SENSOR THERM
MEMBER OF THE NYNOMIC GROUP

# Metis H309 / H316 / H318

## 1-Color High-Speed Pyrometers


**Highest Quality Measurements** by

- Digital signal processing
- Continuous ambient temperature compensation
- High quality optical components

**1-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 in plastic welding.
- **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

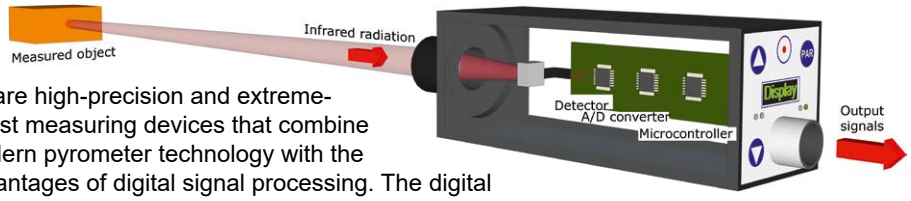
| Temperature ranges |
| --- |
| from 120 – 520°C (248°F)<br>to 700 – 2500°C (4532°F) |

| Response time / Exposure time |
| --- |
| < 40 µs<br>< 20 µs |

| Smallest possible spot size |
| --- |
| 0.4 mm |

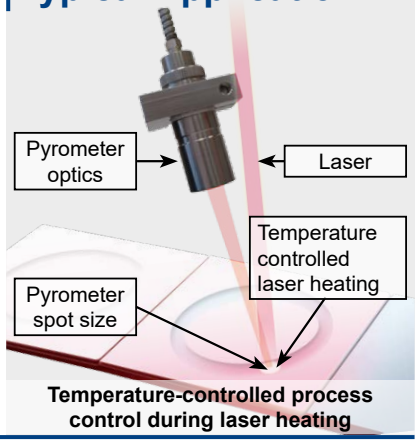
## 50,000 Measurements per Second

1-color high-speed pyrometers of the H3 series perform 50,000 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 pyrometer technology with the advantages of digital signal processing. The digital microcontroller signal processing ensures 100% reproducibility of displayed readings by computational integration of emissivity settings or continuous ambient temperature compensation.

## Typical Application




**Temperature-controlled process control during laser heating**

## Technical Data

| Model | H309 | H316 | H318 |
|---|---|---|---|
| Temperature ranges | 550 – 1200°C 750 – 1800°C<br>600 – 1400°C 750 – 2000°C<br>650 – 1600°C | 250 – 800°C 500 – 1600°C<br>300 – 900°C 600 – 1800°C<br>350 – 1100°C 700 – 2500°C<br>400 – 1200°C | 120 – 520°C<br>180 – 800°C |
| Temp. sub ranges | Any temperature sub-range adjustable within the temperature range (minimum span 50°C) | | |
| Spectral range | 0.7–1.1 µm | 1.45–1.8 µm | 1.65–2.1 µm |
| Detector | Silicon | InGaAs | InGaAs |
| Response time $t_{90}$ | < 40 µs, adjustable up to 10 s | | |
| Exposure time | < 20 µs | | |
| Uncertainty ($\varepsilon$ = 1, $t_{90}$ = 1 s, $T_A$ = 23°C) | 0.5% of measured value in °C + 1K | | |
| Repeatability ($\varepsilon$ = 1, $t_{90}$ = 1 s, $T_A$ = 23°C) | 0.2% of measured value in °C + 1K | | |
| 2 analog outputs | 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: measured temperature, device temperature, control output (devices with PID controller). Outputs can be set within or outside the temperature range. | | |
| Serial interface | RS485 (4.8–921.6 kBd), Resolution 0.1°C / °F | | |
| Inputs / outputs | 12-pin connector: 3 configurable connectors (digital input, output or one analog input)<br>17-pin connector: 4 digital inputs, 2 digital outputs, 1 analog input.<br>■ Digital inputs (via supply voltage): laser targeting light on/off, clearing of peak picker, PID controller start, load a set of parameters, trigger input for start / stop of measured value recording.<br>■ Digital outputs (12-pin devices: max. 50 mA, 17-pin devices: max. 100 mA): limit switch, exceeding the beginning of temperature range, device measuring readiness, device over-temperature, signal strength too low. Devices with PID controller: controller active, control process within limits or finished.<br>■ Analog input (12-pin: 0–20 mA, 17-pin: 0–10 V): analog adjustment of emissivity slope, emissivity or setpoint (devices with PID controller). | | |
| Display (only 12-pin devices) | Dot Matrix, greenyellow, 128 x 32 Dots (5.6 mm high) for temperature or parameter settings, resolution 0.1°C / °F | | |
| Device parameters | Temperature sub range, response time (<1 ms–10s), 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). | | |
| Power requirement | 24 V DC (18–30 V DC), max. 12 VA; protected against reverse polarity | | |
| Isolation | Voltage supply, analog outputs and serial interface are galvanically isolated from each other | | |
| Sightings (optional) | ■ Through-lens sighting (can be darkened at high measuring temperatures)<br>■ Laser targeting light (red, λ=650 nm, P< 1 mW, laser class 2 to IEC 60825-1)<br>■ Color CCD camera (field of view: ca. 3.6% x 2.7% of measuring distance; output signal: FBAS, ca. 1 $V_{pp}$, 75 Ω, CCIR, NTSC / PAL switchable; Resolution: NTSC: 720 x 480 pixels; PAL: 720 x 576 pixels; frame rate: NTSC: 60 Hz, PAL: 50 Hz) | | |
| Ambient temperature | Operating: 0–60°C (32 to 140°F), fiber optic devices on optics side: -20 to 250°C (-4 to 482°F)<br>Storage: -20 to 85°C (-4 to 185°F) | | |
| Relative humidity | Non-condensing conditions | | |
| Housing / protection class | Aluminum / IP65 to DIN 40 050 with connector | | |
| Weight | 650 g | | |
| CE label | According to EU directives for electromagnetic immunity | | |

## 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 OL12 or OL25, 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.

# Optics / Device Versions / Features

## Integrated optics

manually focusable

## Fiber optics, manually focusable

Special: OQ30

Standard: OL25

Miniature: OL12

## Sighting methods

Red **laser targeting light** for displaying the focus distance and spot size center.

**Through-lens sighting** for the visual detection of (glowing) objects.

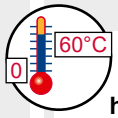
**Color camera** for alignment and dynamic process monitoring.

## 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.

# Optics Data

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: | Fiber optics | | | | | | | | Integrated optics / | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Designation: | OL12-E | | OL25-G0 | | OL25-H0 | | OQ30-90 | | OM09-A0 | | OM09-B0 | | OM09-C0 | | OV09-D1 / D2 *) | |
| Models and full scale temperature value: | H316: ≤1100 H318: 520 | H309: all H316: ≥1200 H318: 800 | H316: ≤1100 H318: 520 | H309: all H316: ≥1200 H318: 800 | H316: ≤1100 H318: 520 | H309: all H316: ≥1200 H318: 800 | H316: ≤1100 H318: 520 | H309: all H316: ≥1200 H318: 800 | H316: ≤1100 H318: 520 | H309: all H316: ≥1200 H318: 800 | H316: ≤1100 H318: 520 | H309: all H316: ≥1200 H318: 800 | H316: ≤1100 H318: 520 | H309: all H316: ≥1200 H318: 800 | H316: ≤1100 H318: 520 | H309: all H316: ≥1200 H318: 800 |
| Focus distance a [mm] | Messfeld-Ø M [mm] | | | | | | | | | | | | | | | |
| 75 | | | 0.6 | 0.45 | | | | | | | | | | | | |
| 100 | 1.5 | 0.9 | 0.9 | 0.6 | | | | | | | | | | | | |
| 130 | 2.2 | 1.25 | 1.3 | 1 | | | | | 0.6 | 0.4 | | | | | | |
| 160 | 2.9 | 1.56 | 1.75 | 1.2 | | | | | 0.8 | 0.5 | | | | | | |
| 170 | 3.1 | 1.67 | 1.78 | 1.3 | 1.6 | 1 | | | 0.87 | 0.53 | | | | | | |
| 175 | 3.22 | 1.73 | 1.79 | 1.35 | 1.63 | 1.03 | | | 0.91 | 0.54 | | | | | | |
| 180 | 3.34 | 1.78 | 1.8 | 1.4 | 1.67 | 1.05 | | | 0.95 | 0.55 | | | | | | |
| 190 | 3.57 | 1.89 | | | 1.74 | 1.1 | | | 1 | 0.6 | 0.8 | 0.5 | | | | |
| 200 | 3.8 | 2 | | | 1.8 | 1.15 | | | 1.1 | 0.65 | 0.85 | 0.54 | | | | |
| 300 | 5.5 | 3.14 | | | 2.9 | 1.83 | | | | | 1.4 | 0.9 | | | | |
| 340 | 6.2 | 3.6 | | | 3.34 | 2.1 | 1.3 | 0.8 | | | 1.7 | 1 | 1.3 | 0.8 | 1.8 | 0.9 |
| 420 | 8.4 | 4.54 | | | 4.22 | 2.75 | 1.8 | 1.05 | | | 2 | 1.3 | 1.8 | 1.05 | 2.3 | 1.08 |
| 500 | 10 | 5.5 | | | 5 | 3.2 | 2.3 | 1.3 | | | | | 2.3 | 1.3 | 2.5 | 1.2 |
| 600 | 10.9 | 6 | | | 6 | 4.1 | 2.8 | 1.62 | | | | | 2.8 | 1.62 | 3 | 1.5 |
| 700 | | | | | 7.5 | 4.8 | 3.3 | 2 | | | | | 3.3 | 2 | 3.8 | 1.9 |
| 1000 | | | | | 11 | 7 | 4.5 | 2.9 | | | | | 4.5 | 2.9 | 5.6 | 2.8 |
| 2000 | | | | | 23 | 15 | 10.5 | 6.1 | | | | | 10.5 | 6.1 | 10 | 4.7 |
| 4000 | | | | | 45 | 29 | 18 | 13 | | | | | 18 | 13 | 19 | 11 |
| 4500 | | | | | 52 | 34 | | | | | | | | | | |
| Aperture D: | 7 mm | | 13 mm | | | | | | 16 mm (FSC ≤ 1400°C); 8 mm (FSC > 1400°C) | | | | | | | |
| Fiber Ø: | 0.4 mm | 0.2 mm | 0.4 mm | 0.2 mm | 0.4 mm | 0.2 mm | 0.4 mm | 0.2 mm | | | | | | | | |

FSC = Full scale temperature value

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

## *SensorTools* Software (included in delivery)

Communication and evaluation software for all pyrometers, controllers, digital displays and calibration sources.

- Measured value display, graphically and numerically, 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)


## 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: AS54
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 BL11

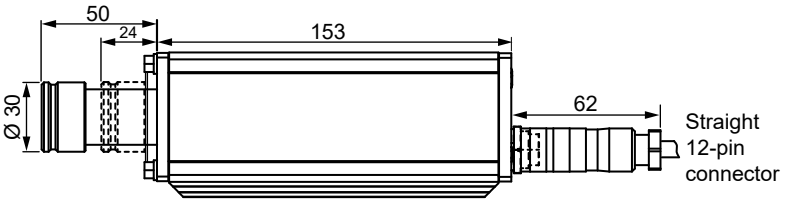
for devices with fiber optics: BL80

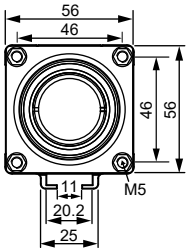
PID controller, programmable: Regulus RF/RD

LED digital display: IF00

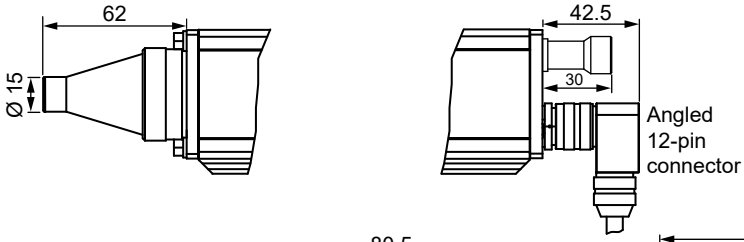
## Dimensions (in mm)

**Manual focusable optics**

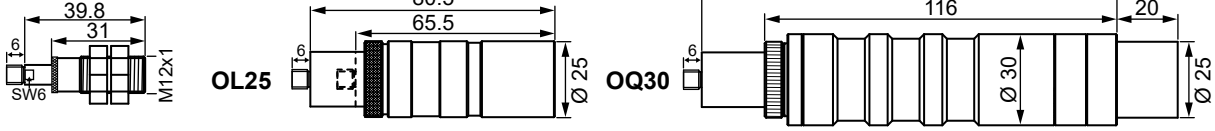



**Fiber optic devices**




**Fiber optics**




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

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