IMPAC ISR 6-TI ADVANCED

Stationary, digital ratio pyrometer with built-in video camera system and infrared filter. Temperature measurement between 700 and 1800°C (1292 to 3272°F).

The Impac® ISR 6-TI Advanced infrared thermometer combines accurate (2-color) pyrometry and thermal imaging in one non-contact temperature measurement system. It accurately measures the temperature of the center spot and uses an infrared filter to show an auto-calibrated thermal image based on the accurate (and, to a large extent, emissivity independent) ratio pyrometer temperature reading.

PRODUCT HIGHLIGHTS

- Improved substrate uniformity
- Combination of pyrometry and thermal imaging in a single solution
- Built-in video camera with short wavelength infrared filter
- Auto calibration of thermal image relative to accurate pyrometer temperature reading
- Definition and evaluation of Regions of Interest (ROIs) in the thermal image
- Inclusive video cable and Video-to-USB grabber for use with InfraWin software
- “Dirty Window” Warning
- Very fast 2 ms response time for highly dynamic processes
- Robust, stainless steel sensor for harsh environments (IP65)

TYPICAL APPLICATIONS

- Metal Industry - e.g. melting processes, melting furnaces, vacuum furnaces, coating processes, welding processes, induction heating processes, and sintering processes
- Glass Industry - e.g. glass gob
- Semiconductor Industry - e.g. sapphire growth
- Other Industy - e.g. waste combustion

AT A GLANCE

Temperature Ranges

700 to 1800°C (1292 to 3272°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%

Repeatability

0.15% oR + 1°C

Optics

Manually focusable between 210 to 5000 mm

Field of View

min 190:1 (min. 1.1 mm)
FOV thermal image: 6.0° × 4.5°
Pixels: 768 × 576

Alignment

Thermal image or video image (black and white)

OVERVIEW

The Impac ISR 6-TI Advanced system is based on the high quality 2-color (ratio) pyrometer in combination with a video camera with a short wavelength infrared filter.

The analog video output signal is converted to USB (using an external video-to-USB grabber) and fed into a PC using the standard pyrometer software InfraWin. InfraWin generates and shows a pseudo-color image from this signal relative to the accurate temperature reading of the central measuring spot (measured by the ratio pyrometer).

The integrated ROI functionality provides the option of defining and evaluating special Regions Of Interest (ROI) within the thermal image. In combination with an optional I/O module, external switching contacts can be triggered based on the temperature data of one or several ROIs.

The response time of only 2 ms facilitates the measurement of fast processes. The ISR 6-TI Advanced is also equipped with all ISR 6 Advanced standard features such as a built-in “dirty window” warning.

The ISR 6-TI Advanced provides valuable measuring data for all applications where not only an accurate temperature reading in one spot is required but also a display of the temperature distribution (around and relative to that spot) is of interest.

TECHNICAL DATA

Measurement Specifications	
Temperature Range	700 to 1800°C (1292 to 3272°F) (MB 18)
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 (κ = 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 (κ = 1, t_{90} = 1 S, $T_{amb.}$ = 25 °C)	0.15% of reading in °C + 1°C

Optical Specifications	
Sighting	Thermal image with marked pyrometer spot
Optics	Manually focusable from rear cover measuring distance a = 210 to 5000 mm
Distance Ratio	Approx. 190 : 1

Electrical	
Power Supply	24 VDC ±25%, ripple must be less than 50 mV
	If instrument is used in combination with an I/O module, a power supply with min. 1 A is required.
Power Consumption	Approximately 8.5 W
Load (analog output)	0 to 500 Ω
Isolation	Power supply, analog output, digital interface, and video signal are electrically isolated from each other

TECHNICAL DATA (CONTINUED)

Environmental Specifications	
Protection Class	IP 65 IEC 60529 (value in mated condition)
Operating Position	Any
Ambient Temperature	0 to 60°C (0 to 140°F)at housing
Storage Temperature	-20 to 80°C (-4 to 176°F)
Relative Humidity	Non-condensating conditions
Weight	0.755 kg (~1.66 lbs)
Housing	Stainless steel
CE Label	According to EU directives about electromagnetical immunity

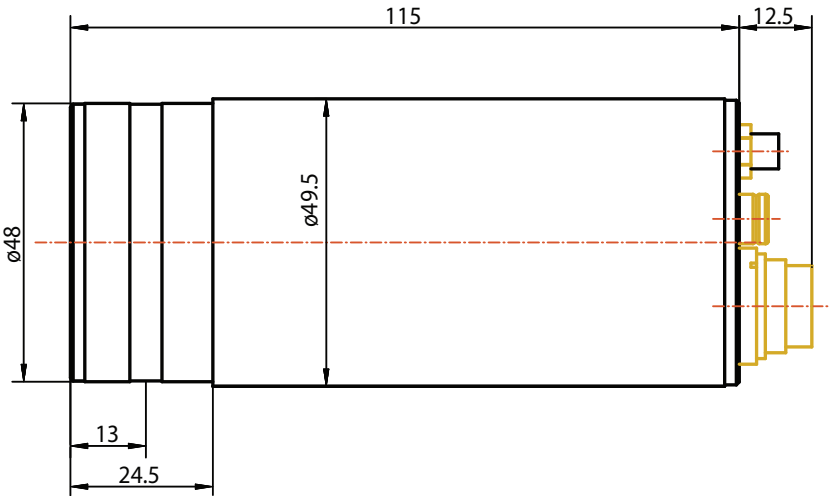
Interface	
Connection	12-pin connector
Connection Video signal	Separate triaxial contact at pyrometer for double screened signal transmission
	Connection cable with BNC-connector on user's side
Display (in rear cover)	LED, 4 digit matrix, 5 mm high for 2-color or 1-color temperature signal or measuring 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, warning level lens contamination monitoring system, transmittance, response time t90, 0 to 20 mA or 4 to 20 mA analog output range, °C/°F, settings for thermal images
	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)
Video-Signal	FBAS-Signal approx. 1 VSS on 75 Ohm, PAL (B), 50 Hz, CCIR656
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

Thermal Imaging Feature[1]	
Relative temperature span in one image (depends on temperature)	100 to 200°C distributed around the spot temperature (for one dynamic range)
	Possible combination of multiple ranges can be used so complete temperature range of pyrometer can be displayed
Pixels	768 x 576
Frequency (fps)	Up to 25 Hz
Signal	Analog Video (PAL), USB (video grabber)
Field of view	6.0° x 4.5° (e.g. 105 x 78 mm at 1000 mm distance)
Calibration of thermal image	Relative to central pyrometer spot

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. See http://info.lumasenseinc.com/calibration for more information.

PRODUCT SCHEMATIC



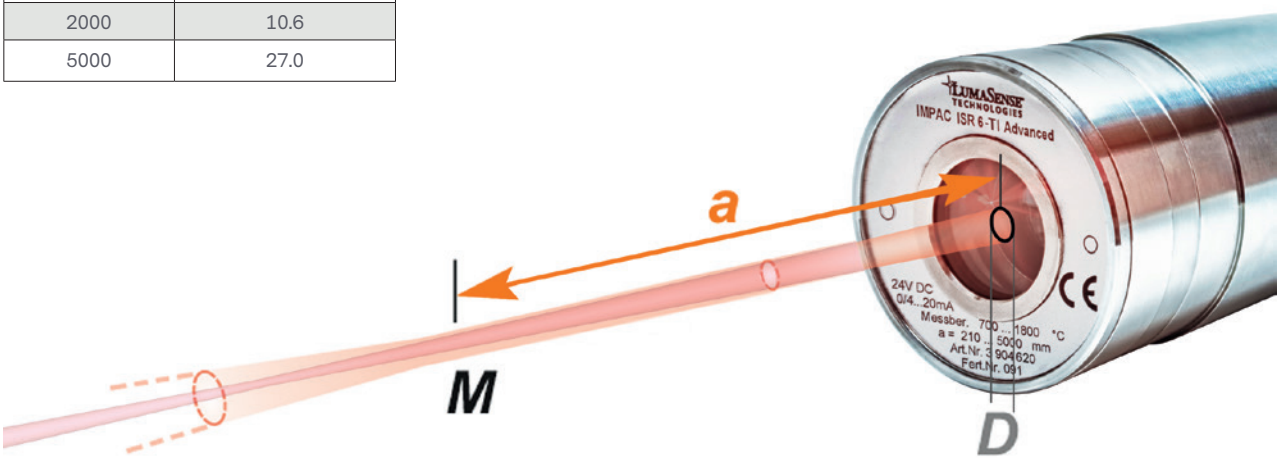
Dimensions in mm

OPTICS

ISR-6 TI Advanced	
Distance a [mm]	Spot Diameter M [mm]
210	1.1
300	1.6
500	2.7
800	4.2
1300	6.9
2000	10.6
5000	27.0

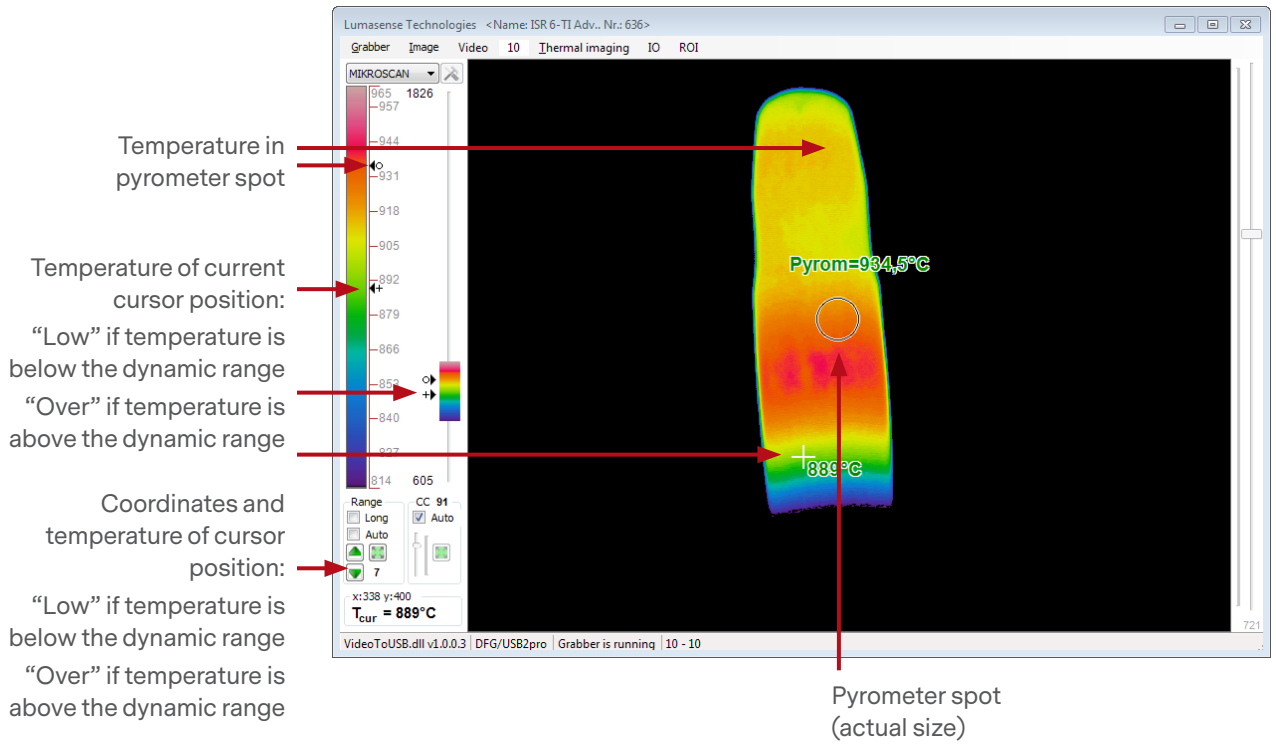
The optics can be manually adjusted at all distances between 210 mm and 5000 mm. The table shows examples of distances and the corresponding spot diameters.

Effective aperture D for all temperature ranges: 12 mm (focused to longest distance) to 14 mm (focused to shortest distance).



THERMAL IMAGING FEATURE

The built-in video camera system has an infrared filter close to the wavelength range of the pyrometer. This makes it possible to display a “simple” thermal image using the standard pyrometer software InfraWin.



REFERENCE NUMBERS

ISR 6-TI Advanced	Video Cable	Reference Number
700 to 1800°C (MB 18) (includes video grabber and video cable)	5 m	3 904 620
	10 m	3 904 680
	20 m	3 904 700
	40 m	3 904 720

Scope of Delivery

Pyrometer, video gabber, video cable, 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
3 820 330	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]
3 920 600	5 m Video Cable f. Series 6, BNC connector, adapter Cinch[2]
3 920 610	10 m Video Cable f. Series 6, BNC connector, adapter Cinch[2]
3 920 630	20 m Video Cable f. Series 6, BNC connector, adapter Cinch[2]
3 920 660	40 m Video Cable f. Series 6, BNC connector, adapter Cinch[2]
3 826 730	Video grabber with USB cable[2]
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 to RS485 adapter cable, HS-version, 1.8 m long
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
3 891 220	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.
3 826 510	PI 6000: PID programmable controller, very fast, for digital Impac pyrometers
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)
3 835 160	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
3 837 540	Cooling plate for series 5 and 6, with air purge
3 846 590	Vacuum flange KF16 with quartz glass window
3 826 770	IO 8-6: IO module with 8 Inputs, 6 Relay outputs, RS485
3 826 780	IA 2: Analog output module with 2 analog outputs (can only be used with 3 826 770)
3 826 710	USB-I/O Interface with USB cable

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.

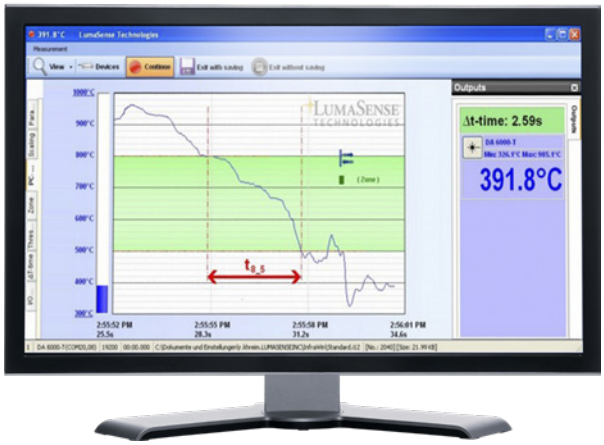
2 For replacement only: please note that video cable and grabber needs to be calibrated with the instrument. If a replacement video cable or grabber is ordered the instrument will have to be calibrated in the factory!

INFRAWIN 5 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.

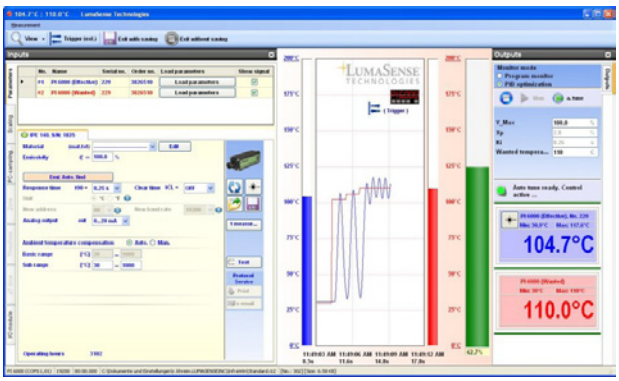
Further special functions are adjustable for example controllers or TV parameters on instruments available with these functions. Changes are transmitted directly to the pyrometer.

Measurement with Color Bar

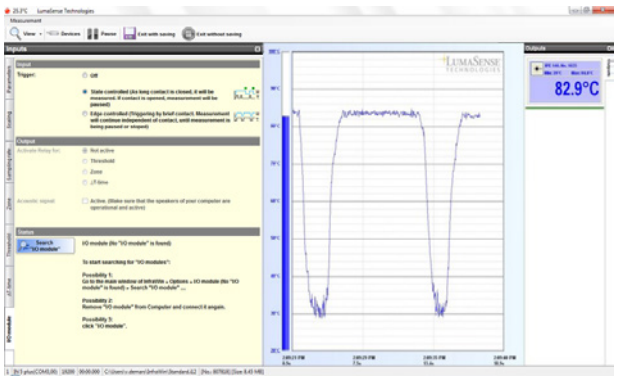
In this window a temperature value for the upper or lower limit can be adjusted numerically or with the mouse.
The acquired minimum and maximum value is indicated as well as the inner temperature of the pyrometer. The emissivity is changeable during the measurement at any time.

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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