Measurements at high operating temperatures

**THMM pro** measurement modules are equipped with 8 or 16 signal inputs for temperature measurements with thermocouples and are designed for applications used under extreme operating temperatures, like e.g. in engine compartments. The measurement inputs are equipped with NiCr-Ni mini thermo connectors and two-color status LEDs. The maximum measurement data rate per channel is 200 Hz. **THMM pro** measurement modules are also available with type J or type T measurement inputs.

Measurement module **THMC 16** provides 16 measurement inputs and is equipped with two LEMO 2B NiCr-Ni multi-connectors. The usage of **THMC 16** measurement modules with multi connectors is recommended if the devices need to be changed frequently and rapidly.

**Key features**

- Internal cold junction compensation per channel
- Median11 filter for interference pulse suppression
- LEDs per channel, e.g. to indicate broken sensors
- Very good measurement accuracy under difficult temperature ranges and environmental conditions
- Very low power consumption

**Shipping content**

- MiniModule THMM pro
- Configuration software CSMconfig
- Documentation
- Calibration certificate (type J and T), Calibration certificate in accordance with DIN EN ISO/IEC 17025 (type K)

**Maintenance**

- Calibration every 12 months recommended

**Accessories**

- See datasheet “CAN Accessories”
### Technical data

<table>
<thead>
<tr>
<th>Type designation</th>
<th>THMM 8 pro</th>
<th>THMM 16 pro</th>
<th>THMC 16</th>
</tr>
</thead>
<tbody>
<tr>
<td>Technical data valid as of revision</td>
<td>G1xx</td>
<td>D0xx</td>
<td>D0xx</td>
</tr>
</tbody>
</table>

#### Measurement inputs

<table>
<thead>
<tr>
<th>Type</th>
<th>THMM 8 pro</th>
<th>THMM 16 pro</th>
<th>THMC 16</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type K</td>
<td>8 NiCr-Ni</td>
<td>16 NiCr-Ni</td>
<td>-</td>
</tr>
<tr>
<td>Type J</td>
<td>8 Fe-CuNi</td>
<td>16 Fe-CuNi</td>
<td>-</td>
</tr>
<tr>
<td>Type T</td>
<td>8 Cu-CuNi</td>
<td>16 Cu-CuNi</td>
<td>-</td>
</tr>
</tbody>
</table>

#### Measurement ranges

<table>
<thead>
<tr>
<th>Type</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type K</td>
<td>-100 °C to +1372 °C</td>
</tr>
<tr>
<td>Type J</td>
<td>-100 °C to +1200 °C</td>
</tr>
<tr>
<td>Type T</td>
<td>-100 °C to +400 °C</td>
</tr>
</tbody>
</table>

#### Internal resolution

<table>
<thead>
<tr>
<th>THMM 8 pro</th>
<th>THMM 16 pro</th>
</tr>
</thead>
<tbody>
<tr>
<td>16 bit</td>
<td>16 bit</td>
</tr>
</tbody>
</table>

#### Internal sampling rate per ch.

<table>
<thead>
<tr>
<th>THMM 8 pro</th>
<th>THMM 16 pro</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 kHz</td>
<td>1 kHz</td>
</tr>
</tbody>
</table>

#### Measurement data rate / sending rate per channel

1 kHz adjustable per module or per channel via configurable CAN identifier

#### HW input filter

<table>
<thead>
<tr>
<th>THMM 8 pro</th>
<th>THMM 16 pro</th>
</tr>
</thead>
<tbody>
<tr>
<td>low-pass filter 250 Hz</td>
<td></td>
</tr>
</tbody>
</table>

#### SW input filter

<table>
<thead>
<tr>
<th>THMM 8 pro</th>
<th>THMM 16 pro</th>
</tr>
</thead>
<tbody>
<tr>
<td>FIR filter (Finite Impulse Response) threshold frequency automatically adjusted to measurement data rate</td>
<td></td>
</tr>
<tr>
<td>median filter, single or double internal clock rate</td>
<td></td>
</tr>
</tbody>
</table>

#### Channel-specific comments

Free text consisting of up to 100 characters per channel

#### Input protection

1) **Operational safety**
   - ±60 V permanent
   - ±100 V permanent, additional ESD protection

2) **Device safety**
   - ±60 V permanent
   - ±100 V permanent, additional ESD protection

#### Broken sensor detection

Yes

#### Cold junction compensation

Internal reference per channel

#### Measurement deviation (type K)

2) Gain error at 25 °C
   - max. ±0.05 % of measured value

Offset and scaling error
   - typ. ±0.1 K
   - max. ±0.3 K ±12 µV

Gain drift
   - max. ±10 ppm/K

Zero drift
   - max. ±14 mK/K

#### Galvanic isolation

3) No safety isolation in terms of high-voltage applications

<table>
<thead>
<tr>
<th>Channel / channel</th>
<th>500 V</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAN / channel</td>
<td>500 V</td>
</tr>
<tr>
<td>CAN / power supply</td>
<td>500 V</td>
</tr>
</tbody>
</table>

#### CAN interface

- CAN 2.0B (active), High Speed (ISO 11898-2:2016)
- 125 kbit/s to max. 1 Mbit/s, data transfer “free running”

#### Configuration

- Via CAN bus with CSMconfig or CSM INCA AddOn settings and configurations are stored in the device

[www.csm.de](http://www.csm.de)
### Type designation

<table>
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<th>THMM 16 pro</th>
<th>THMC 16</th>
</tr>
</thead>
</table>

### Power supply

- **Minimum**: 6 V DC (-10 %)
- **Maximum**: 50 V DC (+10 %)
- **Power consumption**: typ. 1.0 W
- **Power consumption**: typ. 1.4 W

### LED indicators

- **CAN**: power / status

- **Measurement channels**
  - **Configuration**
    - Open channel (red flashing) / sensor connected (green flashing)
  - **Operation**
    - Open channel or broken sensor (red) / Sensor detected (off)

### Housing

- **Protection class**: aluminium, gold anodized
- **Weight**: approx. 300 g
- **Weight**: approx. 500 g
- **Dimensions (w × h × d)**
  - approx. 120 × 33 × 50 mm / approx. 120 × 37 × 50 mm (Slide Case)
  - approx. 200 × 36 × 50 mm / approx. 200 × 40 × 50 mm (Slide Case)

### Connectors

- **CAN / power supply**: LEMO 0B, 5-pole, code G 4)
- **Signal inputs**: miniature thermo connectors
  - NiCr-Ni multi-connector

### Operating and storage conditions

- **Operating temperature range**: -40 °C to +125 °C
- **Relative humidity**: 5 % to 95 %
- **Pollution degree**: 3
- **Storage temperature**: -55 °C to +150 °C

### Conformity

- CE

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1. Observe information regarding the intended use. See CSM document “Safety Instructions MiniModules”.
2. Further information can be found in the Technical Information document on the subject of “Deviation of Measurement”.
3. These MiniModules are designed for measurements in vehicles with 12 V, 24 V, or 48 V on-board power supply systems. The maximum operating voltage at the measurement inputs is 60 V. Not suitable to be directly connected to systems with higher operating voltages, e.g. high-voltage batteries of hybrid or electric vehicles.
4. Optionally available in other variants.

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### additional products

**PT4 evo**

PT4 evo MiniModules are designed for temperature measurements with PT100 and PT1000 elements and are available in different housings.

**HV TH4 evo**

HV TH4 evo MiniModules are especially designed for safe temperature measurements on high-voltage components and are excellently suited for applications in the field of e-mobility.

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Innovative Measurement and Data Technology