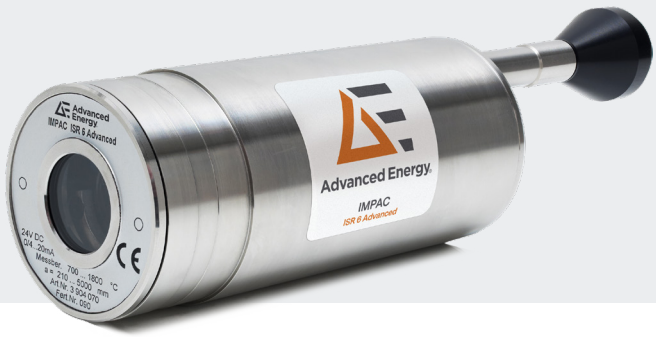
IMPAC ISR 6 ADVANCED

Stationary, digital ratio pyrometer for non-contact temperature measurement in ranges between 600 and 3000°C (1112 to 5432°F).



The Impac® ISR 6 Advanced pyrometer is a digital, compact and fast 2-color pyrometer for non-contact temperature measurement. The pyrometer measures in the 2-color method (ratio method) in which two adjacent wavelengths are used for the temperature determination.

PRODUCT HIGHLIGHTS

- Widest temperature ranges for most flexible process adaptation
- Highest accuracy and repeatability in its class
- “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)

TYPICAL APPLICATIONS

- Steel making
- Metal processing - induction processes: hardening, welding, forging, brazing, soldering, etc.
- Metal processing - noble metals melting and purifying
- Metal processing - wire/rod mill water box measurement, laying head & air cooling conv.
- Solar industry - silicon processing polycrystalline casting in vacuum melting furnace, silicon ingot growth in CVD reactors (Siemens process), crystal pulling of monocrystalline silicon (Czochralski process)
- Glass industry - gob temperature measurement
- Cement industry - clinker temperature in rotary kilns

AT A GLANCE

Temperature Ranges

600 to 1400°C (1112 to 2552°F)
700 to 1800°C (1292 to 3272°F)
800 to 2500°C (1472 to 4532°F)
1000 to 3000°C (1832 to 5432°F)

Spectral Range

Ch. 1: 0.9 µm
Ch. 2: 1.05 µm

Measurement Uncertainty

< 1500°C: 0.3% oR + 2°C
> 1500°C: 0.6% oR in °C

Repeatability

0.15% oR + 1°C

Field of View

min 350:1 (min. 0.6 mm)
Option: line optics

Alignment

Laser targeting or through-lens sighting or color TV camera

OVERVIEW

The ISR 6 Advanced ratio pyrometer uses two adjacent wavelengths 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.

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

The response time of only 2 ms facilitates the measurement of fast processes. The ISR 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.

TECHNICAL DATA

Measurement Specifications	
Temperature Range	600 to 1400°C (1112 to 2552°F) (MB 14) 700 to 1800°C (1292 to 3272°F) (MB 18) 800 to 2500°C (1472 to 4532°F) (MB 25) 1000 to 3000°C (1832 to 5432°F) (MB 30)
Sub Range	Any range adjustable within the temperature range, minimum span: 50°C
Spectral Ranges	Channel 1: 0.9 µm
	Channel 2: 1.05 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 ε	0.050 to 1.000 in steps of 1/1000 (1-color mode)
Transmittance τ	0.050 to 1.000 in steps of 1/1000 (1-color mode)
Emissivity Slope κ	0.800 to 1.200 in steps of 1/1000 (2-color mode)
Measurement Uncertainty ($\kappa = 1$, $t_{90} = 1$ s, $T_{amb.} = 25$ °C)	< 1500°C: 0.3% of reading in °C + 2°C
	> 1500°C: 0.6% of reading in °C
Repeatability ($\kappa = 1$, $t_{90} = 1$ s, $T_{amb.} = 25$ °C)	0.15% of reading in °C + 1°C

Optical Specifications	
Sighting	Built-in laser aiming light (max. power level < 1 mW, λ = 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	MB 14 approx. 100:1 MB 18 approx. 190:1 MB 25 and MB 30 approx. 350:1

TECHNICAL DATA (CONTINUED)

Electrical	
Power Supply	24 VDC ±25%, ripple must be less than 50 mV
Power Consumption	Approximately 3 W (including laser)
Load (analog output)	0 to 500 Ω
Isolation	Power supply, analog output and digital interface are electrically isolated from each other

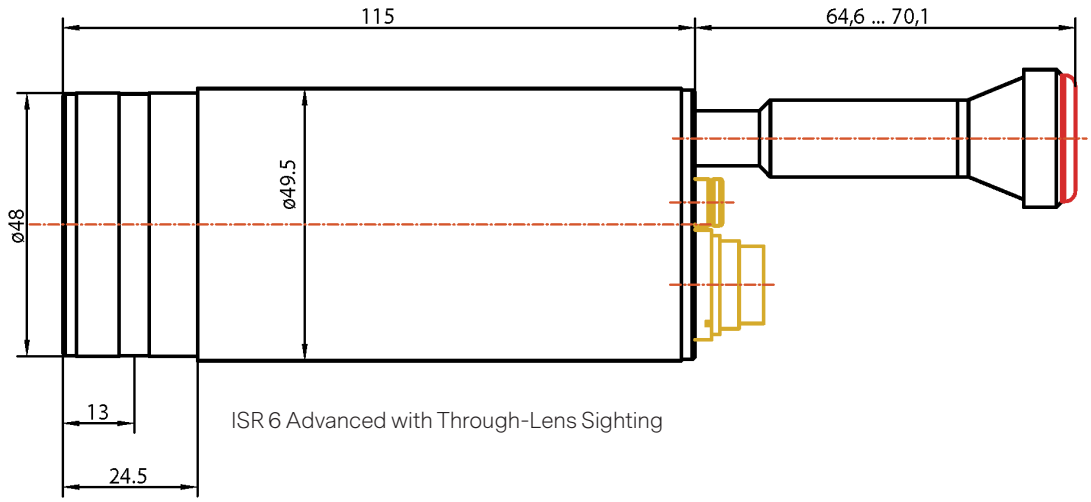
Environmental Specifications	
Protection Class	IP 65 IEC 60529 (value in mated condition)
Operating Position	Any
Ambient Temperature	0 to 65°C (32 to 149°F) at housing
Storage Temperature	-20 to 80°C (-4 to 176°F)
Relative Humidity	Non-condensating conditions
Weight	0.6 kg (~1.32 lbs)
Housing	Stainless steel
CE Label	According to EU directives about electromagnetical immunity

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, 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
	Readable via interface: measured value, internal temperature of the unit, measuring distance

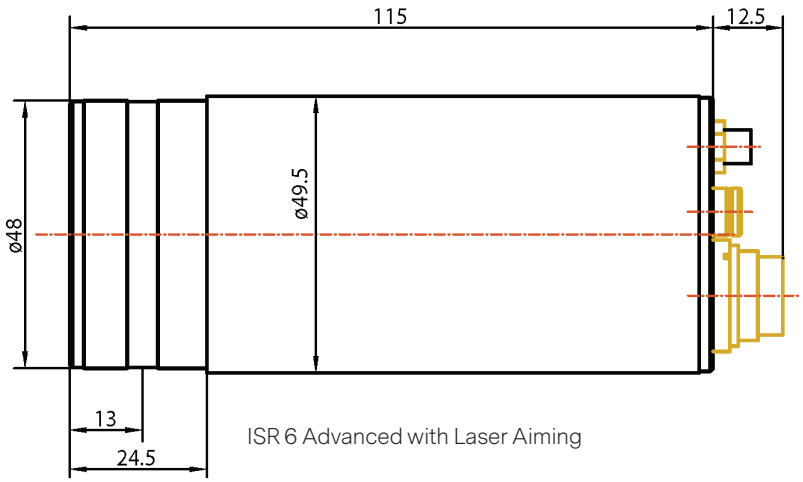
Communication	
Analog Output	Adjustable 0 to 20 mA or 4 to 20 mA, linear (via digital interface)
Digital Interface	RS485 addressable (half-duplex)
	Baud rate: 1200 to 115.2 kBd (on request RS232, not addressable)
Switch Off Limit	2% to 50% (adjustable via interface)
“Dirty Window” Warning	Relay contact, 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 min; 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

1 MB is a shortcut used for temperature range (in German: Messbereich).
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.

PRODUCT SCHEMATIC



ISR 6 Advanced with Through-Lens Sighting



ISR 6 Advanced with Laser Aiming

Dimensions in mm

SIGHTING

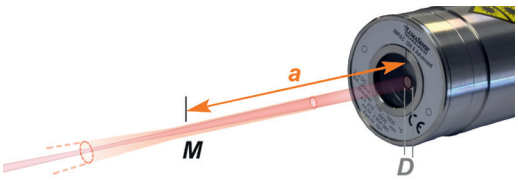
ISR 6 Advanced with Through-Lens Sighting

ISR 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.

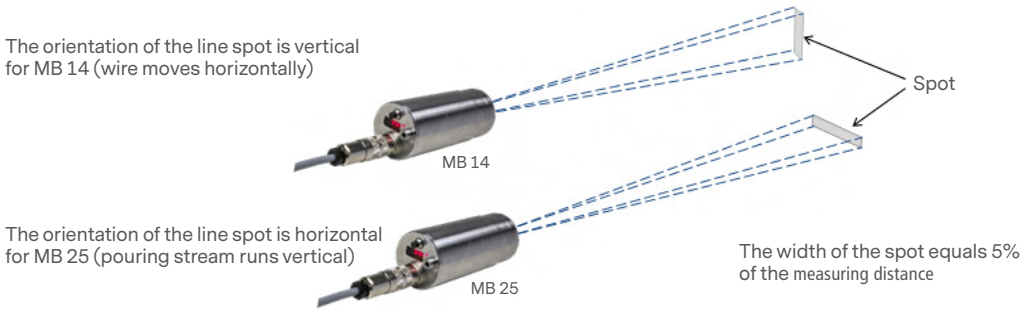
Effective aperture D for all temperature ranges: 13 mm (focused to longest distance) to 15 mm (focused to shortest distance).



ISR 6 Advanced				
Distance a [mm]	600 to 1400°C	700 to 1800°C	800 to 2500°C	1000 to 3000°C
	Spot Diameter M [mm]			
210	2.1	1.1	0.6	0.6
300	3	1.6	0.9	0.9
500	5	2.7	1.5	1.5
800	8	4.2	2.3	2.3
1300	13	6.9	3.7	3.7
2000	20	10.6	5.8	5.8
5000	50	27	15	15

Optional Integrated Line Optics

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



REFERENCE NUMBERS

ISR 6 Advanced			
Temperature Range	With Through-Lens Sighting	With Laser Aiming	With Laser Targeting and line shaped spot (5%)
600 to 1400°C (MB 14)	3 904 020	3 904 010	3 904 050
700 to 1800°C (MB 18)	3 904 080	3 904 070	-
800 to 2500°C (MB 25)	3 904 150	3 904 140	3 904 180
1000 to 3000°C (MB 30)	3 904 220	3- 904 210	-

Scope of Delivery

Pyrometer, PC adjustment and evaluation software InfraWin, works certificate, and operating instructions.

Ordering Note

A connection cable is not included in scope of delivery and must be ordered separately.

ACCESSORIES

PN	Description
3 820 320	Special connection cable with plug and additional pilot light switch, 5 m
3 820 330	Connection cable, 5 m, straight connector[1]
3 820 500	Connection cable, 10 m, straight connector[1]
3 820 510	Connection cable, 15 m, straight connector[1]
3 820 810	Connection cable, 20 m, straight connector[1]
3 820 820	Connection cable, 25 m, straight connector[1]
3 820 520	Connection cable, 30 m, straight connector[1]
3 820 340	Connection cable, 5 m, 90° connector[1]
3 820 530	Connection cable, 10 m, 90° connector[1]
3 820 540	Connection cable, 15 m, 90° connector[1]
3 820 830	Connection cable, 20 m, 90° connector[1]
3 820 840	Connection cable, 25 m, 90° connector[1]
3 820 550	Connection cable, 30 m, 90° connector[1]
3 852 290	Power supply NG DC for DIN rail mounting; 100 to 240 VAC ⇒ 24 VDC, 1 A
3 852 550	Power supply NG 2D for DIN rail mounting; 85 to 265 VAC ⇒ 24 VDC, 600 mA with 2 settable limit switches
3 826 750	USB-RS485 adaptor cable, 1.8m, HS Version 4.5 Mbd
3 852 440	Protocol transducer RS485/RS232 (switch.) ⇔ Profibus-DP for 1 device
3 852 460	Protocol transducer RS485 ⇔ Profibus DP for 32 devices
3 852 620	Protocol converter UPP RS485 or RS232 ⇔ ProfiNet, for 1 pyrometer
3 852 630	Protocol converter UPP RS485 ⇔ ProfiNet, for max. 32 pyrometers
3 826 510	PI 6000: PID programmable controller, very fast, for digital IMPAC pyrometers
3 891 220	DA 4000: LED-display, 2-wire power supply, 2 limit switches (relay contacts), 115 VAC
3 890 650	DA 4000: LED-display, 2-wire power supply, 2 limit switches (relay contacts), 230 VAC
3 890 570	DA 6000-N digital display, to allow adjustment of pyrometer through RS485 interface
3 890 530	DA 6000: like the DA 6000-N, but with analog input and 2 limit switches for the RS485 interface.
3 843 490	SCA 5, External Scanner Series 5 & 6 with fused silica window, 24 VAC/DC
3 846 260	Instrument's support (Series 5 and 6)
3 834 210	Adjustable mounting support (Series 5 and 6)
3 846 290	Instrument's support (Series 5 and 6) with fused silica window
3 835 590	90° mirror with quartz glass window (Series 5 and 6)
3 843 250	ROT 5 scanning mirror attachment up to 70°
3 835 160	Air purge unit, aluminium
3 837 230	Water cooling jacket (heavy duty) with integrated air purge unit
3 837 280	Water cooling jacket (heavy duty) with fused silica window
3 837 500	Water cooling jacket (light duty, with air purge unit (only for instruments with laser targeting)
3 837 510	Water cooling jacket (light duty), with fused silica window (only for instruments with laser targeting)
3 837 540	Cooling plate for series 5 and 6, with air purge
3 846 590	Vacuum flange KF16 with quartz glass window

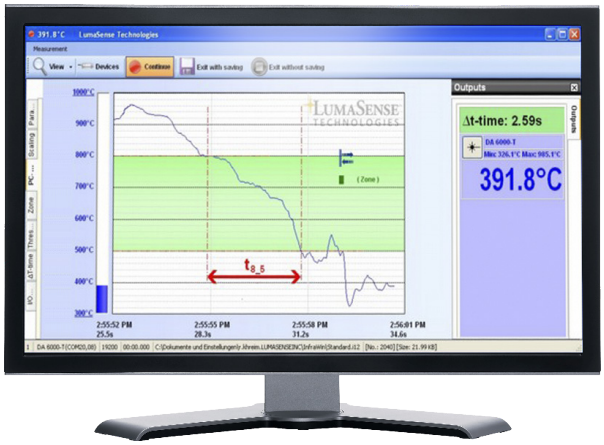
1 All connection cables include a short adapter cable with a 9-pin SUB-D connector. This connector may be used in combination with the RS485 to USB adapter.

INFRAWIN OVERVIEW

InfraWin is easy-to-use measurement and evaluation software for remote configuration of stationary, digital IMPAC brand pyrometers.

This software allows the user to remotely adjust and control settings for one or two pyrometers from a single computer. InfraWin also allows the user to simultaneously monitor and control temperatures.

- Display temperature data as color bars and online graphics
- Capture downstream evaluations as tables, graphics or text files
- Calculate the spot size for different measuring distances
- Features UPP standard (Universal Pyrometer Protocol)



Pyrometer Settings

An IMPAC digital pyrometer connected to a PC will be automatically detected by the software. All available parameters are adjustable, including emissivity, response time, maximum value storage, output signal and sub range.

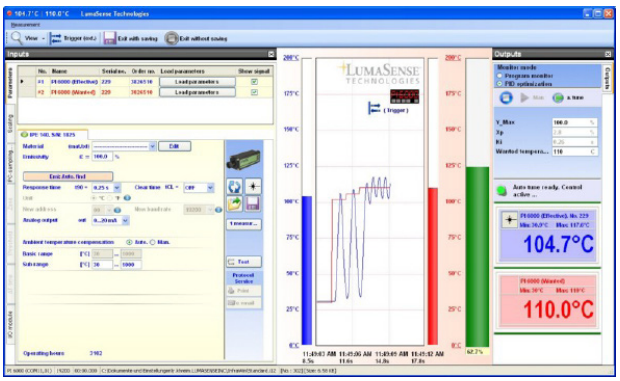
Further special functions are adjustable for example controllers or TV parameters on instruments available with these functions. Changes are transmitted directly to the pyrometer.

Measurement with Color Bar

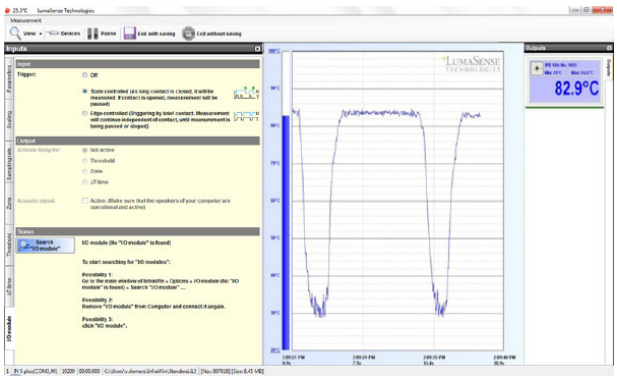
In this window a temperature value for the upper or lower limit can be adjusted numerically or with the mouse.
The acquired minimum and maximum value is indicated as well as the inner temperature of the pyrometer. The emissivity is changeable during the measurement at any time.

Infrared Calculator

After input of the aperture and the focused spot size per datasheet, the calculation of spot sizes at non-focused distances is possible.



Measurement with Internal Temperature of radiation temperature and internal instrument temperature. Parameters can be changed during the measurement.



I/O Module allows users to trigger measurement externally and gives a potential free output contact.

ABOUT ADVANCED ENERGY

Advanced Energy (AE) has devoted more than three decades to perfecting power for its global customers. AE designs and manufactures highly engineered, precision power conversion, measurement and control solutions for mission-critical applications and processes.

AE's power solutions enable customer innovation in complex semiconductor and industrial thin film plasma manufacturing processes, demanding high and low voltage applications, and temperature-critical thermal processes.

With deep applications know-how and responsive service and support across the globe, AE builds collaborative partnerships to meet rapid technological developments, propel growth for its customers and power the future of technology.

PRECISION | POWER | PERFORMANCE

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