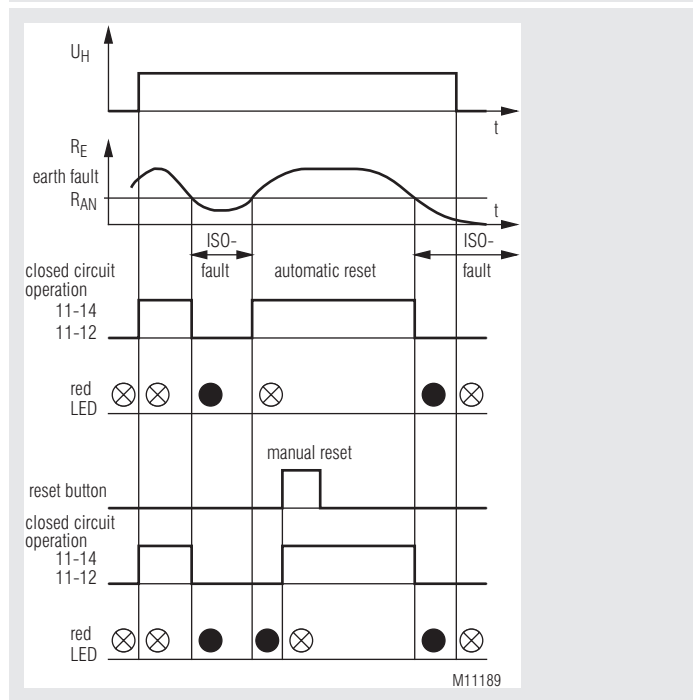




### Product Description

The insulation monitor UH 5892 of the series varimeter IMD monitors the ground resistance of isolated DC-voltage systems (IT-systems) with nominal voltage up to DC 600 V. The unit detects symmetrical as well as unsymmetrical faults. The separate auxiliary supply of AC/DC 24...60 V or AC/DC 85...230 V allows also monitoring when the system is without voltage. To indicate the actual ground resistance value the unit has an LED chain and an analogue output. When a fault is detected the relay switches and the red LED Alarm lights up. The device can be used for system with leakage capacities up to 20  $\mu\text{F}$ .

### Function Diagram



### Your Advantages

- Preventive fire and system protection
- Insulation monitoring of DC and AC-systems up to DC 600 V and AC 400 V nominal voltage
- No additional coupling device required
- Suitable for leakage capacitances up to 20  $\mu\text{F}$
- Monitoring also with voltage-free mains
- 2 wide voltage input ranges for auxiliary voltage

### Features

- Insulation monitoring according to IEC/EN 61557-8
- Detection of symmetric and asymmetric insulation faults
- 1 changeover contact for alarm
- Fixed response value  $R_{AN}$ : 50  $\text{k}\Omega$ , other on request
- Internal reset and test pushbutton
- External test and reset pushbutton can be connected
- LED indicator for auxiliary voltage and alarm
- LED chain to indicate the current insulation resistance
- Automatic or manual reset, programmable
- Analogue output for insulating value
- External indicating instrument can be connected
- Closed circuit operation
- Open circuit operation on request
- With pluggable terminal blocks for easy exchange of devices
  - with screw terminals
  - or with cage clamp terminals
- Width 45 mm

### Approvals and Markings



### Applications

Monitoring of the resistance to earth in ungrounded DC systems

### Function

The device is supplied with auxiliary voltage via terminals A1(+)/A2; a green "ON" LED comes on. After connecting the auxiliary supply a 10 s start up delay is active allowing the measuring circuit to start. After this, measurement of the insulation resistance in the measuring circuits begins.

### Measuring circuit

(Insulation measurement between terminals L(+)/L(-) and PE1/PE2).

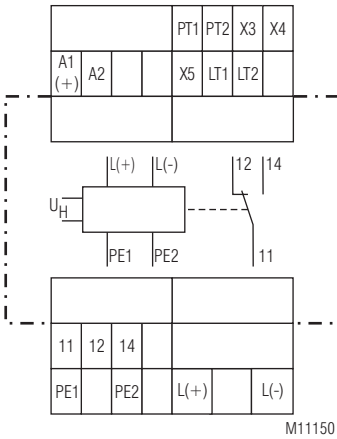
Terminals L(+) and L(-) are connected to the mains to be monitored. In addition, the two terminals PE1 and PE2 must be connected to the protective conductor system via separate lines. An active measuring voltage with alternating polarity is applied between L(+)/L(-) and PE1/PE2 to measure the insulation resistance.

The length of the positive and negative measuring phases has a fixed factory setting of 16 s (max. leakage capacitance of 20  $\mu\text{F}$ ). The LED-chain and the analogue output show the actual determined insulating resistance, and the output relays switch according to the respective response values set. If the response thresholds has been undercut the red LED "Alarm" lights up.

### Indicators

|                  |  |
|------------------|--|
| green LED "ON":  | on, when auxiliary supply connected                      |
| red LED "Alarm": | on, when resistance is below the response value $R_{AN}$ |
| LED-chain:       | the approx. value of actual resistance to ground (PE)    |

## Circuit Diagrams



## Connection Terminals

| Terminal designation | Signal description  |
|----------------------|---|
| A1(+), A2            | Auxiliary voltage $U_H$   |
| L(+), L(-)           | Connection for measuring circuit  |
| PE1, PE2             | Connection for protective conductor   |
| X5/LT1               | Control input (manual/auto reset)<br>X5/LT1 bridged: manual reset<br>X5/LT1 not bridged: auto reset |
| PT1, PT2             | connection option for external device test pushbutton   |
| LT1, LT2             | connection option for external reset pushbutton   |
| X3, X4               | Analogue output   |
| 11, 12, 14           | Alarm signal relay (1 changeover contact)   |

## Notes



### Risk of electrocution!

**Danger to life or risk of serious injuries.**

- Disconnect the system and device from the power supply and ensure they remain disconnected during electrical installation.
- The terminals of the control input X5, LT1, LT2, PT1 and PT2 have no galvanic separation to the measuring circuit L(+) and L(-) and are electrically connected together, therefore they have to be controlled by volt free contacts or bridge. These contacts or bridges must provide a sufficient separation depending on the mains voltage on L(+)-L(-).
- No external potentials may be connected to control terminals X5, LT1, LT2, PT1 and PT2.
- The terminals of the control input X3 and X4 have no galvanic separation to the measuring circuit L(+) and L(-) and are electrically connected together, therefore they have to be controlled by volt free contacts or bridge. Connected devices/indicators must provide a sufficient separation depending on the mains voltage on L(+)-L(-).



### Attention!

- Before checking insulation and voltage, disconnect the monitoring device UH 5892 from the power source!
- In one voltage system only one insulation monitor can be used. This has to be observed when interconnecting two separate systems.
- The device must not be operated without PE1/PE2 connection!
- On fluctuation of the mains voltage momentary false readings can occur. This is normal and caused by the cyclic measuring principle.



### Attention!

- If a monitored AC system includes galvanically connected DC circuits (e.g. via a rectifier), an insulation failure on the DC side can only be detected correctly, when a current of min 10 mA can flow via the semiconductor connections.
- If a monitored DC system includes galvanically connected AC circuits (e.g. via an inverter), an insulation failure on the AC side can only be detected correctly, when a current of min 10 mA can flow via the semiconductor connections.
- The response value  $R_{AN}$  is fixed. An external indicator instrument can be connected.
- The unit works de-energized on trip, that means, the output relay release in position of rest at a insulation failures  $R_E < R_{AN}$ .
- A bridge between X5 and LT1 allows to select auto or manual reset. The UH 5892 has a built in reset button on the front and allows connection of an external button at terminals LT1 and LT2 also.
- For function test an external (terminals PT1-PT2) or built in push button can be used to simulate a ground fault. The push button has to be pressed for the length of a measuring period.
- The analogue output (terminals X3 and X4) provides a voltage signal proportional to the actual insulation resistance of the mains. The following formula describes the input to output ratio:

(0V at  $R_E = 0$  and 13,0 ... 13,5 V at  $R_E = \infty$ )

$$U_A = \frac{U_{\max}}{\frac{180 \text{ k}\Omega}{R_E} + 1} ; \quad U_{\max} = 13,25 \text{ V} \pm 0,25 \text{ V}$$

These values for  $U_A$  are valid for  $C_E = 0$  (see characteristic). In practice it makes no sense to monitor values above 11 ... 12 V as the tolerances increase, especially with mains capacity.

## Technical Data

### Auxiliary circuit

| Auxiliary voltage<br>$U_H$ | Voltage range   | Frequency range            |
|----------------------------|-----------------|----------------------------|
| AC/DC 24 ... 60V           | AC 19 ... 68 V  | 45 ... 400 Hz; DC 48 % W*) |
|                            | DC 18 ... 96 V  | W*) ≤ 5 %                  |
| AC/DC 85 ... 230 V         | AC 65 ... 276 V | 45 ... 400 Hz; DC 48 % W*) |
|                            | DC 75 ... 300 V | W*) ≤ 5 %                  |

\*) W = permitted residual ripple of auxiliary supply

Nominal consumption: max. 1.5 W

### Measuring Circuit

|  |                                 |
|--|---------------------------------|
| Nominal voltage $U_N$ :                          | DC 0 ... 600 V / AC 0 ... 400 V |
| Voltage range:                                   | 0 ... 1,15 $U_N$                |
| Frequency range:                                 | DC or 40 ... 60 Hz              |
| Response value $R_{AN}$ :                        | 50 kΩ, 10 ... 440 kΩ on request |
| Setting $R_{AN}$ :                               | fixed                           |
| Internal AC resistance:                          | > 120 kΩ                        |
| Internal DC resistance:                          | > 150 kΩ                        |
| Messspannung:                                    | approx. ± 13 V                  |
| Max. measuring current ( $R_E = 0$ ):            | < 0.3 mA                        |
| Measuring cycle internally adjustable:           | 2 ... 16 s                      |
| Line capacitance $C_E$ to ground:                | 1 ... 20 μF                     |
| Factory setting:                                 | 16 s (für $C_E = 20$ μF)        |
| Operate delay at $R_{AN} = 50$ kΩ, $C_E = 20$ μF |                                 |
| $R_E$ from ∞ to 0,9 $R_{AN}$ :                   | < 100 s                         |
| $R_E$ from ∞ to 0 kΩ:                            | < 60 s                          |
| Hysteresis at $R_{AN} = 50$ kΩ:                  | approx. 5 %                     |
| Response inaccuracy::                            | ± 15% ± 1.5 kΩ IEC/EN 61557-8   |

### Output

|  |   |
|--|---|
| Contacts:                                | 1 changeover contact                    |
| Max. switching voltage:                  | AC 250 V                                |
| Thermal current $I_{th}$ :               | 5 A                                     |
| Switching capacity to AC 15:             |   |
| NO contact:                              | 5 A / AC 230 V IEC/EN 60 947-5-1        |
| NC contact:                              | 2 A / AC 230 V IEC/EN 60 947-5-1        |
| Short circuit strength max. fuse rating: | 6 A gG / gL IEC/EN 60 947-5-1           |
| Electrical life at 5 A, AC 230 V:        | 1 x 10 <sup>5</sup> switching cycles    |
| Mechanical life:                         | > 50 x 10 <sup>6</sup> switching cycles |

### Analogue output

for actual insulating value, no galvanic separation  
**Terminals X3-X4:** typ. 0 ... 13.25 V /  $R_i$  approx. 50 Ω  
 (0 V at  $R_E = 0$  and 13.0 ... 13.5 V at  $R_E = ∞$ )  
 X4 is internal connected with PE

### General Data

|   |                      |
|---|----------------------|
| Operating mode:                                       | Continuous operation |
| Temperature range                                     |                      |
| Operation:  | - 20 ... + 60°C      |
| Storage:  | - 25 ... + 70°C      |
| Altitude:   | < 2.000 m            |
| Clearance and creepage distances                      |                      |
| overvoltage category / pollution degree:              | IEC 60 664-1         |
| meas. circuit to auxiliary voltage and relay contact: | 6 kV/2               |
| auxiliary voltage to relay contact:                   | 6 kV/2               |
| Insulation test voltage                               |                      |
| Routine test:   | AC 4 kV; 1 s         |

## Technical Data

### EMC

|   |                     |                   |
|---|---------------------|-------------------|
| Electrostatic discharge:                          | 8 kV (air)          | IEC/EN 61 000-4-2 |
| HF irradiation                                    |                     |                   |
| 80 MHz ... 1 GHz:                                 | 20 V / m            | IEC/EN 61 000-4-3 |
| 1 GHz ... 2.7 GHz:                                | 10 V / m            | IEC/EN 61 000-4-3 |
| Fast transients:                                  | 4 kV                | IEC/EN 61 000-4-4 |
| Surge voltage between A1(+) - A2 and L(+) - L(-): | 1 kV                | IEC/EN 61 000-4-5 |
| between A1(+), A2 - PE and L(+), L(-) - PE:       | 2 kV                | IEC/EN 61 000-4-5 |
| between control lines:                            | 0,5 kV              | IEC/EN 61 000-4-5 |
| between control lines and ground:                 | 1 kV                | IEC/EN 61 000-4-5 |
| HF-wire guided:                                   | 20 V                | IEC/EN 61 000-4-6 |
| Interference suppression:                         | Limit value class B | EN 55 011         |

### Degree of protection

|            |       |               |
|------------|-------|---------------|
| Housing:   | IP 40 | IEC/EN 60 529 |
| Terminals: | IP 20 | IEC/EN 60 529 |

### Housing:

|                       |  |
|-----------------------|--|
|                       | Thermoplastic with V0 behaviour according to UL subject 94 |
| Vibration resistance: | Amplitude 0.35 mm IEC/EN 60 068-2-6 frequency 10 ... 55 Hz |
| Climate resistance:   | 20 / 060 / 04 IEC/EN 60 068-1                              |
| Terminal designation: | EN 50 005  |

### Wire connection:

DIN 46 228-1/-2/-3/-4

### Plug in with screw terminals

|                                    |  |
|------------------------------------|--|
| max. cross section for connection: | 1 x 0.25 ... 2.5 mm <sup>2</sup> solid or stranded ferruled (isolated) or 2 x 0.25 ... 1.0 mm <sup>2</sup> solid or stranded ferruled (isolated) |
|------------------------------------|--|

### Insulation of wires or sleeve length:

|  |      |
|--|------|
|  | 7 mm |
|--|------|

### Plug in with cage clamp terminals

|                                    |  |
|------------------------------------|--|
| max. cross section for connection: | 1 x 0.25 ... 2.5 mm <sup>2</sup> solid or stranded ferruled (isolated) or 2 x 0.25 ... 1.5 mm <sup>2</sup> stranded twin ferruled (isolated) |
|------------------------------------|--|

### Insulation of wires or sleeve length:

|  |       |
|--|-------|
|  | 10 mm |
|--|-------|

### Wire fixing:

|                |   |
|----------------|---|
|                | captive slotted screw or cage clamp terminals |
| Fixing torque: | 0.8 Nm  |
| Mounting:      | DIN rail IEC/EN 60 715                        |
| Weight:        | approx. 270 g                                 |

### Dimensions

|                         |                   |
|-------------------------|-------------------|
| Width x height x depth: | 45 x 107 x 121 mm |
|-------------------------|-------------------|

### Classification to DIN EN 50155

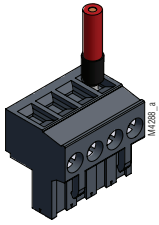
|                                 |                     |               |
|---------------------------------|---------------------|---------------|
| Vibration and shock resistance: | Category 1, Class B | IEC/EN 61 373 |
| Protective coating of the PCB:  | No                  |               |

### Standard Types

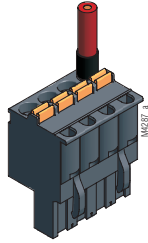
|                                      |                   |
|--------------------------------------|-------------------|
| UH 5892.11PS AC/DC 24 ... 60 V 50 kΩ |                   |
| Article number:                      | 0066309           |
| • Output:                            | 1 Wechsler        |
| • Auxiliary voltage $U_H$ :          | AC/DC 24 ... 60 V |
| • Response value $R_{AN}$ :          | 50 kΩ             |
| • Line capacitance:                  | 20 μF             |
| • De-energized on trip               |                   |
| • Width:                             | 45 mm             |

|                                       |                    |
|---------------------------------------|--------------------|
| UH 5892.11PS AC/DC 85 ... 230 V 50 kΩ |                    |
| Article number:                       | 0066946            |
| • Output:                             | 1 Wechsler         |
| • Auxiliary voltage $U_H$ :           | AC/DC 85 ... 230 V |
| • Response value $R_{AN}$ :           | 50 kΩ              |
| • Line capacitance:                   | 20 μF              |
| • De-energized on trip                |                    |
| • Width:                              | 45 mm              |

## Options with Pluggable Terminal Blocks



Screw terminal  
(PS / plug in screw)



Cage clamp terminal  
(PC / plug in cage clamp)

## Accessories

EH 5861/004:

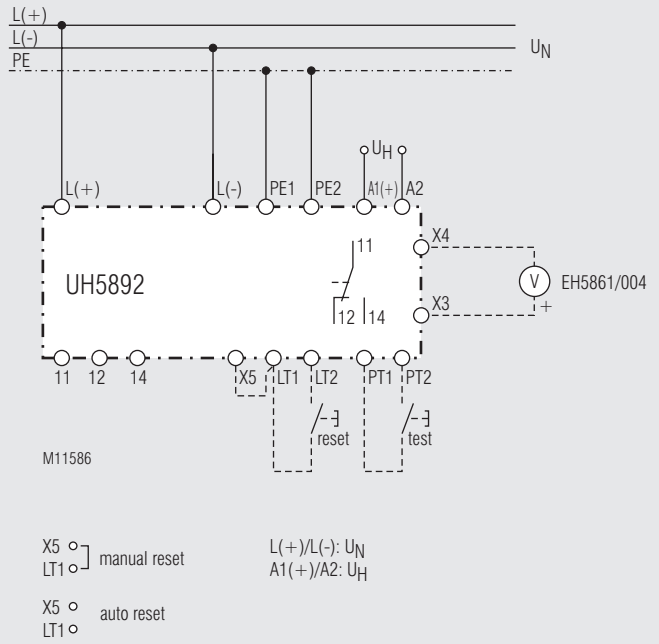
indicating instrument,  
degree of protection: IP 52  
Article number: 0030618



The indicating device EH 5861 is externally connected to the insulation monitor and shows the actual insulation resistance of the voltage system to ground.

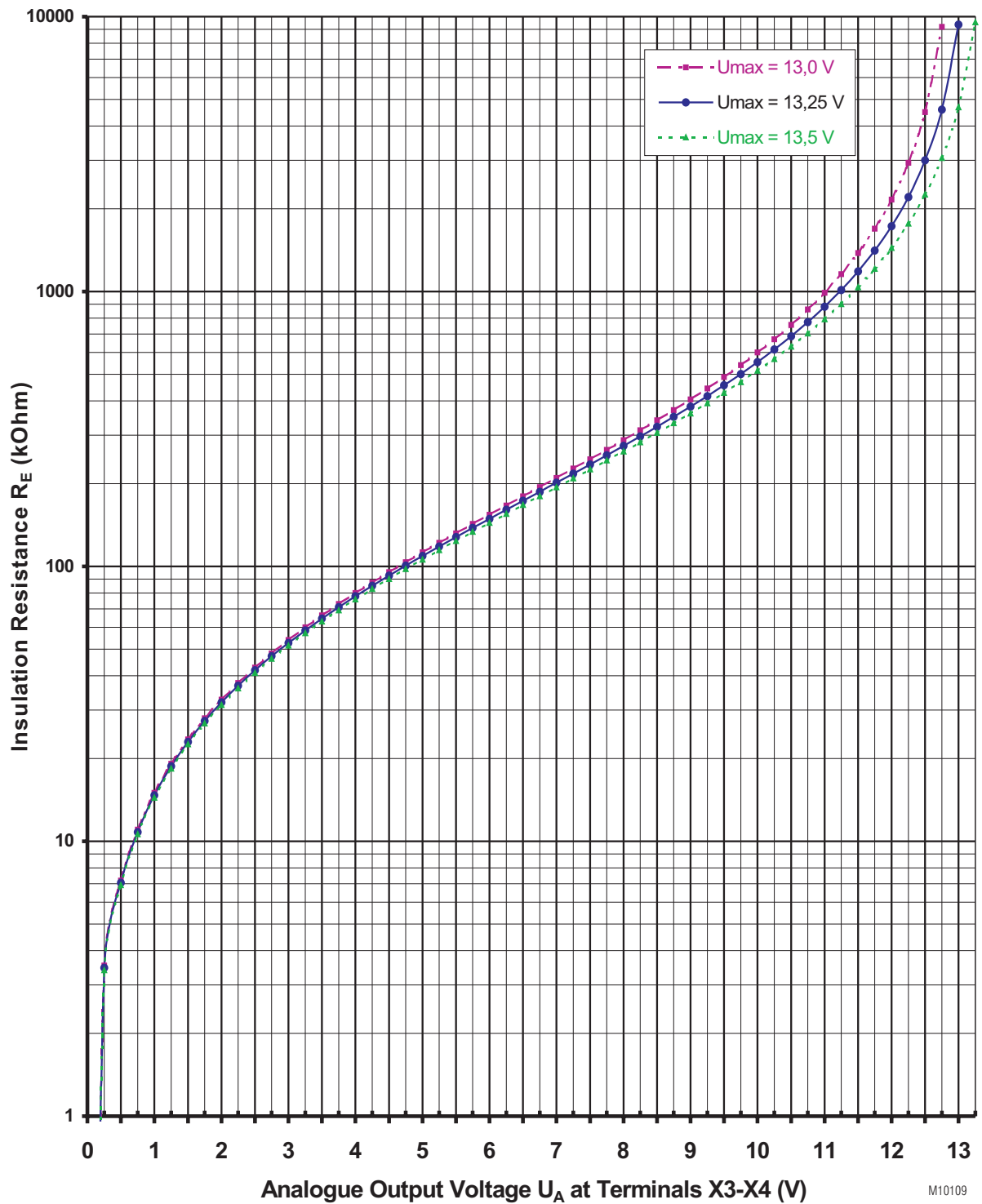
Dimensions:  
Width x height x depth  
96 x 96 x 52 mm

## Connection Examples



## Analogue Output Voltage $U_A$ (Terminals X3-X4) against Insulation Resistance $R_E$ with $C_E = 0$

Parameter: Max. Analogue Output Voltage  $U_{max}$  (at  $R_E = \infty$ )



M10109

