

Metis HS09 / HI16 / HI18

High-Speed Pyrometer for more than 50,000 Measurements per Second

The pyrometer models Metis HS09 and HI16 are high speed versions of the reliable and reputable Metis series. Operating at the near end of the infrared spectrum, these models are an excellent choice for applications with the need for ultra fast measurement of ferrous and non-ferrous metals, for example at laser heating applications.

Chart 1: Temperature range and spectral ranges for standard models and fiber optic versions

Modell	HS09	HI16	HI18
Spectral range	0.7 – 1.1 µm	1.45 – 1.8 µm	1.65 – 2.1 µm
Temperature ranges	550 – 1200°C 600 – 1400°C 650 – 1600°C 700 – 1800°C 750 – 2000°C	250 – 800°C 300 – 900°C 350 – 1100°C 400 – 1200°C 500 – 1600°C 600 – 1800°C 700 – 2500°C	120 – 520°C



Objectives: The infrared energy radiated by the target is transferred via focusable lenses onto the detector. For installations with limited space a focusable miniature version is available for the fiber optic version. Focusable optics offer the advantage of measuring the smallest spot with focused objective as well as measuring a bigger average temperature if objective is out of focus.



Chart 2: Focusable objective of Metis standard version

Objective	Measuring distance	Spot size diameter	
		HS09 / HI16 Beginning of temp. range ≥ 400°C	HI16 beginning of temp. range < 400°C + HI18
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 2: Focusable objectives of Standard Versions:

The detector is sensitive to infrared radiation in an area called the cone of vision. For the spot size diameter of this area at the shortest, medium and widest distances when focused, please refer to chart 2 if using a Metis standard version. The cone of vision diameter in front of the lens (aperture) is ca. 16 mm for full scale temperatures <1400°C and 8 mm for full scale temperatures above 1400°C. This changes continuously in relation to the spot size diameter given in the chart. This area has to be kept free from any intervening objects. The spot size diameter for distances not given in the chart can be calculated by interpolation.

Chart 3: Focusable fiber version objective 25 mm Ø

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

Chart 3 shows the cone of vision diameters of the focusable fiber objective with 25 mm diameter. The aperture diameter of the lens is 18 mm.

Chart 4: Focusable fiber version miniature objective 12 mm Ø

OL12-A0	100 mm	1 mm	2 mm
	350 mm	3.7 mm	7.4 mm
	600 mm	7 mm	14 mm

Chart 4: A small 12 mm diameter focusable lens with a cone of vision (aperture) diameter of 7 mm in front of the lens is available for applications where a miniature reimaging lens is necessary.

The **fiber optic model** is equipped with a standard rugged stainless steel sheathed 2.5 m long mono glass fiber. Depending on the temperature range cables up to 30 m length can be selected.

Viewing windows: Lenses are made of BK7, an optical glass which is highly transparent in the spectral region of Metis HS and HI. For measurements through viewing windows the same optical characteristics have to be used. Standard window glass should not be used under any circumstances.

Focusable objectives offer an optimal adaptation of spot size diameter depending on application and sensor type

Infrared energy emitted by a target is collimated by focusable lenses either directly onto the detector (standard version), or on one end of a fiber optic cable. This focusing feature offers:

- Temperature measurement of the smallest possible spot at its focal point
- Measures the average temperature of a bigger spot size when focusable lens is out of focus

3 different solutions are offered for optical alignment and focusing onto a target:

- Laser aiming, standard aiming method, only opportunity for fiber optic versions.
- Through the lens sighting with reticle-defined target, advantageous for aiming onto hot, incandescent targets. Full scale temperatures above 1800°C, offer additionally dimmable sight attenuation filter to protect the eye.
- Build in color camera module for remote monitoring of the heating process in dangerous environments.

Analog and digital temperature output signals for indication, recording, archiving and controlling:

- Isolated analog output signal, 0 – 20 mA switchable to 4 to 20 mA. Zero- and full-scale temperatures are adjustable to cover any portion of the instrument’s available temperature span
- Ultra fast RS485 digital interface with max. 921 kBd, min. measurement interval of 70 µs via *SensorWin* software.

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 software *SensorWin* 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 requirement is a PC with current Windows operating system.

Technical Data

Measurement Uncertainty ($\epsilon = 1$, $t_{90} = 1s$, $T_A = 23^\circ C$)	HS09/HI16: full scale temperatures < 2500°C: 0.5 % of measured value in °C + 1 K HI18: 1 % of measured value in °C + 1 K
Repeatability	0.2% of measured value in °C + 1 K ($\epsilon = 1$, $t_{90} = 1s$, $T_A = 23^\circ C$)
Response time t_{90}	< 40 µs adjustable up to 10 s in 0.1 ms steps
Exposure time	< 20 µs
Emissivity ϵ	0.05 to 1.2
Temperature resolution	analog < 0.025% of adjusted temperature range, digital 0.1°C
Peak picker reset rate	in 0.1 ms steps up to 25 s adjustable via software
Analog output signal	0–20 mA switchable to 4–20 mA, 500 Ω max. load
Digital interface	RS485 max. 921 kBd (standard supply) optional: external USB converter
Ambient temp.	Pyrometer: operation 0–65°C, storage -20–65°C, fiber optic cable and lens: 0–250°C
Power supply	24 V DC (15–30 V DC), 14 VA
Isolation	Power supply, analog and digital output are galvanically isolated against each other
Housing and protection class	Extruded aluminum profile, IP65 per DIN 40 050 with mounted cable connector
Weight	600 g
CE label	According to EU directives for electromagnetic immunity
Laser aiming light	(optional) 650 nm, < 1 mW, class II per IEC 60825-1-3-4
Camera module (option)	Output signal: FBAS signal ca. 1 V _{PP} , 75 Ω, CCIR, PAL / NTSC switchable Resolution: PAL: 720x576 Pixel; NTSC: 720x480 Pixel Field of view: ca. 14% x 10% of measuring distance; connector: Limosa connector

Dimensions

X: OL25 fibre optic lens

Y: OL12 fibre optic lens

Standard version with focusable objective and eye piece

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