ISOMETER® isoGEN523-S4-4

Insulation monitoring device for unearthed AC, AC/DC and DC systems (IT systems) up to 3(N)AC, AC 400 V, DC 400 V

Suitable for use in applications using generators according to DIN VDE 0100-551

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Device features

- Monitoring the insulation resistance for unearthed AC/DC systems
- Measurement of the system voltage (true r.m.s.) with undervoltage and overvoltage detection
- Measurement of DC system voltages to earth (L1+/PE and L2-/PE)
- Two operating modes: GEn and dc
- Automatic adaptation to the system leakage capacitance up to 5 µF
- Selectable start-up delay, response delay and delay on release
- Two separately adjustable response value ranges of 5…200 kΩ (Alarm 1, Alarm 2)
- Automatic device self test with connection monitoring
- Selectable N/C or N/O relay operation
- Fault memory can be activated
- RS-485 (galvanically isolated) 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

Produktbeschreibung

The 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…400 V or DC 0…400 V. The maximum permissible system leakage capacitance Ce is 5 µF. DC components existing in AC systems do not influence the operating characteristics, when a minimum load current of DC 10 mA flows. A separate supply voltage allows de-energised systems to be monitored too.

In order to meet the requirements of applicable standards, customised parameter settings must be made on the equipment in order to adapt it to local equipment and operating conditions. Please heed the limits of the range of application indicated in the technical data. Any use other than that described in this manual is regarded as improper.

Application

- AC main circuits up to 400 V
- DC main circuits up to 400 V
- Generators according to DIN VDE 0100-551

Funktion

The ISOMETER® measures the insulation resistance RF. It features two operating modes: **GEn** and **dc**.

GEn mode

GEn mode is used in AC/DC or DC systems. The device complies with the maximum response time of ≤ 1s for C_e ≤ 1 µF and $R_F \leq R_{an/2}$.

dc mode

dc mode is only used in DC systems. In this mode, the device complies with the maximum response time of ≤ 1s for C_e ≤ 2 µF and $R_F \leq R_{an/2}$ in the event of asymmetrical insulation faults. In case of symmetrical insulation faults response times of ≤ 10 s for C_e ≤ 5 µF and $R_F \leq R_{an/2}$ are complied with. The leakage capacitance C_e is also measured in this mode.

General measuring functions

The ISOMETER® measures the r.m.s. value of the system voltage Un between L1/+ and L2/- as well as the DC voltages between L1/+ and earth (UL1e) and between L2/- and earth (U_{L2e}).

When coupled to a DC system , the ISOMETER® determines from a minimum value of the DC system voltage the fault location "R %", which shows the distribution of the insulation resistance between conductors L1/+ and L2/-. The distribution is indicated by a "+" or "-" sign preceding the insulation resistance measurement. The value range of the fault location is ±100 %:

Indication	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 %)

When the ISOMETER® is coupled to an AC system, the fault location can only be determined in a connected DC system and the fault is detected either on L1/+ (100 %) or L2/- (-100 %). Calculating the fault distribution is not possible in this case.

If the values R_F or U_n reach or violate the activated response values for the period t_{on} without interruption, an alarm is signalled via the relays K1 and K2. If the values R_F or U_n do not reach or violate their release value (response value plus hysteresis) for the period t_{off} without interruption, 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.

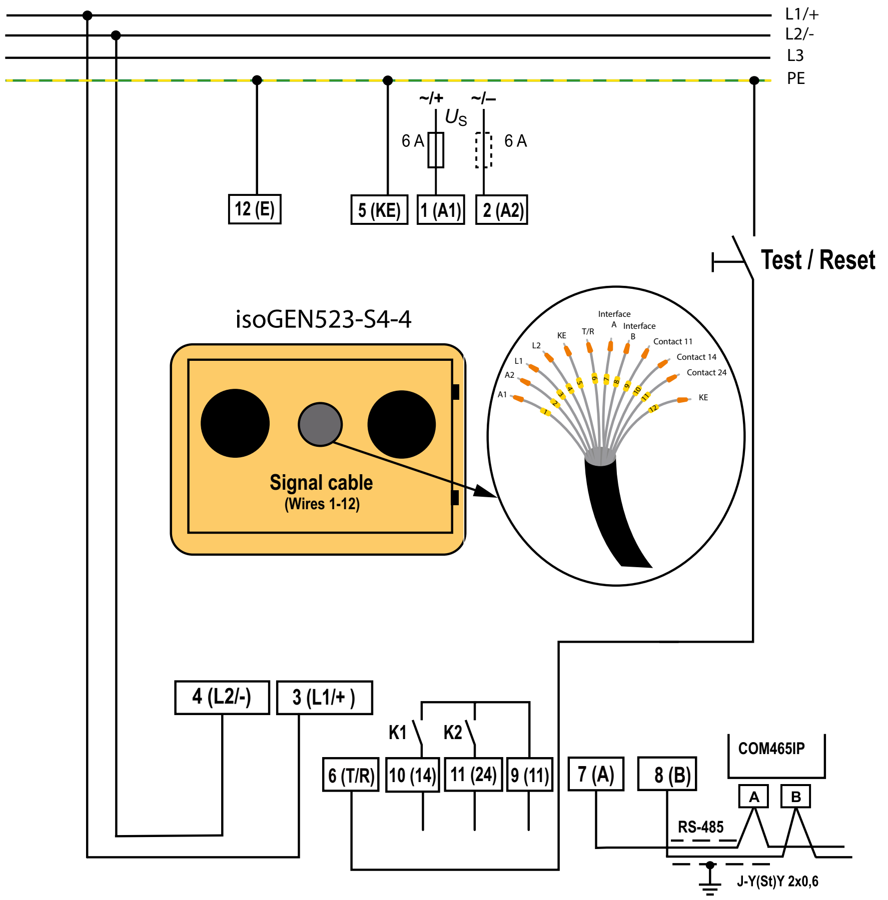
The device function can be tested using the external T/R button. Parameterisation of the ISOMETER® is possible via the BMS bus, for example by means of a BMS-Ethernet gateway (COM465IP) or Modbus RTU.

Standards

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

- DIN EN 61557-8 (VDE 0413-8):2015-12 / Ber1 :2016-12
- IEC 61557-8:2014 / COR1:2016
- DIN VDE 0100-551 :2017-02

Wiring diagram



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

Technical data

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

Definitions:	
Measuring circuit (IC1)	3 (L1/+), 4 (L2/-)
Supply circuit (IC2)	1(A1), 2 (A2)
Output circuit (IC3)	9 (11), 10 (14), 11 (24)
Control circuit (IC4)	12 (E), 5 (KE), 6 (T/R), 7 (A), 8 (B)
Rated voltage	400 V
Overvoltage category	III
Rated impulse voltage:	
IC1/(IC2-4)	6 kV
IC2/(IC3-4)	4 kV
IC3/IC4	4 kV
Rated insulation voltage:	
IC1/(IC2-4)	400 V
IC2/(IC3-4)	250 V
IC3/IC4	250 V
Pollution degree	3
Safe isolation (reinforced insulation) between:	
IC1/(IC2-4)	Overvoltage category III, 600 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

Monitored IT system

Nominal system voltage U_n	3(N)AC, AC 0…400 V/DC 0…400 V
Tolerance of U_n	+25 %
Frequency range of U_n	DC, 35…460 Hz

Measuring circuit

Measuring voltage U_m	±12 V
Measuring current I_m at R_F, $Z_F = 0$	≤ 110 µA
Internal resistance R_i, Z_i	≥ 115 kΩ
Permissible system leakage capacitance C_e	≤ 5 µF
Permissible extraneous DC voltage U_{fg}	≤ 700 V

Response values

Response value R_{an1}	R_{an2}…200 kΩ (46 kΩ)*
Response value R_{an2}	5 kΩ…R_{an1} (23 kΩ)*
Relative uncertainty R_{an}	±15 %, at least ±2 kΩ
Hysteresis R_{an}	25 %, at least 1 kΩ
Undervoltage detection U<	10 V…U > (off/10 V)*
Overvoltage detection U>	U<…500 V (off/500 V)*
Relative uncertainty U	± 5 %, at least ± 5 V
Relative uncertainty depending on the frequency ≥400 Hz	-0.015 %/Hz
Hysteresis U	5 %, at least 5 V

Time response

Response time t_{an} at $R_F = 0.5 \times R_{an}$ and C_e=1 µF acc. to IEC 61557-8	≤ 1 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

Measured value insulation resistance (R_F)	1 kΩ…2 MΩ
Operating uncertainty	±15 %, at least ±2 kΩ
Measured value nominal system voltage (U_n)	0…500 Vr.m.s
Operating uncertainty	±5 %, at least ±5 V
Measured value system leakage capacitance at R_F > 10 kΩ ("dc" mode only)	0…17 µF
Operating uncertainty at R_F ≥ 20 kΩ and C_e ≤ 5 µF	±5 %, at least ±0.1 µF
Password	off/0…999 (0, off)*
Fault memory alarm messages	on/(off)*

Interface

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 pair, shield connected to PE on one side	min. J-Y(St)Y 2 x 0.6
Terminating resistor	120 Ω (0.25 W), external
Device address, BMS bus, Modbus RTU	3…90 (3)*

Switching elements

Switching elements	2 x 1 N/O contacts, common terminal 11
Operating principle	N/C operation/N/O operation (N/O operation)*
Electrical endurance, 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				

Environment/EMC

EMC	IEC 61326-2-4
Ambient temperatures:	
Operation	-40…+70 ºC
Transport	-40…+85 ºC
Storage	-40…+70 ºC
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

Connection type	0.8 m connecting wire
Minimum bending radius of the connecting 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	2 x M4
Tightening torque	max. 3 Nm (26 lb-in)
Weight	≤ 600 g

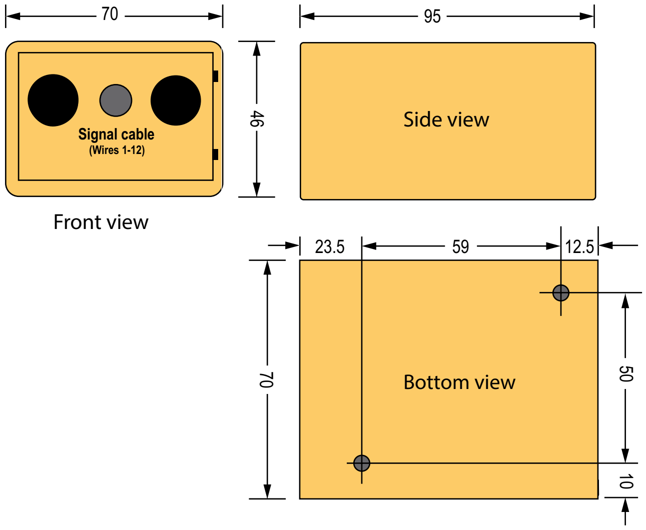
( )* = Factory settings

Ordering details

Version	Type	Art. No.
Digital interface	isoGEN523-S4-4	B91016330

Dimension diagram

Dimensions in mm



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