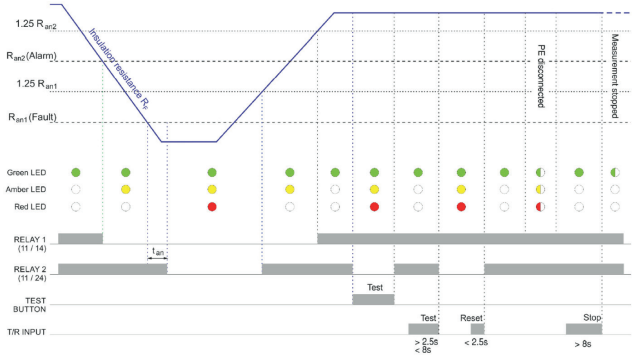
6 Function diagrams

Based of factory defaults



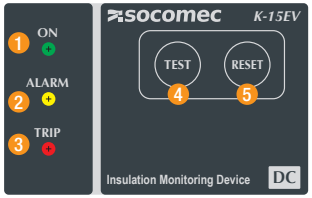
7 LED & relay status

System status	Green LED	Amber LED	Red LED	Relay 1 (Alarm)**	Relay 2 (Fault)**
Normal operation ($R_F > R_{an2}$)	On	Off	Off	EN	EN
Alarm condition ($R_{an2} > R_F > R_{an1}$)	On	On	Off	DE-EN	EN
Fault condition ($R_F \leq R_{an1}$)	On	On	On	DE-EN	DE-EN
Waiting for user to reset after fault ($R_F \geq 1.25\ R_{an1}$)[1]	On	Off	On	DE-EN	DE-EN
Under voltage[2]	On	Flashing	Off	Set via Modbus	
Over voltage[2]	On	Off	Flashing		
PE disconnected	Flashing simultaneously*			EN	EN
Measurement stopped	Flashing*	Off	Off	EN	EN
Test mode	On	On	On	EN	DE-EN

* Flash rate 2Hz.
** Factory default assignment of relays.
(1) This state only applies if automatic reset is disabled.
(2) Under/over voltage detection is disabled by default.

Key to relay abbreviations:
EN = Relay Energised
DE-EN = Relay De-Energised

8 Front panel description



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

9 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 energise.

Insulation fault:

- In the event of an insulation fault, relay 1 (RLY1) will de-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 that the response time t_{an} relay 2 (RLY2) will then de-energise. The red "fault" LED 3 will also illuminate.
- Once the fault has cleared (fault level > 1.25 R_{an1}), the red LED 3 will extinguish and RLY2 will return to its energised state.
- The amber LED 2 will remain lit until the fault level increases to 1.25 R_{an2}. RLY1 will also re-energise.

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. RLY2 will de-energise and remain in this state.
- Release the button to revert to normal operation. RLY2 will re-energise.

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.

QUICK START GUIDE

EN

553108A

socomec
Innovative Power Solutions

Insulation Monitoring Device
K-15EV

Socomec Resource Center
To download, brochures, catalogues and technical manuals

- 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 – 5µF
- Pre-set measurement levels – Fault 100kΩ , Warning 500kΩ (factory default[1])
- 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
- Failsafe relay operation (factory default = relays de-energise on fault[1])
- 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
- Compliant with UL 2231-1 and UL 2231-2
- Monitors the insulation resistance of DC charging stations in accordance with the CHAdeMO standard

[1] Can be changed via Modbus

1 Overview

The K-15EV 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. By default, the relays are initially configured to de-energise on 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.

2 Installation

⚠ **Installation work must be carried out by qualified personnel.**

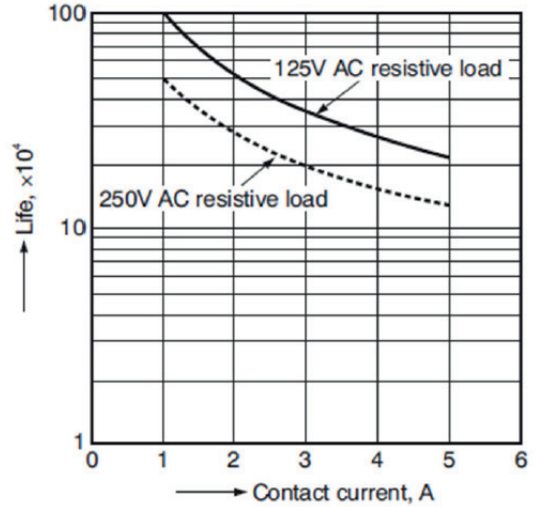
- BEFORE INSTALLATION, **ENSURE ALL SUPPLIES ARE ISOLATED**.
- Connect the unit as shown in the diagram on the next page (N.B. certain features may not be required and therefore do not need to be connected).
- Ensure the Auxiliary supply voltage to be connected to terminals A1 and A2 matches the rating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

CORPORATE HQ CONTACT: SOCOMEC SAS, 1-4 RUE DE WESTHOUSE, 67235 BENFELD, FRANCE.
Print: 70 g/m² - A4 > A7 - R/V - B&W - The bar code must be visible once the document is folded.

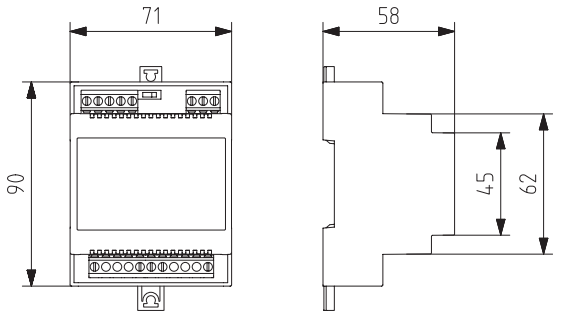
3 Technical specifications

Auxiliary Power Supply (A1, A2)		
Voltage rating (Us)	12 - 24V DC	
Supply variation	85 - 115% of Us	
Auxiliary supply is galvanically isolated from the monitored DC supply (1.25A (T) rated fuse should be installed in line with terminal A1)		
Overvoltage category	III (IEC 60664)	
Power consumption (max.)	2W	
Monitored input (using terminals, L+, L-, PE1 & PE2)		
Monitoring principle	Insulation between L+/L- and PE1/PE2	
Monitored DC supply voltage	30V - 1000V DC	
System leakage capacitance (C_e)	5µF (1.6µF per conductor in CHAdeMO mode)	
Specified response value (R_{an})	R_{an1} = 100kΩ (Fault) R_{an2} = 500kΩ (Alarm) Assuming 1000V DC nominal charger output	
Response level accuracy	±15%, ±1kΩ	
Fault hysteresis level	125% of R_{an1} (125kΩ)	
Alarm hysteresis level	125% of R_{an2} (625kΩ)	
Response time (t_{an})	≤ 10s typically - Response time measured with C_e = 1uF (≤ 1s in CHAdeMO mode)	
Response value for break/disconnection of PE1/PE2 conductors:	> 500Ω	
Measuring voltage	±15V approx.	
Internal DC resistance	At least 30Ω/V of Un. Typ. >376KΩ	
Measuring current	≤ 100µA peak @ Rf = 0Ω	
Reset time	< 1s (from supply interruption)	
LED indication (refer also to function diagram for LED diagnostic information)		
Power Supply	Green x1 - LED is usually permanently lit but will flash if measurement stops*	
Alarm	Amber x1 - Illuminates during alarm condition*	
Tripped	Red x 1 - Illuminates during fault condition*	
* LED also flashes when PE is disconnected		
Manual Test and Reset		
	Front push buttons	**Remote N.O. push button (T/R, PE1)**
"Test" method (assuming unit is in the non-tripped state)	Press "TEST" once to trip the unit	Press and hold button between 2.5s and 8s, then release to trip the unit
"Reset" method (assuming unit is in the tripped state and fault cleared)	Press "RESET" once to clear fault indication only	Press button <2.5s to reset the unit
Auto-reset		
Allows for unit to return to normal operation automatically	Enabled (factory default) To comply with UL 2231, "Auto-reset" must be set to "Disabled"	
Relay operational mode (assuming factory default settings used)		
Status	**RLY1 (Alarm)**	**RLY2 (Fault)**
Normal	Energised	Energised
Alarm	De-energised	Energised
Fault	De-energised	De-energised
Temperature rating		
Operating	-40 to +70°C	
Storage	-40 to +85°C	
Relative humidity	+95% max.	

Housing	
Material	Grey flame retardant polycarbonate UL94 V0
Weight	120g
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 – 2.5mm² (12 – 22/24 AWG)
Stripping length	7mm ±1mm
Tightening torque	0.4 Nm
Standards	
Product	IEC 61851-1, IEC 61851-23, IEC 61557-8, UL 2231-1, UL 2231-2
EMC	IEC 61326-4, IEC 61000-4
General Compliance	CE, UKCA and RoHS Compliant. C-tick

Output		
	Relay 1 (RLY1)	Relay 2 (RLY2)
Terminals	**11, 14**	**11, 24**
Contact arrangement:	1 x SPNO	1 x SPNO
AC1 (250V)	5A (1250VA)	5A (1250VA)
DC1 (25V)	5A (125W)	5A (125W)
Electrical life:		
Dielectric voltage	2kV AC (rms) IEC 60947-1	
Rated impulse withstand voltage	4kV (1.2/50µS) IEC 60664	
Modbus (A, B, COM)		
Connections	Tx+, Tx-, 0V	
Baud rate	Selectable (factory default: 9600)	
Parity	Selectable (factory default: none)	
Stop bit	Selectable (factory default: 1)	
Device address	Selectable (factory default: 003)	
Termination method	120R resistor built in. Set slide switch to "ON" to enable	

4 Dimensions (mm)



5 Connection diagram