature sensor
    - **System leakage capacitance**
      - Response value
      - Response delay
      - Reset delay
    - **Undervoltage**
      - Response value
      - Response delay
      - Reset delay
    - **Overvoltage**
      - Response value
      - Response delay
      - Reset delay

| | | | |
|---|---|---|---|
| | **Inputs/outputs** | | |
| | | **Relay 1** | |
| | | | Relay mode<br>Message assignment<br>• Test<br>• Total Hazard Current (THC)<br>• Impedance<br>• Insulation resistance<br>• Coupling<br>• Capacity<br>• Undervoltage<br>• Overvoltage<br>• Load current<br>• CT connector<br>• Device error<br>• Temperature<br>• Connection temperature sensor<br>• Communication error |
| | | **Relay 2** | |
| | | | see Relay 1 |
| | **Interface** | | |
| | | **Bender Smart Connect** | |
| | | | • Address<br>• Baud rate<br>• Parity<br>• Stopbits<br>• Failure monitoring |
| | | **NFC** | |
| | | | NFC |
| | | **UPDATE** | |
| | | | Update via interface |
| | **System** | | |
| | | **Factory setting** | |
| | | | Factory settings with interface<br>Factory settings without interface<br>Restore |
| | | **Write access** | |
| | | | Write access |

| | |
|---|---|
| **Control** | |
| | **Test** [Execute] |
| | **Reset** [Execute] |
| | **Identify device** [Execute] |
| **Info** | |
| | 1. Manufacturer<br>2. Device<br>3. Application software<br>4. Bootloader<br>5. Bender Smart Connect |
| **Licenses** | |
| | • Acknowledgement of the "Temporary license expires" alarm with information on which function modules are deactivated in each case |
| **Edit texts** | |
| | **Device** |
| | **Measuring values** |

# 6 Interfaces

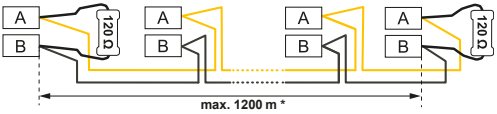
## 6.1 RS-485 interface

### Description

The RS-485 interface is galvanically isolated from the device electronics. It serves as a transmission medium for various protocols. It can be used to connect compatible devices to an RS-485 network. The specifications for the RS-485 interface are included in the technical data.

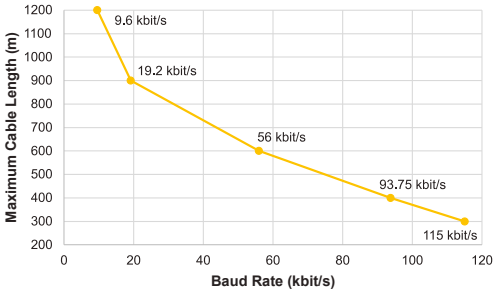
### Connection

*Use daisy chain structure*

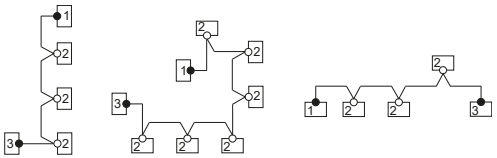



***** The length of the bus cable depends on the number of devices, the transmission protocol, the cables used, and interference affecting the system. The following table provides guide values.

*Cable length depending on the baud rate (empirical values)*




*Examples of RS-485 line structures*



1 Master ● with termination
2 Slave ○ without termination
3 Slave ● with termination

**ADVICE**

*For a stable RS-485 network, please note:*

- *Terminate the first and last device in the line.*
- *Assign each device address uniquely.*
- *Please refer to the technical data for information on the RS-485 interface.*

**Bender Smart Connect (BSC)**

*BSC bus: RS-485 interface with BSC protocol*

The BSC protocol is an exclusive bus protocol for communication between Bender devices.

It offers functions such as

- Observer mode
- Acknowledge via interface
- Backup master functionality
- Forced alarming
- Auto detection
- Address collision resolution
- Identify device
- Start test

The BSC bus comprises Master, Observer and Slave roles. Further details can be found in the documentation for the device acting as the Master (e.g. CP305, D00425).

*The device operates always as a slave. It cannot operate as a master or observer.*

BSC and Modbus RTU can be used in parallel on the same bus. The BSC master can prompt Modbus RTU devices.

## 6.2 NFC (Near Field Communication)

The NFC interface can be used to transmit a previously configured device parameter setting directly to the device.

*This function is available only via the Bender Connect App, which is available for iOS and Android.*

In the Bender Connect App, the device must first be registered. The device-specific setting options are then displayed and can be configured. During data transmission, feedback is provided indicating whether the parameter configuration was successful.

Parameter settings can be transmitted to the device via the Bender Connect App by holding the smartphone close to the device:

- When the device is **unpowered**, parameter settings can be transmitted and are automatically activated once the device is connected to the power supply.
- When the device is **powered**, parameter configuration requires that the NFC interface is activated on the device beforehand.

### 6.2.1 Function modules

Optional function modules can be activated to extend the range of functions. The function modules can be ordered and activated directly when ordering the device or at a later date.

The isoMED527 is available in two versions:

- isoMED527-L-2 base unit
- isoMED527-L-2 with integrated function module A

The basic device can be retrofitted with the extended functions of function module A via the Bender Connect app or COMTRAXX® by activating the license. Alternatively, the device can be delivered with integrated function module A when ordering, so that the extended measuring functions are available ex works.

See also “Ordering details”, page 40.

### Base unit: Monitoring of the IT system

In its basic configuration, the isoMED527 the following functions:

- Monitoring of insulation resistance as a threshold alarm
- Monitoring transformer overload as a threshold alarm
- Monitoring transformer overtemperature as a threshold alarm
- Connection monitoring of the functional earth, IT system, load current transformer, temperature sensor
- Supported temperature sensors: PTC (according to DIN 44081) and bimetal switches

### Function module A: Extended measurement values

The function module A adds the following functions:

- Monitoring of the IT system: insulation resistance, impedance, and total hazard current (THC) as measured value and threshold value alarm
- Voltage measurement per outer conductor to earth and total voltage with adjustable response values for overvoltage and undervoltage
- Connection monitoring of the functional earth with adjustable response value
- Connection monitoring IT system, load current transformer, temperature sensor
- Transformer load as measured value and alarm in amperes or in percent via interface
- Transformer overtemperature as alarm (and measured value for PT100)
- Supported temperature sensors selectable in the menu: PTC (acc. to DIN44081), PT100, bimetal switch

## 6.2.2 Subsequent activation of function modules

If function modules are not already configured ex works, they can also be purchased and installed at a later date.

1. **Request license file**
   Additional functions are activated via license files. You can obtain the license file from the Bender service area.
   Required information:
   - Material product number of the device (MPN)
   - Serial number (on the device or in the "Info" menu)
2. **Download license file**
   After entering the data, the appropriate license file is provided. Save the file on your smartphone or PC.
3. **Transfer and activation**

There are two ways:

a) **Web interface**(e.g. COMTRAXX devices):
Menu path: Settings > License management > Import license file
Upload and confirm file.

b) **Bender Connect App** (Recommended for mobile use):
Install the app from the App Store or Google Play. Connect to the device (via NFC). Import the license file in the Backup/Licenses menu. Activation is automatic, restart the device if necessary.
Activation may only be carried out by authorised specialist personnel.

4. **Check activation** Check the activated modules in the device under "Info" or "Licenses". To activate the functions, the device must be restarted.

**Further links**

Acquire licenses: https://www.bender.de/en/service-support/licences/

In case of problems: Contact Bender Service: https://www.bender.de/en/service-support/fast-assistance/

# 7 Technical data

## 7.1 Factory setting isoMED527

| **Response values / Alarms** | |
|---|---|
| Response value Insulation resistance ($R_{an}$) | 50 kΩ |
| Response value Impedance ($Z_{an}$) | off |
| Response value Total Hazard Current (*THC*) | off |
| Response value Capacity ($C_{an}$) | off |
| Response value Loop resistance ($R_{FE}$) | 150 Ω |
| Response value Voltage measurement ($U_{<>}$) | off |

| **Time behaviour** | |
|---|---|
| Start-up delay *t* | 0 s |
| Response delay $t_{on}$ | 0 s |
| Delay on release $t_{off}$ | 0 s |

Operation mode

| **Switching elements** (Relaiys) | **1** | **2** |
|---|---|---|
| Test | on | on |
| Operation mode | Quiescent current (NC) | Quiescent current (NC) |
| Reporting assignment | Insulation fault $R_F$ | Insulation fault $R_F$ |

| **RS-485 interface** | |
|---|---|
| Address | 100 + last two digits of the serial number |
| Protocol | Bender Smart Connect (BSC) |
| Baud rate | 19,2 kBd |
| Parity | even |
| Stop bits | auto |
| Termination | off |

| **Temperature sensor** | |
|---|---|
| Temperature sensor | PTC (DIN 44081) |
| Response value Temperature sensor | 4 kΩ |

| **Connection of measuring current transformer** | |
|---|---|
| CT type | STW2 |
| Connection monitoring CT | on |
| Response value load current | 7 A |

## 7.2 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 39 |

| **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 rangeg $U_s$ | 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 Ω | ≤ 300 µA |
| Internal resistance $R_i$, $Z_i$ | ≥ 500 kΩ |
| Permissible extraneous DC voltage $U_{fg}$ | ≤ 276 V |
| Permissible system leakage capacitance $C_e$ | ≤ 5 µF |

### 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 kΩ…1 MΩ |
| Response value $R_{an}$ | 50…500 kΩ |
| Step width | 1 kΩ |
| Response uncertainty $R_{an}$ | |
| up to 500 nF | ±10 %, min. ±1 kΩ |
| up to 3 µF | ±20 % |
| up to 5 µF | ±40 % |
| Hysteresis $R_{an}$ | 10 % |

| Impedance (Z) | |
|---|---|
| Measuring range | 1 kΩ…1 MΩ |
| Response value $Z_{an}$ | off, 50…500 kΩ |
| Step width | 1 kΩ |
| Response uncertainty $Z_{an}$ | ±10 %, min. ±1 kΩ |
| 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 µA |
| Hysteresis $THC_{main}$ | 10 % |

| Capacitance (C) | |
|---|---|
| Measuring range | 0…5 µF |
| Response value $C_e$ | off, 25 nF…5 µF |
| Step width 1...5 µF | 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 x $R_{an}$ and $C_e$=0.5 µF 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 |

### 7.2.1 Connections

**Connection with pluggable push-in terminals**

| | |
|---|---|
| Terminals | (A1, A2) (11, 14, 12) (21, 24, 22) |
| Connectivity | |
| rigid | 0.2…2.5 mm² |
| flexible without plastic sleeve | 0.25…2.5 mm² |
| flexible with plastic sleeve | 0.25…2.5 mm² |
| 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 mm² |
| flexible without plastic sleeve | 0.25…1.5 mm² |
| flexible with plastic sleeve | 0.25…0.5 mm² |
| 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 mm² |
| flexible without plastic sleeve | 0.2…2.5 mm² |
| flexible with ferrule | 0.25…2.5 mm² |
| 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 mm² |
| flexible without plastic sleeve | 0.25…1.5 mm² |
| flexible with plastic sleeve | 0.25…0,5 mm² |
| 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 *) | 10 mA at AC/DC ≥ 10 V |

*) 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 connected to PE on one side | CAT6/CAT7 (min. AWG23)<br>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) *) | 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 swtch | |
| 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 |

## 7.3 Standards and approvals

### Standards

The isoMED527series complies in accordance with the following standards.

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

### Approvals

CE UKCA

### 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

## 7.4 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 |

| Type | Description | Art. No. |
|---|---|---|
| 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 |

## 7.5 Change log

| Date | Version | Software version | Changes |
|---|---|---|---|
| 06/2026 | 00 | | NEW document |

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