ISOMETER® iso685

Insulation monitoring device for unearthed AC, AC/DC and DC systems (IT systems)

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Device features

- Insulation monitoring for unearthed systems AC, 3(N)AC 0…690 V, DC 0…1000 V
- Nominal system voltage extendable via coupling devices
- Two separately adjustable response values 1 kΩ…10 MΩ
- Combination of ***AMP***^{PLUS} and other profile-specific measurement methods
- Continuous measurement of the capacitance, voltage and system frequency
- Predefined measurement profiles to meet different requirements
- Automatic adaptation to the system leakage capacitance
- INFO button to display devices and network settings
- Self monitoring with automatic alarm message
- History memory with real-time clock (buffer for three days) for storing 1023 alarm messages with date and time
- Current and voltage output 0(4)…20 mA, 0…400 µA, 0…10 V, 2…10 V (galvanically separated) which is analogous to the measured insulation value of the system
- Permanent coupling monitoring of the measuring lines
- Freely configurable digital and analogue inputs and outputs
- Two separate alarm relays with potential-free contact
- N/O or N/C operation selectable
- High-resolution graphic LC display
- IsoGraph function for time-related representaton of the insulation resistance
- Remote setting of certain parameters via Internet (option; COMTRAXX® Gateway)
- Worldwide remote diagnosis via Internet (made available by Bender-Service only)
- RS-485 interface
- Multilingual

Product description

The ISOMETER® iso685-D is an insulation monitoring device for IT systems in accordance with IEC 61557-8. It is universally applicable in AC, 3(N)AC, AC/DC and DC systems. AC systems may include extensive DC-supplied loads (such as rectifiers, inverters, variable-speed drives).

Application

- AC, DC or AC/DC main circuits
- AC/DC main circuits with directly connected DC components, such as rectifiers, converters, variable-speed drives
- UPS systems, battery systems
- Heaters with phase control
- Systems including switched-mode power supplies
- IT systems with high leakage capacitances

Function

The insulation monitoring device iso685-D continuously monitors the entire insulation resistance of an IT system during operation and triggers an alarm when the value falls below a preset response value. To obtain a measurement the device has to be connected between the IT system (unearthed system) and the protective earth conductor (PE). A measuring current in the µA range is superimposed onto the system which is recorded and evaluated by a micro-controlled measuring circuit. The measuring time is dependent on the selected measurement profiles, the system leakage capacitance, the insulation resistance and possible system-related disturbances.

The response values and other parameters are set using a commissioning wizard or via different setup menus using the device buttons and a high-resolution graphical LC display. The selected settings are stored in a permanent fail-safe memory. Different languages can be selected for the setup menus as well as the messages indicated on the display.

The device utilises a real-time clock for storing fault messages and events in a history memory with time and date stamp. The settings can be protected against unauthorised modifications by a password. To ensure proper functioning of connection monitoring, the device requires the setting of the system type 3AC, AC or DC and the required use of the appropriate terminals L1/+, L2, L3/-.

Measurement method

AMP*Plus** The iso685 series uses the patented ***AMP^{Plus} measurement method. This measurement method allows concise monitoring of modern power supply systems, also in case of extensive, directly connected DC components and high system leakage capacitances.

Standards

The ISOMETER® iso685 series corresponds to the device standard: DIN EN 61557-8

Approvals

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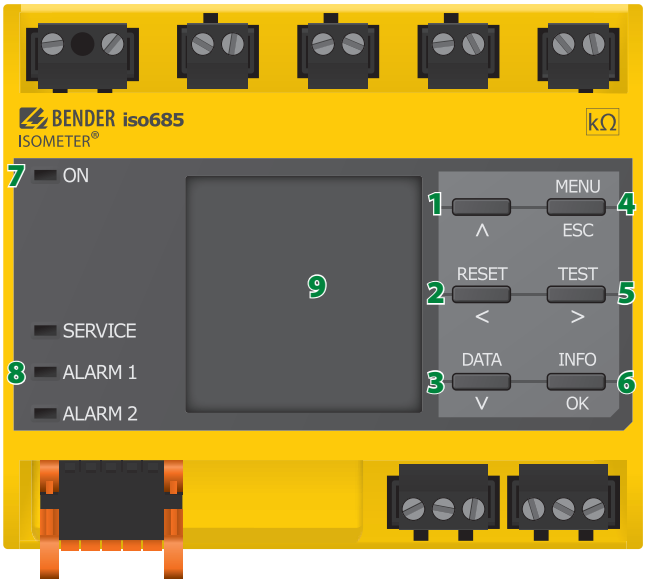
Operating elements



1 - "Λ" button: up, increase value
2 - "RESET" button: Reset messages
"<" button: back, select parameter
3 - "DATA" button: Display data values
"V" button: down, decrease value
4 - "MENU" button: start device menu
"ESC" button: abort, return to the previous menu level
5 - "TEST" button: Carry out self test
"> " button: forward, select parameter
6 - "INFO" button: Display information
"OK" button: OK, confirm
7 - LED "ON": Operation
8 - LED indication "SERVICE, ALARM 1, ALARM 2"
9 - LC display

Ordering information

Nominal system voltage range U_n		Supply voltage U_S		Type	Art. No.
AC	DC	AC	DC		
0…690 V; 1…460 Hz	0…1000 V	100…240 V; 47…460 Hz	24 V, 100…240 V	iso685-D	B 9106 7010

Accessories

Type designation	Art. No.
A set of screw terminals[1)]	B 9106 7901
A set of push-wire terminals	B 9106 7902
Enclosure accessories (terminal cover, 2 mounting clips) [1)]	B 9106 7903

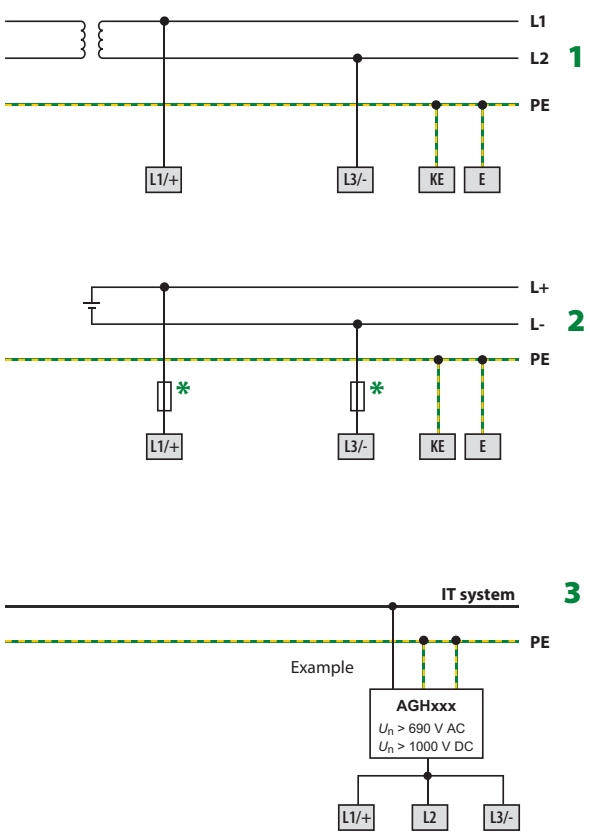
[1)] included in the scope of delivery

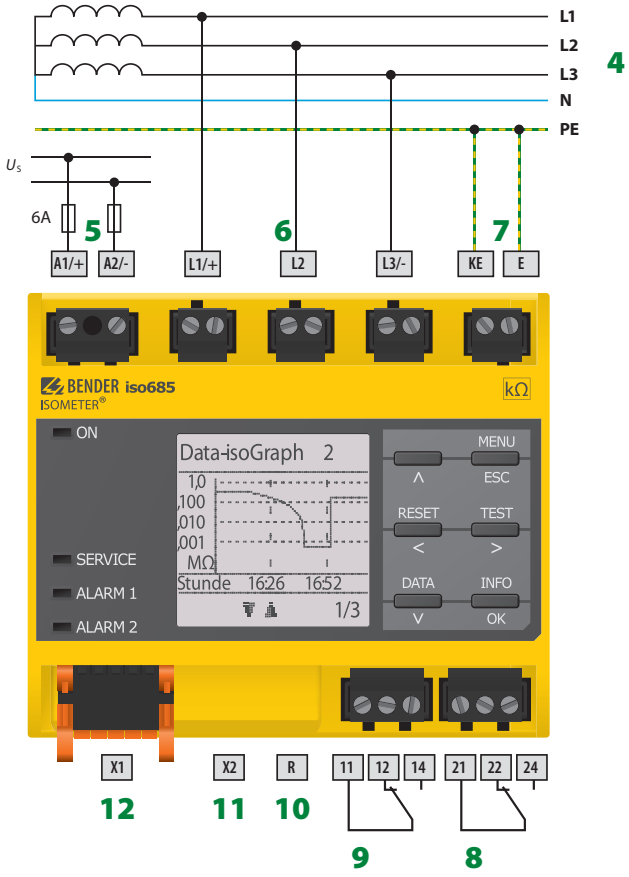
Suitable system components

Type designation	Type	Art. No.
Appropriate measuring instruments SKMP[1)]: 28 kΩ,120 kΩ Current values: 0…400 µA, 0…20 mA	7204-1421	B 986 763
	9604-1421	B 986 764
	9620-1421	B 986 841
Coupling devices	AGH150W-4	B 9801 8006
	AGH204S-4	B 914 013
	AGH520S	B 913 033
	AGH676S-4	B 913 055

[1)] SKMP = midscale

Wiring diagram



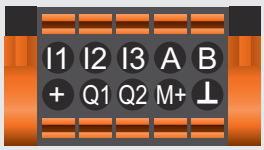


1 - Connection to an AC system U_n
2 - Connection to a DC system U_n
3 - Connection to an IT system with coupling device
4 - Connection to a 3(N)AC system
5 - Supply voltage U_S (see nameplate) via 6 A fuse
6 - Connection to the IT system to be monitored (L1/+, L2, L3/-)
7 - Separate connection of KE, E to PE
8 - (K1) Alarm relay 1, available changeover contacts
9 - (K2) Alarm relay 2, available changeover contacts
10 - Switchable resistor R for RS-485 bus termination
11 - Ethernet interface, connection to Ethernet interface by Bender Service staff only
12 - Digital interface
* - 6 A fuse for systems > 690 V

Note

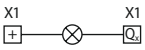
According to DIN VDE 0100-430, devices for protection against a short-circuit can be omitted for the coupling of terminals L1/+ and L3/- to the IT system ≤ 690 V to be monitored if the wiring is carried out in such a manner as to reduce the risk of a short-circuit to a minimum. Ensure short-circuit-proof and earth-fault-proof wiring.

Digital interface X1

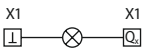
Digital interface	Terminal	Colour
 X1	I1	Input 1
	I2	Input 2
	I3	Input 3
	A	RS-485 A
	B	RS-485 B
	+	+24 V
	Q1	Output 1
	Q2	Output 2
	M+	Analog output
	⊥	Ground

Digital Outputs

Passive

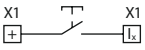


Active

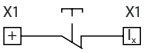


Digital Inputs

High-Active

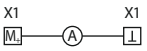


Low-Active

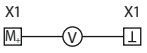


Analog Output

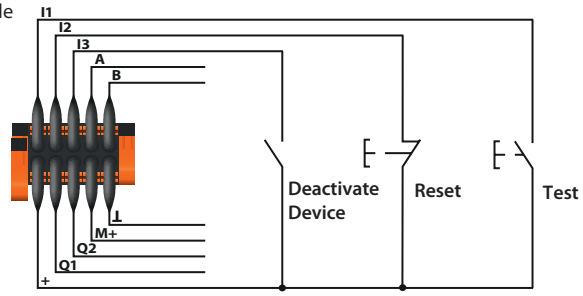
Current Output



Voltage Output



Example



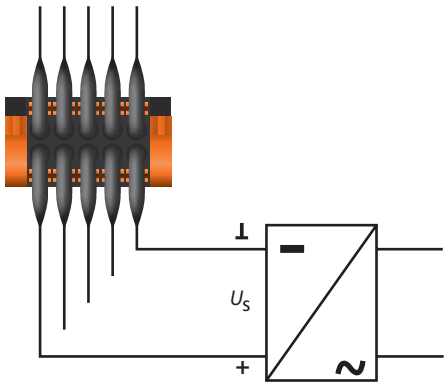
Connection to X1

CAUTION

Danger of damage to property due to faulty connections!
The device can be damaged if the unit is simultaneously connected to the supply voltage via the X1 interface, and A1/+ and A2/- terminals. Do not connect the device simultaneously via X1, and A1/+ and A2/- to different supply voltages.

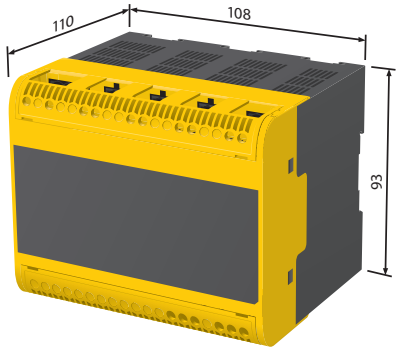
CAUTION

Danger of damage to property due to incorrect nominal voltage!
When the device is powered via the X1 interface, the nominal voltage must be 24 V otherwise the unit may be damaged. Only connect a nominal voltage of 24 V to the X1 interface.



Dimension diagram

Dimensions in mm



Technical data

Insulation coordination

Rated insulation voltage (IEC 60664-1)	1000 V
Rated impulse voltage (IEC 60664-1)	8 kV
Overvoltage category	III
Pollution degree (U_n < 690 V)	3
Pollution degree (U_n < 1000 V)	2
Protective separation (reinforced insulation) between	
(A1, A2) - (11, 12, 14) - (21, 22, 24) - [(L1/+, L2, L3/-), (E, KE), (X1, X2)]	
Voltage test (IEC 61010-1)	4.3 kV

Supply voltage

Supply via A1/+, A2/-:

Supply voltage range U_S	AC/DC 100…240 V
Tolerance of U_S	AC -15…+10 %
	DC -15…+15 %
Frequency range of U_S	DC, 47…460 Hz
Power consumption typically 50 Hz (460 Hz)	5.7 W/20 VA (7.9 W/45.5 VA)

Supply via X1:

Supply voltage U_S	DC 24 V
Tolerance of U_S	DC -20…+25 %

IT system being monitored

Nominal system voltage range U_n	AC 0…690 V
	DC 0…1000 V
Tolerance of U_n	AC/DC + 15 %
Frequency range of U_n	DC, 1…460 Hz

Response values

Response value R_{an1} (Alarm 1)	1 kΩ…10 MΩ (40 kΩ)*
Response value R_{an2} (Alarm 2)	1 kΩ…10 MΩ (10 kΩ)*
Relative uncertainty (acc. to IEC 61557-8)	dependent on the profile, ± 15 %, at least 1 kΩ
Hysteresis	25 %, at least 1 kΩ

Time response

Response time t_{an} at R_F = 0.5 x R_{an} (R_{an} = 10 kΩ) and C_e = 1 µF acc. to IEC 61557-8	
	profile-dependent, typ. 4 s (see diagrams)
Startup delay $T_{startup}$	0…120 s (0 s)*

Measuring circuit

Measuring voltage U_m	profile-dependent, ± 10 V, ± 50 V
Measuring current I_m	≤ 403 µA
Internal resistance R_i, Z_i	≥ 124 kΩ
Permissible extraneous DC voltage U_{fg}	≤ 1200 V
Permissible system leakage capacitance C_e	profile-dependent, 0…1000 µF

Measuring ranges

Measuring range f_n	10…460 Hz
Tolerance measurement of f_n	± 1 % ± 0.1 Hz
Voltage range measurement of f_n	AC 25…690 V
Measuring range of U_n (without external coupling device)	AC 25…690 V
	DC 25…1000 V
Tolerance measurement of U_n	± 5 % ± 5 V
Measuring range C_e	0…1000 µF
Tolerance measurement of C_e	± 10 % ± 10 µF
Frequency range of C_e	DC, 30…460 Hz
Min. insulation resistance measurement of C_e	
	depends on profile and coupling mode, typ. > 10 kΩ

Display

Graphic display	127 x 127 pixel, 40 x 40 mm
Display range measured value	0.1 kΩ…20 MΩ

LEDs:

LED "On" (operation LED)	green
SERVICE	yellow
ALARM 1	yellow
ALARM 2	yellow

Digital inputs

Number	3
Operating mode, adjustable	active high, active low
Functions	none, test, reset, start measurement, deactivate device
Voltage	Low DC -3…5 V, High DC 11…32 V

Digital outputs

Number	2
Operating mode, adjustable	active, passive
Functions	none, pre-alarm, main alarm, connection fault, Alarm DC-, Alarm DC+, symmetrical insulation fault, device error, common alarm, measurement complete, device inactive
Voltage	passive DC 0…32 V, active DC 0/19.2…32 V
Max. current internal sum X1	max. 200 mA
Max. current external per channel	max. 1 A

Analogue output

Number	1
Operating mode	linear, midscale point 28 kΩ/120 kΩ
Functions	insulation value, DC shift
Current, voltage	0…20 mA (< 600 Ω), 4…20 mA (< 600 Ω), 0…400 µA (< 4 kΩ), 0…10 V (>1 kΩ), 2…10 V (>1 kΩ)
Tolerance	±20 %

Interfaces

Field bus:

Interface/protocol	Telnet/HTTP
Data rate	10/100 Mbit/s, autodetect
Cable length	≤100
Connection	RJ45
IP address	DHCP / manual* 192.168.0.5*
Network mask	255.255.255.0*
Function	service interface

Sensor bus:

Interface/protocol	RS-485/BMS
Data rate	9.6 kBaud/s
Cable length	≤ 1200 m
Cable (twisted pair, shield connected to PE on one side)	recommended: J-Y(St)Y min. 2 x 0.8
Connection	terminals X1.A, X1.B
Terminating resistor	120 Ω, can be connected internally
Device address, BMS bus	1…90 (3)*

Technical data (continued)

Switching elements

Number of switching elements					2 changeover contact
Operating mode					N/C operation*/N/O operation
Contact 11-12-14	none, prealarm, main alarm, connection fault, Alarm DC-, Alarm DC+, symmetrical insulation fault, device error, common alarm, measurement complete, device inactive				
Contact 21-22-24	none, prealarm, main alarm, connection fault, Alarm DC-, Alarm DC+, symmetrical insulation fault, device error, common alarm, measurement complete, device inactive				
Electrical endurance under rated operating conditions, number of cycles					10,000
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
Rated insulation voltage ≤ 2000 m NN					250 V
Rated insulation voltage ≤ 3000 m NN					160 V
Minimum contact rating					1 mA at AC/DC ≥10 V

Environment/EMC

EMC	IEC 61326-2-4; EN 50121-3-2; EN 50121-4**
Ambient temperatures:	
Operation	-25…+55 °C
Transport	-40…+85 °C
Storage	-25…+70 °C
Classification of climatic conditions acc. to IEC 60721:	
Stationary use (IEC 60721-3-3)	3K5 (except condensation and formation of ice)
Transportation (IEC 60721-3-2)	2K3
Storage (IEC 60721-3-1)	1K4
Classification of mechanical conditions acc. to IEC 60721:	
Stationary use (IEC 60721-3-3)	3M4
Transportation (IEC 60721-3-2)	2M2
Storage (IEC 60721-3-1)	1M3
Area of application	≤ 3000 m NN

Connection

Connection type	pluggable screw terminal or push-wire terminal
Screw-type terminals:	
Tightening torque	0,5…0,6 Nm (5…7 lb-in)
Conductor sizes	AWG 24…12
Stripping length	7 mm
rigid/flexible	0.2…2.5 mm²
flexible with ferrules, with/without plastic collar	0.25…2.5 mm²
Multiple conductor, rigid	0.2…1 mm²
Multiple conductor, flexible	0.2…1.5 mm²
Multiple conductor, flexible with ferrule without plastic sleeve	0.25…1 mm²
Multiple conductor, flexible withTWIN ferrule with plastic sleeve	0.5…1.5 mm²
Push-wire terminals:	
Conductor sizes	AWG 24…12
Stripping length	10 mm
rigid/flexible	0.2…2.5 mm²
flexible with ferrules, with/without plastic collar	0.25…2.5 mm²
Multiple conductor, flexible withTWIN ferrule with plastic sleeve	0.5…1.5 mm²
Push-wire terminals X1:	
Conductor sizes	AWG 24…16
Stripping length	10 mm
rigid/flexible	0.2…1.5 mm²
flexible with ferrule without plastic sleeve	0.25…1.5 mm²
flexible with TWIN ferrule with plastic sleeve	0.25…0.75 mm²

Other

Operating mode	continuous operation
Mounting	display oriented, cooling slots must be ventilated vertically
Degree of protection internal components	IP40
Degree of protection terminals	IP20
DIN rail mounting acc. to	IEC 60715
Screw fixing	3 x M4 with mounting clip
Enclosure material	polycarbonate
Flammability class	V-0
Dimensions (W x H x D)	108 x 93 x 110 mm
Documentation number	D00022
Weight	≤ 450 g

( )* = Factory setting

( )** = The serial interface (RS-485) is considered a highly-symmetrical wire pair

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The Power in Electrical Safety©

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