

ISOMETER® iso1685...

Insulation monitoring device for unearthed AC, AC/DC and DC power supplies (IT systems) up to AC 1000 V/DC 1500 V



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ISOMETER® iso1685DP

Device features

- Insulation monitoring of IT systems up to AC 1000 V/DC 1500 V
- Measurement of low-resistance insulation faults
- Separately adjustable response values R_{an1} (alarm 1) and R_{an2} (alarm 2) (both 200 Ω...1 MΩ) for prewarning and alarm
- High-resolution graphic LC display for excellent readability and recording of the device status (iso1685DP)
- Automatic adjustment to high system leakage capacitances, selectable range
- Connection monitoring of DC systems for reverse polarity
- Integrated locating current injector up to 50 mA for insulation fault location
- Device self test with automatic message in the event of a fault
- Alarm relays separately adjustable for insulation faults and device errors
- RS-485 interface (BMS bus), e.g. for controlling insulation fault location
- µSD card with data logger and history memory for alarms (iso1685P)

Approvals and certifications



Ordering details

Response value range	Nominal voltage		Supply voltage ¹⁾	Display	Type	Art. No.
	AC	DC	DC			
200 Ω...1 MΩ	0...1000 V	0...1500 V	18...30 V	■	iso1685DP-425	B 9106 5802
				–	iso1685P-425	B 9106 5801

¹⁾ Absolute values

Product description

The iso1685... is used for insulation monitoring of extensive IT systems up to AC 1000 V/DC 1500 V. The specially developed measurement method monitors the insulation resistance also in installations where extremely high system leakage capacitances against earth exist due to interference suppression methods. Adaptation to system-related high leakage capacitances also occurs automatically.

The device generates locating current pulses required for insulation fault location. That allows the localisation of the insulation fault using permanently installed or mobile insulation fault locators.

Function

Insulation monitoring is carried out using an active measuring pulse which is superimposed onto the IT system to earth via the integrated coupling. When the insulation resistance between the IT system and earth falls below the set prewarning response value R_{an1} , the "ALARM 1" LED lights and the relay K1 (11/12/14) switches. When the insulation resistance falls below the alarm response value R_{an2} , the alarm relay K2 (21/22/24) switches and the "ALARM 2" LED lights.

The locating current injector integrated in the device for insulation fault location is activated externally via the BMS interface. When starting the insulation fault location, the LED "PGH ON" signals the locating current pulse.

iso1685P:

The integrated µSD card is used as data logger for storing all relevant events.

The following measured values and states are stored during operation:

- Insulation resistances and leakage capacitances
- System voltage, partial voltages to earth, supply voltages
- Temperatures: current controller locating current injector, coupling L+, L–
- Connection fault
- Device error

Following each device start-up, a new file is generated. If the current file size exceeds 10 MByte during operation, a new file is generated. The file name contains time and date of its creation.

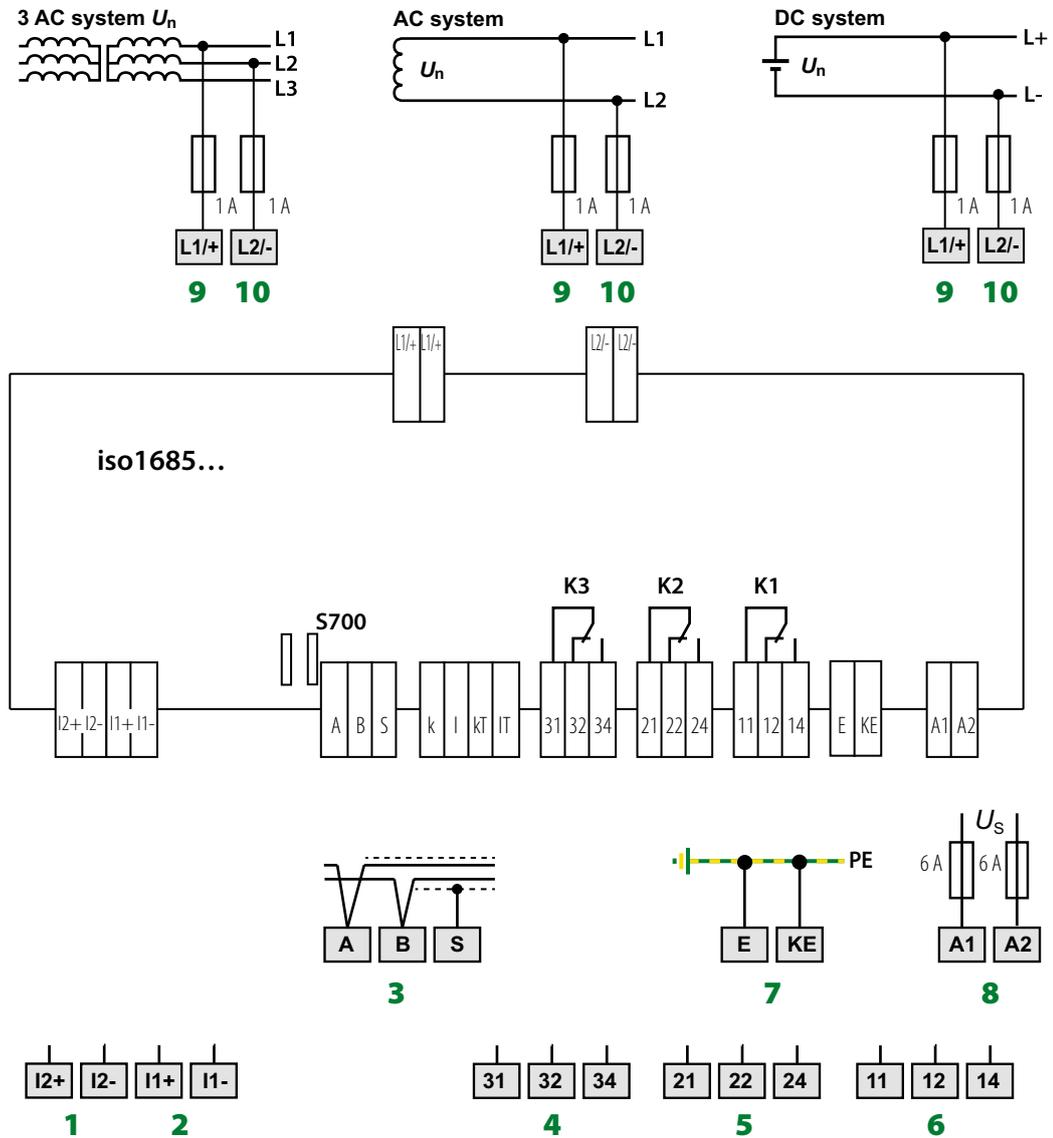
The history memory on the µSD card contains all saved alarms in .csv format.

Standards

The ISOMETER® iso1685... series has been developed in compliance with the following standards:

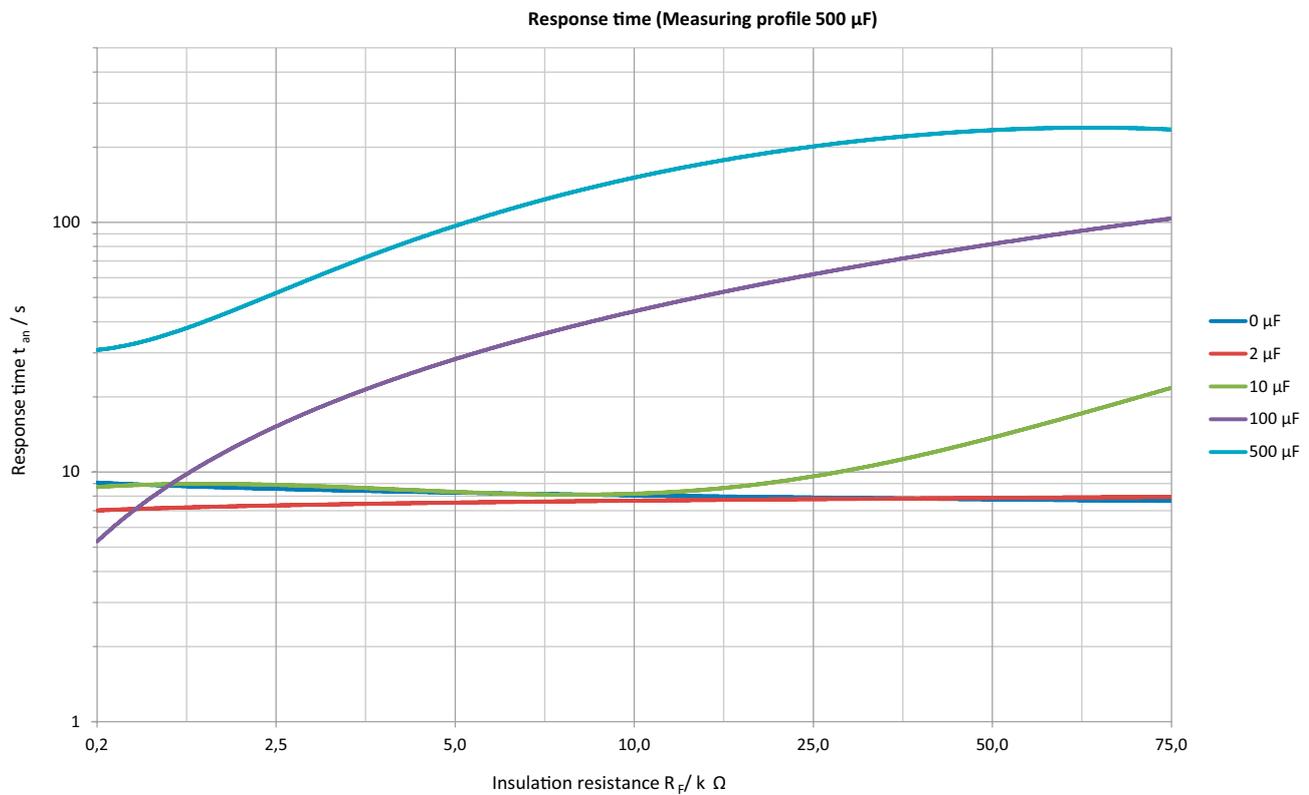
DIN EN 61557-8 (VDE 0413-8), IEC 61557-8, DIN EN 61557-9 (VDE 0413-9), IEC 61557-9, IEC 61326-2-4, DIN EN 60664-1 (VDE 0110-1)

Wiring diagram



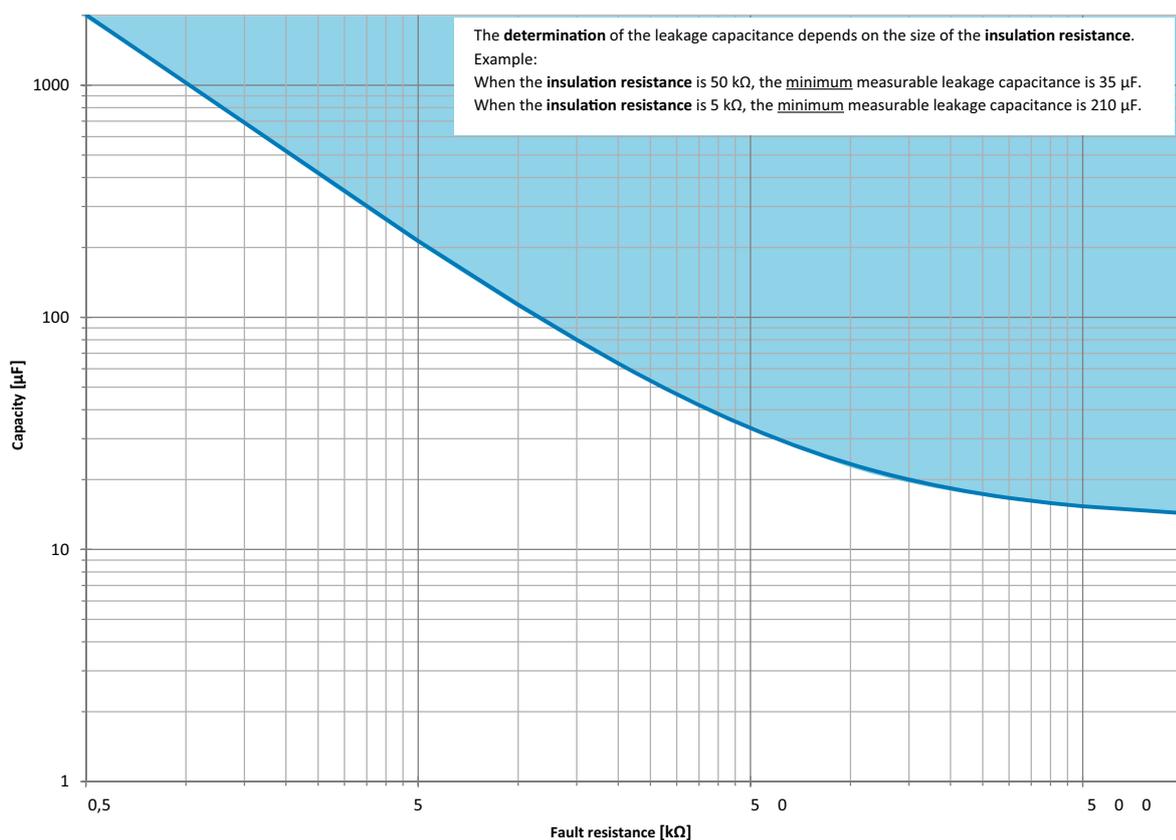
- | | |
|--|--|
| <p>1 - I2+, I2- Currently has no function, digital input</p> <p>2 - I1+, I1- Digital input</p> <p>3 - A, B, S Connection to BMS bus, RS-485, S = shield (connect one end to PE), can be terminated with S700</p> <p>4 - 31, 32, 34 Alarm relay K3 for internal device errors</p> | <p>5 - 21, 22, 24 Alarm relay K2 for insulation faults alarm 2</p> <p>6 - 11, 12, 14 Alarm relay K1 for insulation faults alarm 1</p> <p>7 - E, KE Separate connections of E and KE to PE</p> <p>8 - A1, A2 Connection to U_S = DC 24 V via fuses, 6 A each</p> <p>9 - L1/+ Connection to the IT system to be monitored</p> <p>10 - L2/- Connection to the IT system to be monitored</p> |
|--|--|

Response time for insulation measurement



The measurable leakage capacitance depends on the insulation resistance

Minimum limiting condition for determining the value of the capacitance



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

Insulation coordination according to IEC 60664-1	
Rated voltage	DC 1500 V
Overvoltage category (OVC)	III
Rated impulse withstand voltage	8 kV
Rated insulation voltage	1500 V
Pollution degree exterior	3
Voltage test, routine test (IEC 61010-1)	2.2 kV

Voltage ranges

Nominal system voltage range U_n	AC 0...1000 V/DC 0...1500 V
Tolerance of U_n	AC +10%/DC +5%
Frequency range of U_n	DC, 1...460 Hz
Supply voltage U_s (see also device nameplate)	DC 18...30 V
Frequency range of U_s	DC
Power consumption	
iso1685P	≤ 7 W
iso1685DP	≤ 9 W

Measuring circuit for insulation monitoring

Measuring voltage U_m (peak value)	±50 V
Measuring current I_m (at $R_f = 0 \Omega$)	≤ 1.5 mA
Internal DC resistance R_i	≥ 70 kΩ
Impedance Z_i at 50 Hz	≥ 70 kΩ
Permissible extraneous DC voltage U_{fg}	≤ DC 1500 V
Permissible system leakage capacitance C_e	
iso1685P	≤ 500 μF (150 μF)*
iso1685DP	profile dependent, 0...2000 μF
Measuring range leakage capacitance	
iso1685P	20...500 μF
iso1685DP	20...2000 μF
Tolerance measurement of C_e	±10% ±10 μF
Frequency range measurement of C_e	DC, 30...460 Hz

Response values for insulation monitoring

Response value R_{an1} (alarm 1)	200 Ω...1 MΩ (40 kΩ)*
Response value R_{an2} (alarm 2)	200 Ω...1 MΩ (10 kΩ)*
Condition response value	$R_{an1} \geq R_{an2}$
Upper limit of the measuring range when set to $C_{emax} = 2000 \mu F$ (iso1685DP only)	50 kΩ
Upper limit of the measuring range when set to $C_{emax} = 500 \mu F$	200 kΩ
Relative uncertainty (10 kΩ...1 MΩ) (acc. to IEC 61557-8)	±15%
Relative uncertainty (0.2 kΩ...< 10 kΩ)	±200 Ω ±15%
Hysteresis	25%

Time response

Response time t_{an} at $R_f = 0.5 \times R_{an}$ ($R_{an} = 10 \text{ k}\Omega$) and $C_e = 1 \mu F$ acc. to IEC 61557-8	profile dependent, typ. 10 s
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Measuring circuit for insulation fault location (EDS)

Locating current I_L DC	≤ 50 mA
Test cycle/pause	2 s/4 s
Nominal system voltage range U_n :	
AC ≥ 25 Hz, DC	AC 0...1000 V/DC 0...1500 V
AC < 25 Hz	AC 0...690 V

Indication (iso1685DP only)

Display	graphic display 127 x 127 pixel, 40 x 40 mm
Display range measured value	0.2 kΩ...50 MΩ

LEDs

ON (operation LED)	green
PGH ON	yellow
SERVICE	yellow
ALARM 1	yellow
ALARM 2	yellow

Digital inputs

Operating mode, adjustable	active high, active low
Functions	
iso1685P	digital input 1: test (< 1 s)/standby (> 2 s) digital input 2: reset
iso1685DP	none, test, reset, deactivate device, insulation fault location
High level	10...30 V
Low level	0...0.5 V

Serial interface

Interface/protocol	RS-485/BMS
Connection	terminals A/B
Cable length	≤ 1200 m
Shielded cable (shield to functional earth on one end)	2-core, ≥ 0.6 mm ² , e.g. J-Y(St)Y 2x0.6
Shield	terminal S
Terminating resistor, can be connected (Term. RS-485)	120 Ω (0.5 W)
Device address, BMS bus	
iso1685P	2...33 (2)*
iso1685DP	(1) 2...90 (2)*

Switching elements

Switching elements	
3 changeover contacts: K1 (insulation fault alarm 1), K2 (insulation fault alarm 2), K3 (device error)	
Operating principle K1, K2	N/C operation or N/O operation (N/C operation)*
Operating principle K3	N/C operation, cannot be changed
Electrical endurance under rated operating conditions, number of cycles	100.000

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

Utilisation category	AC13	AC14	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	250 V				
Minimum contact rating	1 mA at AC/DC ≥ 10 V				

Connection (except system coupling)

Connection type	pluggable push-wire terminals
Connection	
rigid/flexible	0.2...2.5 mm ² /0.2...2.5 mm ²
flexible with ferrule, without/with plastic sleeve	0.25...2.5 mm ²
Conductor sizes (AWG)	24...12

Connection of the system coupling

Connection type	pluggable push-wire terminals
Connection	
rigid/flexible	0.2...10 mm ² /0.2...6 mm ²
flexible with ferrule, without/with plastic sleeve	0.25...6 mm ² /0.25...4 mm ²
Conductor sizes (AWG)	24...8
Stripping length	15 mm
Opening force	90...120 N

Technical data (continuation)

Environment/EMC

EMC	IEC 61326-2-4
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) for iso1685P/iso1685DP	3M4
Stationary use (IEC 60721-3-3) for iso1685PW	3M7
Transport (IEC 60721-3-2)	2M2
Long-term storage (IEC 60721-3-1)	1M3
Deviation from the classification of climatic conditions:	
Ambient temperature during operation	-40 ... +70 °C
Ambient temperature for transport	-40 ... +80 °C
Ambient temperature for long-term storage	-25 ... +80 °C
Area of application	≤ 3000 m AMSL

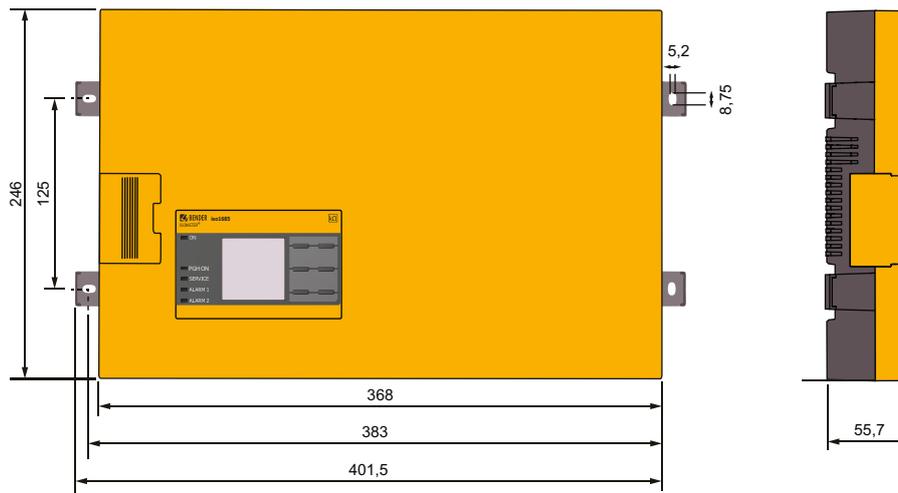
Other

Operating mode	continuous operation
Position of normal use	vertical, system coupling on top
PCB fixation	lens head screw DIN7985TX
Tightening torque of the screws for enclosure mounting	1.0 ... 1.5 Nm
Degree of protection, internal components	IP30
Degree of protection, terminals	IP30
Enclosure material	polycarbonate
Flammability class	V-0
Documentation number	D00272
Weight	≤ 1600 g

()* = Factory setting

Dimension diagram

Dimensions in mm



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