

# IMPAC IN 5 PLUS SERIES

Pyrometers for non-contact temperature measurement of non-metallic surfaces or painted, coated, or anodized metals between -32 and 900°C (-25.6 and 1652°F).



The Impac® IN 5 plus series infrared thermometers are specially designed for non-contact temperature measurements on non-metallic surfaces and also on painted, coated or anodized metals. These instruments are digital pyrometers equipped with a digital interface, enabling temperature indication and storage on a PC. A temperature sub range can be configured and the instrument parameters can be adjusted remotely.

## PRODUCT HIGHLIGHTS

- With analog output 0 or 4 to 20 mA, digital interface RS232 or RS485
- Laser targeting light sighting system
- High accuracy due to digital linearization of the output
- Small spot sizes, minimum 1 mm
- Adjustable exposure time
- Compact housing

## TYPICAL APPLICATIONS

- |                 |                 |
|-----------------|-----------------|
| ■ Plastics      | ■ Ceramics      |
| ■ Fluids        | ■ Wood          |
| ■ Rubber        | ■ Textiles      |
| ■ Painted parts | ■ Glass         |
| ■ Paper         | ■ Food          |
| ■ Asphalt       | ■ Coated metals |

## AT A GLANCE

### Temperature Ranges

IN 5 plus and IN 5-H plus  
-32 to 900°C (MB 9)

IN 5-L plus  
0 to 900°C (MB 9)

### Spectral Range

8 to 14  $\mu$ m

### Repeatability

0.3% oR or 0.6°C

### Optics

3 fixed optics:  
100 mm, 300 mm, and 800 mm

### Alignment

Laser targeting

### Output

0/4 to 20 mA, RS232 or RS485

## IMPAC IN 5 PLUS SERIES

### OVERVIEW

The IN 5 plus is a digital stationary infrared thermometer for non-contact temperature measurement on various surfaces.

The IN 5-L plus is equipped with optics with better fields of view for the measurements of small objects, while the high-speed IN 5-H plus has a shorter exposure time of only 10 ms and is suited for fast measuring tasks.

For optimal match of the instrument to the application (size of the measuring object, distance) different optics are available. For a precise alignment of the pyrometers to the measuring object, the instruments are equipped with a laser targeting light.

### TECHNICAL DATA

Measurement Specifications			
Temperature Ranges	IN 5 plus and IN 5-H plus: -32 to 900°C (-25.6 to 1652°F) (MB 9)		
	IN 5-L Plus: 0 to 900°C (32 to 1652°F) (MB 9)		
IR Detector	Thermopile		
Sub Range	User adjustable (minimum span is 51°C)		
Data Handling	Digital		
Spectral Range	8 to 14 μm		
Emissivity ε	0.2 to 1.0 adjustable		
Measurement Uncertainty $T_{amb}$ (ε = 1, $t_{90}$ = 1 s)	IN 5 plus	T = -32 to 0°C	2°C ( $T_{amb}$ = 15 to 30°C); 2.5°C ( $T_{amb}$ = 0 to 15°C or 30 to 63°C)
		T = 0 to 300°C	0.6% of reading in °C or 2°C ( $T_{amb}$ = 15 to 30°C) <sup>1</sup>
			1% of reading in °C or 2.5°C ( $T_{amb}$ = 0 to 15°C or 30 to 63°C) <sup>1</sup>
		T = 300 to 900°C	1% of reading in °C ( $T_{amb}$ = 15 to 30°C)
			1.3% of reading in °C ( $T_{amb}$ = 0 to 15°C or 30 to 63°C)
		IN 5-H plus	T = -32 to 0°C
	T = 0 to 300°C		0.6% of reading in °C or 2°C ( $T_{amb}$ = 15 to 30°C) <sup>1</sup>
			1% of reading in °C or 2.5°C ( $T_{amb}$ = 0 to 15°C or 30 to 63°C) <sup>1</sup>
	T = 300 to 900°C		1% of reading in °C ( $T_{amb}$ = 15 to 30°C)
			1.3% of reading in °C ( $T_{amb}$ = 0 to 15°C or 30 to 63°C)
	IN 5-L plus		T = 0 to 300°C
		1% of reading in °C or 3°C ( $T_{amb}$ = 0 to 15°C or 30 to 63°C) <sup>2</sup>	
T = 300 to 900°C		1% of reading in °C ( $T_{amb}$ = 15 to 30°C)	
		1.5% of reading in °C ( $T_{amb}$ = 0 to 15°C or 30 to 63°C)	
Repeatability (ε = 1, $t_{90}$ = 1 s)	0.3% of reading in °C or 0.6°C <sup>3</sup>		

<sup>1</sup> Whichever value is greater. The instrument must be at a constant ambient temp. for a minimum of 15 min. and has to be connected to the power supply.

<sup>2</sup> Whichever value is greater. The instrument must be at a constant ambient temp. for a minimum of 30 min. and has to be connected to the power supply.

<sup>3</sup> Whichever value is greater. The instrument must be at a constant ambient temperature for a minimum of 15 minutes (IN 5 plus or IN 5-H plus) or 30 minutes (IN 5-L plus).

<sup>4</sup> 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.

## TECHNICAL DATA (CONTINUED)

Measurement Specifications		
Noise Equivalent Temperature Difference (NETD) ( $\epsilon = 1, t_{amb} = 23^{\circ}\text{C}$ )	IN 5 plus	@ $t_{90} = 80$ ms: $0.2^{\circ}\text{C}$ (@ $23^{\circ}\text{C}$ measuring temperature)
		@ $t_{90} = 1$ s: $0.05^{\circ}\text{C}$ (@ $23^{\circ}\text{C}$ measuring temperature)
	IN 5-H plus	@ $t_{90} = 10$ ms: $0.7^{\circ}\text{C}$ (@ $23^{\circ}\text{C}$ measuring temperature)
		@ $t_{90} = 1$ ms: $0.1^{\circ}\text{C}$ (@ $23^{\circ}\text{C}$ measuring temperature)
	IN 5-L plus	@ $t_{90} = 180$ ms: $0.3^{\circ}\text{C}$ (@ $23^{\circ}\text{C}$ measuring temperature)
		@ $t_{90} = 180$ ms: $0.2^{\circ}\text{C}$ (@ $200^{\circ}\text{C}$ measuring temperature)
		@ $t_{90} = 1$ s: $0.15^{\circ}\text{C}$ (@ $23^{\circ}\text{C}$ measuring temperature)
@ $t_{90} = 1$ s: $0.1^{\circ}\text{C}$ (@ $200^{\circ}\text{C}$ measuring temperature)		
Optics	IN 5 plus & IN 5-H plus: Zinc-Sulfide (ZnS)	
	IN 5-L plus: Zinc-Selenide (ZnSe)	
Sighting	Laser targeting light (max power level < 1 mW, $\lambda = 630$ to $680$ nm, CDRH class II)	

Electrical	
Power Supply	24 VDC (18 to 30 V); nominal, ripple must be less than 0.5 V
Power Consumption	Max 70 mA
Load	Max 500 $\Omega$ @ 24 V (max. 200 $\Omega$ @ 18 V)

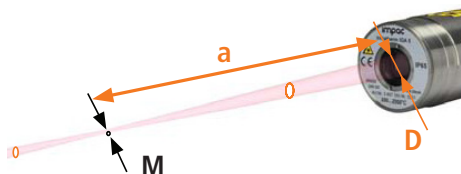
Environmental Specifications	
Protection Class	IP 65 (DIN 40050)
Ambient Temperature	0 to $63^{\circ}\text{C}$ (32 to $145.4^{\circ}\text{F}$ )
Storage Temperature	$-20$ to $70^{\circ}\text{C}$ ( $-4$ to $158^{\circ}\text{F}$ )
Relative Humidity	Non-condensating conditions
Weight	Approx 410 g (~14.47 oz)
Housing	Stainless steel
CE Label	According to EU directives about electromagnetic immunity

Interface and Communication		
Analog Output	0 to 20 mA or 4 to 20 mA (linear), adjustable	
Maximum/Minimum Value Storage	Built-in single and double storage. Clearing with clear time $t_{clear}$ (0.1 s, 0.25 s, 0.5 s, 1 s, 5 s, 25 s), external contact or via interface or also automatically with each new item to be measured	
Exposure Time $t_{90}$	IN 5 plus: 0.08 s	Adjustable in the pyrometer: 0.5 s, 1 s, 2 s, 5 s Adjustable via interface: 0.5 s, 1 s, 2 s, 5 s, 10 s, 30 s
	IN 5-H plus: 0.01 s	
	IN 5-L plus: 0.18 s	

**OPTICS**

The pyrometers are equipped ex works with one of the specified optics. Each optic is focused at a certain distance (main measuring distance). At these distances, each lens achieves its smallest spot size. Normally the spot size will increase at any other distance (shorter or longer).

For each optic, some example values for measuring distance (measured from the front of the lens) and spot size are listed in the table. Keep this in mind when considering the mounting position of the pyrometer as well as the size of the measuring object (the measuring object must be at least as big as the spot size).

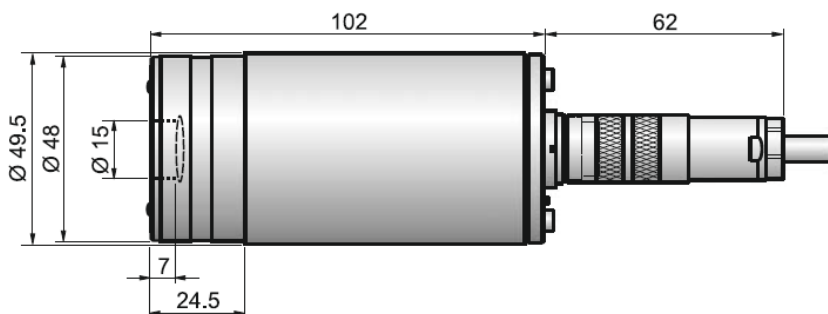


Optics for IN 5-L plus		
	Measuring Distance a [mm]	Spot Size M <sub>90</sub> [mm]
Optics 100	100	1
	200	17
	300	33
Optics 300	200	7
	300	3
	500	15
	1000	45
Optics 800	400	11
	800	8
	1500	28
	3000	71
Aperture D [mm]		15

Optics for IN 5 plus and IN 5-H plus		
	Measuring Distance a [mm]	Spot Size M <sub>90</sub> [mm]
Optics 100	100	2
	200	18
	300	35
Optics 300	300	6
	600	22
	1000	45
Optics 800	800	16
	1500	36
	2500	68
Aperture D [mm]		15

The determination of the main spot size "M" in the main measuring distance "a" occurs at 90% measuring signal.

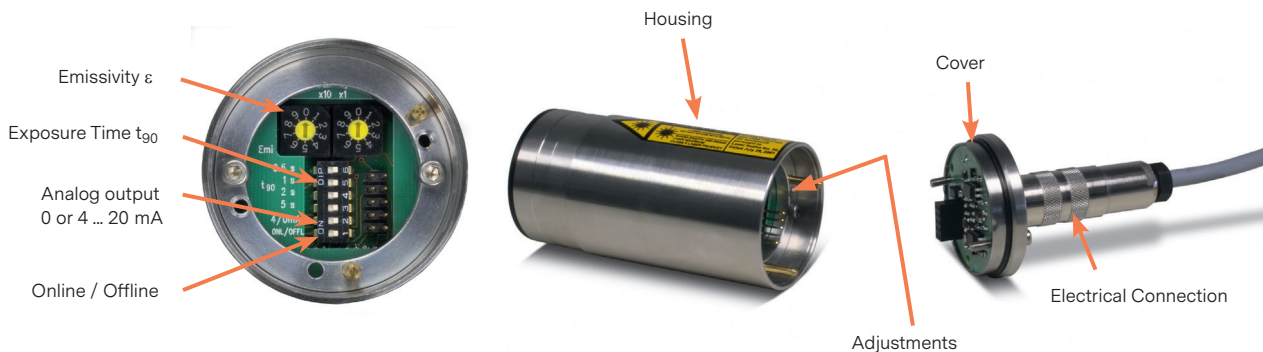
**DIMENSIONS**



Dimensions in mm

## INSTRUMENT SETTINGS

The most important parameters such as emissivity, exposure time, and analog output can be set directly in the instrument. After removing the cover on the back side of the pyrometer, the corresponding adjustments are available.



The instruments can alternatively be switched in online mode to enable the communication via serial interface and software InfraWin (in scope of delivery) on a PC. This allows additional setting options as well as the graphical temperature display combined with subsequent analysis of the measurement values.

## REFERENCE NUMBERS

Model	Temperature Range	Optics	RS232	RS485
IN 5 plus	-32 to 900°C (MB 9)	100	3 869 400	3 869 410
		300	3 869 420	3 869 430
		800	3 869 440	3 869 450
IN 5-H plus	-32 to 900°C (MB 9)	100	3 871 200	3 871 210
		300	3 871 220	3 871 230
		800	3 871 240	3 871 250
IN 5-L plus	-0 to 900°C (MB 9)	100	3 871 600	3 871 610
		300	3 871 620	3 871 630
		800	3 871 640	3 871 650

### Scope of Delivery

Instrument with selected optic, works certificate, PC measurement and evaluation software InfraWin.

### 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
3 820 500	Connection cable, 10 m, straight connector
3 820 510	Connection cable, 15 m, straight connector
3 820 810	Connection cable, 20 m, straight connector
3 820 820	Connection cable, 25 m, straight connector
3 820 520	Connection cable, 30 m, straight connector
3 820 320	Connection cable 5 m (angled connector, additional laser targeting light push button)
3 820 740	Connection cable 5 m (straight connector, temperature resistant up to 200°C)
3 852 290	Power supply NG DC 100 to 240 VAC ⇒ 24 VDC, 1 A
3 852 540	Power supply NG 0D 85 to 265 VAC ⇒ 24 VDC, 600 mA
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
3 852 430	Converter I-7520; RS485 ⇔ RS232 (half duplex)
3 890 650	DA 4000: LED-display, 2-wire power supply, 2 limit switches (relay contacts), 230 VAC
3 891 220	DA 4000: LED-display, 2-wire power supply, 2 limit switches (relay contacts), 115 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.
3 826 510	PI 6000: PID programmable controller, extremely fast, for digital Impac pyrometers
3 843 500	SCA 5, Scanner for Series 5 with CaF <sub>2</sub> window; 24 VAC/DC
3 834 210	Adjustable mounting support (Series 5 and 6)
3 835 160	Air purge unit, aluminium
3 835 440	Air purge unit, stainless steel
3 837 230	Water cooling jacket (heavy duty) with integrated air purge unit (with metric mounting threads)
5 837 230	Water cooling jacket (heavy duty) with integrated air purge unit (UNC mounting threads)
3 837 350	Water cooling jacket (heavy duty) with protection window (with metric mounting threads)
5 837 370	Water cooling jacket (light duty) with integrated air purge unit (UNC mounting threads)
3 837 370	Water cooling jacket (light duty) with integrated air purge unit (with metric mounting threads)
3 837 400	Water cooling jacket (light duty) with protection window (with metric mounting threads)
3 846 100	Mounting tube
3 846 120	Flange tube <sup>1</sup>
3 837 540	Cooling plate for series 5 and 6, with air purge
3 846 630	Vacuum flange KF16 with protection window
3 846 660	Spare protection window, Ø 25 x 3 with Viton-O-ring

<sup>1</sup> Flange system: the flange system is a modular mounting system to fix the pyrometer on furnaces, vacuum chambers, etc. It can consist of e.g. mounting support, tube support with air purge and flange and an open or closed ceramic sighting tube. The mounting support can be equipped with a quartz window for vacuum applications.

INFRAWIN 5 OVERVIEW

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

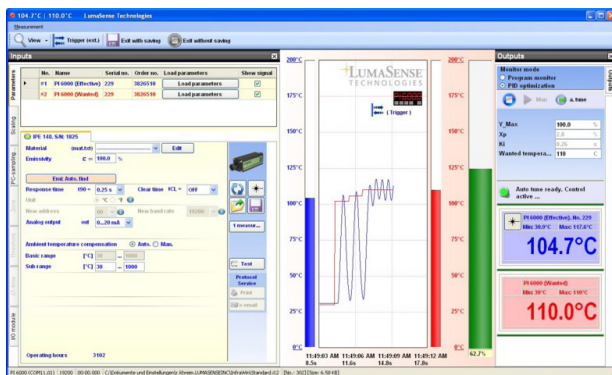
This software allows the user to remotely adjust and control settings for one or two pyrometers from a single computer. InfraWin also allows the user to simultaneously monitor and control temperatures.

- 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)

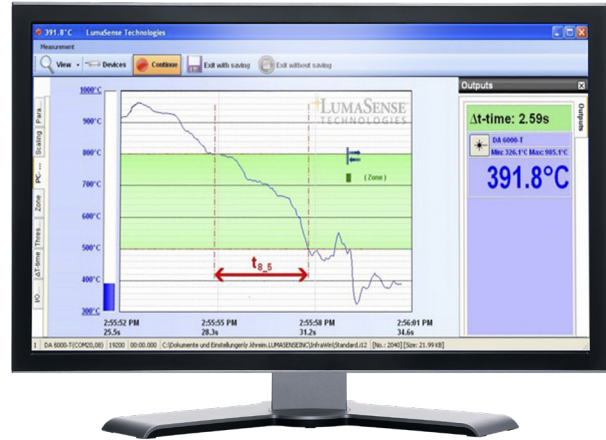
Pyrometer Settings

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



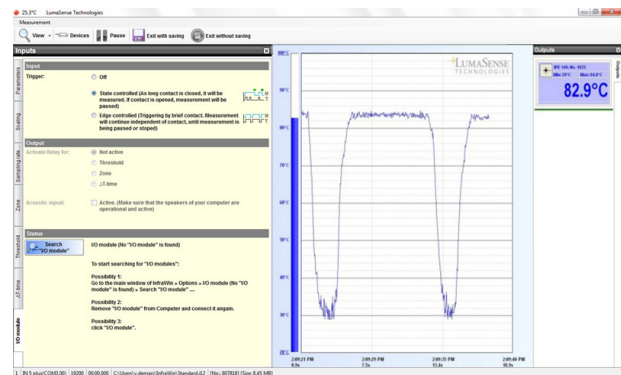
Measurement with Color Bar

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.



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.

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