SENSOR THERM
MEMBER OF THE NYNOMIC GROUP

METIS M309 / 16 / 18 / 23

Versatile Radiation Pyrometer Series

Highest Quality Measurements by

- Digital signal processing
- Continuous ambient temperature compensation
- Optimized optical components

1-color pyrometers for non-contact temperature measurement

- **Shortwave spectral ranges**
  for measurements on metals, shiny materials, ceramics, graphite and many more
- **Versatile model types** due to modular design
  - Optics: focusable, optical fiber version, with motorized focus or fixed focus
  - Sighting method: laser targeting light, through-lens sighting or color camera
  - Optional integrated features: Profibus, Profinet or PID controller

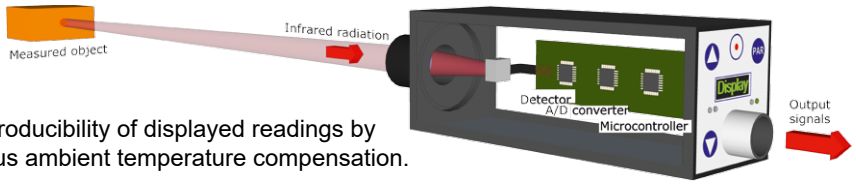
Temperature ranges
from 100 – 700°C (212°F) to 500 – 3300°C (5972°F)

Response time / Exposure time
< 1 ms < 0.5 ms

Smallest possible spot size
0.4 mm

Digital, Precise, Versatile

Series M3 radiation pyrometers are fast and high-precision instruments that combine the versatility and benefits of digital signal processing.
Digital microcontroller signal processing ensures 100% reproducibility of displayed readings by computational integration of emissivity settings or continuous ambient temperature compensation.



Technical Data

Model	M309	M316	M318	M323
Temperature ranges	550 – 1400°C 600 – 1600°C 650 – 1800°C 750 – 2500°C 900 – 3000°C *) 1000 – 3300°C *)	200 – 1300°C 250 – 1300°C 350 – 1800°C 400 – 2500°C 500 – 3300°C **)	100 – 700°C 150 – 1200°C 180 – 1300°C	50 – 800°C 80 – 1200°C 100 – 1500°C
Temp. sub ranges	Any temperature sub-range adjustable within the temperature range (minimum span 50°C)			
Spectral range	0.7–1.1 µm / *) 0.87 µm	1.45–1.8 µm / **) 1.4 µm	1.65–2.1 µm	2–2.6 µm
Detector	Silicon	InGaAs	InGaAs	InGaAs
Response time t_{90}	< 1 ms (with dynamical adaptation at low signal levels), adjustable up to 10 s			
Exposure time	< 0.5 ms			
Uncertainty (ε = 1, t_{90} = 1s, T_A = 23°C)	Full-scale temp. ≤2500°C: 0.25% of reading in °C + 1K Full-scale temp. >2500°C: 0.5% of reading in °C		0.5% of reading in °C + 1K (min. 2°C)	
Repeatability (ε = 1, t_{90} = 1s, T_A = 23°C)	0.1% of reading in °C + 1K		0.2% of reading in °C + 1K (min. 1.6°C)	
Temperature coefficient (deviation to 23°C)	From 10 to 60°C: 0.02%/K From 0 to 10°C and 60 to 80°C: 0.04%/K		10 to 60°C: 0.02%/K 0 to 10°C: 0.04%/K	0–70°C: 0.04%/K
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 temp., control output (devices with PID controller). Outputs can be set within or outside the temp. range.			
Serial interface	RS232 (4.8–115.2 kBd) or RS485 (4.8–921.6 kBd), switchable. Resolution 0.1°C / °F			
Inputs / outputs	12-pin connector: 3 configurable connectors (digital input, output or one analog input) 17-pin connector: 4 digital inputs, 2 digital outputs, 1 analog input. ■ Digital input (via supply voltage): laser targeting light on/off, clearing of peak picker, load a set of parameters, start / stop of measured value recording, PID controller start ■ Digital output (12-pin devices: max. 50 mA, 17-pin devices: max. 100 mA): limit switch, beginning of temperature range exceeding, device measuring readiness, device over-temperature. Devices with PID controller: controller active, control process within limits, control process finished. ■ Analog input (12-pin: 0–20 mA, 17-pin: 0–10 V): analog adjustment of emissivity, measuring distance (for devices with motorized focus) or setpoint (for devices with PID controller).			
PROFIBUS	Optional for 12-pin devices: Supports PROFIBUS DP-V0 (and DP-V1) according to IEC61158 type 3			
PROFINET	Optional for 12-pin devices: Supports PROFINET-RT and IRT according to specification 2.3. Pre-certified, supports class A, B and C functionalities			
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 (RS232: 4.8–115.2 kBd / RS485: 4.8–921,6 kBd), analog outputs (0 or 4–20 mA), interface (RS232/RS485), temperature unit (°C/°F), device menu language (only 12-pin devices: English/German), focus distance (motorized focus devices)			
Power requirement	24 V DC (18–30 V DC), max. 6 VA; protected against reverse polarity			
Isolation	Voltage supply, analog outputs and serial interface are galvanically isolated from each other			
Sightings	■ Through-lens sighting (can be darkened at high measuring temperatures) ■ Laser targeting light (red, λ=650 nm, P< 1 mW, laser class 2 to IEC 60825-1) ■ 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)			Laser targeting light (red, λ=650 nm, P< 1 mW, laser class 2 according to IEC 60825-1)
Ambient temperature	0 to 80°C (32 to 176°F), fiber optic devices on optics side: -20 to 250°C (-4 to 482°F)			0 to 70°C
Storage	-20 to 85°C (-4 to 185°F)			
Relative humidity	Non-condensing conditions			
Housing/protection class	Aluminum / IP65 according 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

with motorized focus

manually focusable

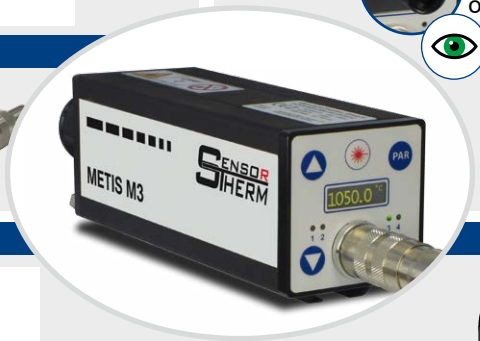
with fixed focus distance and very small spot sizes (on request)

Fiber optics, manually focusable

Standard: OL25

Special: OQ30

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.

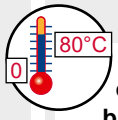
Color camera for alignment and dynamic process monitoring.

Connections / Equipment options

All devices with
- **2 analog outputs**
- **RS232 / 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 or with fieldbus interfaces Profinet or Profibus.
- With **17-pin connection:** 4 digital inputs, 2 digital outputs, 1 analog input, PID controller

Ambient temperature



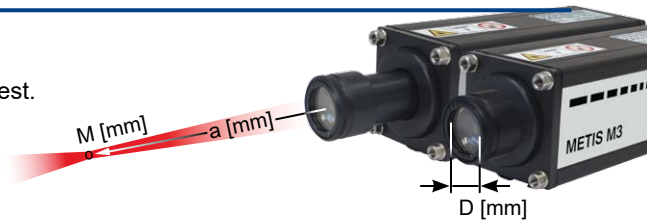
M309, M316 and M318 are optimized for **changing ambient** or **housing temperatures** between **0** and **80°C** (32 and 176°F), M323 up to 70°C.

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 *)		OM23-A0	OM23-B0	OM23-C0	OM23-D0
Models:	M309 M316 M318		M309 M316 M318		M309 M316 M318		M309 M316 M318		M309 M316 M318		M309 M316 M318		M309 M316 M318		M309 M316 M318		M323			
FSC:	700	rest	700	rest	700	rest	700	rest	700	rest	700	rest	700	rest	700	rest	all temperature ranges			
Focus distance a [mm]	**Spot size Ø M [mm]**																			
75			0.6	0.45																
100	1.5	0.9	0.9	0.6													0.6			
130	2.2	1.25	1.3	1					0.6	0.4							0.9			
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								1		
180	3.34	1.78	1.8	1.4	1.67	1.05			0.95	0.55								1.04		
190	3.57	1.89			1.74	1.1			1	0.6	0.8	0.5						1.1		
200	3.8	2			1.8	1.15			1.1	0.65	0.85	0.54						1.17		
300	5.5	3.14			2.9	1.83					1.4	0.9						1.7	1.5	
340	6.2	3.6			3.34	2.1	1.3	0.8			1.7	1	1.3	0.8	1.8	0.9			1.8	
420	8.4	4.54			4.22	2.75	1.8	1.05			2	1.3	1.8	1.05	2.3	1.08			2.4	
500	10	5.5			5	3.2	2.3	1.3					2.3	1.3	2.5	1.2			3	
600	10.9	6			6	4.1	2.8	1.62					2.8	1.62	3	1.5			3.7	
700					7.5	4.8	3.3	2					3.3	2	3.8	1.9			4.4	
1000					11	7	4.5	2.9					4.5	2.9	5.6	2.8			6.5	7
2000					23	15	10.5	6.1					10.5	6.1	10	4.7				14
4000					45	29	18	13					18	13	19	11				29
4500					52	34														32.7
7000																				51
10000																				73
Aperture D:	7 mm		13 mm						16 mm (FSC ≤ 1400°C); 8 mm (FSC > 1400°C)								26 mm			
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 temp. value The values in the tables are exemplary, intermediate values can be interpolated.

*) OV09-D1 for M309; OV09-D2 for M316 and M318

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

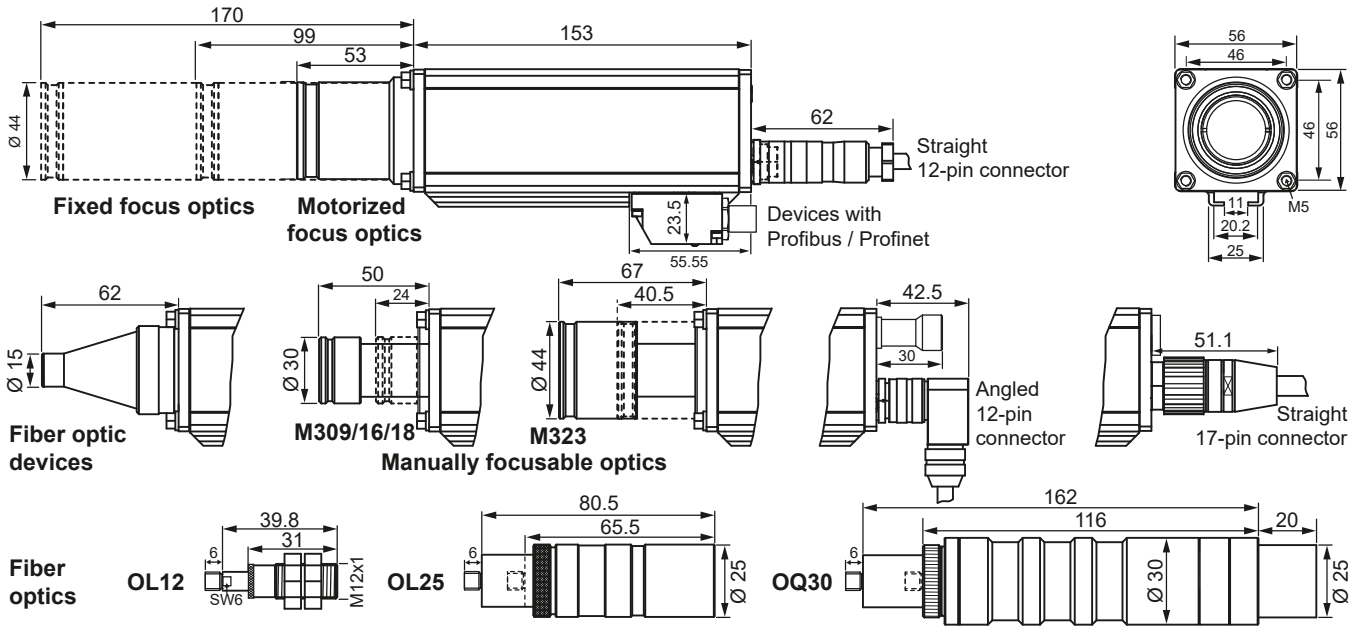
Air purge units:
for devices with integrated optics: BL10 BL11

for devices with fiber optics: BL80

PID controller, programmable: Regulus RF/RD

LED digital display: IF00

Dimensions (in mm)



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

Sensortherm-Datasheet_Metis_M309_M316_M318_M323 (Nov. 05, 2020)

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