Ohm and Current Meter

Milli-TO 3

Technical Specifications

**General Data**

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measuring</td>
<td>control via START-/STOP-button, remote or internal timer</td>
</tr>
<tr>
<td>Reading rate</td>
<td>approx. 1 reading per second within same range</td>
</tr>
<tr>
<td>Ranges</td>
<td>7 ranges, auto ranging or manual ranging</td>
</tr>
<tr>
<td>Function</td>
<td>controlled by buttons, RS232 interface or remote at rear side</td>
</tr>
<tr>
<td>Response time</td>
<td>to rated accuracy 10 minutes</td>
</tr>
<tr>
<td>Displays</td>
<td>2 LCD's with 2 rows by 20 digits each</td>
</tr>
<tr>
<td></td>
<td>range display in scientific form (e.g. 16.55E9 for 16.55 GΩ) LED’s to indicate V\text{ON}! and FAULT, LED’s in all buttons</td>
</tr>
<tr>
<td>Indications</td>
<td>limit indication by relay contact (max. 24 V/0.5 A) and beeper for overrun or underrun of programmable limit window; overflow or underflow indicated in display as OVERRANGE or UNDERRANGE and send via RS 232</td>
</tr>
<tr>
<td>Power Supply</td>
<td>100 VAC to 240 VAC, 50 Hz to 60 Hz approx. 20 VA</td>
</tr>
<tr>
<td>Fuses</td>
<td>main fuse in Euro-socket 1.6 AT; Rx-Low fuse at the rear side 1.6 AT; fuse in the switching power supply 2 AT (qualified technician required)</td>
</tr>
<tr>
<td>Connectors</td>
<td>at the rear side for LIMIT and Remote via SUB-D 9 pole as well as GND and earth pole via 4 mm panel jack</td>
</tr>
<tr>
<td>Safety class</td>
<td>Schutzklasse 1 (Germany)</td>
</tr>
<tr>
<td>Protective System</td>
<td>Schutzart IP 40 (Germany)</td>
</tr>
<tr>
<td>Temperature</td>
<td>operating: 15 °C - 23 °C - 35 °C storage: -10 °C to +60 °C</td>
</tr>
<tr>
<td>Humidity</td>
<td>max. 50 %, no condensation allowed!</td>
</tr>
<tr>
<td>Housing</td>
<td>desktop case with metal hand grip</td>
</tr>
<tr>
<td>Size in mm</td>
<td>W/H/L 340 x 150 x 300</td>
</tr>
<tr>
<td>Weight</td>
<td>5.7 kg</td>
</tr>
</tbody>
</table>

**Ix (Current Measurement)**

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measuring range</td>
<td>0.01 x 10^{-12} A resolution to 1.1 x 10^{-3} A</td>
</tr>
<tr>
<td>Display</td>
<td>3½ digit (0.0 to 1.100)</td>
</tr>
<tr>
<td>Ranges</td>
<td>7; full auto ranging or manual ranging</td>
</tr>
<tr>
<td>Accuracy at 23 °C</td>
<td>+/- 1 K:</td>
</tr>
<tr>
<td></td>
<td>range 1 to 5: +/- 0.2 % +2 digit</td>
</tr>
<tr>
<td></td>
<td>range 6: +/- 0.5 % +2 digit</td>
</tr>
<tr>
<td></td>
<td>range 7: +/- 1 % +2 digit</td>
</tr>
<tr>
<td>Temperature coefficient</td>
<td>(15 to 35 °C): +/- 0.02 % / K</td>
</tr>
<tr>
<td>DC input resistance of the current circuit (R_i):</td>
<td></td>
</tr>
<tr>
<td></td>
<td>range 1: 200 Ω (auto)</td>
</tr>
<tr>
<td></td>
<td>range 2: 1.1 kΩ</td>
</tr>
<tr>
<td></td>
<td>range 3: 10.1 kΩ</td>
</tr>
<tr>
<td></td>
<td>range 4: 100 kΩ</td>
</tr>
<tr>
<td></td>
<td>range 5: 1 MΩ</td>
</tr>
<tr>
<td></td>
<td>range 6: 10 MΩ</td>
</tr>
<tr>
<td></td>
<td>range 7: 1 GΩ</td>
</tr>
<tr>
<td>Overvoltage protection at input R_x / I_x:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>+/- 10 VDC</td>
</tr>
<tr>
<td>Overcurrent protection at input R_x / I_x:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>+/- 10 mADC</td>
</tr>
</tbody>
</table>

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# Ohm and Current Meter

## Milli-TO 3

### Technical Specifications

#### High-Ohm (High Resistance Measurement)
- **Measuring range:**
  - at measurement voltage
    - 1 V: $0.9 \times 10^3$ to $3.3 \times 10^{12} \Omega$
    - 10 V: $9 \times 10^2$ to $33 \times 10^{12} \Omega$
    - 100 V: $90 \times 10^1$ to $0.33 \times 10^{16} \Omega$
    - 500 V: $450 \times 10^3$ to $1.6 \times 10^{15} \Omega$
  (through current measurement)
- **Ranges:**
  - 7: full auto ranging or manual ranging
- **Accuracy at 23 °C ±/− 1 K within 12 months:**
  - range 1 to 5: ±/− 0.3% +2 digits
  - range 6: ±/− 0.5% +2 digits
  - range 7: ±/− 1% +2 digits
- **Temperature coefficient:** 15 °C to 35 °C: ±/−0.1% / K
- **Test voltage:**
  - 10 V, 100 V, 500 V or variable 1 V bis 500 V in 1 V steps
- **Accuracy of test voltage:**
  - at 23 °C: ±/− 0.2 %
- **Temperature coefficient** of test voltage:
  - ±/− 0.01 % / K
- **Test current:**
  - range 1: 1.0 A
  - range 2: 100 mA
  - range 3: 10 mA
  - range 4: 1 mA
  - range 5: 0.1 μA
  - range 6: 10 μA
  - range 7: 1.0 μA
- **Display:**
  - 2½-digit, 3½-digit, 4½-digit programmable
- **Method of measuring:**
  - 2- or 4-terminal method (Kelvin method)
  - decade constant current
- **Compensation and controlling of thermo-voltage:**
  - 0 to ±/− 20 mV allowed
- **Accuracy at 23 °C ±/− 1 K:**
  - ±/− 0.2 % of input +2 digit
  - (typically 0.1 %)
- **Temperature coefficient (15 to 30 °C):**
  - ±/− 0.1 % / K
- **Max. voltage over EUT:**
  - < 4 VDC
- **Max. external voltage between source clamps:**
  - −24 VDC and +3 VDC
- **Max. external voltage between sense clamps:**
  - ±/− 48 VDC
- **Rx / Ix connectors:**
  - 4 x 4 mm jack or 5-pol DIN connector
- **Fuse in the low-ohm circuit:**
  - 1.6 A MT at the rear side

#### Low-Ohm (Low Resistance Measurement)
- **Measuring Range:**
  - 180 mΩ to 180 kΩ
- **Resolution at 4½-digit Display:**
  - range 1: 10 μΩ
  - range 2: 100 μΩ
  - range 3: 1 mΩ
  - range 4: 10 mΩ
  - range 5: 100 mΩ
  - range 6: 1 Ω
  - range 7: 10 Ω
- **Test current:**
  - range 1: 1.0 A
  - range 2: 100 mA
  - range 3: 10 mA
  - range 4: 1 mA
  - range 5: 0.1 μA
  - range 6: 10 μA
  - range 7: 1.0 μA
- **Display:**
  - 2½-digit, 3½-digit, 4½-digit programmable
- **Method of measuring:**
  - 2- or 4-terminal method (Kelvin method)
  - decade constant current
- **Compensation and controlling of thermo-voltage:**
  - 0 to ±/− 20 mV allowed
- **Accuracy at 23 °C ±/− 1 K:**
  - ±/− 0.2 % of input +2 digit
  - (typically 0.1 %)
- **Temperature coefficient (15 to 30 °C):**
  - ±/− 0.1 % / K
- **Max. voltage over EUT:**
  - < 4 VDC
- **Max. external voltage between source clamps:**
  - −24 VDC and +3 VDC
- **Max. external voltage between sense clamps:**
  - ±/− 48 VDC
- **Rx / Ix connectors:**
  - 4 x 4 mm jack or 5-pol DIN connector
- **Fuse in the low-ohm circuit:**
  - 1.6 A MT at the rear side

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