

IMPAC ISR 12-LO/GS

Digital two-color pyrometer with fiber optic for non-contact temperature measurement of a cast iron pouring stream in temperature ranges between 600 and 2500°C (1112 to 4532°F).

The Impac® ISR 12-LO/GS pyrometer is a special foundry system for the measurement of the pouring stream in foundries. This system is useful in automatic or semi-automatic pouring machines and displays the temperature after each single pouring process.

The pyrometer has a special pouring stream mode that calculates one average temperature value for each single casting process. Temperature values in the beginning and the end of the casting process can be eliminated which can impact the correct measurement. The shape of the spot size of the optics is a line which guarantees that even a moving pouring stream is always within the spot.

PRODUCT HIGHLIGHTS

- Accurate measurement of pouring streams
- Automatic recording of the pouring temperature
- Documentation of the temperature of each single pouring process
- Replacement or reduction of immersion lance measurements with expandable thermocouples
- Minimum system maintenance required



AT A GLANCE

Temperature Ranges

600 to 1300°C (MB 13)
750 to 1800°C (MB 18)
900 to 2500°C (MB 25)

Spectral Range

0.8 to 1.05 μm

Measurement Uncertainty

< 1500°C: 0.4% oR in °C + 1°C
> 1500°C: 0.6% oR in °C + 1°C

Repeatability

0.2% oR in °C + 1°C

Optics

5 fixed optics:

a = 340 mm
a = 500 mm
a = 750 mm
a = 1000 mm
a = 2000 mm

Line shaped spot
(5% or 12% of distance)

APPLICATION OVERVIEW

A ratio pyrometer is required for pouring stream applications because

- Molten metal has a very low and fluctuating emissivity
- The position of the pouring stream is moving so that the measuring spot of the pyrometer is only partially filled

The pyrometers are equipped with a lens contamination monitoring system. If the signal strength is too low caused by contamination of the lens or a sighting window, a signal output switches an alarm transmitter

The pouring stream temperature of each single casting process and with that of each single casted part can be recorded automatically with the ISR 12-LO/GS. The temperature value of each finished casting process is displayed on the pyrometer and available as analog and

digital output. With that the casting can be controlled very accurately to achieve the high quality requirements of casted parts.

The measured values can be stored and displayed via analog and digital output.



TECHNICAL DATA

Measurement Specifications	
Temperature Ranges	600 to 1300°C (1112 to 2372°F) (MB 13)
	750 to 1800°C (1382 to 3272°F) (MB 18)
	900 to 2500°C (1652 to 4532°F) (MB 25)
Sub Range	Any range adjustable within the temperature range, min span 51°C
Spectral Range	0.8 to 1.05 µm
Measuring Modes	Pouring stream, ratio-(2-color), mono (1-color), and metal mode switchable
Resolution	Display: 1°C; Interface: 0.1°C
	Analog output: < 0.025% of temperature range
Measurement Uncertainty ($\epsilon = 1, t_{90} = 1 \text{ s}, T_{\text{amb}} = 23^\circ\text{C}$)	< 1500°C: 0.4% of reading in °C + 1°C
	> 1500°C: 0.6% of reading in °C + 1°C
	Note: the pyrometer must operate at least 30 min before these values are valid
Repeatability ($\epsilon = 1, t_{90} = 1 \text{ s}, T_{\text{amb}} = 23^\circ\text{C}$)	0.2% of reading in °C + 1°C
Emissivity Slope K	ϵ_1 / ϵ_2 : 0.800 to 1.200 (adjustable in steps of 0.001)
Emissivity ϵ	0.1 to 1 (adjustable in steps of 0.001, only in mono (1-color) mode)
Measuring Modes	Adjustable: ratio (2-color), mono (1-color), and metal mode
Switch-off Limit	2 to 50% in 1% steps
Pre-run Time	0 to 9.9 s (adjustable in steps of 0.1 s)
Follow-up Time	0 to 9.9 s (adjustable in steps of 0.1 s)
Start Condition	0 to 99% (amount of measurement values in % that must exceed the beginning of the adjusted temperature range)

TECHNICAL DATA (CONTINUED)

Electrical Specifications	
Power Supply	24 VDC (15 to 40 VDC) or 24 VAC (12 to 30 VAC), 48 to 62 Hz
Power Consumption	Max 10 W
Isolation	Power supply, analog output, and digital interface are galvanically isolated against each other
Switch Contact	Max 0.15 A (only active with automatic clear mode or $t_{\text{clear}} \geq 0.5$ s)

Environmental Specifications	
Operating Temperature	Converter Housing: 0 to 60°C (32 to 140°F)
	Optical Head: up to 250°C (482°F)
Storage Temperature	-20 to 70°C (-4 to 158°F)
Relative Humidity	Non-condensing conditions
Weight	2.2 kg (~2.20 lbs)
Protection System	IP65 (according to DIN 40 050)
CE Label	According to EU directives about electromagnetic immunity

Interface Specifications	
Control Panel	4 function keys, switch for serial interface, push button for test current
Sighting	Laser targeting light (max power level < 1 mW, $\lambda = 630$ to 680 nm, CDRH class II) (measurement is stopped while laser targeting light is switched on)
Parameters	Adjustable via interface: Emissivity ϵ , Emissivity slope K, exposure time t_{90} , clear times for maximum value storage t_{clear} , automatically or external deletion of maximum value storage, switching measuring mode, switch-off limit, analog output 0 to 20 or 4 to 20 mA, sub range, address, baud rate, °C/°F
	Readable at the device or via interface: Pouring stream temperature (in 1-color mode: measuring temperature)
	Only adjustable via interface commands: Pre-run time, follow-up time, start condition, wait time t_{W} , keyboard lock

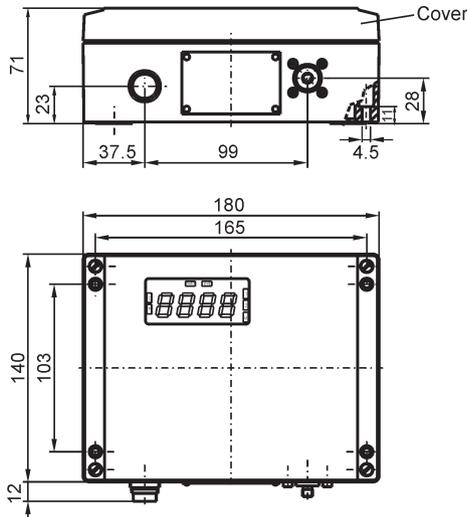
Communication Specifications	
Analog Output	0 to 20 or 4 to 20 mA switchable, load 0 to 500 Ohm
	Test current 10 mA by pressing test key
Digital Interface	Switchable: RS232 or RS485 addressable, half duplex; baud rate 2.4 up to 115.2 kBd
Display	Built-in 4-digit 7-segment-LED, height 13 mm; LED for °C/°F, clear mode "auto", "ext", ratio (2-color), mono (1-color), metal mode
Exposure Time t_{90}	2 ms (with dynamical adaptation 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), extern, via interface or automatically with the next measuring object, hold function to freeze the actual displayed pouring stream temperature

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

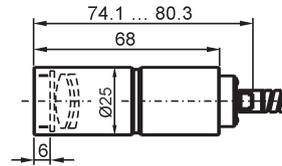
The determination of the technical data of this pyrometer is carried out in accordance with VDI/VDE IEC TS 62942-2, the calibration / adjustment in accordance with VDI/VDE 3511, Part 4.4.

DIMENSIONS

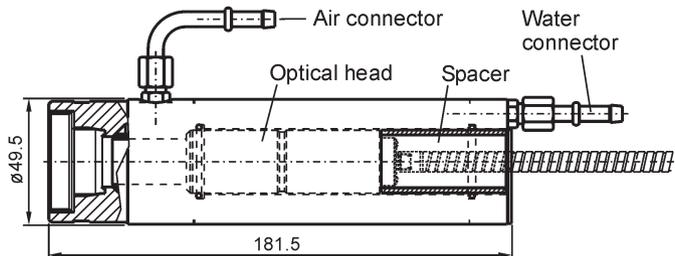
Converter



Optical Head



Water Cooling Jacket (option)



All dimensions in mm

SURVEILLANCE OF POURING STREAM AND DATA ANALYSIS

Automatic Detection of Pouring Stream

The ISR 12-LO/GS detects automatically the beginning and end of a pouring process and with this it is able to determine autonomously the required measuring time interval. The start and end processes of the pouring disturb the temperature calculation and have to be separated.

The result is a single temperature which is determined by the corresponding pouring time. After each pouring process this temperature will be displayed at the pyrometer itself and can be indicated additionally on further displays.

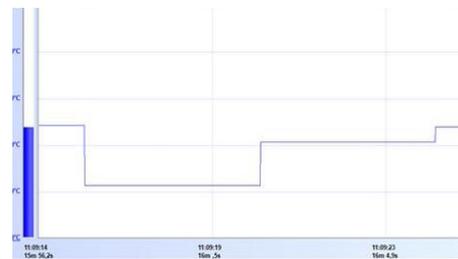
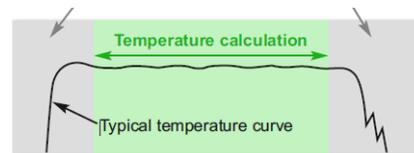
Data Analysis with Software InfraWin

Each temperature value of all single pourings can be indicated, analyzed, and stored easily with the included PC-software InfraWin.

Using the window "online trend" the monitor shows each new temperature value with the corresponding measuring time as a graph sequentially. The acceptable limits of the pouring stream temperatures can be color-marked for easy recognition of deviations.

Using the window "color bar" the monitor shows each new temperature value as digital indication and bar

Automatic detection of beginning and end of the pouring process



Online trend window

graph and is listing each temperature value with date, time and pouring duration after each finished pouring. Additional displays such as e.g. signal strength inform about the reliability of the measuring results.

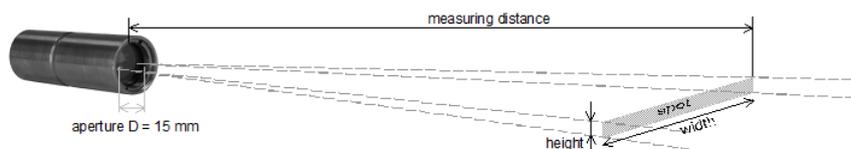
A list with all single pouring stream temperatures can be stored in a file for complete documentation and proof of the compliance with the required temperature of each pouring. This file can be opened with a text editor or import into other software, e.g. Excel.

OPTICAL HEAD

Two different optical heads are available. They have a special spot size in shape of a line which guarantees that even a moving pouring stream can always be captured. The optical heads differ in its spot size depending on the measuring distance. The correct selection depends on the size of the pouring stream, if

the pouring stream is moving and the required distance to the stream.

The tables show some examples for different measuring distances (distance measured from front of the lens to the object).



Optical Head with Line Spot Width = 5% of Measuring Distance		
Measuring Distance a [mm]	Spot Size M ₉₀ [mm] (width x height)	
	MB 18, 25	MB 13
340	17 x 1.6	17 x 3.2
500	25 x 2.4	25 x 4.8
750	37.5 x 3.8	37.5 x 7.6
1000	50 x 5	50 x 10
2000	100 x 11	100 x 22
4500	225 x 22	225 x 44

Optical Head with Line Spot Width = 12% of Measuring Distance		
Measuring Distance a [mm]	Spot Size M ₉₀ [mm] (width x height)	
	MB 18, 25	MB 13
340	41 x 1.6	41 x 3.2
500	60 x 2.4	60 x 4.8
750	90 x 3.8	90 x 7.6
1000	120 x 5	120 x 10
2000	240 x 11	240 x 22
4500	540 x 22	540 x 44

FIBER

The radiation, coming in through the optical head, is transported via the lens system into the 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.

Fiber length	2.5 m, 5 m, 7.5 m, 10 m, 15 m, 30 m on request
Color mark at the fiber	Blue: MB 13
	Red: MB 18, 25
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

REFERENCE NUMBERS

The ISR 12-LO/GS pyrometer can be configured with different optical fiber lengths and optical heads (5% or 12%) as well as with various optional extras To determine the part number and the price for the desired combination, please contact your Advanced Energy sales representative.

Scope of Delivery

Converter, optical fiber and optical head as per configuration, works certificate, PC software InfraWin, and user manual.

Ordering Note

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

ACCESSORIES

PN	Description
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, straight connector, 5 m, temperature resistant up to 200°C
3 852 290	Power supply NG DC 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
3 852 440	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
3 890 560	DA 6000-N: LED digital display with digital input RS232 and possibility for pyrometer parameter settings
3 890 570	DA 6000-N digital display, to allow adjustment of pyrometer through RS485 interface
3 890 520	DA 6000: LED digital display, digital and analog input, 2 limit switches, maximum value storage, analog output, RS232
3 890 530	DA 6000: like the DA 6000-N, but with analog input and 2 limit switches for the RS485 interface.
3 890 150	DA 6000-T, digital display, for measurement of the cool down time t_{8-5} from 800 to 500°C (for welding processes)
3 826 510	PI 6000: PID programmable controller, extremely fast, for digital Impac pyrometers
3 834 390	Ball and socket mounting for optical head I or II
3 834 230	Adjustable mounting support for optical head II
3 835 180	Air purge unit, stainless steel, for optical head II
3 837 160	Water cooling jacket with air purge unit
3 835 240	Air purge unit with 90° mirror for optical head II

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.



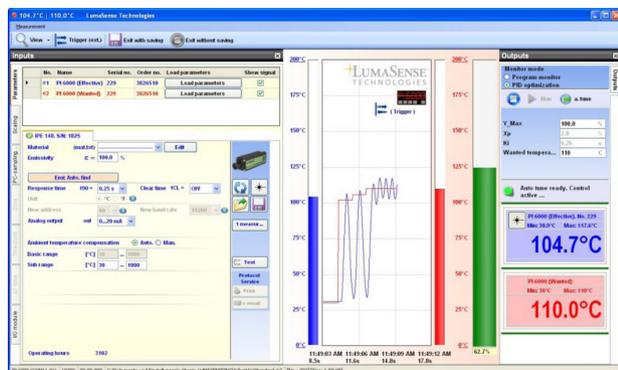
Measurement with Color Bar

In this window a temperature value for the upper or lower limit can be adjusted numerically or with the mouse.

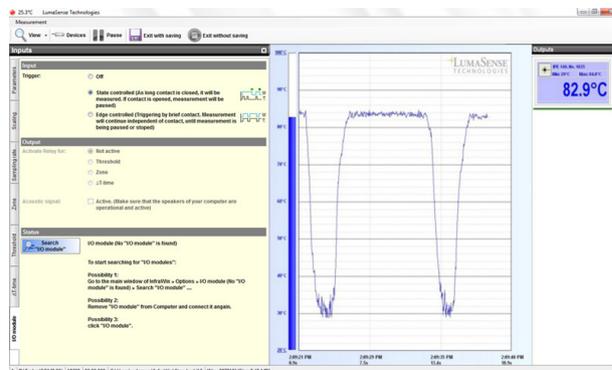
The acquired minimum and maximum value is indicated as well as the inner temperature of the pyrometer. The emissivity is changeable during the measurement at any time.

Infrared Calculator

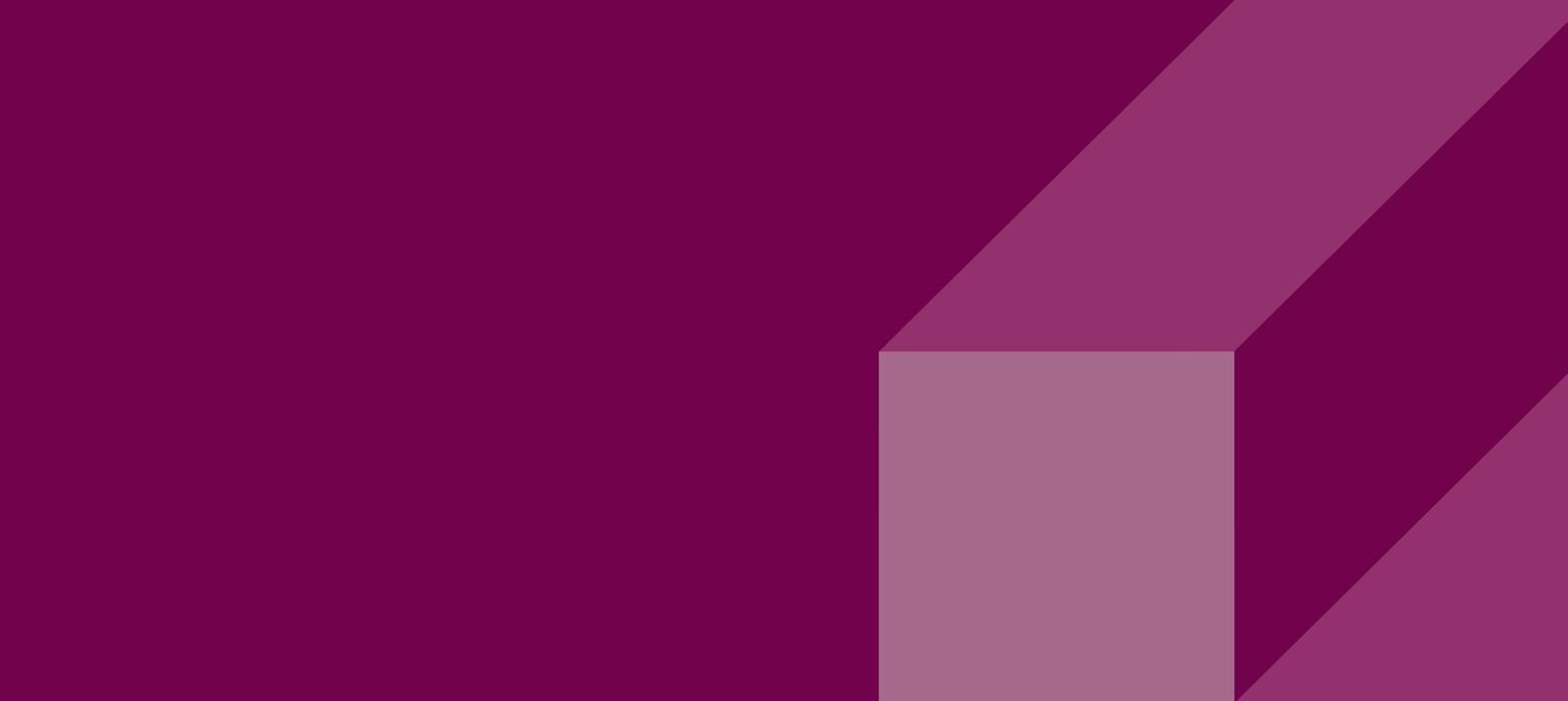
After input of the aperture and the focused spot size per datasheet, the calculation of spot sizes at non-focused distances is possible.



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

For international contact information,
visit advancedenergy.com.

sales.support@aei.com
+1 970 221 0108

Specifications are subject to change without notice. Not responsible for errors or omissions. ©2019 Advanced Energy Industries, Inc. All rights reserved. Advanced Energy®, Impac®, and AE® are U.S. trademarks of Advanced Energy Industries, Inc.

