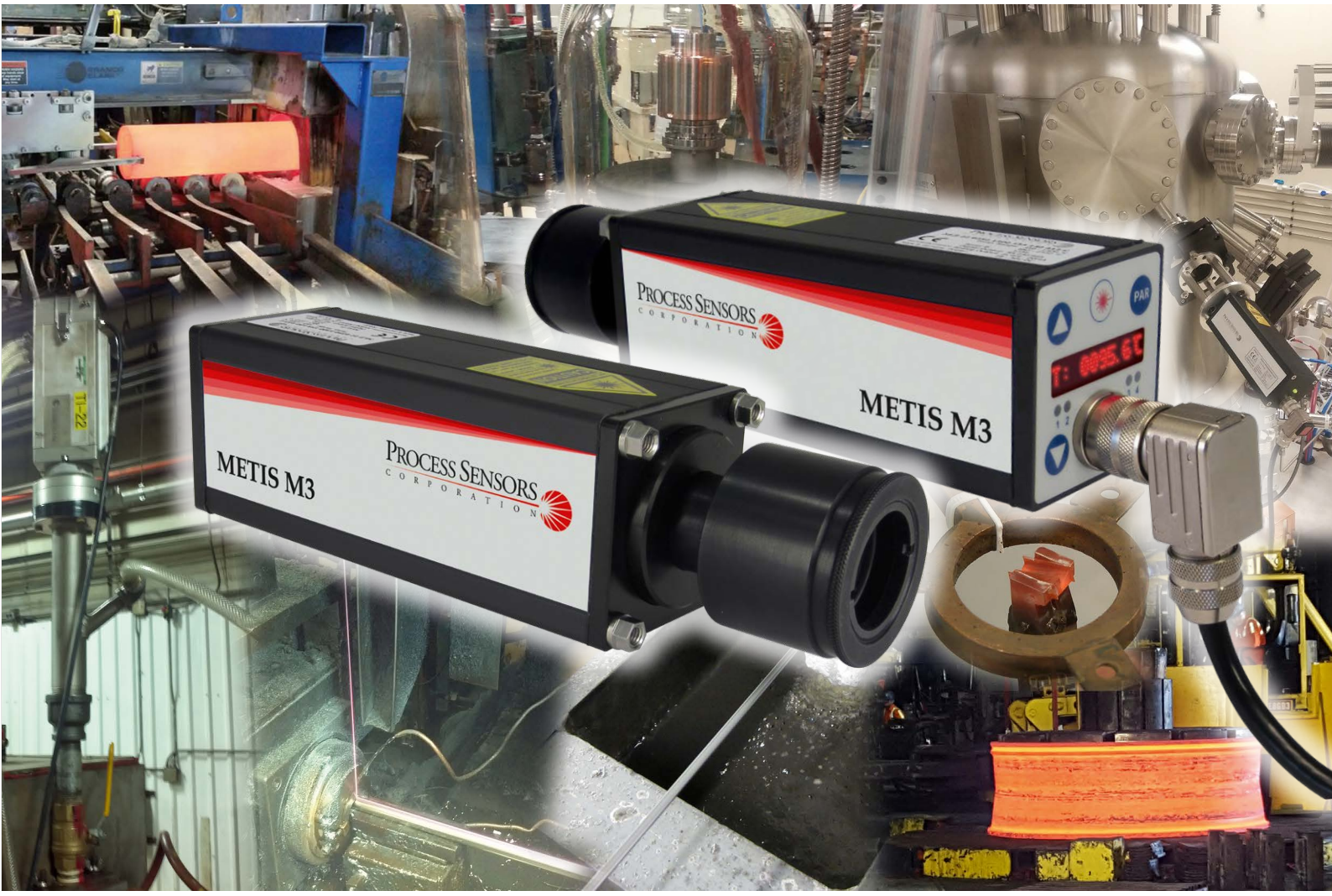
PROCESS SENSORS™
CORPORATION

Metis M323

High-End 1-Color Radiation Pyrometer



Pyrometers for non-contact temperature measurements from 80°C in short wavelength spectral range, primarily for measurements on metals and bright and shiny materials, ceramics and graphite.

APPLICATIONS

- Induction Heating
- Steel / Metals
- Vacuum Furnaces
- Ceramics
- Composites
- Soldering
- Research and Development

FEATURES

- Highest measuring accuracy even at low emissivity settings
- Fully digital and very fast with response time <1 ms
- Choice of optics with extremely small spot sizes from 0.6 mm
- Push button device parameter configuration, or via no-cost software
- 2 high resolution 16 bit analog 0/4 to 20 mA outputs
- 3 versatile configurable inputs or outputs
- Serial interfaces RS-232 and RS-485 (switchable)
- Analog input for external set point or emissivity setting
- 10 digit matrix display for temperature and sensor parameters
- Operates at ambient temperature of 70°C without cooling

Low Temperature Design

The Metis M323 is a short-wave, infrared radiation measuring device that detects target temperatures from 80°C with the highest possible accuracy. The combination of short-wave spectral range and a low temperature threshold enables reliable measurement of all metallic materials, especially in heating processes where early observation may be critical.
The very fast response time of only 1ms and measurement spot sizes from 0.6 mm make the M323 ideal for many exacting applications.
Integrated continuous temperature monitoring and ambient temperature compensation ensure accurate measurements, even up to ambient 70°C without cooling. As with all Process Sensors pyrometers, the M323's digital design provides precise measurement results in continuous daily use regardless of target emissivity.

Technical Data

Model	**M323**
Temperature ranges	50 to 800°C (122 to 1472°F) 80 to 1200°C (176 to 2192°F) 100 to 1500°C (212 to 2732°F)
Temp. sub ranges	Any temperature sub-range adjustable within the temperature range (minimum span 50°C)
Spectral range	2 – 2.6 µm
Detector	InGaAs
Response time t_{90}	< 1 ms (with dynamical adaptation at low signal levels), adjustable up to 10 s
Exposure time	< 0.5 ms
Accuracy (ε = 1, t_{90} = 1s, T_A = 23°C)	0.5% of reading in °C + 1 K or 2°C (the higher value is valid)
Repeatability (ε = 1, t_{90} = 1s, T_A = 23°C)	0.2% of reading in °C + 1 K or 1.6°C (the higher value is valid)
Temperature coefficient (deviations from 23°C)	0–70°C: 0.04%/K
Emissivity ε	0.050–1.200 (corresponds 5–120% in 0.1% steps)
Transmittance	0.050–1.000 (corresponds 5–100% in 0.1% steps)
Fill factor spot size	0.050–1.000 (corresponds 5–100% in 0.1% steps)
Analog output	2 configurable analog outputs 0 or 4–20 mA, max. load: 500 Ω. Resolution 0.0015% of the adjusted temperature (16 Bit). Outputs can be set individually, inside or outside the measuring range.
Serial interface	RS-232 (max. 115 kBd) or RS-485 (max. 921 kBd), switchable. Resolution 0.1°C or 0.1°F
3 configurable Inputs / outputs	■ Digital inputs (max. 3 inputs, protected against reverse polarity): laser targeting light on/off, clearing of peak picker, controller start (when equipped with PID controller), load pyrometer configuration, trigger input for start / stop of measured value recording. ■ Digital outputs (max. 3 outputs, max. 50 mA, protected against short circuit): limit switch, exceeding the beginning of temperature range (for material recognition), device ready after self-test, device over-temperature, signal strength too low. When equipped with PID controller: controller active, control process within limits, control process finished. ■ Analog input (0–20 mA, protected against reverse polarity and incorrect connection): analog adjustment of emissivity or setpoint (devices with PID controller).
Peak picker	Automatic hold mode or manual time settings to clear (reset) or external clear via configurable input
Display	10-digit LED display (5 mm high) for temperature or settings of IR sensor parameters Resolution 0.1°C or 0.1°F
Parameter settings	Push buttons on the device, serial interface, PC software *SensorTools* or via self-compiled communication program: Emissivity, transmittance, fill factor, temperature sub range, settings for peak picker, device address, baud rate, response time, selecting analog outputs 0/4–20 mA, interface RS232/ RS485 (selection on the device only), °C/°F, language (English / German).
Power requirement	24 V DC (18–30 V DC), max. 6 VA; protected against reverse polarity
Isolation	Power supply, analog outputs and serial interface are galvanically isolated from each other
Sighting	Laser targeting light (red, λ=650 nm, P< 1 mW, class 2 according to IEC 60825-1)
Ambient temperature	0 to 70°C (32 to 158°F) (The laser targeting light is deactivated at a device temperature from 60°C to prevent its overheating)
Storage temperature	-20 to 85°C (-4 to 185°F)
Relative humidity	No condensing conditions
Housing / protection class	Aluminum, IP65 to DIN 40 050 with connector
Weight	650 g (1.43 lb.)
CE label	According to EU directives for electromagnetic immunity

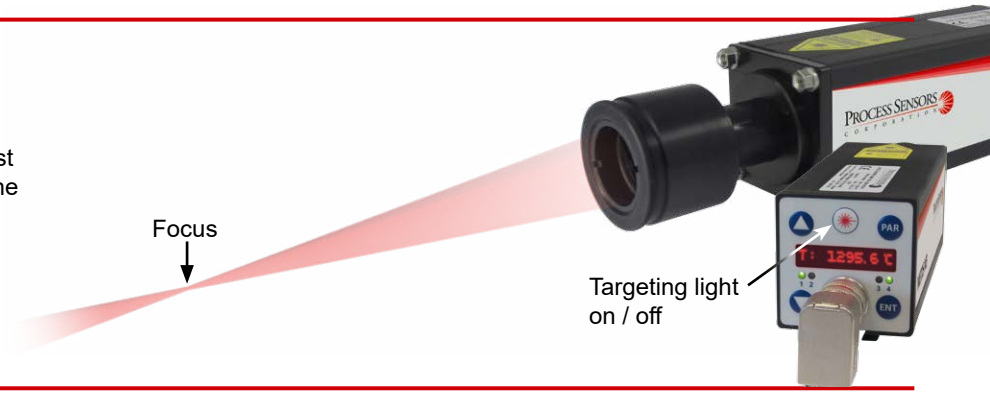
Reference Numbers

M323 Specify with temperature range and optics

Note: *SensorTools* software is included in scope of delivery,
Connection cables are not included in scope of delivery and have to be ordered separately.

Sighting Method

The laser targeting light is a conical red laser beam with the largest diameter directly at the IR sensor's lens and the smallest and sharpest at the focus distance, i.e. at the point where the spot size diameter is the smallest.



Features

Proven Sighting:
- Precise laser targeting light

Clear Device Operation:
- Large, bright display for temperature or parameters
- All measurement settings directly on the device
- LEDs for the display of active limit outputs

Fast, Accurate Outputs:
- Switchable serial interface RS232 or RS485 (high-speed up to 921 kBaud)
- 2 high resolution 16 bit analog 0/4 to 20mA outputs
- 3 configurable inputs / outputs

Wide-aperture fast focusable optics:
- 4 optics with adjustable measuring distance selectable

Harsh Environmental Conditions:
- Use at ambient temperatures up to 70°C with best ambient temperature compensation

As with all Metis M3 models:
- Adjustable material properties (emissivity, transmittance, spot size fill factor)
- Peak picker
- Additional equipment variants: integrated PID controller, fieldbus interface Profibus or Profinet.

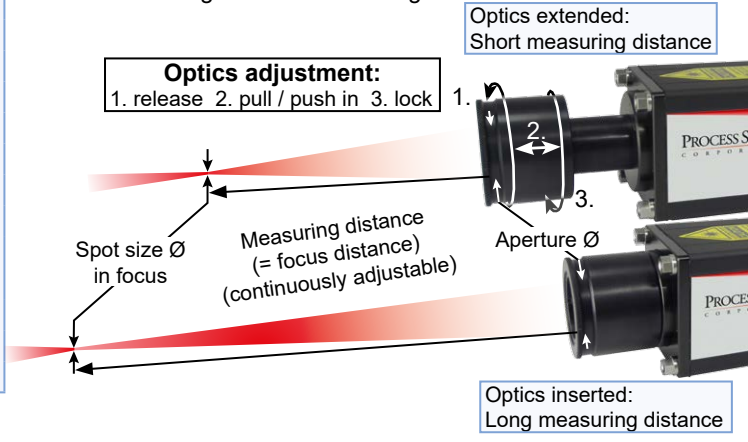
Wide-aperture Optics

For dependable measurements at low temperatures, the M323 is equipped with larger diameter optics aperture. There are 4 different types available, depending on the required focusing range/measuring distance and the spot size diameter.

Integrated manual Focusable Optics

Optics (focusable)	**Measuring distance a [mm]** adjustable focus range		**Spot size diameter M [mm]**	**Aperture Ø D [mm]**
OM23-**A**0	from	100 mm	0.6 mm	26 mm
	···	110 mm	0.7 mm	
	to	130 mm	0.9 mm	
OM23-**B**0	from	175 mm	1 mm	
	···	250 mm	1.5 mm	
	to	300 mm	1.7 mm	
OM23-**C**0	from	300 mm	1.5 mm	
		500 mm	3 mm	
	···	700 mm	4.4 mm	
	to	1000 mm	6.5 mm	
OM23-**D**0	from	1000 mm	7 mm	
		2000 mm	14 mm	
	···	4000 mm	29 mm	
		7000 mm	51 mm	
		10000 mm	73 mm	
	to	>10000 mm	divergent	

The pyrometer must be properly aligned to the measurement object to detect the temperature correctly. At the focal point of the optics (focal distance) the spot size diameter is smallest. Measurements made outside of the focus distance are also possible (in a shorter or longer distance than the focus distance) to determine the average temperature of a bigger spot.
Values in the optics table illustrate the focused measuring distances and respective spot sizes. The spot size diameter for distances not given in the table can be interpolated. The pyrometer can be used at distances other than its focal distance, however the spot size is generally larger and therefore the target size must be larger.



Model Selection Table

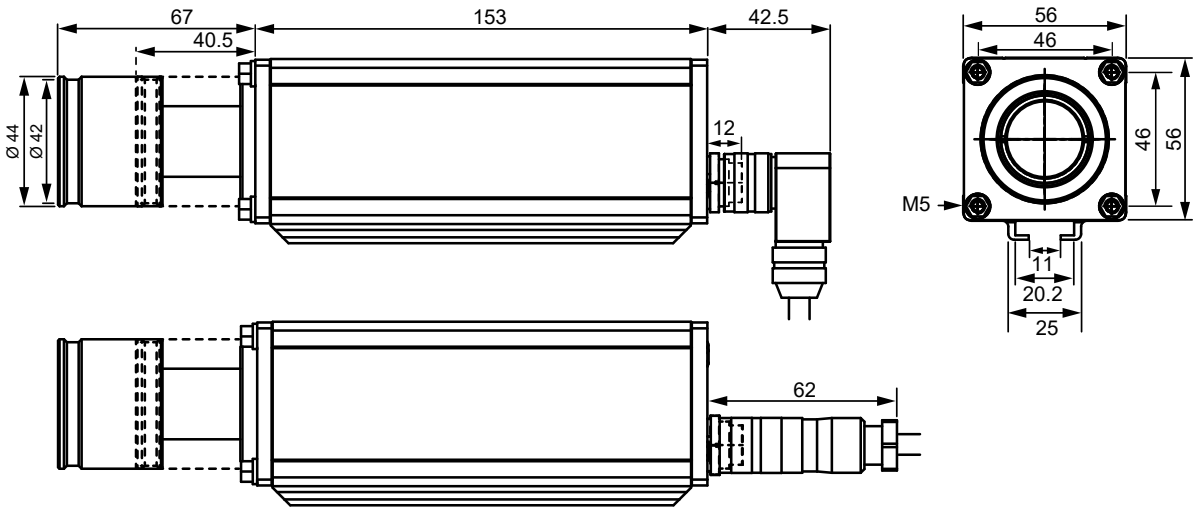
1		2		3		4		5		6		7		8		9		10		11		12
M3xx	-	xxxx	-	xxxx	-	x	-	x	-	x	-	xx	-	x	-	x	-	x	-	x	-	x

1	**Model, Detector, Spectral Range:** M323 = InGaAs, 2 – 2.6 µm
2	**Zero Scale Temperature:** e.g. 0080 = 80°C
3	**Full Scale Temperature:** e.g. 1200 = 1200°C
4	**Sighting Method:** 1 = Laser targeting
5	**Serial Interface:** 5 = Switchable RS-485 / RS-232
6	**Optics:** 7 = Manual focusable optics (aperture diameter 26 mm)
7	**Response Time:** 13 = 1 ms, adjustable to 10 s
8	**Version:** 0 = Standard (12 pin connector, display, push buttons, 3 digital inputs / outputs)
9	**Display:** 4 = With display (12 pin connector)
10	**Analog Output:** 2 = Two analog outputs, standard
11	**Digital Input / Output:** 3 = 3 digital inputs / outputs / 1 analog input 0–20 mA (12 pin connector)
12	**Optics:** Type A 100 to 130 mm Type B 175 to 300 mm Type C 300 to 1000 mm Type D 1000 to 10000 mm

Example: M323-0080-1200-1-5-2-13-0-4-2-3-A
This model refers to: Model M323, temperature range of 80-1200°C, laser targeting, RS-232 & RS-485 communication, manual focusable optics, 1 ms response time, std. version sensor, onboard temperature display,
two 0/4-20 mA outputs, 3 digital inputs/outputs, optics type A.

Dimensions

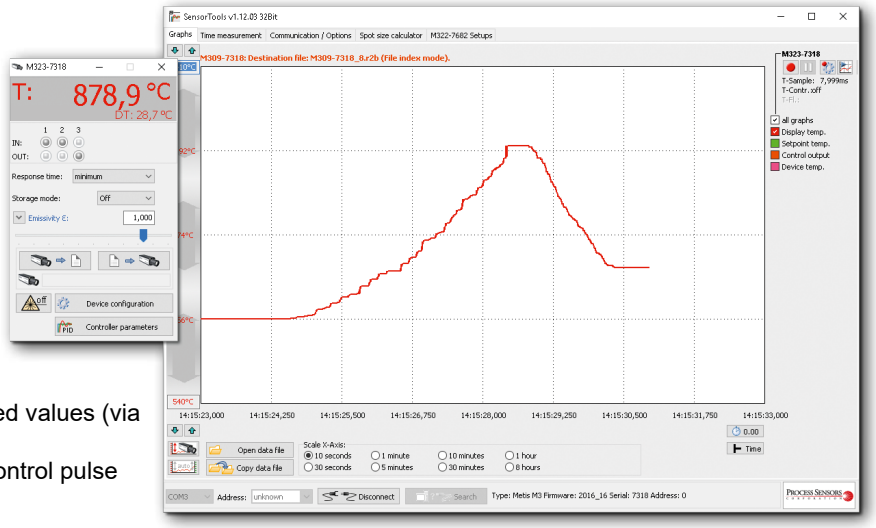
Dimensions in mm



SensorTools Software

The PC software *SensorTools* is our standard software for

- Measurement display
- Measured value recording
- Processing the results
- Display devices inside temperature
- Changing pyrometer parameters



Program functions:

- Perform advanced Pyrometer settings
- Export filtered measured values to csv files
- Define the memory interval for data recording
- External start and stop of the recording measured values (via control input on the pyrometer)
- Back time recording of measured values after control pulse or extend the recording at record stop
- Switch on and off laser targeting light
- Print, store and transfer pyrometer settings to other devices
- Create service and parameter files with devices data and software settings for remote diagnostics

System requirements: Windows 7 Prof, 8 Prof, 8.1 Prof, 10

Accessories

HA20-00	Ball and socket swivel mount for sensor alignment
HA10-00	Mounting bracket
KG10-00	Aluminum water cooling housing
KG20	Aluminum cooling plate
BL10	Air purge attachment
AL11 / AL43	Connection cable, 14-wire (available in 5 m lengths) with right angle connector / straight connector
AU11 / AU43	Connection cable, 14-wire (available in 5 m lengths), with right angle connector / straight connector and interface converter RS-232⇔USB
AV11 / AV43	Connection cable, 14-wire (available in 5 m lengths), with right angle connector / straight connector and interface converter RS-485⇔USB
IF00-00	LED digital indicator for remote adjustment of IR sensor parameters
950-004	Power supply 24 V DC
WB23-1-2-05	Wiring Box (typical standard set): Ready-made plug & play pyrometer connection set (with desktop power supply, 2.5 m connection cable for pyrometers with 12-pin connector, RS-232 interface converter)
WB23-2-2-05	Wiring Box (typical standard set): Ready-m ade plug & play pyrometer connection set (with desktop power supply, 2.5 m connection cable for pyrometers with 12-pin connector, RS-485 interface converter)

Cable connector pyrometer side		AL	AM (incl. Sub-D)	AU (RS232)	AV (RS485)
	with right-angle connector / push button	AL10-05 (5 m)	AM10-05 (5 m)	AU10-05 (5 m)	AV10-05 (5 m)
	with right-angle connector	AL11-05 (5 m)	AM11-05 (5 m)	AU11-05 (5 m)	AV11-05 (5 m)
	with straight connector	AL43-05 (5 m)	AM43-05 (5 m)	AU43-05 (5 m)	AV43-05 (5 m)

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

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