

Stationary, digital ratio pyrometer with possible combination of 1-color and 2-color measurement for non-contact temperature measurements in ranges between 100 and 2000 °C

## IGAR 6 Advanced



- Wide temperature ranges and various operating modes:
  - 1-color mode: 100 ... 2000 °C
  - 2-color mode: 250 ... 2000 °C
  - Smart mode: automatic (temperature-dependent) transition from 1-color to 2-color mode
- Automatic emissivity determination
- "Dirty Window" Warning
- Fully digital core for sub-ranging and adopted analog output
- Very fast 2 ms response time for highly dynamic processes
- Best optics in its class with manual focus capability
- 4 digit LED display
- Robust, stainless steel sensor for harsh environments (IP65/NEMA4)



The IGAR 6 Advanced pyrometer is a digital, compact and fast pyrometer which - depending on the individual requirements - can be operated in different modes. Besides the 1-color mode (100 ... 2000 °C) a 2-color mode (250 ... 2000 °C) or a special Smart mode can be selected. In Smart mode, the measurements in the range between 100 ... 250 °C will be taken in 1-color mode whereas in the range between 280 ... 2000 °C the measurements will be based on the 2-color method (ratio method). In the range from 250 to 280 °C, a continuous transition from 1-color to 2-color measurement automatically takes place.

In 2-color mode (ratio method) two adjacent wavelengths are used for the temperature determination. This technique offers the following advantages compared to standard 1-color pyrometers:

The temperature measurement is largely independent of the object's emissivity and in wide ranges unaffected by dust and other

contaminants in the field of view. The measuring object can be smaller than the spot size, measurements through dirty viewing windows are possible up to a certain contamination.

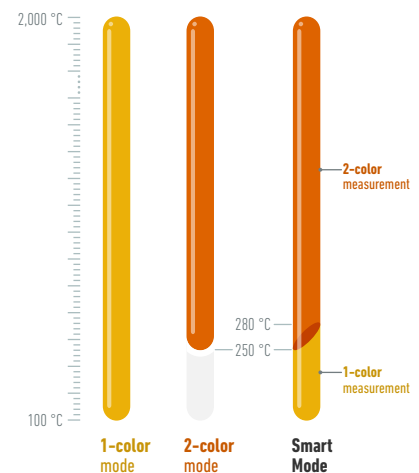
When the instrument is operated in 2-color or Smart mode, InfraWin provides the option to automatically determine the emissivity. By pushing the button "Emi=xxx% Accept", this emissivity is set and used for all measurements in 1-color mode or in Smart mode below 280 °C.

The response time of only 2 ms facilitates the measurement of fast processes. The IGAR 6 is equipped with a built-in "dirty window" warning.

The pyrometer can be connected to a PC through an RS485 to USB connection, enabling parameter adjustments to be made using the InfraWin software. This can be used for temperature indication, data logging and further analyzing of complete temperature processes.

### Typical applications:

- Steel Making
- Metal Processing - e.g. Induction Processes: Hardening, Tempering, Annealing, Soldering, Brazing, Welding, Froging, etc.
- Metal Processing - Wire/Rod Mill, Heating and Cooling Processes
- Sintering
- Vacuum Processes - e.g. Coating, Brazing, etc.
- Laser Applications



# Technical Data

## Measurement Specifications

Temperature Ranges:	1-color and Smart mode: 100 to 2000 °C 2-color (ratio) mode: 250 to 2000 °C
Sub Range:	Any range adjustable within the temperature range, minimum span 50 °C
Spectral Ranges:	Channel 1: 1.5 ... 1.6 µm; Channel 2: 2.0 ... 2.5 µm
Resolution:	0.1 °C or 0.2 °F at interface; < 0.0015% of selected sub range at analog output, min. 0.1 °C, 16 bit; 1 °C or 1 °F on display
Emissivity $\epsilon$ :	0.050 to 1.000 in steps of 1/1000 (1-color mode)
Transmittance $\tau$ :	0.050 to 1.000 in steps of 1/1000 (1-color mode)
Emissivity Slope K:	0.600 to 2.000 in steps of 1/1000 (2-color mode)
Measurement Uncertainty: $\epsilon$ ( $\kappa = 1$ or $\epsilon = 1$ , $t_{90} = 1$ S, $T_{amb.} = 25^\circ\text{C}$ )	< 1500 °C: 0.4% of reading in °C + 2 °C > 1500 °C: 0.8% of reading in °C
Repeatability: ( $\kappa = 1$ or $\epsilon = 1$ , $t_{90} = 1$ S, $T_{amb.} = 25^\circ\text{C}$ )	0.2% of reading in °C + 1 °C

## Optical Specifications

Sighting:	Built-in laser aiming light (max. power level < 1 mW, $\lambda = 630$ to 680 nm, CDRH class II) or through-lens sighting
Optics:	Manually focusable from rear cover measuring distance $a = 210$ to 5000 mm
Distance Ratio:	approx. 100 : 1

## Environmental Specifications

Protection Class:	IP 65 IEC 60529 (value in mated condition)
Operating Position:	any
Ambient Temperature:	0 to 65 °C at housing
Storage Temperature	-20 to +80 °C
Relative Humidity:	Non condensating conditions
Weight:	0.6 kg
Housing:	Stainless steel
CE Label:	According to EU directives about electromagnetic immunity

**Note:** MB is a shortcut used for temperature range (in German: Messbereich)

## Interface

Connection:	12-pin connector
Display (in rear cover):	LED, 4 digit matrix, 5 mm high for 2-color or 1-color temperature signal or measuring distance
Parameters	Adjustable via interface: 2-color / 1-color temperature signal, Smart mode, metal mode, accordingly emissivity slope or emissivity, temperature sub range, settings for maximum value storage, address, baud rate, switch off limit, "dirty window" warning, transmittance, response time $t_{90}$ , 0 to 20 mA or 4 to 20 mA analog output range, °C/°F
	Readable via interface: measured value, internal temperature of the unit, measuring distance

## Communication

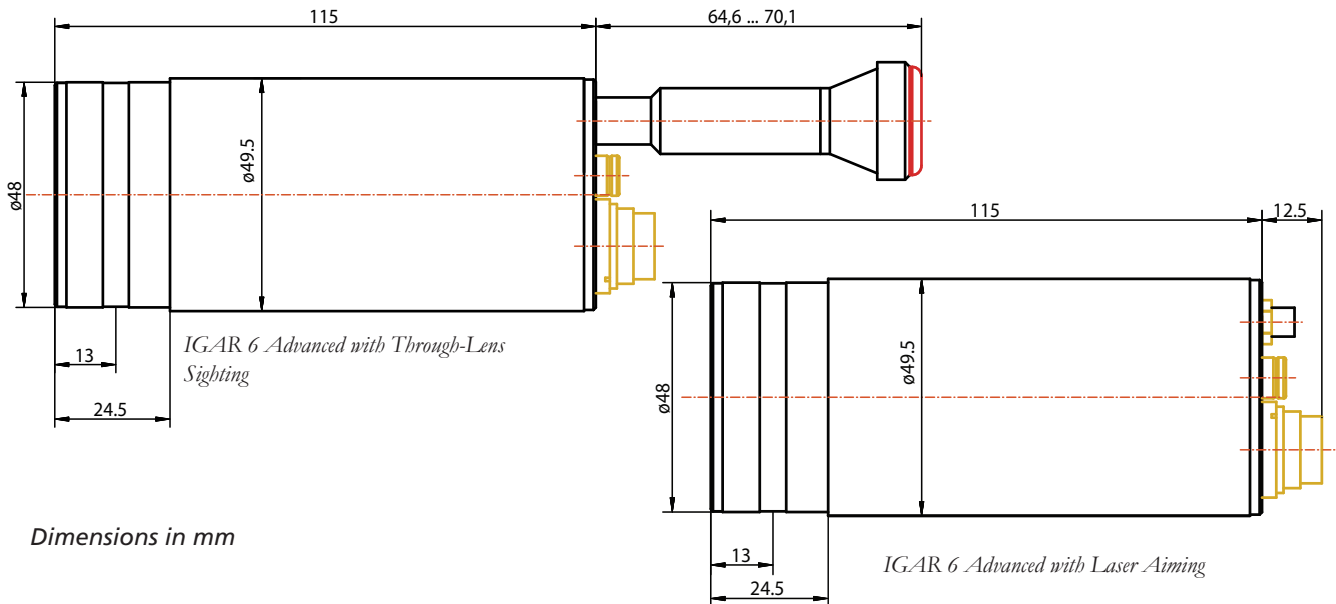
Analog Output:	Adjustable 0 to 20 mA or 4 to 20 mA, linear (via digital interface)
Digital Interface:	RS485 addressable (half-duplex) Baud rate: 1200 to 115.2 kBD (on request RS232, not addressable)
Switch Off Limit:	2% to 50% (adjustable via interface)
"Dirty Window" Warning:	Relay contact, max. continuous current 0.4 A, setting of the warning level: 0 (off) to 99%
Response Time $t_{90}$ :	2 ms (with dynamic adaption at low signal levels); adjustable to 0.01 s; 0.05 s; 0.25 s; 1 s; 3 s; 10 s
Maximum Value Storage:	Built-in single or double storage. Clearing with adjusted time $t_{clear}$ (off; 0.01 s; 0.05 s; 0.25 s; 1 s; 5 s; 25 s), via interface, automatically with the next measuring object, external contact, hold-function

## Electrical

Power Supply:	24 V DC $\pm$ 25%, ripple must be less than 50 mV
Power Consumption:	Max. 3 W (incl. laser)
Load (analog output):	0 to 500 $\Omega$
Isolation:	Power supply, analog output and digital interface are electrically isolated from each other

**Note:** The determination of the technical data of this pyrometer is carried out in accordance with VDI/VDE IEC TS 62942-2, the calibration / adjustment in accordance with VDI/VDE 3511, Part 4.4. See <http://info.lumasenseinc.com/calibration> for more information.

## Product Schematic



## Sighting



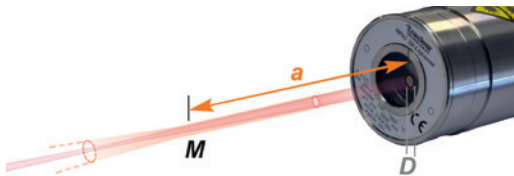
IGAR 6 Advanced with Through-Lens Sighting



IGAR 6 Advanced with Laser Aiming

## Optics

The optics can be manually adjusted at all distances between 210 mm and 5000 mm. The table shows examples of distances and the corresponding spot diameters:



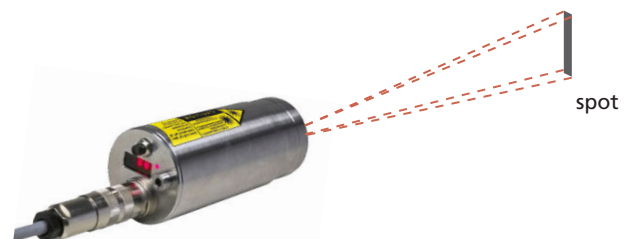
### IGAR 6 Advanced

100 to 2000 °C	
distance a [mm]	Spot diameter M [mm]
210	2.1
300	3
500	5
800	8
1300	13
2000	20
5000	50

Effective aperture D for all temperature ranges: 13 mm (focused to longest distance) to 15 mm (focused to shortest distance)

### Optional Integrated Line Optics

Besides the standard optical heads the IGAR 6 is optionally also available with integrated line optics which features a special spot in shape of a line. It provides additional advantages for some applications such as wire production or pouring stream measurements.



The length of the spot equals 5% of the measuring distance.

## Reference Numbers

Type	Temperature Range	With Through-Lens Sighting	With Laser Aiming	With Laser Targeting and line shaped spot (5%)
IGAR 6 Advanced	100 to 2000 °C	3 914 710	3 914 700	3 914 780

**Scope of delivery:** Pyrometer with PC software InfraWin for adjustment and evaluation, Works Certificate, and Manual

**Ordering note:** A connection cable is not included in scope of delivery and must be ordered separately

## Accessories

3 820 330	Connection cable, 5 m, straight connector*	3 890 640	DA 4000-N: LED digital display to be built into the switchboard
3 820 500	Connection cable, 10 m, straight connector*	3 890 650	DA 4000: like the DA 4000-N, but additionally with 2 limit switches
3 820 510	Connection cable, 15 m, straight connector*	3 890 570	DA 6000-N digital display, to allow adjustment of Pyrometer through RS485 interface
3 820 810	Connection cable, 20 m, straight connector*	3 890 530	DA 6000: like the DA 6000-N, but with analog input and 2 limit switches for the RS485 interface.
3 820 820	Connection cable, 25 m, straight connector*	3 890 630	LD24-UTP; large digital indicator, 57 mm height of digits
3 820 520	Connection cable, 30 m, straight connector*	3 843 250	ROT 5 scanning mirror attachment up to 70°
3 820 340	Connection cable, 5 m, 90° connector*	3 843 490	External Scanner Series 5 & 6 with fused silica window; 24V AC/DC
3 820 530	Connection cable, 10 m, 90° connector*	3 834 210	Adjustable mounting support
3 820 540	Connection cable, 15 m, 90° connector*	3 846 260	Mounting support
3 820 830	Connection cable, 20 m, 90° connector*	3 846 290	Mounting support with fused silica window
3 820 840	Connection cable, 25 m, 90° connector*	3 835 160	Air purge unit, aluminium
3 820 550	Connection cable, 30 m, 90° connector*	3 835 590	90° mirror for Series 5, quartz glass window
3 852 290	Power supply NG DC for DIN rail mounting; 100 to 240 V AC ⇒ 24 V DC, 1 A	3 837 230	Water cooling jacket (heavy duty) with integrated air purge unit
3 852 550	Power supply NG 2D for DIN rail mounting; 85 to 265 V AC ⇒ 24 V DC, 600 mA with 2 settable limit switches	3 837 540	Cooling plate for series 5 and 6, with air purge
3 826 750	USB to RS485 adaptor cable, 1.8m, HS Version 4.5 Mbd	3 846 590	Vacuum flange KF16 with quartz glass window
3 826 510	PI 6000: PID programmable controller		

\*All connection cables include a short adapter cable with a 9-pin SUB-D connector. This connector may be used in combination with the RS485 to USB adapter.

## Accessory Overview



Industrial Power Supplies



Digital Display



Fast Digital Controllers



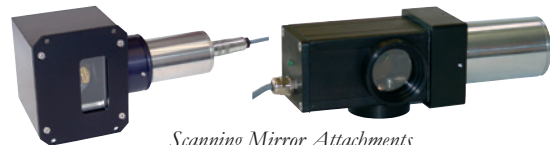
Mounting Brackets



Air Purges



Air/Water Cooled enclosures



Scanning Mirror Attachments

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## Awakening Your 6<sup>th</sup> Sense