

Metis M311 Pouring Stream

2-color pyrometer for measuring pouring stream temperatures



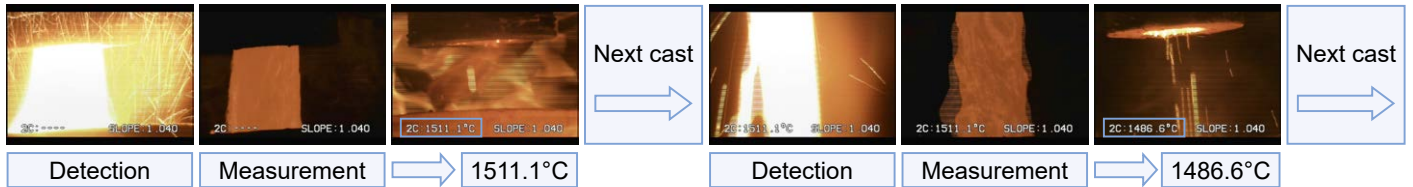
Ratio pyrometers for non-contact temperature measurement of a pouring stream

- Automatic recognition of the entire pouring process
- Output of a temperature of each casting as soon as it is finished
- Ratio measurement method
 - for temperature detection even with fluctuating emissivity levels of the pouring material
 - for measurements where the pyrometer's spot size is not always completely filled
 - for measurements through dust or dirty windows
- Optionally with view finder or camera for easy alignment to the pouring stream
- With temperature display on the device for on-site monitoring
- All pouring conditions configurable
- Contamination monitoring of the optics with programmable warning
- Continuous display of the last pouring temperature

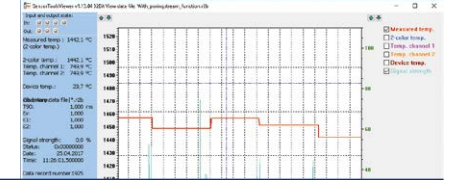
One Pouring – One Temperature

Intelligent pyrometers with pouring stream mode automatically recognize and detect the entire pouring process and use special algorithms for suppressing interfering influences, such as hot slag spillings or drop at the beginning or end of the pouring process. Thus, for every casting always the right pouring temperature is displayed.

With the pouring stream monitoring, a complete quality assessment of the final product is ensured.



1. Detection of a hot pouring stream
2. Pouring stream measurement with automatic averaging
3. Display of the average pouring temperature



Technical Data

Model	M311 Pouring Stream
Temperature ranges	600 – 1400°C 900 – 2500°C 650 – 1500°C 1000 – 3000°C *) 750 – 1800°C 1100 – 3300°C *) 800 – 2100°C
Temp. sub ranges	Any temperature sub-range adjustable within the temperature range (minimum span 50°C)
Spectral range	Channel 1: 0.93–1.1 µm / Channel 2: 0.75–0.93 µm *) Channel 1: 0.99 µm / Channel 2: 0.87 µm
Detector	2 x Silicon
Response time t_{90}	< 1 ms (with dynamical adaptation at low signal levels), adjustable up to 10 s
Exposure time	< 0.5 ms
Uncertainty ($\epsilon = 1, t_{90} = 1s, T_A = 23^\circ C$)	Full-scale temperature up to 2500°C: 0.3% of measured value in °C + 2 K Full-scale temperature above 2500°C: 0.5% of measured value in °C
Repeatability ($\epsilon = 1, t_{90} = 1s, T_A = 23^\circ C$)	0.1% of measured value in °C + 1 K
Temperature coefficient (deviations from 23°C)	From 10°C to 60°C: 0.04%/K From 0 to 10°C and 60 to 80°C: 0.06%/K
Slope / ratio	0.800–1.200
Emissivity ϵ	0.050–1.200 (each channel, corresponds 5–120% in 0.1% steps)
Transmittance	0.050–1.000 (each channel, corresponds 5–100% in 0.1% steps)
Analog output	2 configurable analog outputs 0–20 mA or 4–20 mA, max. load: 500 Ω, temperature range adjustable. Resolution 0.0015% of the adjusted temperature (16 Bit). For the output of the pouring stream temperature and a temperature-proportional output current.
Serial interface	RS232 (max. 115.2 kBd) or RS485 (max. 921.6 kBd), switchable. Resolution 0.1°C or 0.1°F
3 configurable Inputs / outputs	<ul style="list-style-type: none"> ■ Max. 3 digital inputs (protected against reverse polarity): clearing of peak picker, load pyrometer configuration, trigger input for start / stop of measured value recording ■ Max. 3 digital outputs (max. 50 mA): limit switch, exceeding the beginning of temperature range (for material detection), device ready after self-test, device over-temperature, signal strength too low, contamination monitoring ■ Analog input (0–20 mA): analog adjustment of emissivity slope or measuring distance (devices with motorized focus)
Display	10-digit, LED (5 mm high) for temperature display or parameter settings. Resolution 0.1°C or 0.1°F
Parameter settings	Pouring stream parameters, slope/ratio, switch-off level for measurement, switch-off level for dirty window alarm, emissivity, transmittance, temperature sub range, peak picker settings, device address, baud rate, response time, °C/°F, language (Engl. / German), measuring distance with motorized focus optics
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 (optional)	<ul style="list-style-type: none"> ■ Thru-the-lens sighting with adjustable attenuation filter for eye protection of bright targets ■ High dynamic color CCD camera, field of view: ca. 3.6% x 2.7% of measuring distance output signal: FBAS signal 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	Operation: 0–80°C, Storage: -20–85°C (camera is deactivated from 55°C internal device temperature)
Relative humidity	No condensing conditions
Housing / protect. class	Aluminum, IP65 to DIN 40 050 with connector
Weight	650 g
CE label	According to EU directives for electromagnetic immunity

From the Perspective of the Pyrometer

Detection of a hot pouring stream

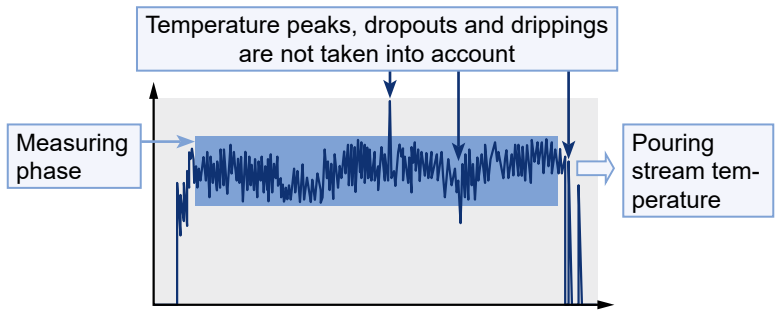
Determine when the beam has stabilized

Beginning of the measurement phase with continuous checking for dropouts or hot slag splashing to keep them out of the final pouring stream temperature

Detection that the casting process is finished

Remove dripping or fire from the measuring time

Output of an average temperature of the entire casting process on the device display, at the analog output and via serial interface. At software monitoring: output of the total pouring times with date and time.



Sensortherm 2-color Technology

Sensortherm 2-color pyrometers are equipped with two separate silicon or indium-gallium-arsenide detectors, which achieve in contrast to sandwich detectors very high signal strengths on both channels and thus ensure high stability. They measure at two wavelengths simultaneously and determine the temperature by forming a quotient. In this method it is not necessary to know the emissivity of the target material. It cancels each other out because the radiation ratio always remains constant at a neutral attenuation of the infrared radiation (by dust, smoke ...).

Sighting Method

Sighting is used to pinpoint the location of the measured target.

The **view finder** provides upright imagery so that the target under measurement can be viewed visually. A circular reticle shows the measuring spot. For devices with measuring range above 1800°C, the eyepiece can be darkened for eye protection.

The integrated **color camera module** is connected to a TV, monitor or a video grabber to a PC. A circular reticle shows the measuring field. The camera provides automatic, highly dynamic adjustment of the picture brightness.



Optics / Alignment to the Pouring Stream

To adjust the measuring spot size, the optics are focusable, alternatively manually or via motorized focus. The spot size diameter is the smallest at the focused point of the optics (focus distance = measuring distance in the table), the spot size is larger in the defocused area in front of or behind the focused distance, so that a larger measurement area is detected.

Integrated Optics (with motorized focus or manually focusable)

Optics (focusable)	Measuring distance a [mm] adjustable	Spot size M [mm]	Aperture Ø D [mm]
M311: OQ11-A1	from 340 mm	0,8 mm	16 mm (FSC≤1400°C)
	500 mm	1,5 mm	
	700 mm	2 mm	
M322: OQ22-A2	... 1000 mm	2,8 mm	8 mm (FSC >1400°C)
	2000 mm	5,8 mm	
	to 3000 mm	7,8 mm	

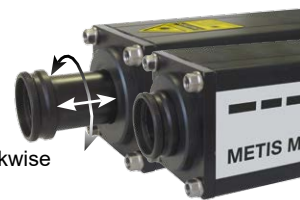
FSC = Full scale temp. range

Manual Focus

1. Turn counterclockwise
2. Pull / push in
3. Lock turn clockwise

Motorized focus

- Via push buttons
- Via PC software



SensorTools Software

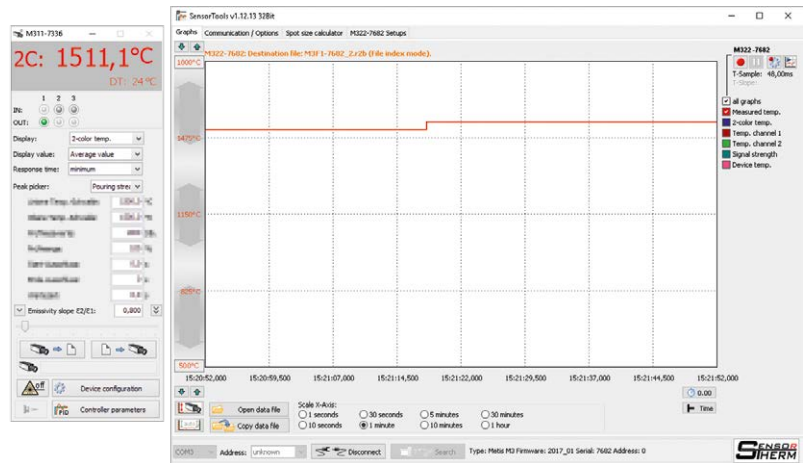
Using our standard PC software *SensorTools* for

- Numerically and graphically measured value representation
- Measured value recording
- Measuring value evaluation / export
- Measuring value evaluation / export
- Changing pyrometer parameters

the pouring stream parameters can be specified for adaptation to the different pouring stream conditions.

Program functions:

- Change pyrometer parameters
- Playback of recorded data
- Adapted graphics mode to computer performance
- Export measured values in csv files
- Record interval setting for acceptable data size.
- Back time recording of measured values after control pulse
- Laser targeting light switching on and off / configuring the camera display
- External start and stop of the recording measured values (via control input on the pyrometer)
- Create a service file with settings for remote diagnostics

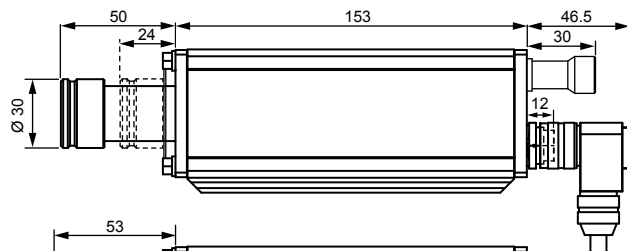


Recommended Accessories

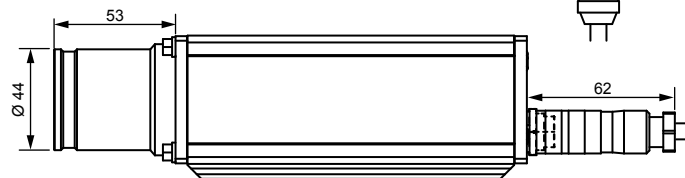
HA20	Ball and socket swivel mount for sensor alignment	
HA10	Mounting bracket	
KG10	Aluminum water cooling housing	
HA22	Heavy ball and socket swivel mount for water cooling housing KG10	
KG20	Aluminum cooling plate	
BL10 / BL11	Air purge for devices with motor focus / manually focusable optics	
AL11 / AL43	Connection cable, 14-wire (available in 5 m steps) with right angle connector / straight connector	
AU11 / AU43	Connection cable, 14-wire, interface converter RS232⇔USB with right angle connector / straight connector	
AV11 / AV43	Connection cable, 14-wire, interface converter RS485⇔USB with right angle connector / straight connector	
AK50	Connection cable for camera module (Limosa-plug⇔Cinch-plug, available in 5 m steps)	
IF0000	LED digital indicator for remote adjustment of IR sensor parameters	
NG12 / 15	Power supply 24 VDC: DIN rail power supply 1.6 A / desktop power supply 2.5 A	

Dimensions

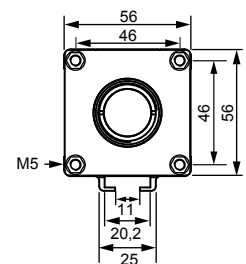
Manual focusable optics



Motorized focus optics



Dimensions in mm



Reference Numbers

Metis M311 Pouring Stream, to specify with temperature range, sighting method and optics

Note: *SensorTools* software is included as standard equipment.
Connection cables must be ordered separately.

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

Sensortherm-Datasheet_Metis_M311-PouringStream (Dec. 07, 2021)

Sensortherm GmbH

Infrared Temperature Measurement and Control
Weißkirchener Str. 2-6 • D-61449 Steinbach/Ts.
Tel.: +49 6171 887098-0 • Fax: -989
www.sensortherm.com • info@sensortherm.com

**SENSOR
THERM**