

ISOMETER® iso1685DP-425 isoHV1685D-425 isoLR1685DP-325

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



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ISOMETER® iso1685DP

Device features

- ISOMETER® for IT AC systems with galvanically connected rectifiers or inverters and for IT DC systems (IT = unearthed systems)
- Automatic adaptation to the existing system leakage capacitance
- Combination of and other profile-specific measurement methods
- Two separately adjustable response value ranges of 1 kΩ...10 MΩ for Alarm 1 and Alarm 2
- High-resolution graphical LC display
- Connection monitoring (monitoring of the measuring lines)
- Automatic device self test
- Graphical representation of the insulation resistance over time (isoGraph)
- History memory with real-time clock (buffer for three days) for storing 1023 alarm messages with date and time
- Freely programmable digital inputs and outputs
- Remote setting via the Internet or Intranet (COMTRAXX® gateway)
- Worldwide remote diagnosis via the Internet (made available by Bender Service only)
- RS-485 interface for data exchange to other Bender devices

iso1685DP-425

- measuring insulation faults 200Ω ... 1MΩ

isoLR1685DP-325

- measuring insulation faults 20 Ω... 100 kΩ

isoHV1685DP-425

- measuring insulation faults 200Ω ... 1MΩ at mains voltages AC 2000V, DC 3000 V

iso1685DP-425 and isoLR1685DP-325

- Locating current injection for selective insulation fault location
- Indication of the insulation faults selectively located by the EDS system
- Parameter setting of EDS systems
- Customer-specific texts for each measuring channel

Product description

The ISOMETER® isoxx1685Dx-x25 is used for insulation monitoring of extensive IT systems. 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 ISOMETER® iso1685Dxx 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.

Standards

The iso1685DP was designed according to the following standards:

- DIN EN 61557-8 (VDE 0413-8)
- IEC 61557-8
- IEC 61557-8 Appendix C (only applies to profile Fast 2000 μF)
- DIN EN 61557-9 (VDE 0413-9)
- IEC 61557-9
- IEC 61326-2-4
- DIN EN 60664-1 (VDE 0110-1)

Certifications

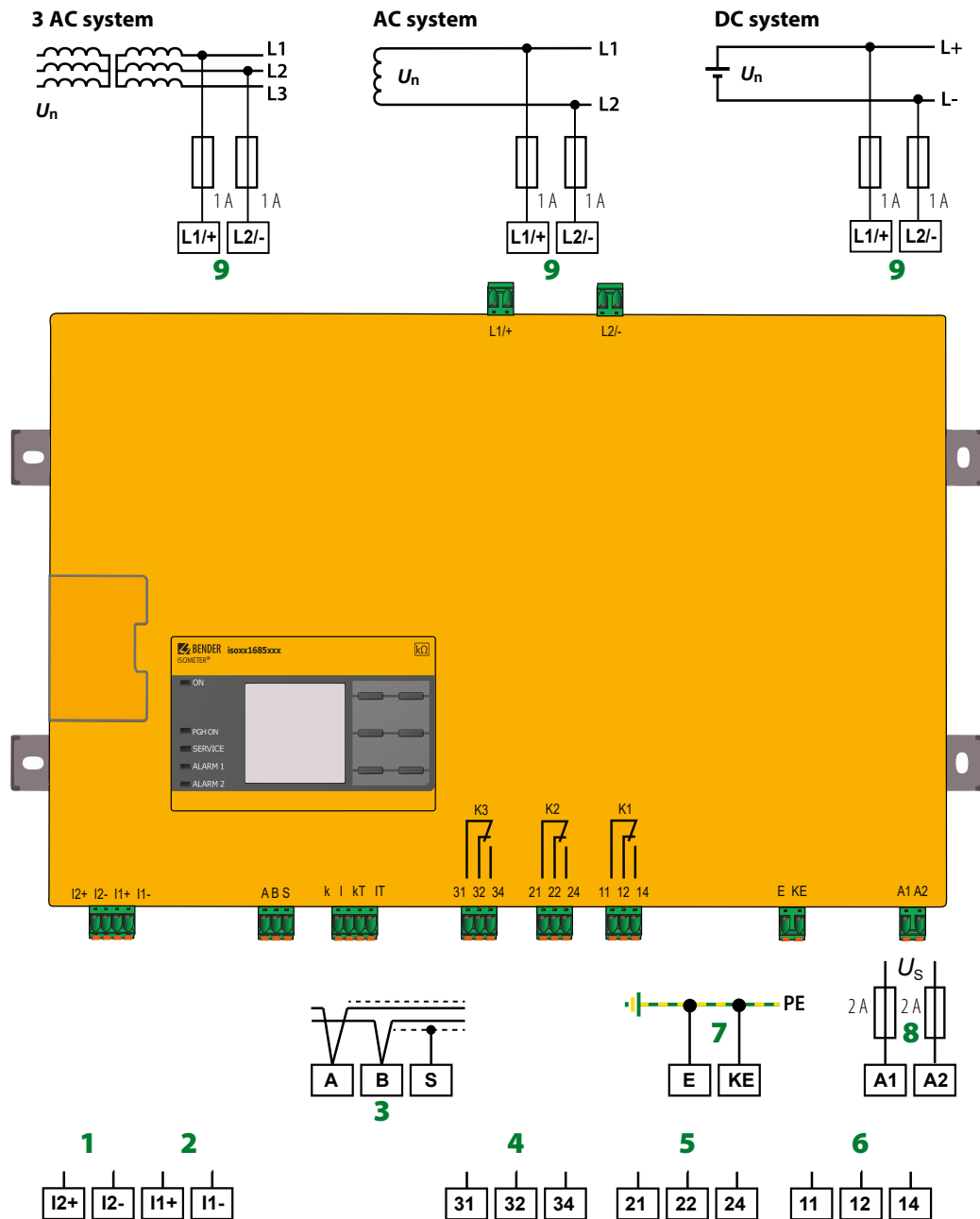


Ordering details

Supply voltage ¹⁾	Response value range	Nominal voltage		Type	Art. No.
		AC	DC		
18...30V	20 Ω... 100 kΩ	0...690 V	0...690 V	isoLR1685DP-325	B91065803
	200 Ω... 1 MΩ	0...2000V	0...3000V	isoHV1685D-425	B91065805
		0...1000V	0...1500V	iso1685DP-425	B91065802

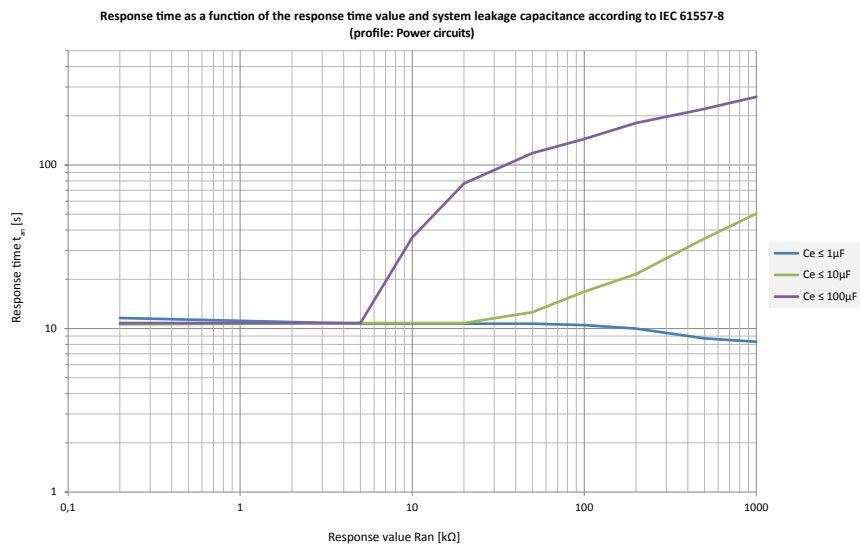
¹⁾ Absolute values

Wiring diagram

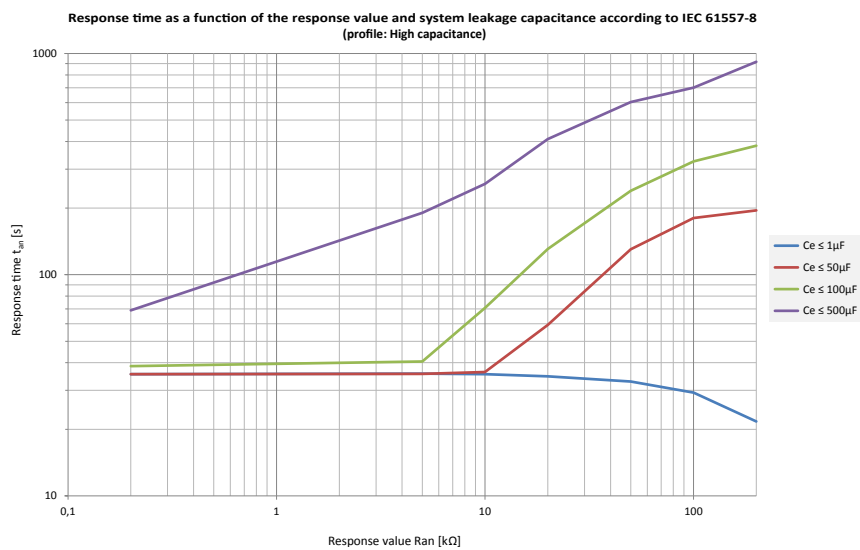


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|--|---|
| <p>1 - I2+, I2- Standby, digital input</p> <p>2 - I1+, I1- Test, digital input</p> <p>3 - A, B, S Connection to BMS bus, RS-485, S = shield (connect one end to PE), can be terminated with S700</p> <p>4 - 31, 32, 34 Alarm relay K3 for internal 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, 2 A each</p> <p>9 - L1+, L2/- Connection to the IT system to be monitored</p> |
|--|---|

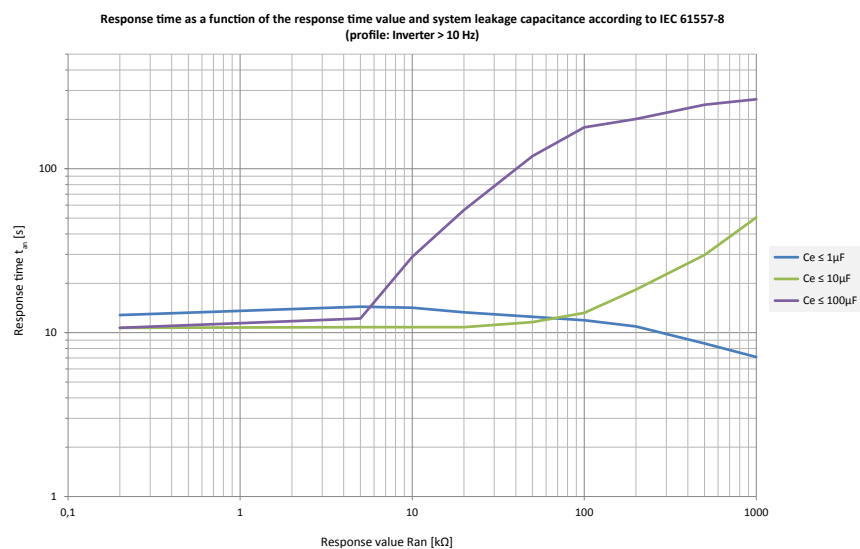
Response time profile Power circuits



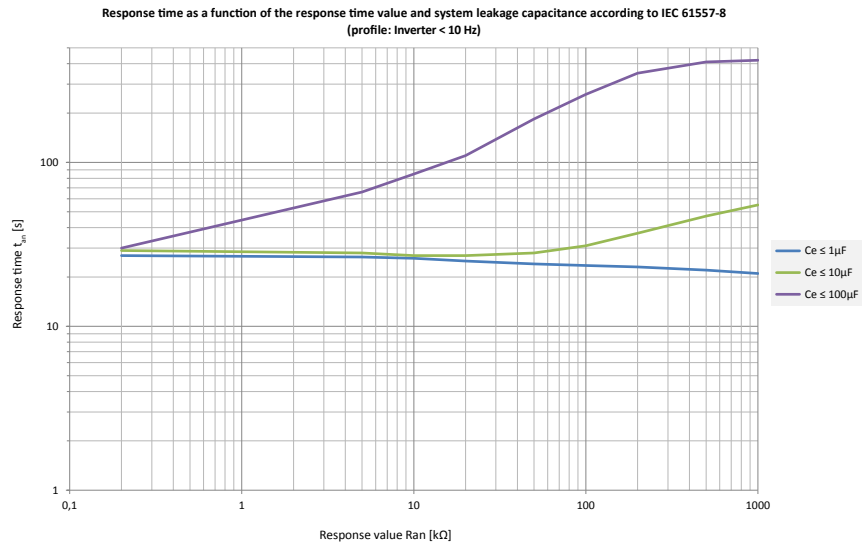
Response time profile High capacitance



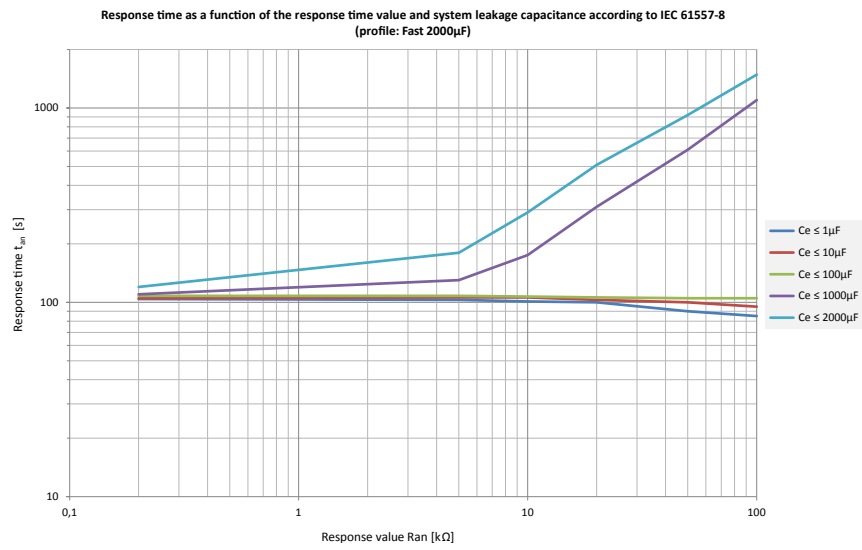
Response time profile Inverter > 10 Hz



Response time profile Inverter < 10 Hz

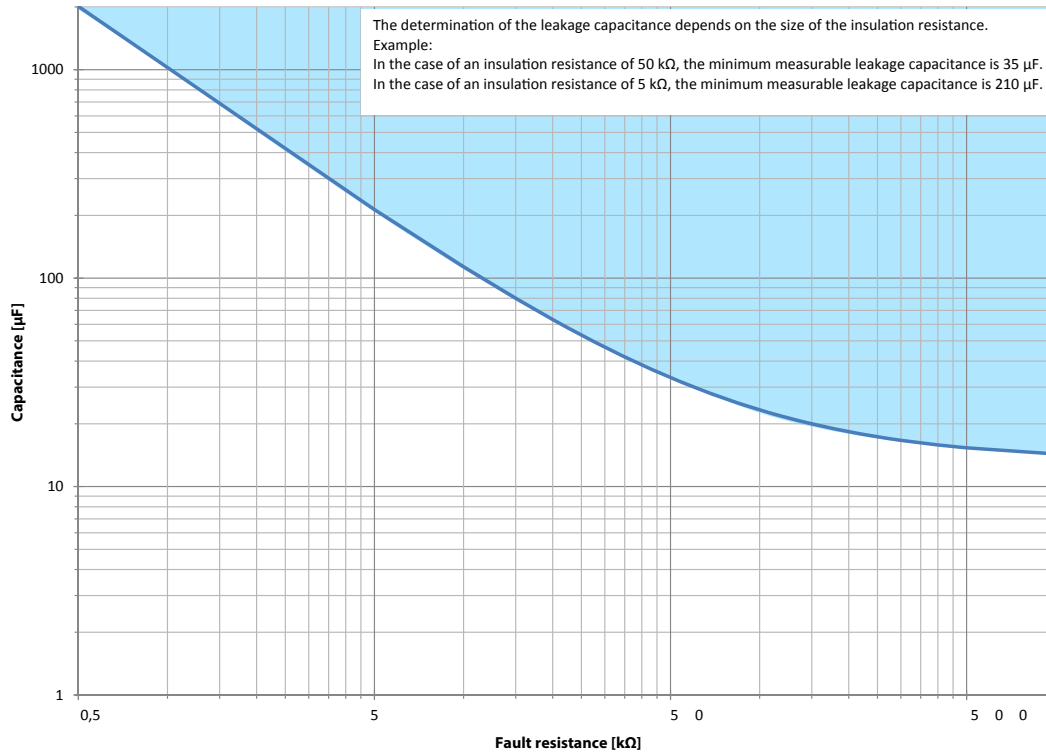


Response time profile Fast 2000 μF

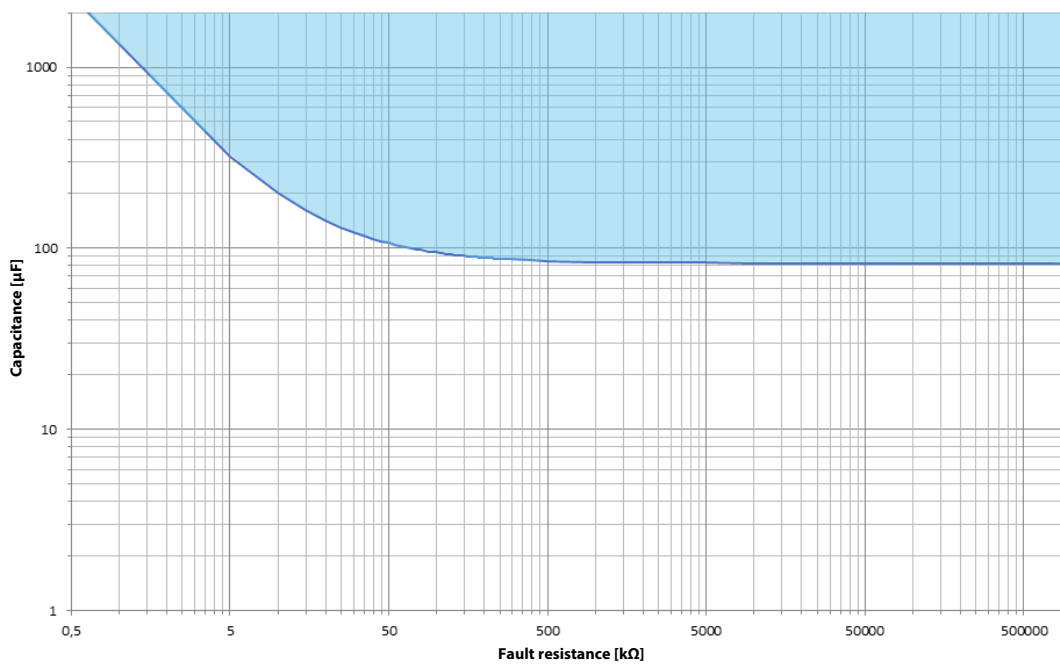


Leakage capacitance

Limiting condition for detemining value of capacitance (iso1685DP; isoHV1685D)



Limiting condition for detemining value of capacitance (isoLR1685DP)



Technical data
Isolationskoordination nach IEC 60664-1/IEC 60664-3

Definitions:	
Measuring circuit (IC1)	(L1/+, L2/-), (E, KE)
Supply circuit (IC2)	A1, A2
Outputcircuit 1 (IC3)	11, 12, 14
Outputcircuit 2 (IC4)	21, 22, 24
Outputcircuit 3 (IC4)	31, 32, 34
Controlcircuit (IC6)	(A, B), (I1+, I1-, I2+, I2-)
Rated Voltage [for isoHV1685D]	1500V [3000 V]
Overvoltagecategory	III
Rated impulse voltage:	
IC1/(IC2-5) [for isoHV1685D]	10 kV [16,670 kV]
IC2/(IC3-5)	4 kV
IC2/IC1+IC6	800 V
IC3/(IC4-6)	4 kV
IC4/(IC5-6)	4 kV
IC5/IC6	4 kV
Rated insulation voltage:	
IC1/(IC2-6) [für isoHV1685D]	1500 V [3000 V]
IC2/(IC3-5)	250 V
IC2/IC6	50 V
IC3/(IC4-6)	250 V
IC4/(IC5-6)	250 V
IC5/IC6	250 V
Pollutiondegree	3
Safe insulation (reinforced insulation)between:	
IC1/(IC2-5) [für isoHV1685D]	Überspannungskategorie III, 1500 V [3000 V]
IC2/(IC3-5)	Überspannungskategorie III, 300 V
IC2/IC6	Überspannungskategorie III, 50 V
IC3/(IC4-6)	Überspannungskategorie III, 300 V
IC4/(IC5-6)	Überspannungskategorie III, 300 V
IC5/IC6	Überspannungskategorie III, 300 V
Voltage test (routine test) acc. to IEC 61010-1:	
IC2/(IC3-5)	AC 2,2 kV
IC2/IC6	DC ±0,50 kV
IC3/(IC4-6)	AC 2,2 kV
IC4/(IC5-6)	AC 2,2 kV
IC5/IC6	AC 2,2 kV

Voltage ranges

Nominal system voltage range U_n	
iso1685DP	AC 0...1000 V; DC 0...1500 V
isoHV1685D	AC 0...2000 V; DC 0...3000 V
isoLR1685DP	AC 0...690 V; DC 0...690 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	≤ 9 W

Measuring circuit for insulation monitoring

Measuring voltage U_m (peak value)	±50 V
Measuring current I_m (bei $R_f = 0 \Omega$)	
iso1685DP, isoHV1685D	≤ 1,5 mA
isoLR1685DP	≤ 3,5 mA
Internal DC resistance R_i	
iso1685DP, isoHV1685D	≥ 70 kΩ
isoLR1685DP	≥ 15kΩ* ¹⁾
Impedance Z_i at 50 Hz	
iso1685DP, isoHV1685D	≥ 70 kΩ
isoLR1685DP	≥ 15 kΩ* ¹⁾
Permissible extraneous DC voltage U_{fg}	
iso1685DP	≤ DC 1600 V
isoHV1685D	≤ DC 3150 V
isoLR1685DP	≤ DC 720 V
Permissible system leakage capacitance C_e	profile dependent, 0...2000 μF

Response values for insulation monitoring

Response value R_{an1} (alarm 1) and (alarm 2)	
iso1685DP, isoHV1685D	200 Ω...1 MΩ (40 kΩ/10 kΩ)* ²⁾
isoLR1685DP	20 Ω...100 kΩ (4 kΩ/1 kΩ)* ²⁾
Condition response value	$R_{an1} \geq R_{an2}$
Upper limit of the measuring range when set to $C_{emax} = 2000 \mu F$	50 kΩ
Upper limit of the measuring range when set to $C_{emax} = 500 \mu F$	200 kΩ
Relative uncertainty (iso1685DP; isoHV1685D)	
(10 kΩ...1 MΩ) (acc. to IEC 61557-8)	±15 %
(0.2 kΩ...< 10 kΩ)	±200 Ω ±15 %
Relative uncertainty (isoLR1685DP)	
(1 kΩ...100 kΩ) (acc. to IEC 61557-8)	±15 %
(20 Ω...< 1 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) (only iso1685DP)

Locating current IL DC	≤ 50 mA (1/2,5/5/10/25/50 mA)
Test cycle/pause	2 s/4 s

Indication

Display	graphic display 127 x 127 pixel, 40 x 40 mm
Display range measured value	
iso1685DP, isoHV1685D	200 Ω...50 MΩ
isoLR1685DP	20 Ω...1 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	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/Modbus/RTU
Connection	terminals A/B
Cable length	≤ 1200 m
Shielded cable (shield to functional earth on one end)	2-core, ³⁾ 0.6 mm ² , e.g. J-Y(St)Y2x0.6
Shield	terminal S
Terminating resistor, can be connected (Term. RS-485)	120 Ω (0.5 W)
Device address, BMS bus	(1) 2...90 (2)*
Device adress Modbus/RTU	1...247
Baudrate	9,6/19,2/38,4/57,6/115 kB
Parity	even/odd
Stop Bits	1/2/auto

Technical data (continued)

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	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	250 V				
Minimum contact rating	1 mA at AC/DC \geq 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				
Connection, 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				
Connection, 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				

Environment/EMC

EMC	IEC 61326-2-4
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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 iso1685DP	3M4
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 transport	-40...+80 °C
Ambient temperature long-term storage	-25...+80 °C
Area of application	\leq 3000 m AMSL

Other

Operating mode	continuous operation
Position of normal use	vertical, system coupling on top
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
Weight	\leq 1600 g

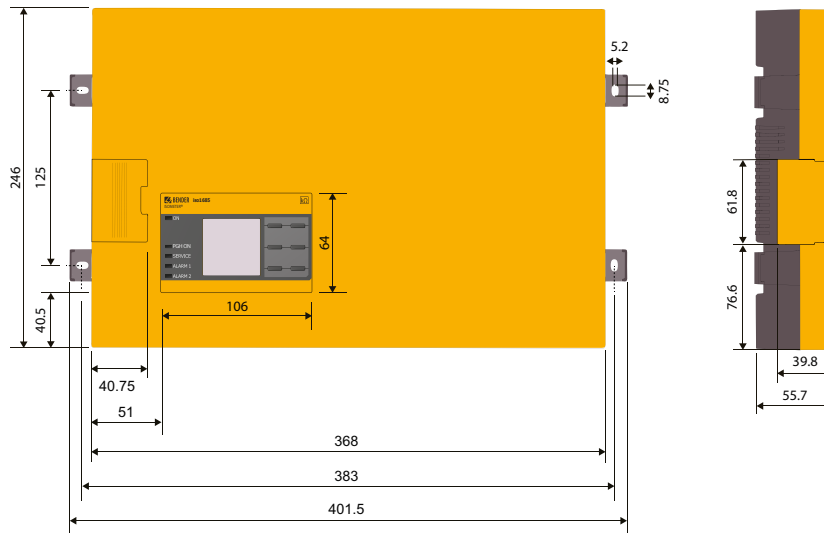
()* = Factory settings

¹⁾ for $U_n > 500$ V not acc. to IEC61557-8

²⁾ Values in brackets are factory settings

Dimension diagram

Dimensions in mm



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