

# IMPAC IN 5/5 PLUS SERIES

Compact pyrometers for temperature measurement of glass and quartz glass surfaces with temperature ranges between 100 and 2500°C (212 and 4532°F).



The Impac® IN 5/5 plus series infrared thermometers are specially designed for non-contact temperature measurement of glass surfaces and quartz surfaces. These instruments are digital pyrometers equipped with a digital interface, enabling temperature indication and storage on a PC. Also 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, min. 1.1 mm
- Adjustable exposure time
- Compact housing

## TYPICAL APPLICATIONS

- Float glass
- Hollow glass
- Glass drop
- Glass hardening
- Glass bending
- Bulb production
- Heat treatment

## AT A GLANCE

### Temperature Ranges

IN 5/5 plus  
100 to 1300°C (MB 13)  
400 to 2500°C (MB 25)

IN 5/5-H plus and IN 5/5-L plus  
200 to 1300°C (MB 13)  
400 to 2500°C (MB 25)

### Spectral Range

5.14  $\mu$ m

### Repeatability

0.3% oR or 0.6°C

### Optics

IN 5/5 plus and IN 5/5-H plus  
100 mm, 300 mm, or 1200 mm

IN 5/5-L plus  
105 mm, 370 mm, or 800 mm

### Alignment

Laser targeting

### Output

0/4 to 20 mA, RS232 or RS485

OVERVIEW

The IN 5/5-L plus is equipped with optics with better fields of view for the measurements of small objects, while the high-speed IN 5/5-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 5/5 plus	100 to 1300°C (212 to 2372°F) (MB 13)
		400 to 2500°C (752 to 4532°F) (MB 25)
	IN 5/5-H plus IN 5/5-L plus	200 to 1300°C (392 to 2372°F) (MB 13)
		400 to 2500°C (752 to 4532°F) (MB 25)
IR Detector	Thermopile	
Sub Range	User adjustable (minimum span is 51°C)	
Data Handling	Digital	
Spectral Range	5.14 μm	
Emissivity ε	0.2 to 1.0 adjustable	
Measurement Uncertainty Dependent on object temperature T and ambient temperature T <sub>amb</sub> (ε = 1, t <sub>90</sub> = 1 s)	T < 1300°C	0.6% (IN 5/5-L plus: 0.8%) of reading in °C or 2°C (T <sub>amb</sub> = 15 to 30°C) <sup>1</sup>
		1% of reading in °C or 2.5°C (T <sub>amb</sub> = 0 to 15°C or 30 to 63°C) <sup>1</sup>
	T = 1300 to 1800°C	0.8% of reading in °C (T <sub>amb</sub> = 15 to 30°C)
		1.2% of reading in °C (T <sub>amb</sub> = 0 to 15°C or 30 to 63°C)
	T = 1800 to 2500°C	1% of reading in °C (T <sub>amb</sub> = 15 to 30°C)
		1.4% of reading in °C (T <sub>amb</sub> = 0 to 15°C or 30 to 63°C)
Repeatability (ε = 1, t <sub>90</sub> = 1 s)	0.3% of reading in °C or 0.6°C <sup>1</sup>	
Noise Equivalent Temperature Difference (NETD) (ε = 1, T <sub>amb</sub> = 23°C)	IN 5/5 plus	@ t <sub>90</sub> = 80 ms: 0.7°C (@ 110°C measuring temperature)
		@ t <sub>90</sub> = 1 s: 0.4°C (@ 110°C measuring temperature)
	IN 5/5-H plus	@ t <sub>90</sub> = 10 ms: 0.5°C (@ 500°C measuring temperature)
		@ t <sub>90</sub> = 10 ms: 0.3°C (@ 1100°C measuring temperature)
	IN 5/5-L plus	@ t <sub>90</sub> = 80 ms: 1.5°C (@ 300°C measuring temperature)
		@ t <sub>90</sub> = 80 ms: 0.6°C (@ 500°C measuring temperature)
		@ t <sub>90</sub> = 1 s: 0.4°C (@ 300°C measuring temperature)
		@ t <sub>90</sub> = 1 s: 0.2°C (@ 500°C measuring temperature)
Optics	Zinc-Sulfide (ZnS)	
Sighting	Laser targeting light (max power level < 1 mW, λ = 630 to 680 nm, CDRH class II)	

<sup>1</sup> Whichever value is greater. The instrument must be at a constant ambient temp. for a minimum of 15 min (30 min for IN 5/5-L plus for 200 to 1300°C @ T<sub>amb</sub> = 0 to 15°C or 30 to 63°C) and has to be connected to the power supply.

<sup>2</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)**

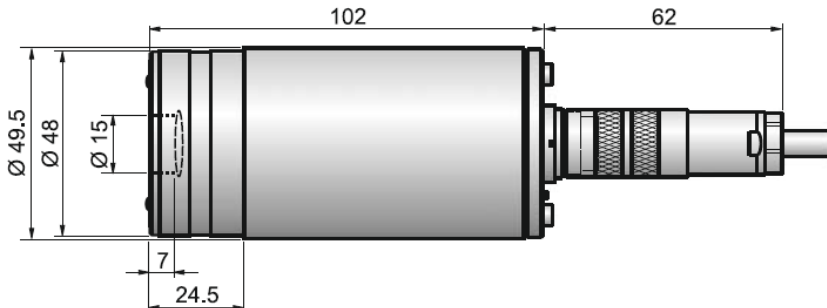
Electrical	
Power Supply	24 VDC (18 to 30 V); nominal, ripple must be less than 0.5 V
Power Consumption	Max 70 mA
Load	Max 500 Ω @ 24 V (max 200 Ω @ 18 V)
Isolation	Power supply, analog outputs and digital interfaces are electrically isolated from each other

Environmental Specifications	
Protection Class	IP 65 (DIN 40050)
Ambient Temperature	0 to 63°C (32 to 145.4°F) (IN 5/5 plus, MB 25: 0 to 60°C (32 to 140°F))
Storage Temperature	-20 to 70°C (-4 to 158°F)
Relative Humidity	Non-condensing conditions
Weight	Approx 410 g (~14.47 oz)
Housing	Stainless steel
CE Label	According to EU directives about electromagnetic immunity

Communication	
Analog Output	0 to 20 mA or 4 to 20 mA (linear), adjustable
Interface	RS232 or RS485 (addressable, half duplex), baud rate 1.2 to 19.2 kBd, resolution 0.1°C
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 5/5 plus: 0.08 s
	IN 5/5-H plus: 0.01 s
	IN 5/5-L plus: 0.18 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	

Interface		
Parameters	Adjustable on the pyrometer	Emissivity, exposure time, analog output to 0 to 20mA, online/offline switch
	Via interface / PC adjustable and readable (online mode)	Emissivity, exposure time, 0 or 4 to 20 mA analog output, sub temperature range, max/min value storage with different clear times or automatic or external clearing mode, address, baud rate, internal temperature, display in °C or °F, activation of ambient temperature compensation

**DIMENSIONS**

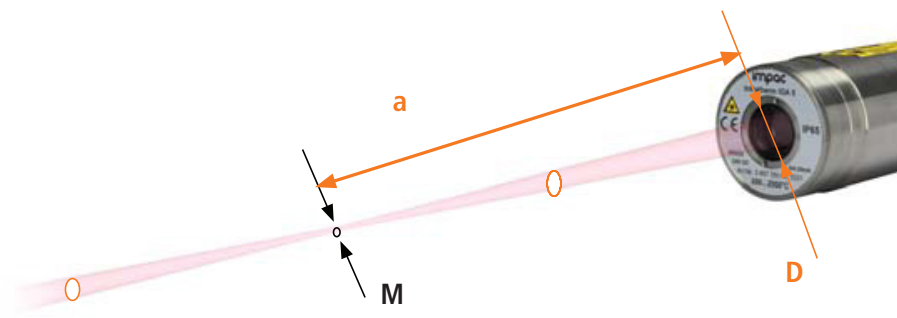


Dimensions in mm

**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).



When measuring the temperature of very large and hot surfaces (for example by the float glass production), additional radiation is received by the pyrometer’s detector due to unavoidable effects (diffraction, multiple reflection). These effects increase the temperature output. To get correct temperature values in this case, the pyrometer must be prepared ex works. The effect will be compensated by the float glass calibration.

Optics for IN 5/5 plus and IN 5/5-H plus			
	Measuring Distance a [mm]	Spot Size M <sub>90</sub> [mm]	
		MB 13	MB 25
Optics 100	100	2.5	2.5
	200	18	13
	300	35	24
Optics 300	300	6	6
	600	22	17
	1000	45	32
Optics 1200	1200	24	24
	2500	50	43
	4000	80	65
Aperture D [mm]		15	10

Optics for IN 5/5-L plus		
	Measuring Distance a [mm]	Spot Size M <sub>90</sub> [mm]
Optics 105	105	1.1
	200	15.7
	300	31
Optics 370	370	3.5
	600	15
	1000	35
Optics 800	800	7
	1500	26.3
	3000	67.5
Aperture D [mm]		15

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

**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**

**IN 5/5 plus series with Laser Targeting Light**

Model	Optics	100 to 1300°C (212 to 2372°F)		400 to 2500°C (752 to 4532°F)	
		RS232	RS485	RS232	RS485
IN 5/5 plus	100	3 869 460	3 869 470	3 869 520	3 869 530
	300	3 869 480	3 869 490	3 869 540	3 869 550
	1200	3 869 500	3 869 510	3 869 560	3 869 570
IN 5/5-L plus	105	3 871 660	3 871 670	3 871 720	3 871 730
	370	3 871 680	3 871 690	3 871 740	3 871 750
	800	3 871 700	3 871 710	3 871 760	3 871 770
IN 5/5-H plus	100	3 871 260	3 871 270	3 871 320	3 871 330
	300	3 871 280	3 871 290	3 871 340	3 871 350
	1200	3 871 300	3 871 310	3 871 360	3 871 370

**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
3 852 440	Protocol converter RS485/RS232 (switchable) ⇔ Profibus-DP for 1 instrument
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 CaF2 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)
3 837 340	Water cooling jacket (heavy duty) with protection window
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)
3 837 390	Water cooling jacket (light duty) with protection window
3 846 100	Mounting tube
3 846 120	Flange tube
3 837 540	Cooling plate for series 5 and 6, with air purge
3 846 620	Vacuum flange KF16 with protection window
3 846 650	Spare protection window, Ø 25 x 3 with Viton-O-ring

# INFRAWIN 5 OVERVIEW

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

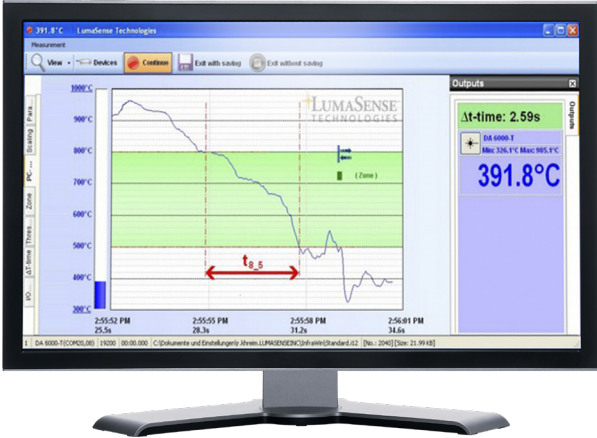
This software allows the user to remotely adjust and control settings for one or two pyrometers from a single computer. InfraWin also allows the user to simultaneously monitor and control temperatures.

- 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.



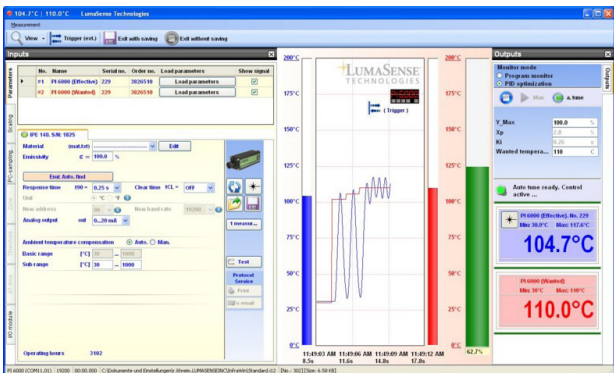
### Measurement with Color Bar

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

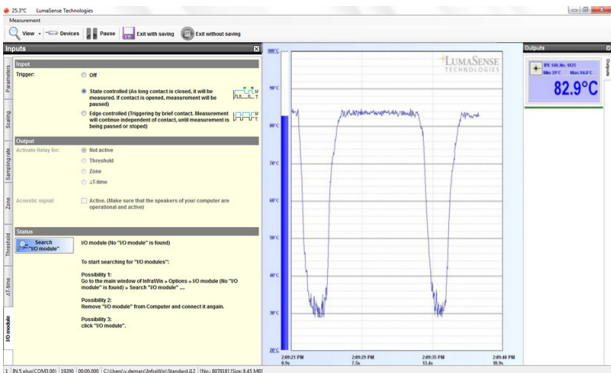
The acquired minimum and maximum value is indicated as well as the inner temperature of the pyrometer. The emissivity is changeable during the measurement at any time.

### 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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