

**Stationary, digital 2-color pyrometer with fiber optics for non-contact temperature measurement between 700°C and 2500°C**

**ISQ 5-LO**



- Very small spot sizes, min 0.45 mm
- Wide temperature ranges
- Laser targeting light
- Analog output  
0 to 20 mA or 4 to 20 mA
- Digital interface RS232 or RS485 (bus control)
- Maximum value storage
- Fiber optic and optical head withstand temperatures up to 250°C
- Rugged mono fiber optic (max. length up to 30 m)



The **ISQ 5-LO** is a digital, accurate 2-color pyrometer with fiber optic for non-contact temperature measurement.

The pyrometer measures in the 2-color principle (ratio principle) in which two adjacent wavelengths are used to calculate the temperature. This technique offers the following advantages compared with the standard one-color pyrometers:

- The temperature measurement is independent of the emissivity of the object in wide ranges
- The measuring object can be smaller than the spot size
- Measurements are unaffected by dust and other contaminants in the field of view or by dirty viewing windows

Additionally the pyrometer can be switched to 1-color mode and used like a conventional pyrometer in the wavelength band near 0.9 μm.

The instrument is equipped with a fiber and an exchangeable optical head. The fiber and optical head are unaffected by electromagnetic interferences (e.g. induction) and can be used in high ambient temperatures up to 250°C without additional cooling.

The most important parameters as emissivity slope, exposure time and analog output can be set directly in the instrument.

Additionally the pyrometer can be connected to a PC via serial interface, enabling adjustments of further

parameters with the delivered software *InfraWin*. This can be used for temperature indication, data logging and further analyzing of complete temperature processes.

**Typical applications:**

- Induction heating
- Welding
- Casting
- Forging
- Annealing
- Sintering
- Rolling mill
- Rotary kilns
- Pouring stream

# Technical Data

Temperature ranges:	700 to 1800°C (MB 18) 800 to 2500°C (MB 25)
Sub range:	Any range adjustable within the temperature range, minimum span 51°C
Spectral ranges:	Channel 1: 0.7 ... 1.15 µm; channel 2: 0.97 ... 1.15 µm
Power supply:	24 V DC ± 25%, stabilised, ripple < 50 mV
Max load:	≤ 3 VA (incl. active laser targeting light)
Analog output:	0 to 20 mA or 4 to 20 mA, switchable, linear in temperature, load independent DC
Interface:	RS232 or RS485 (adressable), half duplex, baud rate 1.2 up to 38.4 kBd
Resolution:	0.1°C at the interface at the analog output < 0.1% of the adjusted temperature range, but min. 0.1°C
Isolation:	Power supply and digital output and analog output are galvanically isolated
Parameters:	Adjustable on the converter's rear side: emissivity slope, response time, analog output 0 to 20 mA or 4 to 20 mA, offline / online mode for settings on the instrument or via PC Additionally via interface adjustable and readable: ratio / mono channel temperature signal, according to this setting emissivity slope or emissivity, temperature sub range, settings for the maximum value storage, address, baud rate, switch off limit, contamination level Via interface readable only: measured value, internal temperature of the unit.
Maximum value storage:	Built-in single or double storage, clear modes: time (off; 0.01 s; 0.05 s; 0.25 s; 1 s; 5 s; 25 s), external clear contact, via interface or automatic „hot object mode“, hold-function for freezing the current temperature reading (not for ISQ 5-LO-C)
Emissivity slope K:	0.800 to 1.250
Emissivity ε (mono channel mode):	0.05 to 1.00
Response time t <sub>90</sub> :	< 10 ms, adjustable to 0.01 s; 0.05 s; 0.25 s; 1 s; 3 s; 10 s
Switch off limit:	Adjustable via interface: 2% ... 50%
Contamination warning:	Relay contact, max. continuous current 0.4 A, setting of the switch level: 0 (off) ... 99%
Accuracy:	< 1500°C: 0.5% of reading in °C + 2°C > 1500°C: 1.0% of reading in °C
(K = 1, t <sub>90</sub> = 1 s, T <sub>amb.</sub> = 25°C)	
Repeatability:	0.2% of reading in °C + 2°C (K = 1, t <sub>90</sub> = 1 s, T <sub>amb.</sub> = 25°C)
Noise equivalent temperature difference (NETD):	MB 18: 0.4°C (at 710°C meas. temperature)      MB 25: 0.4°C (at 810°C meas. temperature) 0.1°C (at 800°C meas. temperature)                      0.1°C (at 900°C meas. temperature)
(K = 1, t <sub>90</sub> = 10 ms, T <sub>amb.</sub> = 10...40°C)	
Temperature dependence:	± 0.25°C per °C deviation of ambient temperature from 25°C
Sighting system:	Laser targeting (max. power level < 1 mW, λ = 630-680 nm, CDRH class II)
Protection system:	IP65 (according to DIN 40050)
Operating temperature:	0 to 70°C at the converter housing, up to 250°C at optical head and fiber
Storage temperature:	-20 to 70°C
Weight:	Converter: approx. 550 g; optical head: approx. 140 g; fiber (2.5 m): approx. 250 g
Housing:	Stainless steel, for details see drawing on next page
CE-label:	According to EU directives about electromagnetic immunity

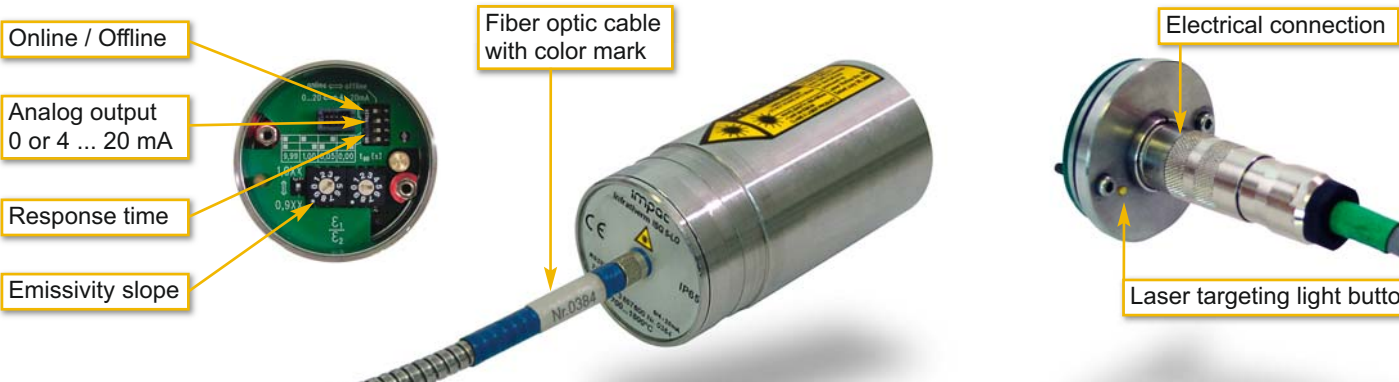


## Option: ISQ 5-LO-C, Special Version with Integrated PID Controller

The ISQ 5-LO-C is equipped with an integrated PID controller. This enables automatic controlling and monitoring of processes. The controller compares the current measuring temperature with the target temperature value, calculates the control signal and gives an output signal of 0 or 4 to 20 mA (instead of the temperature signal output). The controller is very fast and updates the signal with the pyrometer's response time (< 10 ms). The built-in self-tuning algorithm determines automatically and a very good approximation of the controlling parts P, I and D. Activating and deactivating of the controller as well as setting the parameters can be done via interface and software or via portable parametrizing device HT 6000 or the LED digital display DA 6000 or DA 6000-N.



## Details



## Optical Head

Depending on the application the instrument will be delivered with a small or a large optical head. The selection of the optical head depends not only on its size but also on the required spot size (size of the measuring object) and the measuring distance.

### Optical head I:

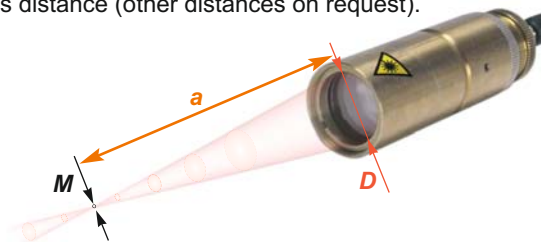
With the very small dimensions the optical head I is suited for use in confined spaces. The optics is adjusted to one of the measuring distances mentioned in the table. The mentioned spot size will be achieved in exactly this distance (other distances on request).

### Optical head II:




The optics II is bigger, but smaller spot sizes can be achieved. Two designs are available, fixed adjusted or focusable:

Similar to optics I the fixed adjusted type is adjusted to one of the measuring distances mentioned in the table (other distances on request).

The focusable type is available for 6 different distance ranges. Each measuring distance can be adjusted within the mentioned limits to achieve the smallest spot size in the required distance.



from the front of the lens

Optical head	Measuring distance $a$ [mm]	Spot size $M_{90}$ [mm]		Aperture $D$ [mm]
		700 ... 1800°C	800 ... 2500°C	
<b>Optical head I:</b> 	Adjusted to: 120	2.2	1.2	7
	Adjusted to: 260	5	2.6	7
	Adjusted to: 700	14	7.2	7
<b>Optical head II: (fixed adjusted)</b> 	Adjusted to: 87	0.75	0.45	17
	Adjusted to: 200	1.5	0.8	17
	Adjusted to: 600	5.3	2.7	15
	Adjusted to: 4500	42	22	15
<b>Optical head II: (focusable)</b> 	Range: 88 to 110	0.8 to 1.1	0.45 to 0.6	17
	Range: 95 to 129	0.9 to 1.3	0.5 to 0.75	16
	Range: 105 to 161	1.1 to 1.7	0.6 to 1	15
	Range: 200 to 346	1.5 to 2.8	0.8 to 1,5	17
	Range: 247 to 606	2 to 5.2	1.1 to 2.7	16
	Range: 340 to 4500	2.8 to 42	1.5 to 22	15

## Fiber Optic

The radiation, coming in through the optical head, is transported via the lens system into the mono glass fiber with flexible stainless steel protection tube where it is transmitted along to the converter. As the optical head contains only the lens system and the sensor and the electronics are located in the converter box, fiber and optical head can withstand ambient temperatures up to 250°C without cooling. Depending on the measuring range two different fibers are used. They are marked red or blue.

Fiber: Monofiber in stainless steel, flexible protection tube with standardised FSMA-plugs.

Length: 2.5 m in scope of delivery; 5 m, 7.5 m, 10 m, 15 m, 30 m on request

Color mark at the fiber: blue: for MB 18 (700 to 1800°C)

red: for MB 25 (800 to 2500°C)

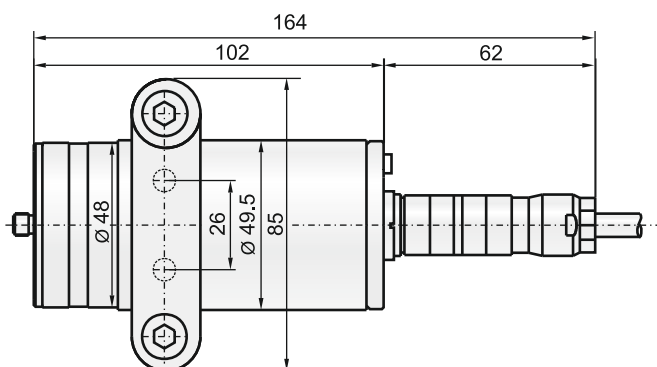
Ambient temperature: max. 250°C (instrument's side with color mark max 125°C)

Minimum bending radius: blue: 100 mm for short time, 300 mm permanently

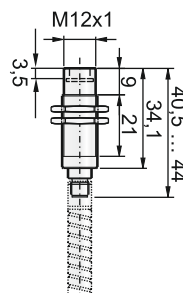
red: 50 mm for short time, 120 mm permanently

## Dimensions

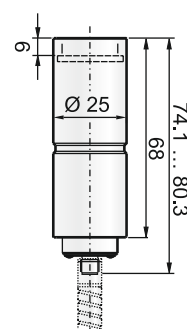
### Converter:



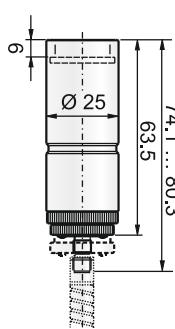
### Optical head type I:



### Optical head type II: (fixed adjusted)



### Optical head type II: (focusable)



All dimensions in mm

## Reference Numbers

Type	Temperature range	Interface		Type	Temperature range	Interface	
		RS232	RS485			RS232	RS485
ISQ 5-LO	MB 18: 700 ... 1800°C	3 853 940	3 853 950	ISQ 5-LO-C	MB 18: 700 ... 1800°C	3 853 680	3 853 690
	MB 25: 800 ... 2500°C	3 853 960	3 853 970		MB 25: 800 ... 2500°C	3 853 780	3 853 790

**Scope of delivery:** Converter, optical head I or II, optical fiber 2.5 m, mounting bracket for converter, works certificate, PC operating and analyzing software *InfraWin*.

**A connection cable is not included in scope of delivery, it has to be ordered separately!**

**Ordering details:** To process your order as fast as possible, please give us the following data:

- Instrument with reference number (e.g. ISQ 5-LO, 3 853 940)
- Optical head's design (I or II fixed adjusted or focusable) and the desired measuring distance (e.g. optical head I, a = 120 mm)
- Length of optical fiber (except standard length 2.5 m)
- Connecting cable (e.g. 3 820 330)

### Accessories:

3 820 330	Connection cable, length 5 m, straight connector	3 835 510	Air purge unit with ceramic tube (large) for optical head I
3 820 500	Connection cable, length 10 m, straight connector	3 835 180	Air purge unit for optical head II
3 820 510	Connection cable, length 15 m, straight connector	3 852 290	Power supply NG DC for DIN rail mounting; 100 to 240 V AC ⇒ 24 V DC, 1 A
3 820 810	Connection cable, length 20 m, straight connector	3 852 540	Power supply NG 0D for DIN rail mounting (with 12 pin cable connector) 85 ... 265 V AC ⇒ 24 V DC, 600 mA
3 820 820	Connection cable, length 25 m, straight connector	3 852 550	Power supply NG 2D, as NG 0D with 2 limit switches
3 820 520	Connection cable, length 30 m, straight connector	3 890 640	LED digital display DA 4000-N
3 820 740	Connection cable, length 5 m, straight connector, temperature resistant up to 200°C	3 890 650	LED digital display DA 4000 with 2 limit switches
3 834 370	Mounting support for optical head I (fixed)	3 890 560	LED digital display DA 6000-N: with possibility for pyrometer parameter settings for digital pyrometers; RS232 interface
3 834 380	Mounting support for optical head I (adjustable)	3 890 570	LED digital display DA 6000-N with RS485
3 834 050	Ball and socket mounting with clamp for optical head I or II or air purge unit for optical head II	3 826 500	HT 6000, portable parametrizing device
3 834 230	Adjustable mounting support for optical head II		
3 835 170	Air purge unit for optical head I		
3 835 500	Air purge unit with ceramic tube (small) for optical head I		

## Overview Accessories

### Mechanical accessories:



Air purge units for optical head I



Adjustable mounting support for optical head II or air purge unit for optical head II



Ball and socket mounting for optical head I or II and for air purge unit for optical head II



Air purge unit for optical head II



Fixed or adjustable mounting support for optical head I

### Electrical accessories:



LED digital display



Portable parametrizing device HT 6000



Power supplies NG DC; NG 0D; NG 2D

Note: all mechanical accessories are made from stainless steel

## LumaSense Technologies

### Americas and Australia Sales & Service

3301 Leonard Court  
Santa Clara, CA 95054

Tel.: +1 408 727-1600  
Fax: +1 408 727-1677

[info@lumasenseinc.com](mailto:info@lumasenseinc.com)

### Europe, Middle East, Africa Sales & Service

D-60326 Frankfurt, Germany  
Kleyerstr. 90

Tel.: +49 69 97373-0  
Fax: +49 69 97373-167

### India

Sales & Support Center  
Mumbai, India

Tel.: +91 22 67419203  
Fax: +91 22 67419201

### China

Sales & Support Center  
Shanghai, China

Tel.: +86 21 5882 2277  
Fax: +86 21 5887 0077

Visit [lumasenseinc.com](http://lumasenseinc.com) for local sales representation