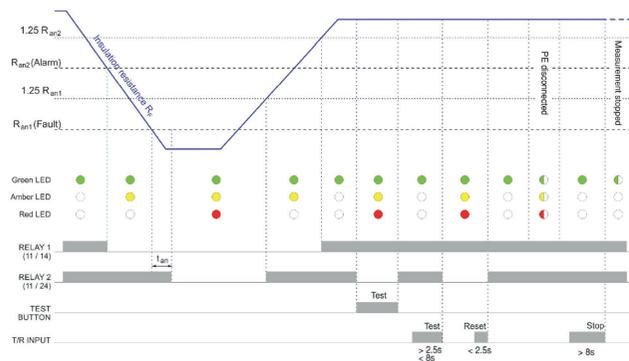


6 Function diagrams

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.

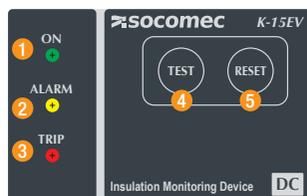
(2) Under/over voltage detection is disabled by default.

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 than 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 (then 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.



553108B

Insulation Monitoring Device K-15EV



- 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 – 25 μ F
- Pre-set measurement levels – Fault 100k Ω , Warning 500k Ω (factory default¹)
- 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 fault¹)
- 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.

- It is recommended that the unit is mounted horizontally to allow air to flow vertically through the cooling slots in the housing. Avoid blocking these slots.
- 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.

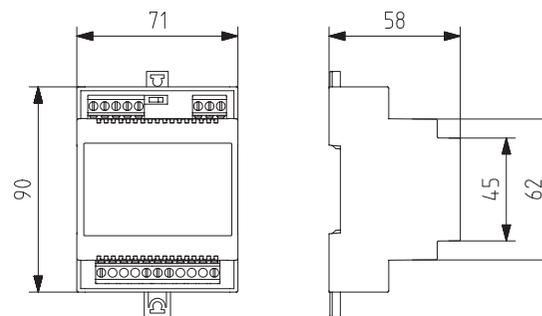


3 Technical specifications

| Auxiliary Power Supply (A1, A2) | | |
|--|--|--|
| Voltage rating (U _i) | 12 - 24V DC | |
| Supply variation | 85 - 115% of U _i | |
| Auxiliary supply is galvanically isolated from the monitored DC supply (1.25A (T) rated fuse should be installed in line with terminal A1) | | |
| Overtoltage 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 (U _i) | 50V - 1000V DC | |
| Max. permanently admissible voltage (U _{ip}) | 1100V DC | |
| System leakage capacitance (C _s) | 25µF (1.6µF per conductor in CHAdEMO mode) | |
| Max. system leakage capacitance (C _e) according to UL 2231-1/-2 | 10µF | |
| Specified response value (R _{sp}) | R _{sp1} = 100kΩ (Fault) R _{sp2} = 500kΩ (Alarm) Assuming 1000V DC nominal charger output | |
| Response level accuracy | ±15%, ±2kΩ | |
| Fault hysteresis level | 125% of R _{sp1} (125kΩ) | |
| Alarm hysteresis level | 125% of R _{sp2} (625kΩ) | |
| Response time (t _{sp}) | ≤ 10s typically - Response time measured with C _e = 1µF (≤ 1s in CHAdEMO 1 mode) | |
| Response value for break/disconnection of PE1/PE2 conductors: | > 500Ω | |
| Measuring voltage (U _m) | ±15V approx. | |
| Internal DC resistance | Typ. >376kΩ | |
| Measuring current | ≤ 100µA peak @ R _f = 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 | Horizontally on to 35mm symmetric DIN rail to BS EN 60715 | |
| Pollution degree | 2 | |
| Terminal conductor size | | |
| Cable type | Solid or stranded | |
| Nominal cross section | 0.2 – 2.5mm ² (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 UL Recognized (UL2231-1/-2) | |
| EMC | IEC 61326-4, IEC 61000-4 | |
| General Compliance | CE, UKCA and RoHS Compliant. | |

| Output | | |
|---------------------------------|--|--------------------------------------|
| | Relay 1 (RLY1) | Relay 2 (RLY2) |
| Terminals | 11, 14 | 11, 24 |
| Contact arrangement: | 1 x SPNO 5A (1250VA) 5A (125W) | 1 x SPNO 5A (1250VA) 5A (125W) |
| Electrical life: | | |
| Rated Impulse Withstand Voltage | | |
| | SC (Supply circuit) | A1, A2 |
| | OC (Output circuit) | 11, 14, 24 |
| | BC (Modbus circuit) | A, B, COM |
| | CC (Control circuit) | T/R, PE1, PE2 |
| | MC (Monitored circuit) | L+/L- |
| Definitions | | |
| | SC/BC | Galvanically isolated <100V |
| | OC/(SC, MC) | 8kV |
| | OC/CC | 8kV |
| | CC/(SC,BC) | 8kV |
| | MC/(SC, BC) | 8kV |
| | MC/OC | 8kV |
| Ratings | | |
| Modbus (A, B, COM) | | |
| Connections | Tx+, Tx-, OV | |
| 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)



General tolerances
DIN ISO 2768-c

5 Connection diagram

