## TECHNICAL SPECIFICATIONS OF THE INSTRUMENTS

<table>
<thead>
<tr>
<th>Instrument</th>
<th>Dimensions</th>
<th>Weight</th>
<th>Materials</th>
<th>Display</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(Length x Width x Height)</td>
<td>185x90x40mm</td>
<td>ABS, rubber</td>
<td>2x4½ digits plus symbols</td>
</tr>
<tr>
<td></td>
<td></td>
<td>470g (complete with Batteries)</td>
<td>Visible area: 52x42mm</td>
<td></td>
</tr>
</tbody>
</table>

### Operating conditions
- **Operating temperature**: -5 ... 50°C
- **Storage temperature**: -25 ... 65°C
- **Working relative humidity**: 0 ... 90% RH, no condensation
- **Protection degree**: IP67

### Power supply
- **Batteries**: 4 Batteries 1.5V type AA
- **Autonomy**: 200 hours with 1900mA alkaline batteries
- **Current consumption when instrument off**: 20μA
- **Main**: 12Vdc / 1000mA Output main adapter

### Security of data stored
- Unlimited, independent of battery charge conditions
- 1min/month max drift

### Measured values storage - model HD2178.2
- **Type**: 2000 pages each one containing 40 samples
- **Quantity**: 80000 samples in total
- **Storage interval**: 1s ... 3600s (1 hour)

### Serial interface RS232C
- **Type**: RS232C electrically isolated
- **Baud rate**: can be set from 1200 to 38400 baud
- **Data bit**: 8
- **Parity**: None
- **Stop bit**: 1
- **Flow Control**: Xon/Xoff
- **Serial cable length**: Max 15m
- **Immediate print interval**: 1s ... 3600s (1 hour)

### USB interface - model HD2178.2
- **Type**: 1.1 - 2.0 electrically isolated

### Connections
- **Input for probes**
- **Serial and USB interface**: 8-pole MiniDin connector
- **Mains adapter**: 2-pole connector (positive at centre)

### Temperature measurement by instrument - RTD sensors
- **Type**: PT100
- **Measuring range**: -200...+650°C
- **Resolution**: 0.1°C
- **Accuracy**: ±0.05°C
- **Drift after 1 year**: 0.1°C/year

### Temperature measurement by instrument - TC
- **Type**: TC
- **Measuring range**: K -200...+1370°C
- **Measuring range**: J -100...+750°C
- **Measuring range**: T -200...+400°C
- **Measuring range**: N -200...+1300°C
- **Measuring range**: E -200...+750°C
- **Resolution**: 0.1°C
- **Instrument accuracy**: Thermocouple K ±0.1°C up to 600°C ±0.2°C over 600°C Thermocouple J ±0.05°C up to 400°C ±0.1°C over 400°C Thermocouple T ±0.1°C Thermocouple N ±0.1°C up to 600°C ±0.2°C over 600°C Thermocouple E ±0.1°C up to 300°C ±0.15°C over 300°C

### Temperature drift @20°C
- **Temperature drift**: 0.02%/°C
- **Drift after 1 year**: 0.1°C/year

### Thermocouple probes accuracy:
- Tolerance of a type of thermocouple corresponds to the maximum acceptable shift from the e.m.f. of any thermocouple of that type, with reference junction at 0°C. The tolerance is expressed in degrees Celsius, preceded by the sign. The percentage tolerance is given by the ratio between the tolerance expressed in degrees Celsius and the measurement junction temperature, multiplied by one hundred. The tolerances refer to the operating temperature expected for the thermocouple, in agreement with the thermo-elements’ diameter.
- Those thermocouples that comply with the limits for temperatures over 0°C, do not necessarily comply with the limits for ranges below 0°C.

### Accuracy
- Accuracy is referred to the instrument only; error due to the thermocouple or to the cold junction reference sensor is not included.
- Temperature drift @20°C: 0.02%/°C
- Drift after 1 year: 0.1°C/year
### Technical Data of Probes and Modules Equipped with Instrument

#### Temperature Probes PT100 Sensor with SICRAM Module

<table>
<thead>
<tr>
<th>Model</th>
<th>Type</th>
<th>Application field</th>
<th>Accuracy</th>
</tr>
</thead>
<tbody>
<tr>
<td>TP472I</td>
<td>Immersion</td>
<td>-196°C...+500°C</td>
<td>±0.25°C (-196°C...+350°C)</td>
</tr>
<tr>
<td>TP472.0</td>
<td>Immersion</td>
<td>-50°C...+400°C</td>
<td>±0.25°C (-50°C...+350°C)</td>
</tr>
<tr>
<td>TP473P</td>
<td>Penetration</td>
<td>-50°C...+400°C</td>
<td>±0.25°C (-50°C...+350°C)</td>
</tr>
<tr>
<td>TP473P.0</td>
<td>Penetration</td>
<td>-50°C...+400°C</td>
<td>±0.25°C (-50°C...+350°C)</td>
</tr>
<tr>
<td>TP474C</td>
<td>Contact</td>
<td>-50°C...+400°C</td>
<td>±0.3°C (-50°C...+350°C)</td>
</tr>
<tr>
<td>TP474C.0</td>
<td>Contact</td>
<td>-50°C...+400°C</td>
<td>±0.3°C (-50°C...+350°C)</td>
</tr>
<tr>
<td>TP475A</td>
<td>Air</td>
<td>-50°C...+250°C</td>
<td>±0.3°C (-50°C...+250°C)</td>
</tr>
<tr>
<td>TP472.5</td>
<td>Immersion</td>
<td>-50°C...+250°C</td>
<td>±0.3°C (-50°C...+250°C)</td>
</tr>
<tr>
<td>TP472.10</td>
<td>Immersion</td>
<td>-70°C...+250°C</td>
<td>±0.4°C (-70°C...+250°C)</td>
</tr>
<tr>
<td>TP49A</td>
<td>Immersion</td>
<td>-70°C...+250°C</td>
<td>±0.25°C (-70°C...+250°C)</td>
</tr>
<tr>
<td>TP49AC</td>
<td>Contact</td>
<td>-70°C...+250°C</td>
<td>±0.25°C (-70°C...+250°C)</td>
</tr>
<tr>
<td>TP49AP</td>
<td>Penetration</td>
<td>-70°C...+250°C</td>
<td>±0.25°C (-70°C...+250°C)</td>
</tr>
<tr>
<td>TP875</td>
<td>Globe thermometer Ø150mm</td>
<td>-30°C...+120°C</td>
<td>±0.25°C</td>
</tr>
<tr>
<td>TP676</td>
<td>Globe thermometer Ø 50mm</td>
<td>-30°C...+120°C</td>
<td>±0.25°C</td>
</tr>
<tr>
<td>TP97</td>
<td>Immersion</td>
<td>-50°C...+200°C</td>
<td>±0.25°C</td>
</tr>
<tr>
<td>TP878</td>
<td>For solar panels</td>
<td>+5°C...+80°C</td>
<td>±0.25°C</td>
</tr>
<tr>
<td>TP879</td>
<td>For compost</td>
<td>-20°C...+120°C</td>
<td>±0.25°C</td>
</tr>
</tbody>
</table>

#### Common Features

- Temperature drift @20°C: 0.003%/°C
- 4 wires PT100 and 2 wires PT1000 Probes

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<th>Model</th>
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<tr>
<td>TP47.100</td>
<td>4 wires PT100</td>
<td>-50...+400°C</td>
<td>Class A</td>
</tr>
<tr>
<td>TP47.1000</td>
<td>2 wires PT1000</td>
<td>-50...+400°C</td>
<td>Class A</td>
</tr>
</tbody>
</table>

#### PURCHASING CODES

- **HD2178.1**: The kit consists of instrument HD2178.1, 4 per 1.5V alkaline Batteries, instruction manual and case, software DeltaLog9. Probes and cables have to be ordered separately.
- **HD2178.2**: The kit consists of instrument data logger HD2178.2, 4 per 1.5V alkaline Batteries, instruction manual and case, software DeltaLog9. Probes and cables have to be ordered separately.
- **HD2110**: 8-pole connection cable MiniDin - Sub D 9-pole female for RS232C.
- **C.206**: Cable for instruments of the series HD21...1 and 2 to connect directly to USB input of PC.
- **HD2101/USB**: Connection cable USB 2.0 connector type A - 8-pole MiniDin.
- **DeltaLog9**: Software for download and management of the data on PC using Windows 98 to XP and Vista operating systems.
- **SWD10**: Stabilized power supply at 250Vac/12Vdc- 300mA-1000mA mains voltage.
- **HD40.1**: Upon request, portable, serial input, 24 column thermal printer, 58mm paper width.

Probes equipped with SICRAM module:
- **TP472**: Immersion probe, PT100sensor. Stem Ø 3 mm, length 300 mm. Cable 2 meters long.
- **TP472.0**: Immersion probe, PT100sensor. Stem Ø 3 mm, length 230 mm. Cable 2 meters long.
- **TP473P**: Penetration probe, PT100sensor. Stem Ø 4 mm, length 150 mm. Cable 2 meters long.
- **TP473P.0**: Penetration probe, PT100sensor. Stem Ø 4 mm, length 230 mm. Cable 2 meters long.
- **TP474C**: Contact probe, PT100sensor. Stem Ø 4 mm, length 230 mm, contact surface Ø 5 mm. Cable 2 meters long.
- **TP474C.0**: Contact probe, PT100sensor. Stem Ø 4 mm, length 230 mm, contact surface Ø 5 mm. Cable 2 meters long.
- **TP472.10**: Immersion probe, PT100sensor. Stem Ø 6 mm, length 1,000mm. Cable 2 meters long.
- **TP49A**: Immersion probe, PT100sensor. Stem Ø 2.7mm, length 150mm. Cable 2 meters long. Aluminum handle.
- **TP49AC**: Contact probe, PT100sensor. Stem Ø 4 mm, length 150mm. Cable 2 meters long. Aluminum handle.
- **TP49AP**: Penetration probe, PT100sensor. Stem Ø 2.7mm, length 150mm. Cable 2 meters long. Aluminum handle.
- **TP875**: Globe thermometer Ø 150 mm with handle. Cable 2 meters long.
- **TP876**: Globe thermometer Ø 50 mm with handle. Cable 2 meters long.
- **TP87**: Immersion probe, PT100sensor. Stem Ø 3 mm, length 70 mm. Cable 2 meters long.
- **TP87**: Contact probe for solar panels. Cable 2 meters long.
- **TP87.1**: Contact probe for solar panels. Cable 5 meters long.
- **TP879**: Penetration probe for compost. Stem Ø 8 mm, length 1 meter. Cable 2 meters long.

Temperature probes without SICRAM module:
- **TP47.100**: Direct 4 wires PT100 sensor immersion probe. Stem Ø 3 mm, length 230mm. 4 wires connection cable with connector, 2 meters long.
- **TP47.1000**: PT100 sensor immersion probe. Stem Ø 3 mm, length 230mm. 2 wires connection cable with connector, 2 meters long.
- **TP47**: Only connector for probe connection: direct 3 and 4 wires PT100, 2 wires PT1000.

**Thermocouple probes**

Any thermocouple probe with standard miniature connector available on the price list can be connected to these instruments. Please see pages from 17 to 21.