BENDER
The Power in Electrical Safety©

ISOMETER® isoHV525

Insulation monitoring device for
unearthed AC, AC/DC and DC systems (IT systems)
up to 3(N)AC, AC/DC 0...1000V or DC 0...1000 V

isoHV525_D00297_01_D_XXEN/11.2017

ISOMETER® isoHV525

Insulation monitoring device for unearthed AC, AC/DC and DC systems (IT systems) up to 3(N)AC, AC/DC 0...1000V or DC 0...1000 V

ISOMETER® isoHV525

Device features

isoHV525-M4-4

- Monitoring the insulation resistance for unearthed AC/DC systems
- Automatic adaptation to the system leakage capacitance up to 150 µF
- Two separate response values for Alarm 1 and Alarm 2
- Alarms are signalled via alarm relays (K1, K2)
- 10 V analogue output (galvanically separated)

isoHV525-S4-4

- Monitoring the insulation resistance for unearthed AC/DC systems
- Measurement of the mains voltage (true r.m.s.) with undervoltage and overvoltage detection
- Measurement of DC system voltages to earth (L1+/PE and L2-/PE)
- Automatic adaptation to the system leakage capacitance up to 150 µF
- Two separate response values for Alarm 1 and Alarm 2
- Alarms are signalled via alarm relays (K1, K2)
- Selectable N/C or N/O relay operation
- Selectable start-up delay, response delay and delay on release
- Fault memory can be activated
- RS-485 (galvanically separated) including the following protocols:
  - BMS interface (Bender measuring device interface) for data exchange with other Bender components
  - Modbus RTU
  - IsoData (for continuous data output)

Certifications

CE

Product description

The isoHV525 ISOMETER® monitors the insulation resistance of unearthed AC, AC/DC and DC systems (IT systems) with nominal system voltages of 3(N)AC, AC/DC 0 … 1000 V or DC 0 …1000 V. The maximum permissible system leakage capacitance C_e is 150 µF.

DC components existing in AC systems do not influence the operating characteristics, when a minimum load current of DC 100 mA flows. A separate supply voltage allows de-energised systems to be monitored too.

Please heed the limits of the area of application indicated in the technical specifications. Any use other than that described in this manual is regarded as improper.

The isoHV525 is contained in an enclosure filled with polyurethane and can therefore be used under extreme environmental conditions such as shock, vibration and temperature.

Application

- AC main circuits up to 1000 V
- DC main circuits up to 1000 V
- Systems including switched-mode power supplies
- High shock and vibration requirements
- High temperature requirements

Variants

- isoHV525-M4-4 with an analogue output
- isoHV425-S4-4 with a serial interface

Function

isoHV525-M4-4

The ISOMETER® measures the insulation resistance R_F between the system to be monitored (L1/+, L2/-) and earth (PE) and outputs a voltage between 0…10 V depending on the measured value. If the value R_F exceeds the set response value, this will be indicated by the relays K1 and K2. If the value R_F exceeds the respective release value (response value plus hysteresis), the alarm relays switch back to their initial position. The device function can be tested using the external Test/Reset button.

isoHV525-S4-44

The ISOMETER® measures the insulation resistance R_F and the leakage capacitance C_e between the system to be monitored (L1/+, L2/-) and earth (PE). The r.m.s. value of the mains voltage U_n between L1/+ and L2/-, as well as the DC voltages between L1/+ and earth (U_{L1e}) and between L2/- and earth (U_{L2e}) are also measured.

From a minimum value of the DC system voltage, the ISOMETER® determines the fault location "R %", which shows the distribution of the insulation resistance between conductors L1/+ and L2/-.

The value range of the fault location is ±100 %:

Display	Meaning
-100 %	One-sided fault on conductor L2/-
0 %	Symmetrical fault
+100 %	One-sided fault on conductor L1/+

The partial resistances can be calculated from the total insulation resistance R_F and the fault location (R %) using the following formula:

Fault on conductor L1/+ -> R_{L1F} = (200 % * R_F)/(100 % – R %)

Fault on conductor L2/- -> R_{L2F} = (200 % * R_F)/(100 % + R %)

If the values R_F or U_n exceed the set response values, this will be indicated by the relays K1 and K2.

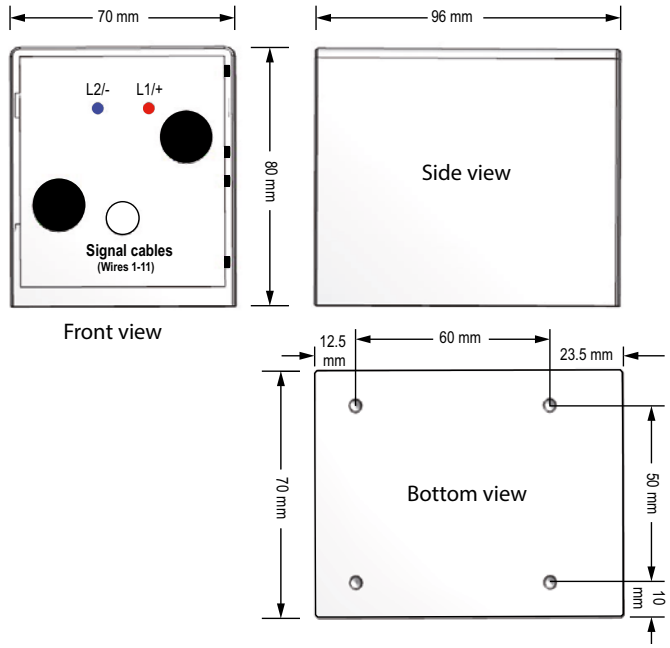
If the values R_F or U_n exceed their release value (response value plus hysteresis) uninterrupted for no longer than the period t_{off}, then the alarm relays will switch back to their initial position. If the fault memory is enabled, the alarm relays remain in the alarm state until the external Test/Reset button is pressed or until the supply voltage is switched off.

The device function can be tested using the external Test/Reset button. Device parameters are initially assigned by Bender. Parameterisation of the ISOMETER® isoHV525-S4-4 is also possible via the BMS bus, for example by means of a BMS-Ethernet gateway (COM460IP) or Modbus RTU.

Ordering information

Supply voltage U_S		Nominal voltage U_n	Version	Type	Art. No.
AC	DC	AC-, 3(N)AC			
100…240 V, 47…63 Hz	24…240 V	0…1000 V	Analogue output	isoHV525-M4-4	B91036530
			Serial interface	isoHV525-S4-4	B91036531

Dimension diagram

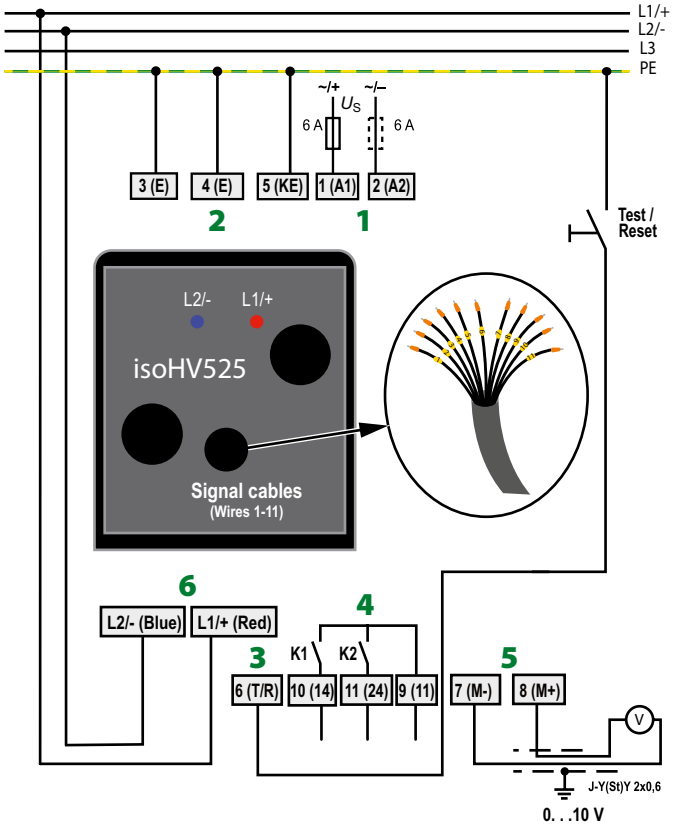


Standards

The ISOMETER® has been developed in compliance with the following standards:

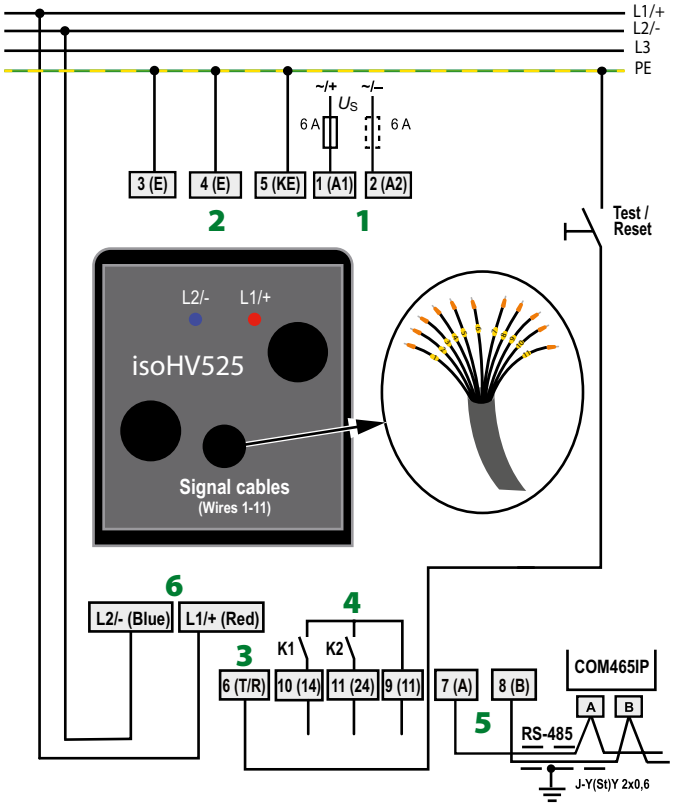
- EN 61557-8 (VDE 0413-8):2015-12 / Ber1 :2016-12
- EN 50155: 2008-03
- IEC 61557-8:2014 / COR1:2016
- EN 45545-2:2013 + A1:2015 (for cable only)
- UL94 V0

Wiring diagram isoHV525-M4-4



	Wire number	Terminal	Connections
1	1 2	A1 A2	Connection to the supply voltage via fuse (line protection). If supplied from an IT system, both lines have to be protected by a fuse.
2	3 and 4 5	E KE	Connect each terminal separately to PE
3	6	T/R	Connection for the external combined Test/Reset button
4	9 10 11	11 14 24	Common connection for K1 and K2 Connection to alarm relay K1 Connection to alarm relay K2
5	7 8	M- M+	Analogue communication interface
6	Red Blue	L1/+ L2/–	Connection to the system to be monitored

Wiring diagram isoHV525-S4-4



	Wire number	Terminal	Connections
1	1 2	A1 A2	Connection to the supply voltage via fuse (line protection). If supplied from an IT system, both lines have to be protected by a fuse.
2	3 and 4 5	E KE	Connect each terminal separately to PE
3	6	T/R	Connection for the external combined Test/Reset button
4	9 10 11	11 14 24	Common connection for K1 and K2 Connection to alarm relay K1 Connection to alarm relay K2
5	7 8	A B	Serial communication interface (external terminating resistor include) Example: Connection of a BMS Ethernet gateway COM465IP
6	Red Blue	L1/+ L2/–	Connection to the system to be monitored

Technical data

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

Definitions:	
Measuring circuit (IC1)	L1/+, L2/-
Supply circuit (IC2)	A1, A2
Output circuit (IC3)	11, 14, 24
Control circuit (IC4)	E, KE, T/R, A/M-, B/M+
Rated voltage	1000 V
Overvoltage category	III
Rated impulse voltage:	
IC1/(IC2-4)	8 kV
IC2/(IC3-4)	4 kV
IC 3/(IC4)	4 kV
Rated insulation voltage:	
IC1/(IC2-4)	1000 V
IC2/(IC3-4)	250 V
IC 3/(IC4)	250 V
Pollution degree	3
Safe isolation (reinforced insulation) between:	
IC1/(IC2-4)	Overvoltage category III, 1000 V
IC2/(IC3-4)	Overvoltage category III, 300 V
IC 3/(IC4)	Overvoltage category III, 300 V
Voltage tests (routine test) acc. to IEC 61010-1:	
IC2/(IC3-4)	AC 2.2 kV
IC 3/(IC4)	AC 2.2 kV

Supply voltage

Supply voltage U_s	AC 100…240 V/DC 24…240 V
Tolerance of U_s	-30…+15 %
Frequency range U_s	47…63 Hz
Power consumption	≤ 3 W, ≤ 9 VA

IT system being monitored

Nominal system voltage U_n	AC 0…1000 V/DC 0…1000 V
Tolerance of U_n	AC +10 %, DC +10 %
Frequency range of U_n	DC, 15…460 Hz

Measuring circuit

Permissible system leakage capacitance C_e	≤ 150 µF
Permissible extraneous DC voltage U_{fg}	≤ 1600 V

Response values

ISOMETER® isoHV525-S4-4:

Response value R_{an1}	11…500 kΩ (50 kΩ)*
Response value R_{an2}	10…490 kΩ (25 kΩ)*
Relative uncertainty R_{an}	±15 %, at least ±3 kΩ
Hysteresis R_{an}	25 %, at least 1 kΩ
Undervoltage detection	30…1.09 kV (off)*
Overvoltage detection	30…1.10 kV (off)*
Relative uncertainty U	±5 %, at least ±5 V
Relative uncertainty depending on the frequency ≥ 200 Hz	-0.075 % / Hz
Hysteresis U	5 %, at least 5 V

ISOMETER isoHV525-M4-4:

Response value R_{an1}	(for customized variant refer to the name plate) 50 kΩ*
Response value R_{an2}	(for customized variant refer to the name plate) 25 kΩ*
Relative uncertainty R_{an}	±15 %, at least ±3 kΩ
Hysteresis R_{an}	25 %, at least 1 kΩ

Time response (valid for isoHV525-S4-4 only)

Response time t_{an} for R_F = 0.5 x R_{an} and C_e=1 µF acc. to IEC 61557-8	≤ 20 s
Start-up delay t	0…10 s (0 s)*
Response delay t_{on}	0…99 s (0 s)*
Delay on release t_{off}	0…99 s (0 s)*

Measured values, storage

ISOMETER isoHV525-S4-4:

Insulation resistance measured value range (R_F)	1 kΩ…4 MΩ
Operating uncertainty	±15 %, at least ±3 kΩ
Nominal system voltage measured value range (U_n)	30…1.15 kV r.m.s
Operating uncertainty	±5 %, at least ±5 V
System leakage capacitance measured value range for R_F > 20 kΩ	0…200 µF
Operating uncertainty	±15 %, at least ±2 µF
Password	off/0…999 (0, off)*
Fault memory alarm messages	on/(off)*

ISOMETER isoHV525-M4-4:

Insulation resistance measured value range (R_F)	1 kΩ…4 MΩ
Operating uncertainty	±15 %, at least ±3 kΩ

Serial interface (valid for isoHV525-S4-4 devices only)

Interface/protocol	RS-485/BMS, Modbus RTU, isoData
Baud rate	BMS (9.6 kbit/s), Modbus RTU (selectable), isoData (115.2 kbits/s)
Cable length (9.6 kbits/s)	≤ 1200 m
Cable: twisted pairs, shield connected to PE on one side	min. J-Y(St)Y 2x0.6
Terminating resistor	120 Ω (0.25 W), internal, can be connected
Device address, BMS bus, Modbus RTU	3…90 (3)*

Analogue output (valid for isoHV525-M4-4 only)

Operating mode	mid-scale 120 kΩ
Functions	Insulation value
Voltage	0…10 V (≥ 20 kΩ)
Tolerance	±10 %, +2 % of the full scale value

Switching elements

Switching elements	2 x 1 N/O contact, common terminal 11
Operating principle	N/C operation/N/O operation (N/O operation)*
Electrical endurance under rated operating conditions, number of cycles	10,000

Contact data acc. to IEC 60947-5-1:

Utilisation category	AC-12	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	2 A	1 A	0.2 A	0.1 A
Minimum contact rating	1 mA at AC/DC ≥ 10 V				

Technical data (continuation)

Environment/EMC	
EMC	IEC 61326-2-4, EN 50121-3-2
Ambient temperatures:	
Operation:	
(U_n < 700)	-55…+70 °C
(U_n > 700)	-55…+55 °C
Transport	-55…+85 °C
Storage	-55…+70 °C
Classification of climatic conditions acc. to IEC 60721:	
Stationary use (IEC 60721-3-3)	3K8
Transport (IEC 60721-3-2)	2K4
Long-term storage (IEC 60721-3-1)	1K6
Classification of mechanical conditions acc. to IEC 60721:	
Stationary use (IEC 60721-3-3)	3M7
Transport (IEC 60721-3-2)	2M2
Long-term storage (IEC 60721-3-1)	1M3

Connection type	
isoHV525-M4-4	0.5 m cable
isoHV525-S4-4	3 m cable
Minimum bending radius of the connection cable	> 40 mm

Other	
Operating mode	continuous operation
Degree of protection, built-in components (DIN EN 60529)	IP65
Enclosure material	polycarbonate (filled with Wevo PUR403FL)
Screw mounting	4 x M4 (screw depth max. 7 mm)
Tightening torque	max. 3 Nm (26 lb-in)
Weight	≤ 1100 g

( )* = Factory setting

BENDER
The Power in Electrical Safety©

Bender GmbH & Co. KG
P.O. Box 1161 • 35301 Grünberg • Germany
Londorfer Straße 65 • 35305 Grünberg • Germany
Tel.: +49 6401 807-0 • Fax: +49 6401 807-259
E-mail: info@bender.de • www.bender.de

BENDER Group