Monitoring Technique

VARIMETER IMD
Insulation Monitor
AN 5873

Product Description
The insulation monitor AN 5873 of the series VARIMETER IMD monitors the ground resistance of ungrounded DC and 3-phase AC voltage systems (IT-systems) with nominal voltage up to DC 0 ... 1000 V and 3 AC 24 ... 690 V. The unit detects symmetrical as well as unsymmetrical faults. The separate auxiliary supply 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 lights up.

Monitoring of the ground resistance of isolated 3-phase and DC-current systems.

The device is supplied with auxiliary voltage via terminals A1/A2. 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 L1/L2/L3 and PE resp. L+/L- and PE). The connection to a 3-phase AC voltage system is done on terminals L1, L2, L3, to a DC voltage system on terminals L+ and L-. The terminal PE is connected to protective earth.

An active measuring voltage with alternating polarity is applied between L1/L2/L3 and PE resp. L+/L- and PE to measure the insulation resistance. The length of the positive and negative measuring phases has a fixed factory setting of 2 s (max. leakage capacitance of 1 μF).

The LED-chain and the analogue output show the actual determined insulating resistance, and the output relays witch according to the respective response values set. If the response thresholds has been undercut the red LED "R_e < R_AW" lights up.

Your Advantages
- Preventive fire and system protection
- Insulation monitoring of DC- and 3 AC-systems up to 1000 V and 3 AC 690 V nominal voltage
- No additional coupling device required
- Monitoring also with voltage-free mains

Features
- Insulation monitoring according to IEC/EN 61557-8
- Fixed response value R_AW
- Internal reset button
- External reset and test button can be connected
- LED indicator
- 1 changeover contact
- Programmable for manual reset or hysteresis function
- Analogue output for insulating value
- External connection of indicating instrument possible
- As option de-energized on trip or energized on trip
- Width 100 mm

Applications
Monitoring of the ground resistance of isolated 3-phase and DC-current systems.

Functions
The device is supplied with auxiliary voltage via terminals A1/A2. 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 L1/L2/L3 and PE resp. L+/L- and PE). The connection to a 3-phase AC voltage system is done on terminals L1, L2, L3, to a DC voltage system on terminals L+ and L-. The terminal PE is connected to protective earth.

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Indicators
- LED chain: Shows actual resistance to ground
- Red LED: On, when ground fault

All technical data in this list relate to the state at the moment of edition. We reserve the right for technical improvements and changes at any time.
Circuit Diagram

<table>
<thead>
<tr>
<th>Terminal designation</th>
<th>Signal description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A1, A2</td>
<td>AC-auxiliay voltage UH</td>
</tr>
<tr>
<td>L1, L2, L3</td>
<td>Connection for measuring circuit (3-phase systems)</td>
</tr>
<tr>
<td>L+, L-</td>
<td>Connection for measuring circuit (DC systems)</td>
</tr>
<tr>
<td>PE</td>
<td>Connection for protective conductor</td>
</tr>
<tr>
<td>X5 (/LT1)</td>
<td>Control input (manual / auto reset)</td>
</tr>
<tr>
<td></td>
<td>X5/LT1 bridged: manual reset</td>
</tr>
<tr>
<td></td>
<td>X5/LT1 not bridged: auto reset</td>
</tr>
<tr>
<td>LT1, LT2</td>
<td>Connection option for external reset-button</td>
</tr>
<tr>
<td>X3, X4</td>
<td>Analogue output</td>
</tr>
<tr>
<td>11, 12, 14</td>
<td>Alarm signal relay (1 changeover contact)</td>
</tr>
</tbody>
</table>
### Auxiliary voltage $U_{H}$: AC 230 V, others on request
- **Voltage range:** 0.8 ... 1.2 $U_H$
- **Frequency range:** 40 ... 400 Hz
- **Nominal consumption:** Approx. 4 VA

### Measuring Circuit
- **Nominal voltage $U_{N}$:** 3 AC 24 ... 690 V / ≤ DC 1000 V
- **Voltage range:** 0.8 ... 1.15 $U_N$ / 0 ... 1.15 $U_N$
- **Frequency range:** 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
- **Measuring voltage:** Approx. +/- 13 V
- **Max. measuring current (RE = 0):** < 0.3 mA
- **Max. permissible noise DC voltage:** DC 1000 V
- **Measuring cycle internally adjustable:** 2 ... 16 s
- **Line capacitance CE to ground:** 1 ... 20 µF
- **factory setting:** 2 s (for CE = 1 µF)
- **Operate delay At $R_{AN} = 50$ kΩ, CE = 1 µF**
  - $R_{i}$ from $\infty$ to 0.9 $R_{AN}$: < 15 s
  - $R_{i}$ from 0 to 0 kΩ: < 10 s
- **Hysteresis At $R_{AN} = 50$ kΩ:** Approx. 5 %
- **Response inaccuracy:** ± 15% ± 1.5 kΩ IEC/EN 61557-8
- **Nominal consumption:** Approx. 4 VA
- **Phase failure bridging:** > 40 ms

### Contacts
- **AN 5873.11:** 1 changeover contact
- **Max. switching voltage:** AC 250 V
- **Thermal current $I_{Th}$:** 8 A
- **Switching capacity To AC 15**
  - NO contact: 3 A / AC 230 V IEC/EN 60947-5-1
  - NC contact: 1 A / AC 230 V IEC/EN 60947-5-1
- **Electrical life**
  - At 8 A, AC 250 V: 2 x 10⁷ switching cycles
- **Short circuit strength**
  - Max. fuse rating: 6 A gG / gL IEC/EN 60947-5-1
  - Mechanical life: 30 x 10⁵ switching cycles

### Analogue output
- **For actual insulating value, no galvanic separation to measuring circuit terminals X3-X4:**
  - Typ. 0 ... 13.25 V / $R_i$ approx. 50 Ω
  - (0 V at $R_i = 0$ and 13.0 ... 13.5 V at $R_i = \infty$)
  - X4 is internal connected with PE

### Other Technical Data
- **Operating mode:** Continuous operation
- **Temperature range**
  - Operation: - 20 ... + 60 °C
  - Storage: - 25 ... + 70 °C
- **Altitude:** ≤ 2000 m

### EMC
- **Electrostatic discharge:** 6 kV (contact) IEC/EN 61000-4-2
- **HF irradiation**
  - 80 MHz ... 1 Ghz: 20 V / m IEC/EN 61000-4-3
  - 1 GHz ... 2.7 GHz: 10 V / m IEC/EN 61000-4-3
- **Fast transients:** 2 kV IEC/EN 61000-4-4
- **Surge voltages Between A1 - A2 and L+, L-:** 2 kV IEC/EN 61000-4-5
- **Between A1, A2 - PE:** 4 kV IEC/EN 61000-4-5
- **Between control lines:** 1 kV IEC/EN 61000-4-5
- **Between control lines and ground:** 1 kV IEC/EN 61000-4-5
- **HF-wire guided:** 10 V IEC/EN 61000-4-6
- **Interference suppression:** Limit value class B EN 55011

### Degree of protection
- **Housing:** IP 40 IEC/EN 60529
- **Terminals:** IP 20 IEC/EN 60529
- **Housing:** Thermoplastic with V0 behaviour according to UL subject 94
- **Climate resistance:** 20 / 060 / 04 IEC/EN 60068-2-6 frequency 10 ... 55 Hz
- **Vibration resistance:** Amplitude 0.35 mm IEC/EN 60068-2-6
- **Wire connection Cross section:** 2 x 2,5 mm² solid or 2 x 1,5 mm² stranded wire with sleeve DIN 46228-1/-2/-3/-4
- **Stripping length:** 10 mm
- **Wire fixing:** Flat terminals with self-lifting clamping piece IEC/EN 60999-1
- **Fixing torque:** 0.8 Nm
- **Mounting:** DIN rail IEC/EN 60715
- **Weight:** 500 g

### Dimensions
- **Width x height x depth:** 100 x 78 x 115 mm
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
Analogue Output Voltage $U_A$ (Terminals X3-X4) against Insulation Resistance $R_E$ with $C_E = 0$

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

- $U_{\text{max}} = 13.0 \text{ V}$
- $U_{\text{max}} = 13.25 \text{ V}$
- $U_{\text{max}} = 13.5 \text{ V}$