ISOMETER® iso685-D-B

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
- Two separately adjustable response values 1 kΩ…10 MΩ
- Combination of ***AMP***^{PLUS} and other profile-specific measurement methods
- Continuous measurement of 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
- High-resolution graphic LC display
- IsoGraph function for time-related representation of the insulation resistance
- Remote setting and diagnosis via Internet (option; COMTRAXX® Gateway)
- Modbus TCP and web server
- Internal system isolating switch for use in coupled systems (ISOnet)
- Multilingual

Approvals

CE

Product description

The ISOMETER® iso685-D-B is an insulation monitoring devices 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 switch-mode power supplies
- coupled IT systems with high leakage capacitances

Function

The insulation monitoring device iso685-D-B 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 as well as possible system-related disturbances.

The insulation monitoring device iso685-D-B has an internal system isolating switch, which makes it possible to operate several ISOMETER®s in coupled IT systems. For this purpose, the ISOMETER®s are connected via an Ethernet bus. The integrated Isonet function ensures that only one ISOMETER® is actively measuring at a time, while the other devices are completely isolated from the system and waiting in standby mode for measuring permission.

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 graphic 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 entering 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/-.

Device variants

iso685-D-B

The device version iso685-D-B features a high-resolution graphic LC display and control elements for direct operating of the device functions.

iso685-S-B

The device version iso685-S-B neither features a display nor a control unit. It can only be used in combination with FP200 and is indirectly operated via this front panel.

Option "W"

Device variants with Option "W" are available for extreme climatic and mechanical conditions.

Measurement method

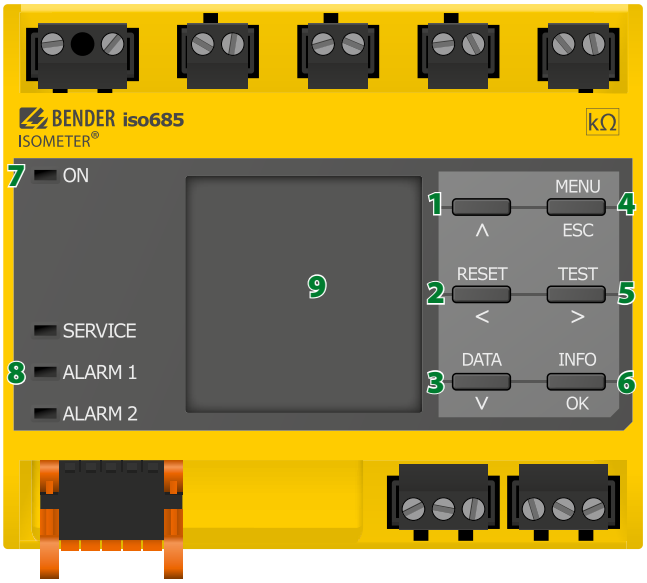
AMP^{Plus} The iso685-D-B series uses the patented ***AMP***^{Plus} measurement method. This measurement method allows concise monitoring of modern power supply systems, also in case of extensive, directly connected DC components and high system leakage capacitances.

Standards

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

AC/DC

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		Display	Option "W" [1]	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		B 9106 7020
					-40…+70 °C, 3K5, 3M7	iso685W-D-B[1]		B 9106 7020W
				–	–	iso685-S-B + FP200		B 9106 7220
					-40…+70 °C, 3K5, 3M7	iso685W-S-B + FP200W[1]		B 9106 7220W

[1] Increased shock and vibration resistance 3K5 and 3M7.

Accessories

Description	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
Front cover 144x72 transparent (for IP65)	B 9806 0005

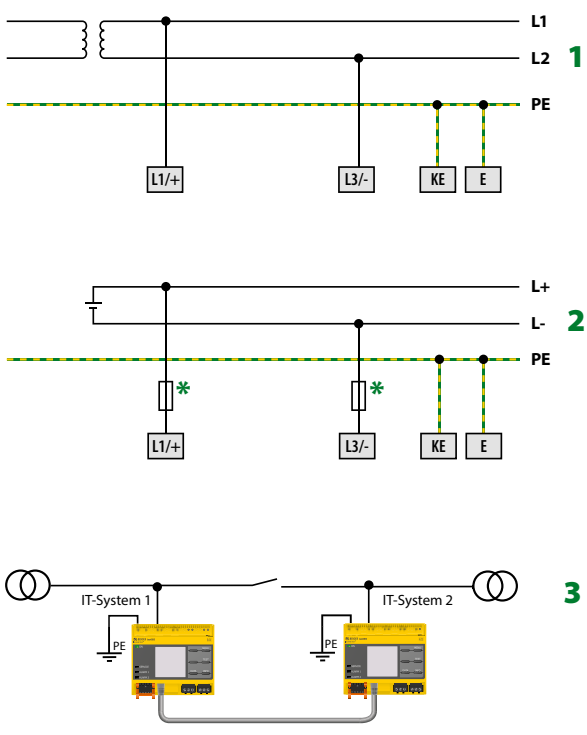
[1] included in the scope of delivery

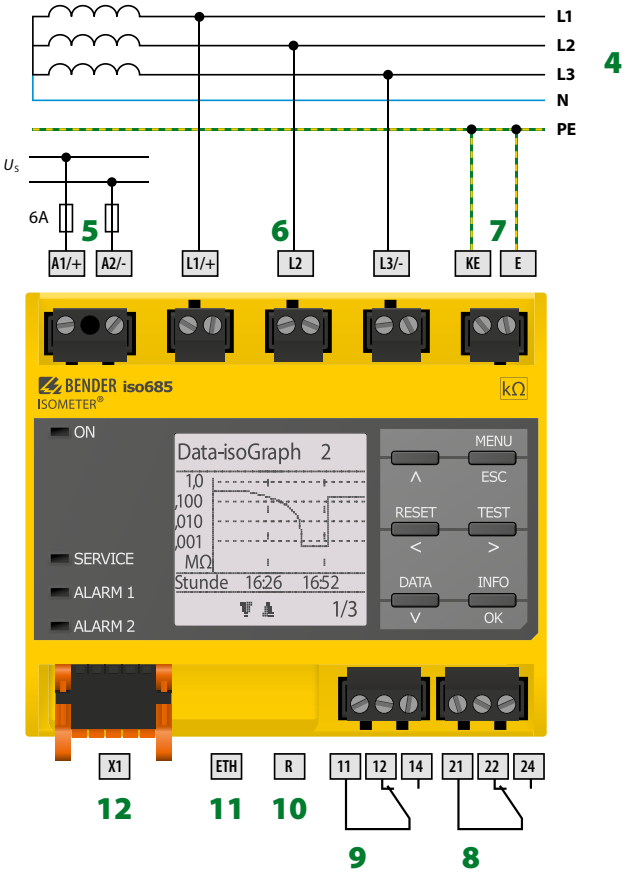
Suitable system components

Description	Type	Art. no.
Device version without display	iso685-S-B	B 9106 7120
	iso685W-S-B	B 9106 7120W
Display for front panel mounting	FP200	B 9106 7904
	FP200W	B 9106 7904W

Suitable measuring instruments on request!

Wiring diagram





1 - Connection to an AC system U_n
2 - Connection to a DC system U_n
3 - Linked with two IT systems which can be interconnected via a coupling switch. Information regarding the state of the coupling switch is not necessary.
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

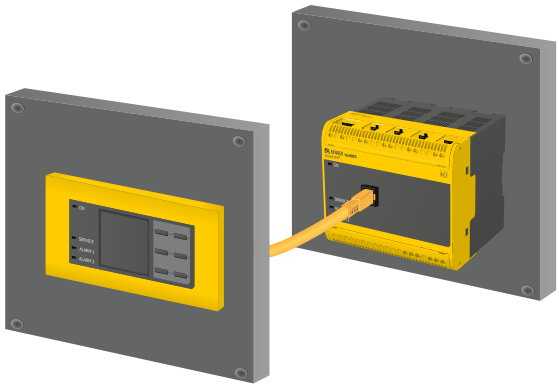
According to DIN VDE 0100-430, devices for protection against a short-circuit can be omitted for the coupling of terminals L1/+ and L3/- to the IT system ≤ 690 V to be monitored if the wiring is carried out in such a manner as to reduce the risk of a short-circuit to a minimum. Ensure short-circuit-proof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

The connecting lines L1/+, L2, L3/- to the system to be monitored must be carried out as spur lines. No load current may be conducted through the terminals.

For UL applications:

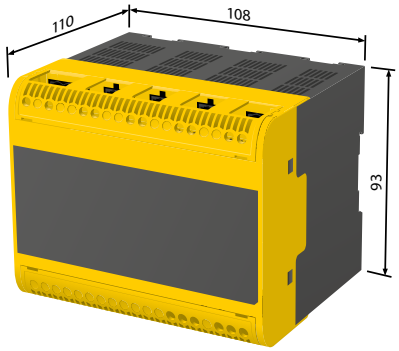
Use 60/70°C copper lines only!
UL and CSA application require the supply voltage to be protected via 5 A fuses.

Connection to FP200

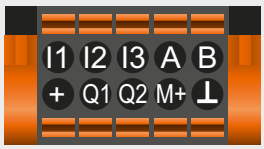


Dimension diagram

Dimensions in mm

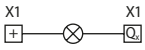


Digital interface X1

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+	Analogue output
	⊥	Ground

Digitale Ausgänge

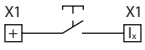
Passive



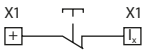
Active

Digitale Eingänge

High-Active

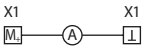


Low-Active

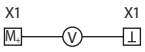


Analoger Ausgang

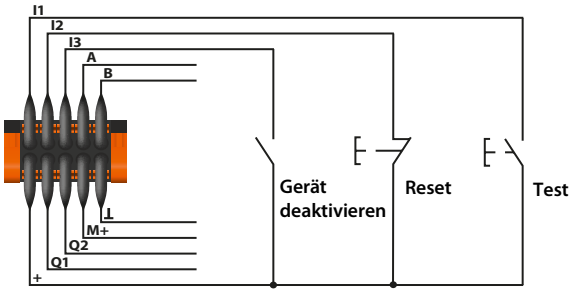
Stromausgang



Spannungsausgang



Beispiel



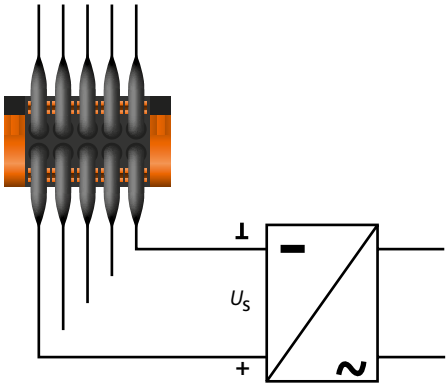
Connection to X1

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/+, A2/- terminals. Do not connect the device simultaneously via X1, and A1/+, 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. kann. Only connect to the X1 interface with a nominal voltage of 24 V.



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, routine 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)	profile-dependent, ±15 %, min. ±1 kΩ
Hysteresis	25 %, min. 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 U_n(without external coupling device)	AC 25…690 V
	DC 25…1000 V
Voltage range measurement of U_n	AC/DC > 10 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 measurement of C_e	DC, 30…460 Hz
Min. insulation resistance measurement of C_e	
	depending on profile and coupling mode, typ. > 10 kΩ

Display

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

LEDs:

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, device inactive
Voltage	Low DC -3…5 V, High DC 11…32 V

Digital outputs

Number	2
	Operating mode, adjustable active, passive
Functions	none, Alarm 1, Alarm 2, 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, mid-scale 28 kΩ/120 kΩ
Functions	Insulation value, DC shift
Current	0…20 mA (< 600 Ω), 4…20 mA (< 600 Ω), 0…400 µA (< 4 kΩ)
Voltage	0…10 V (>1 kΩ), 2…10 V (>1 kΩ)
Tolerance related to the current/voltage final value	± 20 %

Interfaces

Field bus:

Interface/protocol	web server/Modbus TCP/BCOM
Data rate	10/100 Mbit/s, autodetect
Max. amount Modbus requests	< 100/s
Cable length	≤ 100 m
Connection	RJ45
IP address	DHCP/manual* 192.168.0.5*
Network mask	255.255.255.0*
BCOM address	system-1-0
Function	Communication interface

ISOnet

Number ISOnet devices	≤ 5

Sensor bus:

Interface/protocol	RS-485/BMS
Data rate	9.6 kBaud/s
Cable length	≤ 1200 m
Cable: Twisted pair, one end of shield connected to PE	recommended: J-Y(St)Y min. 2x0.8
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 contacts
Operating mode					N/C operation*/N/O operation
Contact 11-12-14					none, Alarm 1, Alarm 2, connection fault, Alarm DC-, Alarm DC+, symmetrical insulation fault, device error, common alarm, measurement complete, device inactive
Contact 21-22-24					none, Alarm 1, Alarm 2, 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					10000
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
Ambient temperatures:	
Operating temperature	-25…+55 °C
Transport	-40…+85 °C
Long-term 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)
Transport (IEC 60721-3-2)	2K3
Long-term storage (IEC 60721-3-1)	1K4
Classification of mechanical conditions acc. to IEC 60721:	
Stationary use (IEC 60721-3-3)	3M4
Transport (IEC 60721-3-2)	2M2
Long-term storage (IEC 60721-3-1)	1M3
Area of application	≤3000 m NN

Connection

Connection type	pluggable screw terminal or push-wire terminal
Screw-type terminal:	
Nominal current	≤10 A
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 ferrule with/without plastic sleeve	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 with TWIN ferrule with plastic sleeve	0.5…1.5 mm²
Push-wire terminal:	
Nominal current	≤10 A
Conductor sizes	AWG 24…12
Stripping length	10 mm
rigid/flexible	0.2…2.5 mm²
flexible with ferrule with/without plastic sleeve	0.25…2.5 mm²
Multiple conductor, flexible withTWIN ferrule with plastic sleeve	0.5…1.5 mm²
Push-wire terminals X1:	
Nominal current	≤8 A
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 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	D00177
Weight	≤ 390 g

Option "W"

Ambient temperatures:	
Operating temperature	-40…+70 °C
Classification of climatic conditions acc. to IEC 60721:	
Stationary use (IEC 60721-3-3)	3K5 (condensation and formation of ice possible)
Classification of mechanical conditions acc. to IEC 60721:	
Stationary use (IEC 60721-3-3)	3M7

( )* Factory setting

** Indication limited outside the temperature range -25…+55 °C

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The Power in Electrical Safety©

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