

Metis HQ11 / HQ22

High-Speed 2-Color Pyrometer for more than 25,000 Measurements per Second

Two-color pyrometer models; **Metis HQ11** and **HQ22** are high speed versions of the reliable Metis MQ series. Two-color pyrometers (also known as ratio pyrometers) measure temperatures from the ratio of radiation signals of two adjacent wavelengths, different to single wavelength models measuring the absolute intensity.

This results in the following advantages:

- Gray bodies, i.e. objects with the same emissivity on both wavelengths, can be measured without emissivity setting.
- There is automatic compensation for dust, smoke or a dirty viewing window between pyrometer and measuring object as long as they are unique transparent in the spectral region of the two-color pyrometer.
- Targets smaller than the spot size can be measured.

Metis two-color pyrometers can be used for universal applications. Additionally to the two-color mode measurements can be done in single wavelength mode (shorter or longer wavelengths).

Chart 1: Temperature Ranges and Spectral Responses

Model	HQ11	HQ22
Spectral range	0.75 – 1.1 µm	1.45 – 1.8 µm
Temperature ranges	600 – 1100°C	350 – 800°C
	650 – 1300°C	
	750 – 1400°C	
	900 – 1800°C	550 – 1400°C
	1000 – 2000°C	700 – 2300°C
	1100 – 2200°C	1000 – 2500°C
	1300 – 2500°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

Model	Objective	Measuring distance	Spot size Ø for full scale temperatures	
			below 1200°C	above 1200°C
HQ11 HQ22	A	340 mm	1.5 mm	1 mm
		500 mm	3.1 mm	2 mm
		750 mm	5 mm	3.1 mm
HQ11 with camera HQ22 with camera	D	1000 mm	6.9 mm	4.3 mm
		2000 mm	14.3 mm	8.5 mm
		3000 mm	22 mm	13 mm

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. 17 mm (full scale temperatures <1200°C) and 12 mm for full scale temperatures above 1200°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.

The spot size of the focusable objectives to be used with the Metis MQ fiber-optic version can be taken from **charts 3** and **4**. The cone of vision diameter (aperture) in front of **Chart 3** lens (optics B) is 18 mm and 7 mm for **Chart 4** lenses (optics C). The larger 25 mm objective offers the advantage of smaller spot sizes at the same distance.

Chart 3: Focusable fiber version objective 25 mm Ø

HQ11 HQ22	B	140 mm	1 mm	0.5 mm
		500 mm	3.7 mm	2.5 mm
		750 mm	5.6 mm	3.8 mm
		1000 mm	7.7 mm	5 mm
		2000 mm	15.4 mm	10 mm
		3000 mm	23 mm	15 mm

Chart 4: Focusable fiber version miniature objective 12 mm Ø

HQ11 HQ22	C	120 mm	2.2 mm	1.2 mm
		250 mm	5 mm	2.5 mm
		500 mm	12 mm	6 mm

Fiber-optic versions are supplied with **2.5 m, single mode fiber**. Longer fiber cables up to 30 m are available on request.

Sighting windows: Measurements through windows are possible with a uniform transparent window material (crown glass, BK7). Normal window glass should be used under any circumstances.

Focusable lenses 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 the fiber optic cable.

This focussing feature offers:

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

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

- Laser aiming, standard method and the only method of sighting for fiber optic versions.
- Through the lens sighting with circle mark. Recommended for aiming onto hot incandescent targets. For full scale temperatures above 1500°C, an eye protection filter is included to protect the operator's eye from high radiation intensity.
- Built-in color video camera for remote monitoring of the heating process in harsh & difficult to reach environments.

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

- Isolated analog output signal, 0 – 20 mA switchable to 4 – 20 mA. Zero-scale and full-scale temperatures are adjustable to increase the resolution of the analog output.
- Ultra-fast RS485 digital interface with up to 921 kBd; shortest measurement interval of 80 µs via Software *SensorWin*.

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 the latter 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. This enables to avoid a decrease of temperature output, should a short "cold period" duration occur at the moment of reset of the clear time.

Software *SensorWin*:

The *SensorWin* software is available for automatic or manual set up of the pyrometer, for recording and for saving of graphical, text or table files. These files can be extremely important for quality assurance purposes and for analyzing historical data. Via Software also the selection of 2-channel mode or 1-channel mode will be done.

Minimum system requirements: PC with current Windows operating system.

Technical Data

Measurement uncertainty:	0.5 % of measured value in °C ($\epsilon_1/\epsilon_2 = 1$, $t_{90} = 1$ s, $T_{Amb.} = 23^\circ\text{C}$)
Repeatability:	0.2% of measured value in °C + 1 K ($\epsilon_1/\epsilon_2 = 1$, $t_{90} = 1$ s, $T_{Amb.} = 23^\circ\text{C}$)
Response time t_{90} :	< 80 µs adjustable via software up to 10 s in 0.1 ms steps
Exposure time:	< 40 µs
Emissivity ratio ϵ_1/ϵ_2 :	0.800 to 1.200
Emissivity ϵ (per channel):	0.05 to 1.20
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 to 20 mA switchable to 4 to 20 mA, 500 Ω max. load
Digital Interface:	RS485, 921 kBd max, optional: external USB converter
Power supply:	24 V DC (15 to 30 V DC), 14 VA
Isolation:	power supply, analog and digital output are galvanically isolated from each other
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
Weight:	700 g
Housing and protection class:	Aluminum, IP65 per DIN 40 050 with cable connector installed
Ambient temp. range:	Pyrometer: operation 0 to 65°C, storage -20 to 65°C, Fiber optic version: cable and lens: 0 to 250°C
Rel. humidity	No condensing conditions
CE label:	According to EU directives for electromagnetic immunity

Dimensions

Fibre Optic Lens OQ25

Fiber optic version with focusable lenses

Fibre Optic Lens OL12

Standard Version with focusable lens and eye piece

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