



## **IMD100**

**Insulation Monitoring Device for ungrounded DC circuits  
used in the charging of electric vehicles**

**Data Sheet/Technical Information – V1.0**

**English**

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## 1. Key Features

- ❑ **For integration into Mode 4, high-voltage DC electric vehicle charging stations**
- ❑ **Insulation monitoring according to IEC 61557-8**
- ❑ **Suitable for network voltages up to 1000VDC**
- ❑ **Maximum system leakage capacitance – 5 $\mu$ F**
- ❑ **Pre-set measurement levels – Fault 100k $\Omega$  , Warning 500k $\Omega$  (factory default<sup>1</sup>)**
- ❑ **Response time <10s**
- ❑ **System voltage monitoring with undervoltage and overvoltage detection**
- ❑ **Isolated MODBUS RTU connection**
- ❑ **Auxiliary power supply – 12-24VDC**
- ❑ **2 (SPNO) configurable relay outputs**
- ❑ **Local Test and Reset buttons**
- ❑ **Option to connect external button for remote Test/Reset triggering**
- ❑ **LED indication for status, warning and fault**
- ❑ **DIN Rail mounting – 70mm wide enclosure**

<sup>1</sup> Can be changed via Modbus

## 2. Overview

The IMD100 is designed for use in unearthed DC (IT) systems to monitor the insulation resistance and detect any deterioration in the wiring to the EV charging equipment. It serves as an early warning system to indicate and identify a potential fault thereby allowing any maintenance to be carried out to rectify.

The IMD is permanently connected to a separate supply which also allows for the monitoring of de-energised systems. Monitoring of this supply is made by connection to the terminals L+, L- and PE. Two relay outputs provide both alarm and fault states which can be independently set to operate at a pre-set level. Additionally, the relays can be configured to either energise or de-energise in response to a fault.

Adjustment to the factory default settings is made via Modbus. From here, it is possible to change parameters such as response values, relay switching logic and system voltage to be monitored. Furthermore, current and historical information can also be viewed.

## IMD100 Insulation Monitoring Device

### 3. Function Diagram

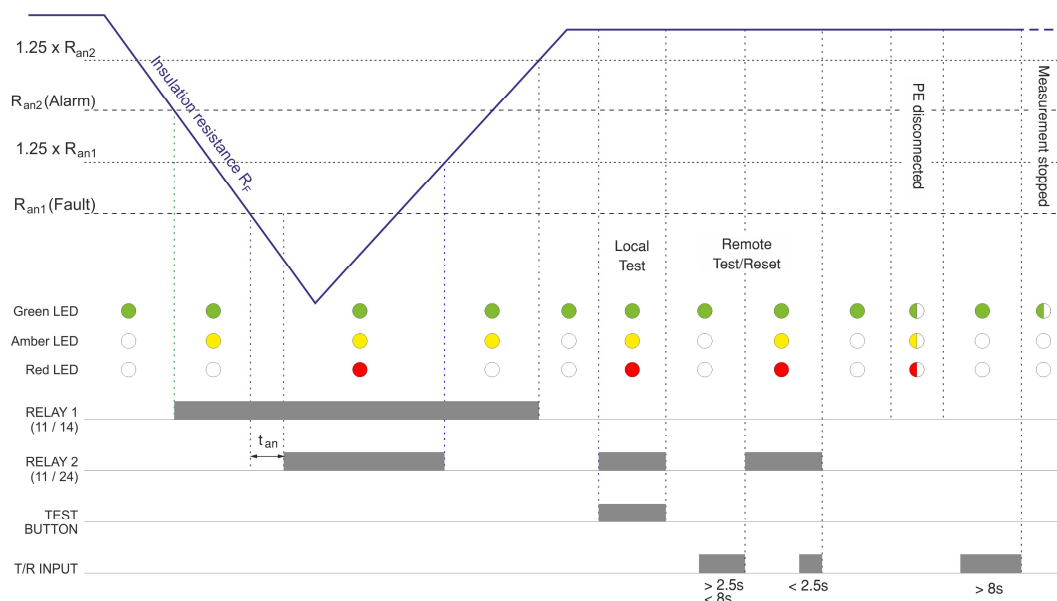


Fig. 1

### 4. LED & Relay Status

System status	Green LED	Amber LED	Red LED	Relay 1 (Alarm)**	Relay 2 (Fault)**
Normal operation ( $R_F > R_{an2}$ )	On	Off	Off	DE	DE
Pre-alarm condition ( $R_{an2} > R_F > R_{an1}$ )	On	On	Off	EN	DE
Alarm/Fault condition ( $R_F \leq R_{an1}$ )	On	On	On	EN	EN
Test mode	On	On	On	EN	EN
PE disconnected	Flashing simultaneously*			DE	DE
Measurement stopped	Flashing*	Off	Off	DE	DE
Manual self-test	On	On	On	EN	EN

\* Flash rate 2Hz

\*\* factory default

## 5. Installation



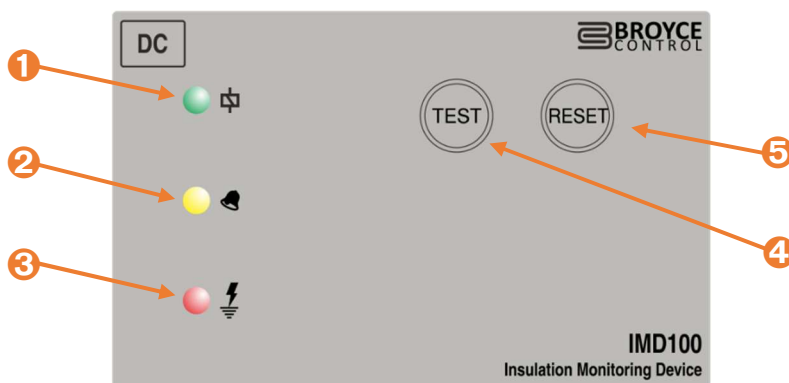
Installation work must be carried out by qualified personnel.

- BEFORE INSTALLATION, **ENSURE ALL SUPPLIES ARE ISOLATED.**
- Connect the unit as shown in the diagram on the next page (N.B. certain features may not be required and therefore do not need to be connected).
- Ensure the Auxiliary supply voltage to be connected to terminals A1 and A2 matches the rating of the product.
- If the device is intended to be connected to MODBUS and is last in the chain, the slide switch that connects the internal 120Ω resistor should be set to “ON”.
- To satisfy regulations, it is recommended that the device be tested periodically to ensure correct operation.

## IMD100 Insulation Monitoring Device

### 6. Front Panel Description

- |                                    |                   |
|------------------------------------|-------------------|
| 1. Power on LED indication (Green) | 4. "Test" button  |
| 2. "Alarm" LED indication (Amber)  | 5. "Reset" button |
| 3. "Fault" LED indication (Red)    |                   |



### 7. Operation

- The unit is supplied with factory default settings. There are no user adjustments on the product itself.

*The following assumes factory default settings.*

#### *Applying power.*

- Apply power and the green "power on" LED ① will illuminate. Both output relays will remain in their de-energised state.

#### *Insulation fault.*

- In the event of an insulation fault, relay 1 (RLY1) will energise first if the fault level is less than the response value  $R_{an2}$ . The amber "alarm" LED ② will illuminate.
- If the insulation fault then becomes less than the response value  $R_{an1}$  for greater than the response time  $t_{an}$  relay 2 (RLY2) will then energise. The red "fault" LED ③ will also illuminate.
- Once the fault has cleared (fault level  $> 1.25 R_{an1}$ ), the amber LED ② and red LED ③ will extinguish. Both relays will return to their de-energised states.

#### *Fault simulation (Test mode).*

##### **Local Test**

- The unit can be placed into a fault condition by pressing and holding the "Test" button ④ on the front of the unit. The relays change state accordingly.
- Release the button to revert to normal operation.

##### **Remote Test (if fitted)**

- The remote (T/R) button must be closed for between 2.5s and 8s (the released) to enter the Test mode.
- Press the button again ( $< 2.5s$ ) to revert to normal operation.

#### *Stop mode.*




- Press and hold the remote (T/R) button for  $> 8s$  to enter stop mode and pause measurements.
- Release the button to resume operation.

#### *Troubleshooting.*

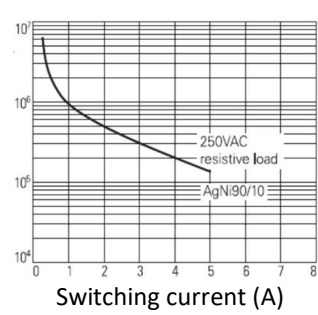
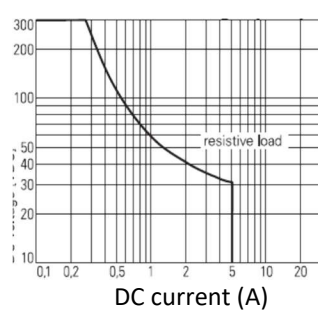
- If the unit fails to operate correctly, check that all wiring and connections are good.

## IMD100 Insulation Monitoring Device

### 8. Technical Specification

<b>Auxiliary Power Supply (A1, A2)</b>			
Voltage rating (Us):	12 - 24V DC		
Supply variation:	85 - 115% of Us		
<i>Auxiliary supply is galvanically isolated from the monitored DC supply</i>			
Overvoltage category:	III (IEC 60664)		
Power consumption (max.):	2W		
<b>Monitored input (using terminals, L+, L-, PE1 &amp; PE2)</b>			
Monitoring principle:	Insulation between L+/L- and PE1/PE2		
Monitored DC supply voltage:	30V - 1000V DC		
System leakage capacitance (C <sub>e</sub> ):	5uF		
Specified response value (R <sub>an</sub> ):	R <sub>an1</sub> = 100kΩ (Fault) R <sub>an2</sub> = 500kΩ (Alarm) <i>Assuming 1000V DC nominal charger output</i>		
Response level accuracy:	±15%, ±1kΩ		
Fault hysteresis level:	125% of R <sub>an1</sub> (125kΩ)		
Alarm hysteresis level:	125% of R <sub>an2</sub> (625kΩ)		
Response time (t <sub>an</sub> ):	≤ 10s typically <i>Response time measured with C<sub>e</sub> = 1uF</i>		
Response value for break/disconnection of PE1/PE2 conductors:	> 500Ω		
Measuring voltage:	±15V approx.		
Internal DC resistance:	At least 30Ω/V of Un. Typ. >2MΩ		
Measuring current:	≤ 100μA peak @ R <sub>f</sub> = 0Ω		
Reset time:	< 1s (from supply interruption)		
<b>LED indication (refer also to function diagram for LED diagnostic information)</b>			
Power Supply		Green x1	<i>LED is usually permanently lit but will flash if measurement stops*</i>
Alarm		Amber x1	<i>Illuminates during alarm condition*</i>
Tripped		Red x 1	<i>Illuminates during fault condition*</i>
<i>* LED also flashes when PE is disconnected</i>			
<b>Manual Test and Reset</b>			
	<b>Front push buttons</b>		<b>Remote N.O. push button (T/R, PE1)</b>
<i>“Test” method (assuming unit is in the non-tripped state)</i>	Press “TEST” once to trip the unit		Press and hold button between 2.5s and 8s, then release to trip the unit
<i>“Reset” method (assuming unit is in the tripped state and fault cleared)</i>	Press “RESET” once to clear fault indication only		Press button <2.5s to reset the unit
<b>Auto-reset</b>			
Allows for unit to return to normal operation automatically	Enabled ( <i>factory default</i> )		
<b>Relay operational mode (assuming factory default settings used)</b>			
Status	<b>RLY1 (Alarm)</b>	<b>RLY2 (Fault)</b>	
Normal:	De-energised	De-energised	
Alarm:	Energised	De-energised	
Fault:	Energised	Energised	

## IMD100 Insulation Monitoring Device

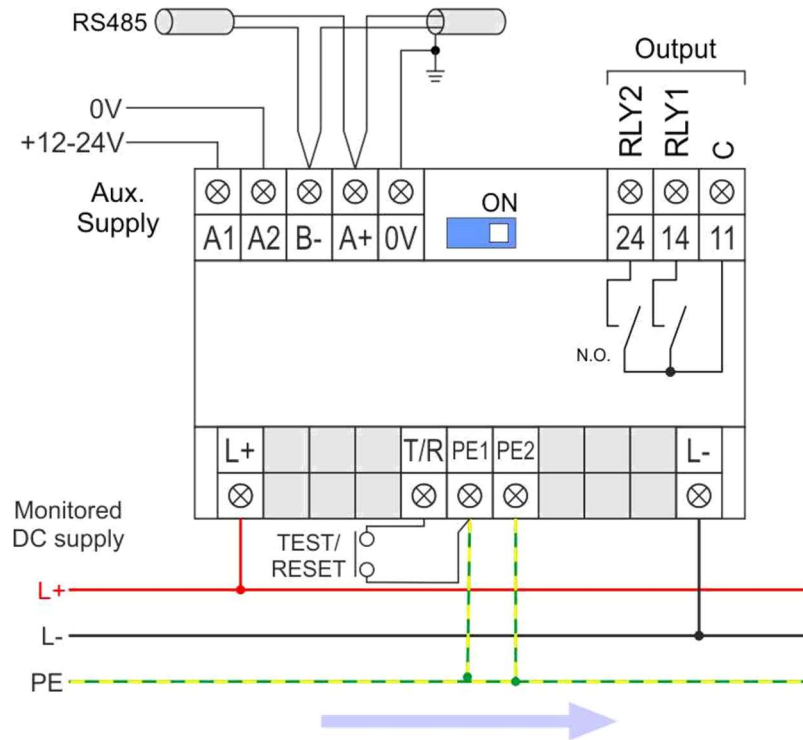
Temperature rating		
Operating:	-40 to +70°C	
Storage:	-40 to +85°C	
Relative humidity:	+95% max.	
Output		
	Relay 1 (RLY1)	Relay 2 (RLY2)
Terminals:	<b>11, 14</b>	<b>11, 24</b>
Contact arrangement:	1 x SPNO	1 x SPNO
AC1 (250V)	5A (1250VA)	5A (1250VA)
DC1 (25V)	5A (125W)	5A (125W)
Electrical life:	 <p>The graph shows electrical life (cycles) on a logarithmic y-axis (10<sup>4</sup> to 10<sup>7</sup>) versus switching current (A) on a linear x-axis (0 to 8). Two curves are shown: one for 250VAC resistive load and one for AgNi90/10 contact material. Both curves show a decrease in life as current increases.</p>	
DC load capacity:	 <p>The graph shows DC load capacity (W) on a logarithmic y-axis (10 to 300) versus DC current (A) on a logarithmic x-axis (0.1 to 20). A single curve for resistive load shows a decrease in capacity as current increases.</p>	
Dielectric voltage:	2kV AC (rms) IEC 60947-1	
Rated impulse withstand voltage:	4kV (1.2/50μs) IEC 60664	
Modbus (A+, B-, 0V)		
Connections:	Tx+, Tx-, 0V	
Baud rate:	Selectable ( <i>factory default: 9600</i> )	
Parity:	Selectable ( <i>factory default: none</i> )	
Stop bit:	Selectable ( <i>factory default: 1</i> )	
Device address:	Selectable ( <i>factory default: 003</i> )	
Termination method:	120R resistor built in. Set slide switch to "ON" to enable	
Housing		
Material:	Grey flame retardant polycarbonate UL94 V0	
Weight:	170g approx.	
Mounting option:	On to 35mm symmetric DIN rail to BS EN 60715	
Terminal conductor size		
Cable type:	Solid or stranded	
Nominal cross section:	0.2 – 2.5mm <sup>2</sup> (12 – 22/24 AWG)	
Stripping length:	7mm ±1mm	
Tightening torque:	0.4 Nm	



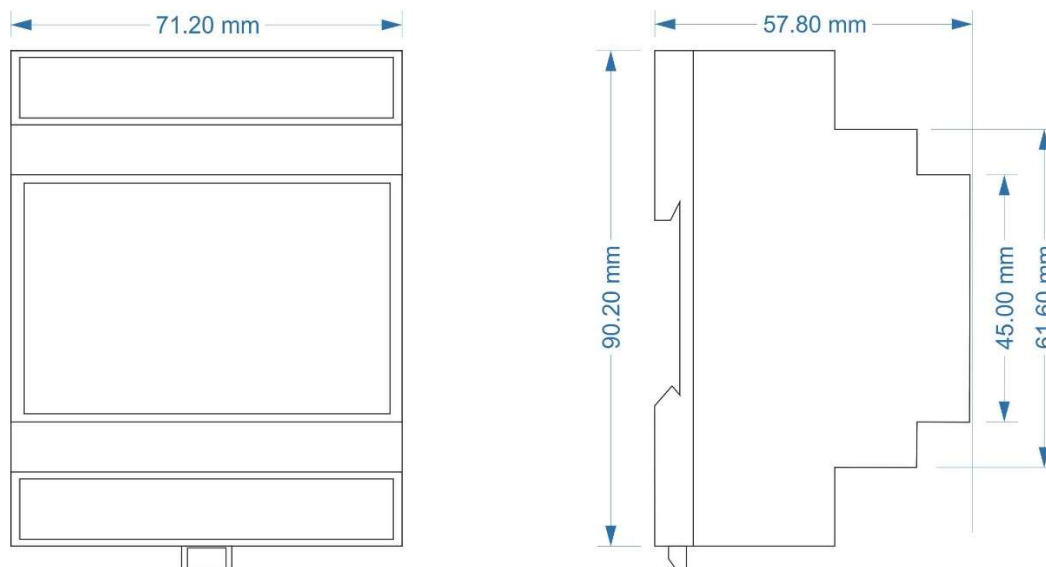
## IMD100 Insulation Monitoring Device

Standards	
Product:	IEC 61851-1, IEC 61851-23, IEC 61557-8
EMC:	IEC 61326-4, IEC 61000-4
General Compliance:	CE, UKCA and RoHS Compliant. C-tick

### 9. Connection Diagram



### 10. Product Dimensions





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