METIS H311 / H322
2-Color High-Speed Pyrometers

2-Color High-Speed Pyrometers for Very Fast Non-Contact Temperature Measurement

- **Shortwave spectral ranges**
  - for measurements on metals, shiny materials, ceramics, graphite and many more
  - for measurements and laser power control during laser hardening and build-up welding of steels.

- **Measurement through polluting window, dust, smoke or objects that are smaller than the pyrometer’s spot size**

- **Versatile model types** due to modular design
  - Focusable optics: integrated or as optical fiber version
  - Sighting method: laser targeting light, through-lens sighting or color camera
  - Integrated PID controller

Temperature ranges
- from 350 – 800°C to 1600 – 3300°C

Response time / Exposure time
- < 80 µs
- < 40 µs

Smallest possible spot size
- 0.8 mm

www.sensortherm.com
25,000 Measurements per Second

2-color high-speed pyrometers of the H3 series perform 25,000 measurements per second and are thus capable, e.g. to perform laser power control almost in real time and react to complex workpiece geometries.

H3 are high-precision and extremely fast measuring devices that combine modern 2-color technology with the advantages of digital signal processing:

- 2 separate measuring detectors for the two spectral ranges for a safe measurement recording even at low signal strengths
- Digital microcontroller signal processing for 100% reproducibility of displayed readings
- IR signal monitoring, used for warning of optic or window contamination

### Technical Data

<table>
<thead>
<tr>
<th>Modell</th>
<th>H311</th>
<th>H322</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Temperature ranges</strong></td>
<td>600–1100°C</td>
<td>1000–2000°C</td>
</tr>
<tr>
<td>650–1300°C</td>
<td>1100–2200°C</td>
<td>400–1200°C</td>
</tr>
<tr>
<td>750–1400°C</td>
<td>1300–2500°C</td>
<td>500–1300°C</td>
</tr>
<tr>
<td>900–1800°C</td>
<td>1600–3300°C</td>
<td>550–1400°C</td>
</tr>
<tr>
<td><strong>Temp. sub ranges</strong></td>
<td>Any temperature sub-range adjustable within the temperature range (minimum span 50°C)</td>
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<tr>
<td><strong>Spectral range</strong></td>
<td>Channel 1: 0.93–1.1 µm / channel 2: 0.75–0.93 µm</td>
<td>Channel 1: 1.65–1.8 µm / ch. 2: 1.45–1.65 µm</td>
</tr>
<tr>
<td>*) Channel 1: 0.99 µm / channel 2: 0.78 µm</td>
<td>**) Channel 1: 1.64 µm / channel 2: 1.4 µm</td>
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<tr>
<td><strong>Detector</strong></td>
<td>2 x Silicon</td>
<td>2 x InGaAs</td>
</tr>
<tr>
<td><strong>Response time t]</strong></td>
<td>&lt; 80 µs, adjustable up to 10 s</td>
<td></td>
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<tr>
<td><strong>Exposure time</strong></td>
<td>&lt; 40 µs</td>
<td></td>
</tr>
<tr>
<td><strong>Uncertainty</strong> (ε = 1, t = 1 s, T_a = 23°C)</td>
<td>0.5% of measured value in °C + 1K</td>
<td>0.2% of measured value in °C + 1K</td>
</tr>
<tr>
<td><strong>Repeatability</strong> (ε = 1, t = 1 s, T_a = 23°C)</td>
<td>0 or 4–20 mA, max. load: 500 Ω, resolution 0.0015% of the (adjusted) temperature (sub) range (16 Bit). Output 1: output of the measured temperature, output 2 adjustable: 2-color or 1-color temperature (optionally of channel 1 or 2), device temperature, control output (devices with PID controller). Outputs can be set within or outside the temperature range.</td>
<td></td>
</tr>
<tr>
<td><strong>Serial interface</strong></td>
<td>RS485 (4.8–921.6 kBD), Resolution 0.1°C / °F</td>
<td></td>
</tr>
<tr>
<td><strong>Inputs / outputs</strong></td>
<td>12-pin connector: 3 configurable connectors (digital input, output or one analog input)</td>
<td>17-pin connector: 4 digital inputs, 2 digital outputs, 1 analog input.</td>
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<tr>
<td></td>
<td>2-color or 1-color temperature measurement (optionally of channel 1 or 2), temperature sub range, response time (&lt; 1 ms–10s), emissivity slope (0.800–1.200), emissivity (0.050–1.200), transmittance (0.050–1.000), spot size fill factor (0.050–1.000), peak picker (clear settings: automatic, time clear, externally), device address (00–97), baud rate (4.8–921.6 kBD), analog outputs (0 or 4–20 mA), temperature unit (°C / °F), device menu language (only 12-pin devices: English/German).</td>
<td></td>
</tr>
<tr>
<td><strong>Display</strong> (only 12-pin devices)</td>
<td>Dot Matrix, green/yellow, 128 x 32 Dots (5.6 mm high) for temperature or parameter settings, resolution 0.1°C / °F</td>
<td></td>
</tr>
<tr>
<td><strong>Device parameters</strong></td>
<td>2-color or 1-color temperature measurement (optionally of channel 1 or 2), temperature sub range, response time (&lt; 1 ms–10s), emissivity slope (0.800–1.200), emissivity (0.050–1.200), transmittance (0.050–1.000), spot size fill factor (0.050–1.000), peak picker (clear settings: automatic, time clear, externally), device address (00–97), baud rate (4.8–921.6 kBD), analog outputs (0 or 4–20 mA), temperature unit (°C / °F), device menu language (only 12-pin devices: English/German).</td>
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<tr>
<td><strong>Power requirement</strong></td>
<td>24 V DC (18–30 V DC), max. 12 VA; protected against reverse polarity</td>
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<tr>
<td><strong>Isolation</strong></td>
<td>Voltage supply, analog outputs and serial interface are galvanically isolated from each other</td>
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<tr>
<td><strong>Sightings (optional)</strong></td>
<td>Through-lens sighting (can be darkened at high measuring temperatures)</td>
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<td></td>
<td>Laser targeting light (red, λ=650 nm, P&lt; 1 mW, laser class 2 to IEC 60825-1)</td>
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<td></td>
<td>Color CCD camera (field of view: ca. 3.6% x 2.7% of measuring distance; output signal: FBAS, ca. 1 Vpp, 75 Ω, COIR, NTSC / PAL switchable; Resolution: NTSC: 720 x 480 pixels; PAL: 720 x 576 pixels; frame rate: NTSC: 60 Hz, PAL: 50 Hz)</td>
<td></td>
</tr>
<tr>
<td><strong>Ambient temperature</strong></td>
<td>Operating: 0–60°C (32 to 140°F), fiber optic devices on optics side: -20 to 250°C (-4 to 482°F)</td>
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<tr>
<td>Storage: -20 to 85°C (-4 to 185°F)</td>
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<tr>
<td><strong>Relative humidity</strong></td>
<td>Non-condensing conditions</td>
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<tr>
<td><strong>Housing / protection class</strong></td>
<td>Aluminum / IP65 to DIN 40 050 with connector</td>
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<tr>
<td><strong>Weight</strong></td>
<td>650 g</td>
<td></td>
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<tr>
<td><strong>CE label</strong></td>
<td>According to EU directives for electromagnetic immunity</td>
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</table>

### Ordering Specifications

**Model:** Specify each model in 12- or 17-pin, with temperature range, sighting method as well as optics type. For fiber-optic devices additional the optical fiber length between 2.5 and 30 m (in 2.5 m increments).

**Scope of delivery:** Device (optical fiber devices optionally with optics OQ12 or OQ25, special optics OQ30 for an additional charge. Optical fiber: 2.5 m; surcharge for each additional 2.5 m), works certificate, operating manual, SensorTools software. Connection cables are not included and have to be ordered separately.
The focus distance is the measuring distance in which the spot size is smallest. It can be continuously adjusted in the specified range for all optics. Measurements outside the focus distance are also possible, but the spot size diameter is usually larger.

### Optics Data

**Optics:**

- **Integrated optics**
  - Manually focusable
- **Fiber optics, manually focusable**
  - Standard: OQ25
  - Miniature: OQ12
  - Special: OQ30

**Optics / Device Versions / Features**

- **Connections / Equipment options**
  - All devices with
    - 2 analog outputs
    - RS485 interface (switchable)
  - With 12-pin connection: with display, adjustment keys and LED's for displaying operational readiness and active switching outputs, 3 configurable inputs / outputs, optional with integrated PID controller.
  - With 17-pin connection: 4 digital inputs, 2 digital outputs, 1 analog input, PID controller

- **Ambient temperature**
  - All models are optimized for changing ambient or housing temperatures between 0 and 60°C (32 and 140°F).
  - Influences due to temperature fluctuations are continuously digitally compensated.

<table>
<thead>
<tr>
<th>Optics:</th>
<th>Fiber optics</th>
<th>Integrated optics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Designation:</td>
<td>OQ12- E</td>
<td>OQ25- B1 (M311) / B2 (M322)</td>
</tr>
<tr>
<td><strong>Models and full scale temperature value:</strong></td>
<td>H311: ≤1400</td>
<td>H311: ≤1400</td>
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<tr>
<td></td>
<td>H322: ≥800</td>
<td>H322: ≥800</td>
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<tr>
<td><strong>Focus distance a [mm]</strong></td>
<td>120</td>
<td>240</td>
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<tr>
<td></td>
<td>2.2</td>
<td>4.8</td>
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<tr>
<td></td>
<td>1.2</td>
<td>2.4</td>
</tr>
</tbody>
</table>

**Spot size Ø M [mm]**

- 16 mm (FSC ≤ 1400°C); 8 mm (FSC > 1400°C)

The values in the tables are exemplary, intermediate values can be interpolated.

### Typical Application: Temperature-Controlled Process Control

- **In laser cladding**
- **In laser hardening**
- **In additive manufacturing**
Communication and evaluation software for all pyrometers, controllers, digital displays and calibration sources.

- Measured value display, graphically and numerically.
- 2-color temperature + 1-color temperature display simultaneously and device temperature
- Measured value recording incl. parameters
- View and compare up to 4 measurement data files simultaneously in the SensorTools Viewer
- Make all device settings
- Special recording settings: externally start/stop, retroactive or extended recording via signal input
- Print or save pyrometer settings, or transfer settings to other devices or export to csv files
- Switch on/off laser targeting light, adjust camera settings or motorized focus (depending on features)

**SensorTools Software (included in delivery)**

**Accessories (selection)**

**Pyrometer assembly**
- Mounting bracket for pyrometers: HA10
- Ball joint bracket for pyrometers: HA20
- Mounting bracket for fiber optics: OL12: HA80, OL25/OQ30: HA14

**Connection cable**
- 12-pin: with angled plug/straight: AL11/43
- 17-pin: only straight plug: Optional: with interface converter, integrated or via sub-D adapter (all cables available in 5m increments)

**Electrical**
- Pyrometer connection kit, ready made: Wiring-Box
- DIN rail power supply: 24 V / 1.6 A: NG12

**Protection**
- Water cooling housing (aluminum): KG10
- Air purge unit: BL12
- Mounting bracket: HA12
- Heavy ball joint bracket: HA22
- Air purge units: for devices with integrated optics: BL10
- for devices with fiber optics: BL11, BL80

**PID controller, programmable:** Regulus RF/RD

**LED digital display:** IF00

**Dimensions (in mm)**

**Manual focusable optics**

**Fiber optic devices**

- Fiber optics: OQ12, OQ25, OQ30

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Sensortherm reserves the right to make changes in scope of technical progress or further developments.

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