Digital 2-color IMPAC pyrometer with fiber optic for non-contact temperature measurement on metals, ceramics, graphite etc. between 300 and 3300 °C

ISR 12-LO • IGAR 12-LO

CE

- Extremely fast exposure time
- Very small spot sizes
- Highest accuracy
- Built-in lens contamination control system
- 2-color- / mono- / metal mode (switchable)
- Built-in laser targeting light
- All parameters adjustable at the instrument
- Output 0 - 20 mA or 4 - 20 mA (switchable)
- Interface RS232 / RS485 (switchable)
- Test current output for diagnostics

The pyrometers ISR 12-LO and IGAR 12-LO are digital, highly accurate 2-color pyrometers with fiber optic for non-contact temperature measurement.

The pyrometers measures in the 2-color principle in which two adjacent wavelength 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 pyrometers can be switched to 1-color mode and used like a conventional pyrometer. The metal mode allows measurements of metals and alloys with unknown K-factor (emissivity slope).

Optical head and fiber can be used in very high ambient temperatures up to 250 °C without cooling and they are unaffected by electromagnetical interferences.

The very short response time of only 2 ms facilitates the measurement of fastest heating processes.

You can setup the pyrometer as well as view and store the temperature on a PC using serial interface and the provided software InfraWin.

Typical Applications:

- Induction heating
- Welding
- Casting
- Forging
- Annealing
- Sintering
- Rolling Mill
- Rotary Kilns
- Pouring Stream
- Research and Development
- Laser Applications

Technical Data

Measurement Specifications		
Temperature ranges:	ISR 12-LO	600...1300 °C (MB 13) 750...1800 °C (MB 18) 900...2500 °C (MB 25) 1000...3300 °C (MB 33)
	IGAR 12-LO	300...1000 °C (MB 10) 350...1300 °C (MB 13) 450...1700 °C (MB 17) 500...2200 °C (MB 22) 550...2500 °C (MB 25)
Sub range:	Any range adjustable within the temperature range, min. span 51 °C	
Spectral ranges:	ISR 12-LO	0.8 ... 1.05 µm
	IGAR 12-LO	1.52 ... 1.64 µm MB 22: 1.28 ... 1.65 µm
Resolution:	Display: 1 °C	Interface: 0.1 °C
	Analog output: < 0.025% of adjusted temperature range	
Accuracy: (ε = 1, t_{90} = 1 s)	ISR 12-LO 0.4% of reading in °C + 1 °C (< 1500 °C) 0.6% of reading in °C + 1 °C (> 1500 °C) IGAR 12-LO 0.5% of reading in °C + 1 °C (< 1500 °C) 0.7% of reading in °C + 1 °C (> 1500 °C)	
Repeatability:	ISR 12-LO: 0.2% of reading in °C + 1 °C IGAR 12-LO: 0.3% of reading in °C + 1 °C	
Signal processing:	Photo current, digitized immediately	
Emissivity slope K:	$\varepsilon_1/\varepsilon_2$: 0.800 to 1.200 adjustable in steps of 0.001	
Emissivity ε:	0.1 to 1 adjustable in steps of 0.001	
Measuring modes:	Adjustable: ratio- (2-color-) / mono- / metal mode, switchable	
Switch-off limit:	2% - 50% in 1% steps	
Exposure Time t_{90}:	2 ms (with dynamical adaption at low signal levels), adjustable up to 10 s	
Maximum value storage:	Built-in single or double storage. cleared by preselected time interval t_{clear} (off; 0.01 s; 0.05 s; 0.25 s; 1 s; 5 s; 25 s) or extern or automatically with the next measuring object	
Sighting system:	Laser targeting (max. power level < 1 mW, λ = 630-680 nm, CDRH class II)	

Communication / Interface	
Analog output:	0 to 20 or 4 to 20 mA switchable, load 0 to 500 Ohm test current 10 mA for inspection of wiring and connected instruments
Interfaces:	Switchable: RS232 or RS485 addressable, half duplex; baud rate 2.4 up to 115.2 kBd
Display:	Built-in 4-digit 7-segment-LED, height 13 mm; LED for °C / °F, clear mode „auto“, „ext“, ratio- (2-color-) / mono- / metal mode
Control panel:	4 keys, switch for interface, key for test current
Parameters:	Adjustable at the instrument or via serial interface: Emissivity ε, Emissivity slope K, response time t_{90}, clear times t_{clear} for maximum value storage, automatic or external deletion of the maximum value storage, setting of ratio- / mono- / metal mode, switch-off limit, analog output 0 to 20 or 4 to 20 mA, Temperature sub range, address, baud rate, Temperature display in °C / °F.
Electrical	
Power supply:	24 V DC (15 to 40 V DC) or 24 V AC (12 to 30 V AC), 48 to 62 Hz
Current consumption:	Max. 600 mA
Isolation:	Power supply, analog output and digital interface are galvanically isolated against each other
Switch contact:	max. 0.15 A
Environmental	
Operating temperature:	At the converter housing: 0 to 60 °C (ISR 12-LO); 0 to 50 °C (IGAR 12-LO)
Storage temperature:	-20 to 70 °C
Relative humidity:	non condensing conditions
Weight:	Converter: 2.2 kg; optical head II: 140 g; fiber (2.5 m): 250 g
Protection system:	IP65 (according to DIN 40 050)
CE-label:	According to EU directives about electromagnetic immunity

Note: The calibration / adjustment of this pyrometer is carried out in accordance with VDI/VDE 3511, Part 4.4. See http://info.lumasenseinc.com/calibration for more information.

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 2 different fibers are used. They are marked red or blue.

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: ISR 12-LO, MB 13; IGAR 12-LO, MB 10 red: ISR 12-LO, MB 18, 25, 33, IGAR 12-LO MB 13, 17, 22, 25
Max 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

Optical Head

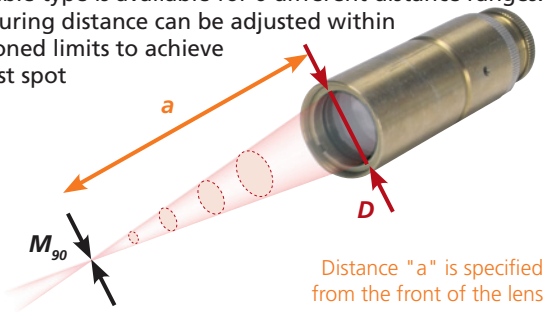
Depending on the application the instrument will be delivered with a small or a large optical head. The selection of the optical head depends not only on its size but also on the required spot size (size of the measuring object) and the measuring distance.

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.

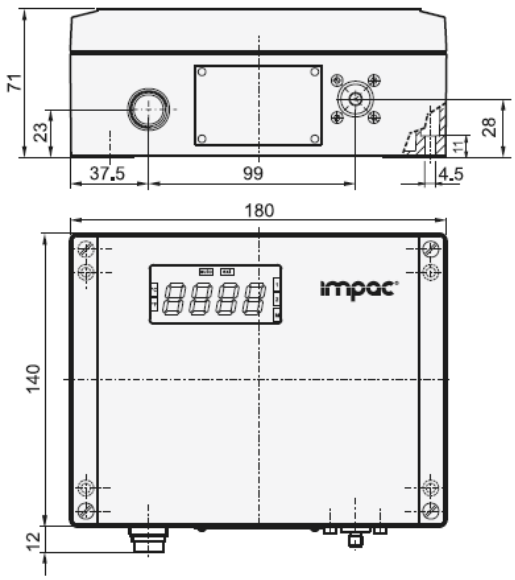


Distance "a" is specified from the front of the lens

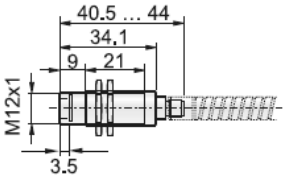
Optical Head	Measuring distance a [mm]	Spot size M_{90} [mm]		Aperture D [mm]
		ISR 12-LO: MB 13 IGAR 12-LO: MB 10	ISR 12-LO: MB 18, 25, 33 IGAR 12-LO: MB 13, 17, 22, 25	
Optical head I: 	Adjusted to: 120	2.2	2.2	7
	Adjusted to: 260	5	2.6	7
	Adjusted to: 700	14	7.2	7
Optical head II: (fixed adjusted) 	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
Optical head II: (focusable) 	Range: 88 ... 110	0.8 ... 1.1	0.45 ... 0.6	17
	Range: 95 ... 129	0.9 ... 1.3	0.5 ... 0.75	16
	Range: 105 ... 161	1.1 ... 1.7	0.6 ... 1	15
	Range: 200 ... 346	1.5 ... 2.8	0.8 ... 1.5	17
	Range: 247 ... 606	2.0 ... 5.2	1.1 ... 2.7	16
	Range: 340 ... 4500	2.8 ... 42	1.5 ... 22	15

Dimensions

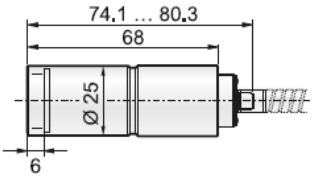
Converter:



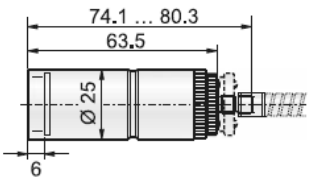
Optical head type I:



Optical head type II:
(fixed adjusted)



Optical head type II:
(focusable)



All dimensions in mm

Reference numbers

Type	Ref. number	Temperature Range	
ISR 12-LO	3 855 100	600 to 1300 °C	(MB 13)
	3 855 110	750 to 1800 °C	(MB 18)
	3 855 120	900 to 2500 °C	(MB 25)
	3 855 130	1000 to 3300 °C	(MB 33)

Scope of delivery: Converter, optical fiber, length 2.5 m, optical head I or II, PC software Infrawin, works certificate, and user manual.

Ordering note: A connection cable is not included in scope of delivery and needs to be ordered separately.

Type	Ref. number	Temperature Range	
IGAR 12-LO	3 855 200	300 to 1000 °C	(MB 10)
	3 855 210	350 to 1300 °C	(MB 13)
	3 855 300	450 to 1700 °C	(MB 17)
	3 855 220	500 to 2200 °C	(MB 22)
	3 855 230	550 to 2500 °C	(MB 25)

When ordering, please provide: Instrument with reference number, optical head's design and the desired measuring distance, length of optical fiber, and connecting cable with reference number.

Accessories

3 820 330	Connection cable, straight connector, 5 m
3 820 500	Connection cable, straight connector, 10 m
3 820 510	Connection cable, straight connector, 15 m
3 820 810	Connection cable, straight connector, 20 m
3 820 820	Connection cable, straight connector, 25 m
3 820 520	Connection cable, straight connector, 30 m
3 820 740	Connection cable, length 5 m, straight connector, temperature resistant up to 200 °C
3 834 390	Ball and socket mounting for optical head I or II
3 834 230	Adjustable mounting support for optical head II
3 834 170	Air purge unit, stainless steel, for optical head I
3 835 180	Air purge unit, stainless steel, for optical head II
3 835 240	Air purge unit with 90° mirror for optical head II
3 852 290	Power supply, NG DC, 100 to 240 V AC, ⇒ 24 V DC, 1 A
3 890 640	DA 4000-N: LED-display, 2-wire power supply, 230 V AC
3 891 210	DA 4000-N: LED-display, 2-wire power supply, 115 V AC
3 890 650	DA 4000: like DA 4000-N with 2 limit contacts, 230 V AC
3 891 220	DA 4000: like DA 4000-N with 2 limit contacts, 115 V AC
3 890 560	LED digital display DA 6000-N: with possibility for pyrometer parameter settings for digital IMPAC pyrometers; RS232 interface
3 890 570	DA 6000-N with RS485 interface
3 890 520	DA 6000, digital display, digital and analog input, dual limit switch, maximum value storage, analogue output, RS232
3 890 530	DA 6000, digital display, digital and analog input, dual limit switch, maximum value storage, analogue output, RS485
3 890 150	DA 6000-T, digital display, for measurement of the cool down time t_{8_5} from 800 °C to 500 °C (for welding processes)
3 826 510	PI 6000, programmable PID-controller
3 890 630	ILD24-UTP, LED large display height of digits 57 mm

Features

°C or °F display

Temperature or parameter display

Parameter indicator

Switch for interface RS232 / RS485

Push-button for test current

Electrical connection

Indicating of clear mode

Operating mode display:
· mono mode
· ratio mode
· metal mode

Adjusting keys

Laser targeting light

Mounting hole

Optical fiber

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