

## Metis MI13

### Special Pyrometer for Tungsten Measurements

For measurements of tungsten, it is necessary to measure in a specific narrow spectral band which detects the emission properties of tungsten optimal. The **MI13** is a standard one channel pyrometer that captures the temperatures at **1.27 microns**. For tungsten measurements this spectral range is superior to that of 2-color pyrometers, so that unoxidized tungsten can be well measured under vacuum or inert gas.



**Chart 1: Temperature Ranges**

Model	MI13
Wavelength	1.27 $\mu$ m
Temperature ranges	400 – 1400°C 500 – 2000°C 800 – 2500°C 1000 – 3000°C

**Objective and Fiber-Optic Cable:** The infrared energy radiated by the target is centered either directly to the detector (standard version) or via fiber optic cable. The objectives are focusable and offer the possibility to measure a small spot (focused objective) or the average of a bigger spot (out of focus). Lenses are made of BK7, an optical glass which is highly transparent in the specified spectral region. If measurements through additional viewing windows are necessary, similar optical characteristics must be ensured. Fiber optic versions are supplied with 2.5 m long single mode fibers, longer cables up to 30 m are available on request.

**Chart 2: Focusable Lenses of Standard Version**

Optics	Measuring distance	Spot Size Diameter	
		500–2000°C 800–2500°C 1000–3000°C	400–1400°C
OM09-A0	130 mm	0.35 mm	0.7 mm
	160 mm	0.50 mm	1 mm
	200 mm	0.70 mm	1.4 mm
OM09-B0	190 mm	0.50 mm	1 mm
	300 mm	0.80 mm	1.6 mm
	420 mm	1.30 mm	2.6 mm
OM09-C0	340 mm	0.90 mm	1.8 mm
	2000 mm	6.50 mm	13 mm
	4000 mm	15 mm	30 mm

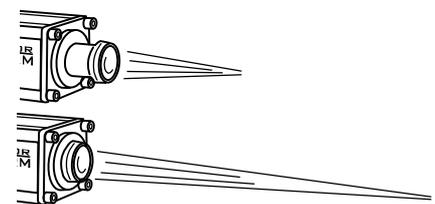
**Chart 3: Focusable Lenses of Fiber Optic Version**

Optics	Measuring distance	Spot Size Diameter	
		500–2000°C 800–2500°C 1000–3000°C	400–1400°C
OL25-G0	75 mm	0.50 mm	0.7 mm
	130 mm	0.65 mm	0.85 mm
	180 mm	0.70 mm	1 mm
OL25-H0	170 mm	0.75 mm	1.4 mm
	2000 mm	9 mm	17 mm
	4500 mm	22 mm	40 mm

**Tables 2 and 3** indicate the spot size of the cone of vision for the measurement distance specified. As cone of vision the cone-shaped area between lens and the object of measurement is denoted, in which the infrared radiation emitted from the object of measurement is taken. This area has to be kept free from any intervening objects. The distances for each smallest possible spot size diameter are exemplary, they can be adjusted continuously. Measuring distances not shown in the table are determined by interpolation. The cone of vision diameter in front of the lens is about 16 mm (end of temp. range up to 1400°C) or 8 mm (end of temp. range above 1400°C).

Optics pulled out: short measuring distances

Optics slide in: long measuring distances



**Chart 4: Focusable Fiber Optic in Miniature design with only 12 mm Tube Diameter**

Optics	Measuring distance	Spot Size Diameter	
		500–2000°C 800–2500°C 1000–3000°C	400–1400°C
OL12-A0	100 mm	1 mm	2 mm
	350 mm	3.7 mm	7.4 mm
	600 mm	7 mm	14 mm

A small 12 mm diameter focusable lens with an aperture (cone of vision) diameter of 7 mm in front of the lens is available for applications where a miniature reimaging lens is necessary. For diameters at the focal distance please see **chart 4**.

**Optical Alignment:** Metis MS and MI Standard Pyrometers are available with 2 solutions for aiming the sensor onto the target. Number one and most popular method is the built in laser aiming light. Number two is a sight through optics version with reticle-defined target which is advantageous for applications where aiming onto hot, incandescent targets is needed. The viewing telescope of these units, with full scale temperatures above 1800°C is equipped with a dimmable sight attenuation filter to protect the eye.

**Output Signals:** Metis Pyrometers offer a variety of analog and digital output signals for indication, recording, archiving and controlling of measured process temperatures. The isolated analog output is switch able from 0 to 4 to 20 mA. Zero- and full-scale temperatures are adjustable to cover any portion of the instrument's available temperature span to a minimum of 50°C. There is a choice of 3 digital communication interfaces: **RS232** or **RS485** max. 57.6 kBd or **Profibus**.

**Built-in PID Controller:** The pyrometer can be equipped with PID control output signal instead of the analog temperature output signal 0 or 4 – 20 mA. The control features and functions can be operated manually by PC or automatically by digital commands. If PID option is selected, the temperature information will be available from the pyrometer only via digital interface.

**Signal Filtering:** For measuring and holding of the highest instantaneous temperature value a peak picker (maximum value storage) is installed to compensate interruptions or attenuations in radiation caused by bursts of steam, smoke or dust. It can be either reset automatically or manually by an external contact closure or periodically by user preset clear time. In this last case the highest temperature will be held in a dual storage and will be reset in only one of the two storages after preset clear time to avoid a decrease of the temperature output, should a short cold period appear just at the reset moment.

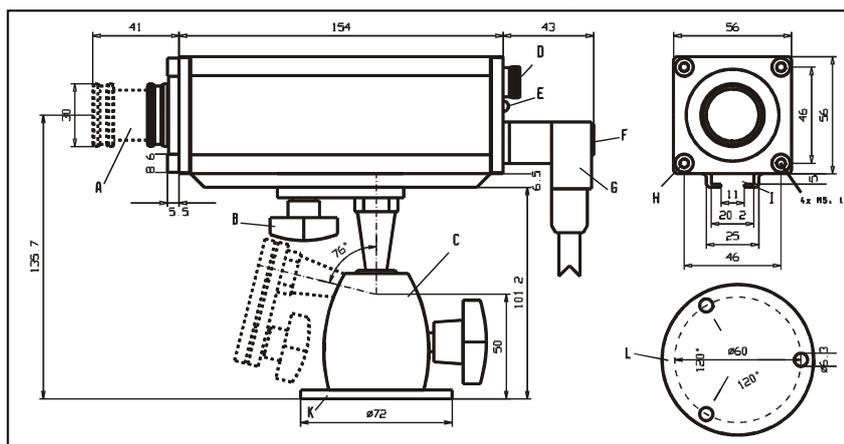
**Software Sensorwin:** The *Sensorwin* software is available for automatic or manual set up of the pyrometer, for recording and for saving of graphical or table files. At the same time these files can be used for quality assurance purposes because the parameter settings are recorded, too. Minimum computer requirements: Current Windows operating system.

**Customized Solutions:** In order to measure temperatures at the strip bottom in hot rolling mills, or slab temperatures inside the cooling chamber of continuous casters, special rugged sensing heads in stainless steel housings with external electronic boards have proven themselves very well for this purpose.

## Technical Data

Measurement uncertainty ( $\epsilon = 1$ , $t_{90} = 1s$ , $T_{Amb} = 23^{\circ}C$ )	Full-scale temperatures up to 1500°C: 0.3% of measured value in °C + 1 K Full-scale temperatures above 1500°C: 0.5% of measured value in °C
Repeatability ( $\epsilon = 1$ , $t_{90} = 1s$ , $T_{Amb} = 23^{\circ}C$ )	0.1% of measured value in °C + 1 K
Response time $t_{90}$ :	< 1 ms (with dynamic adaptation at low signal levels), adjustable up to 10 s
Emissivity	0.05 – 1.00
Analog output signal	0 or 4 – 20 mA selectable, 500 $\Omega$ max. load
Digital interface	Either RS232 or RS485 max. 57.6 kBd (standard supply), Profibus (optional)
Temperature resolution	Analog < 0.1% of adjusted temperature range, digital 0.1°C
Power supply	24 V AC/DC (12 – 30 V AC/DC), AC: 48 – 62 Hz, max. 2.5 VA
Isolation	Power supply, analog and digital output are galvanically isolated against each other and against housing
Laser aiming light (option)	650 nm, < 1 mW, class II per IEC 60825-1-3-4
Weight	600 g
Housing / protection	Aluminum, IP65
Ambient temperature	Pyrometer: operation 0 – 70°C, storage -20 – 70°C, Fiber optic cable and lens: 0 – 250°C
Humidity	No condensing conditions
CE label	According to EU directives about electromagnetic immunity

**Dimensions:** Metis MI13 with Focusable Lens and optional Swivel Base HA20



- A: Focusable lens
- B: Fast-mount screw
- C: Swivel mounting base
- D: Eye piece (for models with sight-through optics only)
- E: Operation LED
- F: Laser push button
- G: 12-pin connector
- H: Front-mount threads
- I: Mounting rail
- K: Swivel base mounting flange
- L: Base view of item K with mounting holes

## Accessories

Description	Model
Swivel Base Metis series	HA20-00
Air Purge for fiber-optic lens OL12	BL13-00
Air Purge for fiber-optic lens OL25	BL14-00
Adjustable mounting bracket for fiber-optic lens OL12	HA15-00
Adjustable mounting bracket for fiber-optic lens OL25	HA14-00
2.5 m Spare fiber-optic cable, $\varnothing$ 0.2 mm	LL02-02

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