

Digital 2-color pyrometer with fiber optic for non-contact temperature measurement on metals, ceramics, graphite etc. between 700 and 3000°C

## ISR 50-LO



- Short exposure time
- Very small spot sizes
- Built-in lens contamination control system
- HeavyDuty fiber connector for rough application conditions
- Built-in LC display
- All settings adjustable at the instrument or via interface
- Digital interface RS232 / RS485 (switchable)
- Test current output for diagnostics



The ISR 50-LO is a digital, highly accurate 2-color pyrometer with fiber optic for non-contact temperature measurements in temperature ranges between 700 and 3000°C.

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.

The instrument is equipped with an optical fiber, which can be used in very high ambient temperatures up to 250°C without cooling and it is unaffected by electromagnetic interferences.

The built-in display shows the current temperature or all instrument settings. Via the built-in keys all parameters can be changed if necessary.

Via serial interface and the provided software InfraWin the temperature can be displayed and stored on a PC, parametrizing can also be done.

### Typical Applications:

- Induction heating
- Annealing
- Welding
- Forging
- Sintering
- Melting
- Rolling mill
- Rotary kilns
- Pouring stream
- Research and development
- Laser application

## Technical Data

Measurement Specifications		Parameters:	Adjustable or readable at the instrument or via interface:
Temperature ranges:	700 - 1800°C (MB 18) 800 - 2500°C (MB 25) 1000 - 3000°C (MB 30)		Measuring temperature, operation mode (ratio/mono), emissivity slope or emissivity, exposure time, clear times for maximum value storage, hold function, analog output 0 - 20 or 4 - 20 mA, temperature sub range, switch-off level, contamination limit, RS485 address, baud rate, RS485 wait time, temperature display in °C or °F, error status, maximum internal temperature
Sub range:	Any range adjustable within the temperature range, minimum span 51°C		
Spectral ranges:	Channel 1: 0.9 µm Channel 2: 1.05 µm		
IR detector:	Silicon photo diode (Si/Si)		
Fiber:	MB 18: HD multi fiber 0.6 mm (green fiber mark) MB 25 and MB 30: HD mono fiber 0.2 mm (red fiber mark)		
Uncertainty: ( $\varepsilon = 1$ , $t_{90} = 1$ s, $T_{amb.} = 23^{\circ}\text{C}$ )	Up to 1500°C: 0.5% of measured value in °C + 2°C Above 1500°C: 1% of measured value in °C		
Repeatability: ( $\varepsilon = 1$ , $t_{90} = 1$ s, $T_{amb.} = 23^{\circ}\text{C}$ )	0.2% of measured value in °C + 2°C		
Resolution:	0.1°C on interface and display < 0.1% of temperature range at the analog output		
Exposure time $t_{90}$ :	10 ms; adjustable to 0.01 s; 0.05 s; 0.25 s; 1 s; 3 s; 10 s		
Emissivity slope K:	0.8 - 1.2 adjustable in steps of 0.001		
Emissivity $\varepsilon$ :	5 - 100% adjustable in steps of 0.1%		
Switch-off level:	2% - 50%, adjustable		
Maximum value storage:	Built-in single or double storage. Clearing with adjusted $t_{clear}$ (off; 0.01 s; 0.05 s; 0.25 s; 1 s; 5 s; 25 s), extern, via interface or automatically with the next measuring object		
Internal LC display:	LC display for temperature indication or parameter settings		
Digital interface:	RS232 or RS485 addressable (half duplex), switchable; baud rate 1200 up to 115200 Bd		
Physical Characteristics		Dimensions:	See drawing on the right side
		Weight:	Converter: approx. 600 g Optical head: approx. 140 g Fiber (2.5 m): approx. 630 g
Environmental Specifications		Ambient temperature:	0 to 50°C on the converter; 0 to 250°C on side of the optical head
		Storage temperature:	-20 to 60°C
		Relative humidity:	Non condensing conditions
		Protection class:	IP65 (DIN 40050)
Electrical		Power supply:	24 V DC (18 - 36 V DC), ripple < 500 mV
		Power consumption:	Max. 1 W
		Analog Output:	0 - 20 mA or 4 - 20 mA (linear), switchable; test current 10 mA or 12 mA by pressing test key
		Load:	0 - 500 Ω
		Isolation:	Power supply, analog output and digital interface are galvanically isolated from each other
		Switch contact: Opto relay (AC/DC):	Switch contact for dirty window alarm max. switch current: 0,5 A; max. switch supply 60 V AC/DC
		CE label:	According to EU directives about electromagnetic immunity

## Signal Processing

**Advantages of the digital signal processing:** The signal processing of series 50 pyrometers is fully digital, i. e. the detector signal is digitized immediately and digitally processed. With this technique an extremely high accuracy and repeatability is achieved.

<b>Accuracy:</b>	The high accuracy is achieved by the digital linearisation of the sensor output as well as the digital compensation for the ambient temperature.
<b>Temperature range:</b>	Due to the digital technique any temperature sub range within the full temperature range can be set. The analog measuring output corresponds automatically to the selected sub range. This setting of a sub range does not effect the high accuracy and repeatability.
<b>Output:</b>	The analog measuring outputs 0 ... 20 mA or 4 ... 20 mA are selectable as well as the serial digital interfaces RS232 or RS485. Additionally the interface allows the controlling of the pyrometer via PC.
<b>Bus control:</b>	The serial interface RS485 facilitates the integration of the pyrometer into existing field bus systems.
<b>Calibration:</b>	If necessary a calibration of the pyrometers can be done with help of a PC and a calibration source without opening the housing.

## HD Optical Head

The instrument is delivered with a HD optical head II that is specially designed for the connection of a HD fiber. The optics has to be adjusted ex-works to the required measuring distance (possible range 340 to 4500 mm, measured from the front of the lens). Only in this distance the specified spot sizes will be achieved.



Measuring distance a [mm]	Spot size $M_{90}$ [mm]		Aperture D [mm]
	0.6 mm fiber 700 ... 1800°C (MB 18)	0.2 mm fiber 800 ... 2500°C (MB 25); 1000 ... 3000°C (MB 30)	
340 mm	5.1	1.7	17
600 mm	9	3	17
1000 mm	15	5	17
4500 mm	66	22	17

## HD Fiber

The transmission between optical head and converter is done via a heavy duty fiber with a stainless steel protection hose. Depending on the temperature range the fiber is designed in different thicknesses and built as mono fiber or multi fiber.

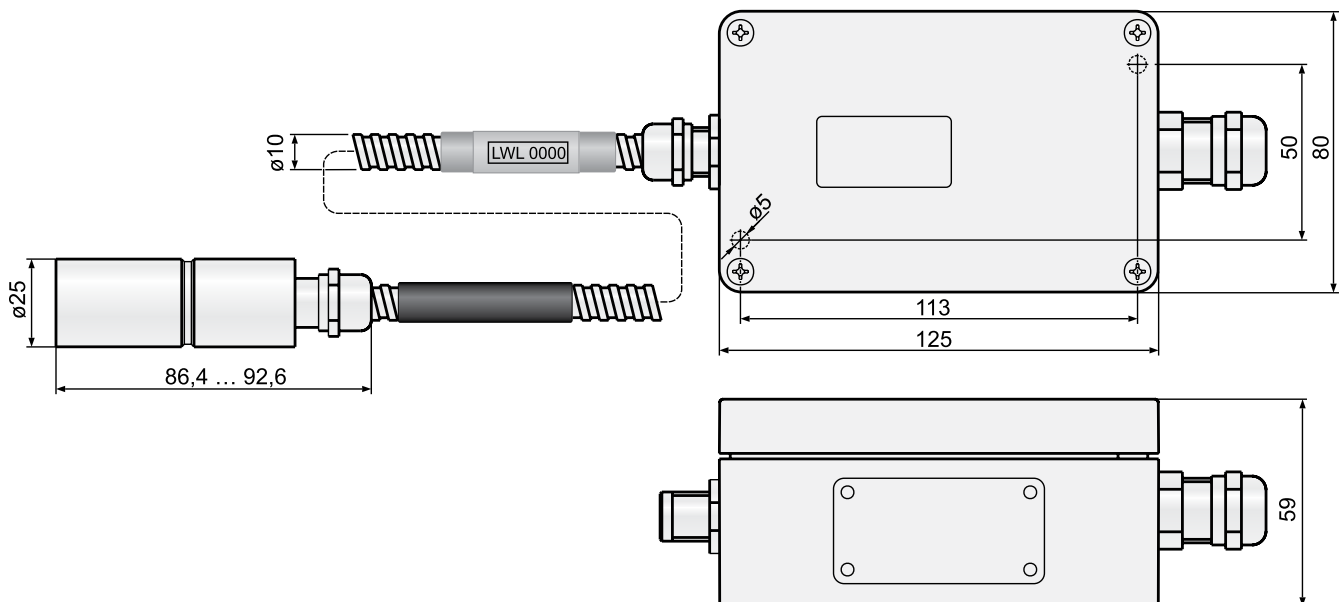
MB 18: HD multi fiber 0.6 mm (green fiber mark)

MB 25 and MB 30: HD mono fiber 0.2 mm (red fiber mark)

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 (fiber at converter side max. 125°C).

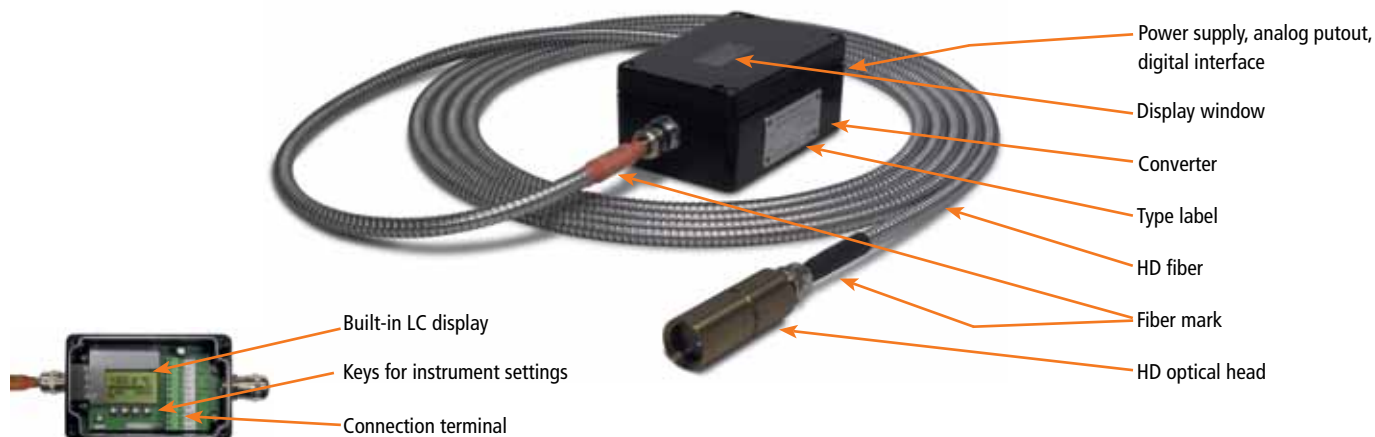
Minimum bending radius:			0.6 mm fiber	0.2 mm fiber
	for short time (max. 250°C):		30 mm	50 mm
permanent (max. 250°C):		50 mm	120 mm	
wound up (max. 50°C):		50 mm	120 mm	

## Dimensions



All dimensions in mm

## Features



## Reference numbers

### Instruments:

Ref. number	Temperature range		
3 882 900	ISR 50-LO	MB 18	700 - 1800°C
3 882 910	ISR 50-LO	MB 25	800 - 2500°C
3 882 920	ISR 50-LO	MB 30	1000 - 3000°C

### Scope of delivery:

Pyrometer ISR 50-LO consisting of converter, HD fiber, length: 2.5 m (other length 5 m, 6 m, 10 m or 15 m possible for extra charge) and optical head; works certificate, PC software „InfraWin“, user manual. A connection cable is not included in scope of delivery!

### Notes:

When ordering the following data are necessary:

- the measuring distance the optical head has to be adjusted
- the length of the fiber in case of another length as the standard length of 2.5 m

### Accessories:

3 821 440	Connection cable 5 m, 11 wires, with additional digital cable (1 m)
3 821 450	Connection cable 5 m, 4 wires (supply and analog output only)
on request	Fiber extension to total length of 5 m
on request	Fiber extension to total length of 6 m
on request	Fiber extension to total length of 10 m
on request	Fiber extension to total length of 15 m

3 834 390	Ball and socket mounting for optical head
3 834 230	Adjustable mounting support for optical head
3 835 180	Air purge for optical head
3 835 240	90° mirror for optical head
3 852 290	Power supply NG DC for DIN rail mounting; 100 - 240 V AC ⇒ 24 V DC, 1 A
3 852 540	Power supply NG 0D for DIN rail mounting; 85 - 265 V AC ⇒ 24 V DC, 600 mA
3 852 550	power supply NG 2D, as NG 0D: additionally with 2 limit switches
3 890 640	LED digital display DA 4000-N
3 890 650	LED digital display DA 4000: as DA 4000-N additionally with 2 limit switches
3 890 560	LED digital display DA 6000-N: with possibility for pyrometer parameter settings for digital
3 890 570	LED digital display DA 6000-N with RS485
3 890 520	LED digital display DA 6000; as DA 6000-N additional with 2 limit switches and analog input and output
3 890 530	LED digital display DA 6000 with RS485
3 890 630	ILD24-UTP, LED large display height of digits 57 mm
3 826 500	HT 6000, portable battery driven indicator and instrument for pyrometer parameter setting

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