

## **ISOMETER® iso1685P...**

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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## Device features

- Insulation monitoring in extensive unearthed power supply 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
- Automatic adaptation to high system leakage capacitances up to 2000 μF, selectable range
- Integrated locating current injector up to 50 mA
- Device self test with automatic fault message in the event of a fault
- Alarm relays separately adjustable for insulation fault 1, insulation fault 2 and device error
- RS-485 interface (BMS bus), e.g. to control insulation fault location
- μSD card with data logger and history memory for alarms

## Certifications



## Product description

The iso1685P... 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 LED "Alarm 1" lights and the alarm relay K1 switches. When the values fall below the alarm response value  $R_{an2}$ , also LED "Alarm 2" lights and the alarm relay K2 switches.

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

The integrated μSD card is used as data logger for storing all relevant events. The following measured values, statuses and alarms are stored during operation:

- Insulation resistances and leakage capacitances
- System voltages, partial voltages to earth, supply voltages
- Temperatures: current controller of the locating current injector, coupling L1/+, L2/-
- Insulation fault
- 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 the time and date of the creation time. Usually, it takes two days until the maximum file size is reached.

Hence, a μSD card with a memory space of 2 GByte can record data for approx. 400 days.

When the card has reached the maximum data volume, always the oldest file will be overwritten.

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

## Standards

The iso1685P was designed according to 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)

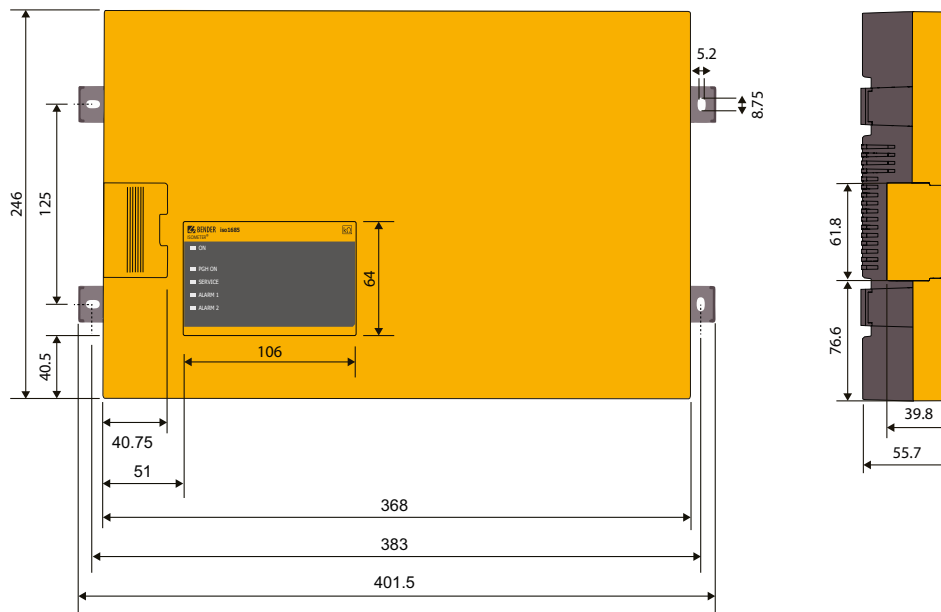
Ordering details

Response value range	Nominal voltage		Supply voltage <sup>1)</sup>	Type	Art. No.
	AC	DC	DC		
200 Ω...1 MΩ	0...1000V	0...1500V	18...30V	iso1685P-425	B91065801
				iso1685PW-425	B91065801W

<sup>1)</sup> Absolute values

Dimension diagram

Dimensions in mm



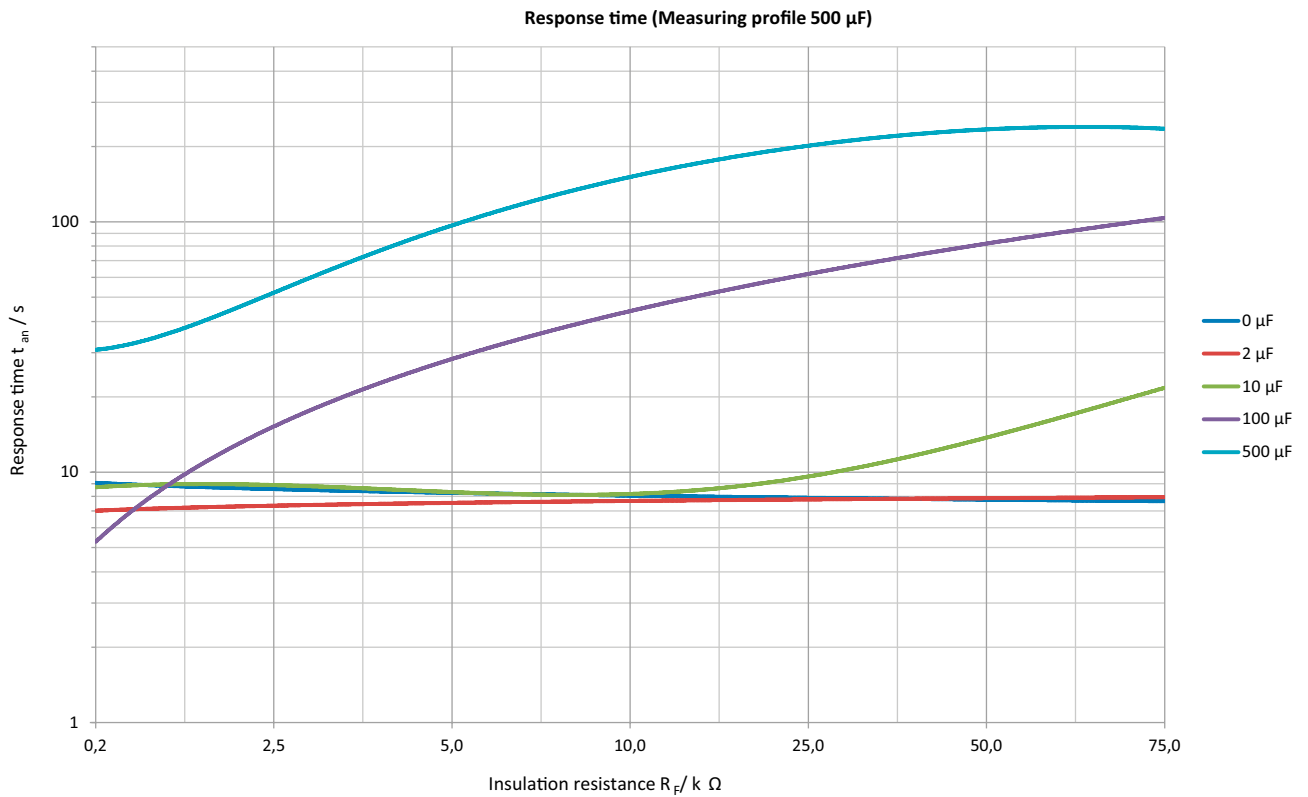
Operating elements



- 1 - ON Power On indicator: Flashes with a pulse duty factor of approx. 80 % and 1 Hz.  
Device error: Lights continuously, when the device stops functioning (device stopped).  
Software update: Flashes approx. three times faster during firmware update. Update time < 4 minutes
- 2 - PGH ON The LED „PGH ON“ flashes during insulation fault location. It indicates that the locating current for the insulation fault location is generated.
- 3 - SERVICE Internal device and connection error (system, earth): Lights continuously.
- 4 - ALARM 1 Insulation fault 1 (prewarning): The „ALARM 1“ LED lights continuously when the insulation resistance falls below the response value 1,  $R_F < R_{an1}$   
Flashes: Connection fault, check earth and system (L1/+, L2/-)
- 5 - ALARM 2 Insulation fault 2 (alarm): The „ALARM 2“ LED lights continuously when the insulation resistance falls below the response value 2,  $R_F < R_{an2}$   
Flashes: Connection fault, check earth and system (L1/+, L2/-)

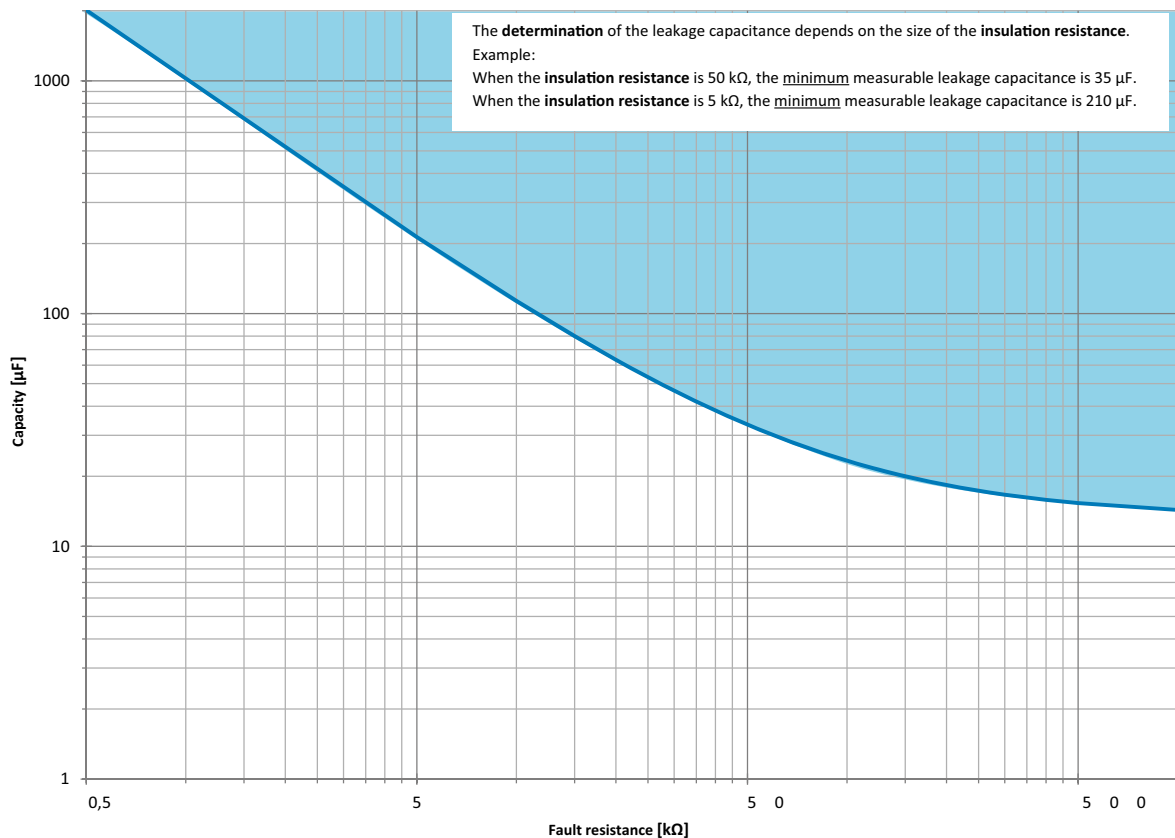


Response time for insulation measurement



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
Overtoltage 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 +6%
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	≤ 7 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 k $\Omega$
Impedance $Z_i$ at 50 Hz	≥ 70 k $\Omega$
Permissible extraneous DC voltage $U_{fg}$	≤ DC 1500 V
Permissible system leakage capacitance $C_e$	≤ 500 $\mu$ F (150 $\mu$ F)*
Measuring range leakage capacitance	20...500 $\mu$ F
Tolerance measurement of $C_e$	±10% ±10 $\mu$ F
Frequency range measurement of $C_e$	DC, 30...460 Hz

### Response values for insulation monitoring

Response value $R_{an1}$ (alarm 1)	200 $\Omega$ ...1 M $\Omega$ (40 k $\Omega$ )*
Response value $R_{an2}$ (alarm 2)	200 $\Omega$ ...1 M $\Omega$ (10 k $\Omega$ )*
Condition response value	$R_{an1} \geq R_{an2}$
Upper limit of the measuring range when set to $C_{e\max} = 500 \mu$ F	200 k $\Omega$
Relative uncertainty (10 k $\Omega$ ...1 M $\Omega$ ) (acc. to IEC 61557-8)	±15%
Relative uncertainty (0.2 k $\Omega$ ...< 10 k $\Omega$ )	±200 $\Omega$ ±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

### Memory

$\mu$ SD card for history memory and log files	≤ 32 GB
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### 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	
digital input 1	test (< 1 s)/standby (> 2 s)
digital input 2	reset
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 <sup>2</sup> , e.g. J-Y(St)Y 2x0.6
Shield	terminal S
Terminating resistor, can be connected (Term. RS-485)	120 $\Omega$ (0.5 W)
Device address, BMS bus	2...33 (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 <sup>2</sup> /0.2...2.5 mm <sup>2</sup>
flexible with ferrule, without/with plastic sleeve	0.25...2.5 mm <sup>2</sup>
Conductor sizes (AWG)	24...12

### Connection of the system coupling

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

**Technical data (continued)**

Environment/EMC		Other	
EMC	IEC 61326-2-4	Operating mode	continuous operation
<b>Classification of climatic conditions acc. to IEC 60721:</b>		Position of normal use	vertical, system coupling on top
Stationary use (IEC 60721-3-3)	3K5 (except condensation and formation of ice)	PCB fixation	lens head screw DIN7985TX
Transport (IEC 60721-3-2)	2K3	Tightening torque of the screws for enclosure mounting	1.0 ... 1.5 Nm
Long-term storage (IEC 60721-3-1)	1K4	Degree of protection, internal components	IP30
<b>Classification of mechanical conditions acc. to IEC 60721:</b>		Degree of protection, terminals	IP30
Stationary use (IEC 60721-3-3)		Enclosure material	polycarbonate
iso1685P	3M4	Flammability class	V-0
iso1685PW	3M7	Weight	≤ 1600 g
Transport (IEC 60721-3-2)	2M2	( )* = Factory setting	
Long-term storage (IEC 60721-3-1)	1M3		
<b>Deviation from the classification of climatic conditions:</b>			
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		



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