

# ISOMETER® isoHR1685DW-925

Insulation monitoring device for mobile, insulated elevating work platforms



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## Device features

ISOMETER® for mobile, insulated elevating work platforms

- Continuous monitoring of both insulation levels on elevating work platforms, also during operation
- Storage of data for verification of insulation condition. Where necessary, provision of documentary verification following a electrical accident
- Graphical representation of the insulation resistance over time (isoGraph)
- RS-485 interface with BMS protocol and Modbus RTU for forwarding data, alarms and acknowledgements via existing communication to work platform
- History memory with real-time clock (13-day buffer) for storing 1023 alarm messages with date and timestamp
- Freely programmable digital inputs
- Automatic device self-test with automatic message in the event of a fault
- Connection monitoring
- Separately adjustable response values  $R_{an1}$  (alarm 1) and  $R_{an2}$  (alarm 2) for pre-warning and alarm
- High-resolution graphic LC display, for excellent readability and recording of the device status
- Measurement of high-resistance insulation faults 100 k $\Omega$ ...50 G $\Omega$
- Automatic adjustment to high system leakage capacitances

## Approvals and certifications



## Product description

The ISOMETER® isoHR1685DW-925 is designed for insulation monitoring on elevating work platforms/overhead catenary vehicles. Voltages of up to 1500 V make working on live overhead lines for local transport vehicles particularly hazardous. To protect operatives, overhead catenary vehicles are equipped with 2 insulation levels. Pollution, ageing or damage to these insulation levels can cause the current to be perceptible to people and presents an electrocution hazard.

The isoHR1685DW-925 makes a valuable contribution to improving the safety of work carried out on live systems of this kind.

The device is installed in the vehicle, where it continuously monitors the insulation level and notifies operatives immediately whenever defined insulation levels drop below defined thresholds during the approach, and both before and during maintenance work. Both insulation levels can be monitored.

## Function

Insulation monitoring is carried out using an active measuring pulse which is superimposed onto the lifting arm of the elevating work platform and the vehicle chassis via the integrated coupling.

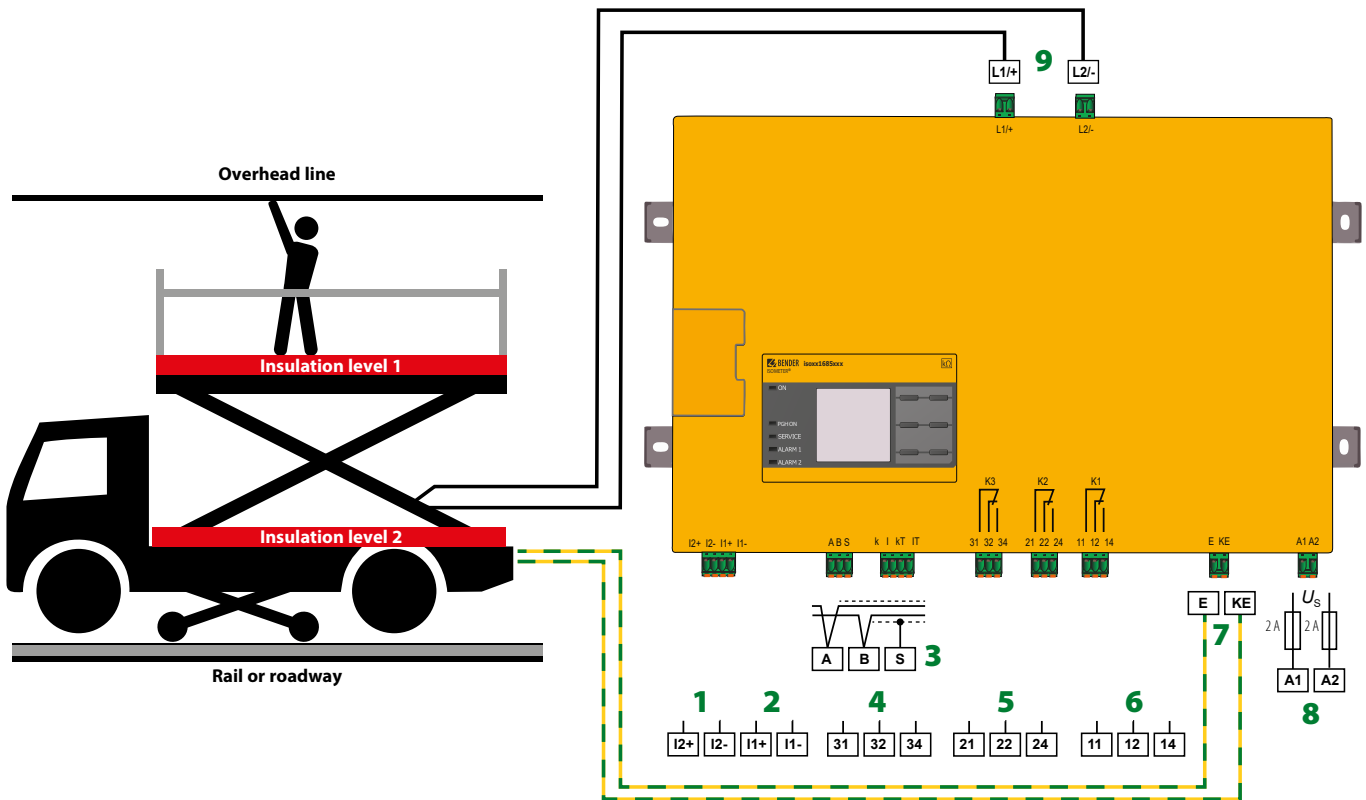
If the insulation resistance between the lifting arm and the vehicle chassis exceeds the preconfigured pre-warning response value  $R_{an1}$ , the "ALARM 1" LED lights up and relay K1 (11/12/14) switches. If this value drops below the alarm response value  $R_{an2}$ , alarm relay K2 (21/22/24) switches over and the "ALARM 2" LED lights up.

## Standards

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

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

Wiring diagram



- |   |   |
|---|---|
| <p><b>1 - I2+, I2-</b> Initial measurement, digital input</p> <p><b>2 - I1+, I1-</b> Test, digital input</p> <p><b>3 - A, B, S</b> Connection to RS-485 with BMS bus, Modbus RTU, S = shield (connect to PE on one side), can be terminated with S700</p> <p><b>4 - 31, 32, 34</b> Alarm relay K3 for internal device faults</p> <p><b>5 - 21, 22, 24</b> Alarm relay K2 for insulation faults, alarm 2</p> | <p><b>6 - 11, 12, 14</b> Alarm relay K1 for insulation faults, alarm 1</p> <p><b>7 - E, KE</b> Separate connections of E and KE to PE and/or vehicle chassis</p> <p><b>8 - A1, A2</b> Connection to <math>U_S = DC 24 V</math> via fuses, 2 A each</p> <p><b>9 - L1/+, L2/-</b> Connection of both coupling terminals L1/+ and L2/- to lifting arm of the work platform</p> |
|---|---|

## Technical data

### Insulation coordination acc. to IEC 60664-1/IEC 60664-3

#### Definitions:

Measuring circuit (IC1)	(L1/+, L2/-), (E, KE)
Supply circuit (IC2)	A1, A2
Output circuit 1 (IC3)	11, 12, 14
Output circuit 2 (IC4)	21, 22, 24
Output circuit 3 (IC4)	31, 32, 34
Control circuit(IC6)	(A, B), (I1+, I1-, I2+, I2-)

Rated voltage 1500 V

Overvoltage category III

#### Rated impulse voltage:

IC1/(IC2-5)	10 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)	1500 V
IC2/(IC3-5)	250 V
IC2/IC6	50 V
IC3/(IC4-6)	250 V
IC4/(IC5-6)	250 V
IC5/IC6	250 V

Pollution degree 3

#### Protective separation (reinforced insulation) between:

IC1/(IC2-5)	Overvoltage category III, 1500 V
IC2/(IC3-5)	Overvoltage category III, 300 V
IC2/IC6	Overvoltage category III, 50 V
IC3/(IC4-6)	Overvoltage category III, 300 V
IC4/(IC5-6)	Overvoltage category III, 300 V
IC5/IC6	Overvoltage category III, 300 V

#### Voltage test (routine test) as per 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 $U_n$	AC 0...1000 V DC 0...1500 V
Tolerance of $U_n$	AC +10%/DC +5 %
Frequency range of $U_n$	DC 0.1...460 Hz
Supply voltage $U_s$ (also see device name plate)	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 $I_m$ (at $R_f = 0 \Omega$ )	≤ 1 $\mu$ A
Internal resistance DC $R_i$	≥ 50 M $\Omega$
Impedance $Z_i$ at 50 Hz	≥ 50 M $\Omega$
Permissible extraneous DC voltage $U_{fg}$	≤ DC 1600 V
Permissible system leakage capacitance $C_e$ isoHR1685DW-925	profile-dependent, 0...1 $\mu$ F

### Response values for insulation monitoring

Response value $R_{an1}$ (alarm 1) and $R_{an2}$ (alarm 2)	100 k $\Omega$ ...100 M $\Omega$
Response value condition	$R_{an1} \geq R_{an2}$
Upper limit of the measuring range when setting measuring profile to "high capacity" $C_{emax} = 5 \mu$ F	24 M $\Omega$
Relative uncertainty (acc. to IEC 61557-8)	±15 %
100 k $\Omega$ ...10 M $\Omega$	±200 k $\Omega$ ±15 %
Hysteresis	25 %

### Time response

Response time  $t_{an}$  at  $R_f = 0.5 \times R_{an}$  ( $R_{an} = 100 \text{ k}\Omega$ ) and  $C_e = 1 \mu\text{F}$  acc. to IEC 61557-8  
profile-dependent, typ. 10 s

### Display

Display	graphic display 127 x 127 pixels, 40 x 40 mm
Display range, measured value	100 k $\Omega$ ...50 G $\Omega$

### LEDs

ON (operation LED)	green
PGH ON (no function)	yellow
SERVICE	yellow
ALARM 1	yellow
ALARM 2	yellow

### Digital inputs

Operating mode, variable	active high, active low
Functions	off, test, reset, disable 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 side)	2-core, ≥ 0.6 mm <sup>2</sup> , e.g. J-Y(St)Y 2x0.6

Shield	Terminal S
Terminating resistance, engageable (term. RS-485)	120 $\Omega$ (0.5 V)
Device address, BMS bus	(1) 2...90 (2)*
Device address, Modbus RTU	1 – 247
Baud rate	9.6/19.2/38.4/57.6/115 kB
Parity	even/uneven
Stop bits	1/2/auto

### Connection (except mains coupling)

Type of connection	Pluggable push-wire terminals
Connection, rigid/flexible	0.2...2.5 mm <sup>2</sup> /0.2...2.5 mm <sup>2</sup>
Connection, flexible with ferrule, without/with plastic sleeve	0.25...2.5 mm <sup>2</sup>
Conductor sizes (AWG)	24...12

### Connection of the mains coupling

Type of connection	Pluggable push-wire terminals
Connection, rigid/flexible	0.2...10 mm <sup>2</sup> /0.2...6 mm <sup>2</sup>
Connection, 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

### Switching elements

Switching elements	3 changeover contacts: K1 (insulation fault alarm 1), K2 (insulation fault alarm 2), K3 (device fault)
Operating mode K1, K2	N/C operation / N/O operation (N/C operation)*
Operating mode K3	N/C operation, not modifiable
Electrical endurance under rated operating conditions	100,000 cycles

### 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 ≥ 10 V				

**Technical data (continued)**

**Environment/EMC**

EMC IEC 61326-2-4

**Classification of climatic conditions acc. to IEC 60721:**

Stationary use (IEC 60721-3-3) 3K5 (no condensation, no formation of ice)  
 Transport (IEC 60721-3-2) 2K3  
 Long-term storage (IEC 60721-3-1) 1K4

**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

**Deviation from climate classes:**

Ambient temperature during operation -40...+70 °C  
 Ambient temperature during transport -40...+80 °C  
 Ambient temperature during long-term storage -25...+80 °C  
 Application range ≤ 3000 m AMSL

**Other**

Operating mode Continuous operation  
 Position of normal use Vertical, mains coupling at top  
 Tightening torque for screws (4x M5) to fasten enclosure 1.0...1.5 Nm  
 Degree of protection, internal components IP30  
 Degree of protection, terminals IP30  
 Enclosure material Polycarbonate  
 Flammability class V-0  
 Weight ≤ 1600 g

( )\* = factory setting

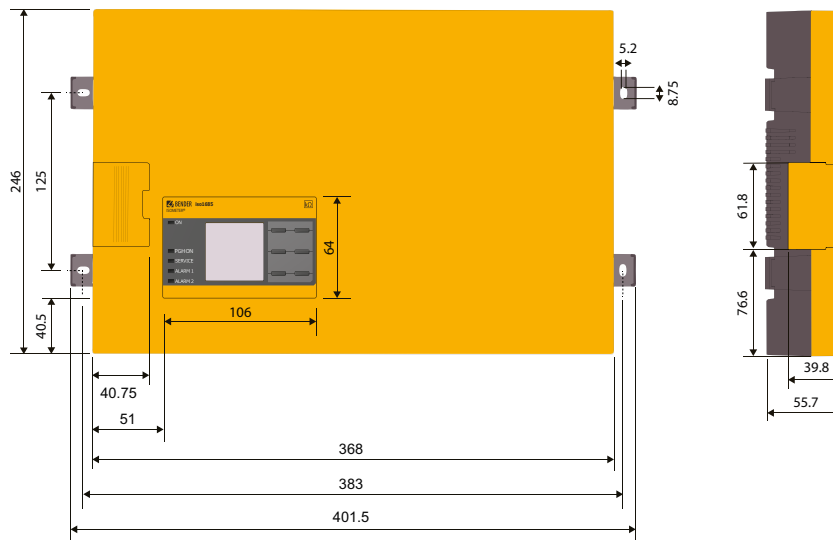
**Ordering information**

Supply voltage <sup>1)</sup>	Response value range	Nominal system voltage		Type	Art. No.
		AC	DC		
DC 18...30V	100 kΩ...100 MΩ	0...1000V	0...1500V	isoHR1685DW-925	B91065806W

<sup>1)</sup> Absolute values

**Dimension diagram**

Dimensions in mm





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