

IMPAC IN 140/5 SERIES

Digital pyrometer with a spectral response of $5.14\ \mu\text{m}$ for measurement of glass and quartz glass surfaces between 250 and 2500°C (482 to 4532°F).



The Impac[®] IN 140/5 series pyrometers are digital, highly accurate pyrometers for non-contact temperature measurement of glass and quartz glass surfaces with temperature ranges between 250 and 2500°C (482 to 4532°F). The instrument is characterized by a very short response time and extremely small spot sizes. Making it applicable for fast measuring tasks and for the measurement of very small objects. The type IN 140/5-L is equipped with an optics with better field of view (optics 2-NL). The high speed version IN 140/5-H has a shorter response time of only $10\ \text{ms}$.

PRODUCT HIGHLIGHTS

- Very short response time, min $10\ \text{ms}$
- Extremely small spot sizes, min $0.9\ \text{mm}$
- Focusable optics
- Optimized through lens view finder or laser targeting light
- Test current output
- Built-in digital display
- Interface RS232 / RS485 switchable

TYPICAL APPLICATIONS

- Flat glass fabrication
- Bulb production
- Car glass assembly
- Glass bending

AT A GLANCE

Temperature Ranges

250 to 1400°C (MB 14)
 300 to 1600°C (MB 16)
 50 to 1500°C (MB 15)
 500 to 2500°C (MB 25)

Spectral Ranges

$5.14\ \mu\text{m}$

Measurement Uncertainty

$< 1300^{\circ}\text{C}$: 0.6% oR or 2°C
 $> 1300^{\circ}\text{C}$: 0.8% oR

Repeatability

0.3% oR

Optics

3 focusable optics:
 $a = 100$ to $128\ \text{mm}$
 $a = 187$ to $322\ \text{mm}$
 $a = 362$ to $2170\ \text{mm}$

Alignment

Laser targeting or through lens sighting

TECHNICAL DATA

Measurement Specifications		
Temperature Range	250 to 1400°C (482 to 2552°F) (MB 14)	
	300 to 1600°C (572 to 2912°F) (MB 16)	
	450 to 1500°C (842 to 2732°F) (MB 15)	
	500 to 2500°C (932 to 4532°F) (MB 25)	
Sub Range	Any range adjustable within the temperature range, minimum span 51°C	
Data Handling	Digital	
Spectral Ranges	5.14 μm (narrow band, for glass surfaces)	
Infrared Detector	Thermopile	
Resolution	Interface: 0.1°C	
	Display: 0.1°C/°F (450 to 999°C / 842 to 999°F), 1°C (= 1000 °C/°F)	
	< 0.1% of the adjusted temperature subrange at the analog output	
Emissivity ε	10 to 120% adjustable in the instrument or via interface in steps of 0.1%	
Measurement Uncertainty (ε = 1, t ₉₀ = 1 s, T _{amb} = 23°C)	Below 1300°C	0.6% of reading in °C or 2°C (T _{amb} = 15 to 30°C) ¹
		1% of reading in °C or 3°C (T _{amb} = 0 to 15 or 30 to 70°C) ¹
	Above 1300°C	0.8% of reading in °C (T _{amb} = 15 to 30°C)
		1.2% of reading in °C (T _{amb} = 0 to 15 or 30 to 70°C)
Repeatability (ε = 1, t ₉₀ = 1 s, T _{amb} = 23°C)	0.3% of measured value in °C	
Noise Equivalent Temperature Difference (NETD) (ε = 1, t ₉₀ = 1 s, T _{amb} = 23°C)	MB 15, MB 25	@ t ₉₀ = min: 1.2°C (@ 500°C measuring temperature)
		@ t ₉₀ = min: 0.6°C (@ 1200°C measuring temperature)
	MB 14, MB 16	@ t ₉₀ = min: 0.7°C (@ 310°C measuring temperature)
		@ t ₉₀ = min: 0.2°C (@ 500°C measuring temperature)
		@ t ₉₀ = min: 0.15°C (@ 1200°C measuring temperature)
Sighting	Through lens view finder or laser targeting light (max. power level < 1 mW, λ = 630 to 680 nm, CDRH class II)	

Communication Specifications	
Analog Output	0 to 20 mA or 4 to 20 mA (linear), switchable
	Test current 10 mA or 12 mA by pressing test key
Digital Interface	RS232 or RS485 addressable (half duplex), switchable; baud rate 1200 up to 115200 Bd
Exposure Time t ₉₀	IN 140/5: 40 ms, adjustable up to 0.05 s, 0.25 s, 1 s, 3 s, 10 s
	IN 140/5-L: 80 ms, adjustable up to 0.05 s, 0.25 s, 1 s, 3 s, 10 s
	IN 140/5-H: 10 ms, adjustable up to 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

Electrical Specifications	
Power Supply	24 V AC/DC (14 to 30 V AC/DC) (AC: 48 to 62 Hz)
Power Consumption	Max 1.2 W
Load	0 to 500 Ω
Isolation	Power supply, analog output and digital interface are galvanically isolated from each other

¹ Whichever value is greater. The instrument must be at a constant ambient temperature for a minimum of 30 minutes.

² 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.

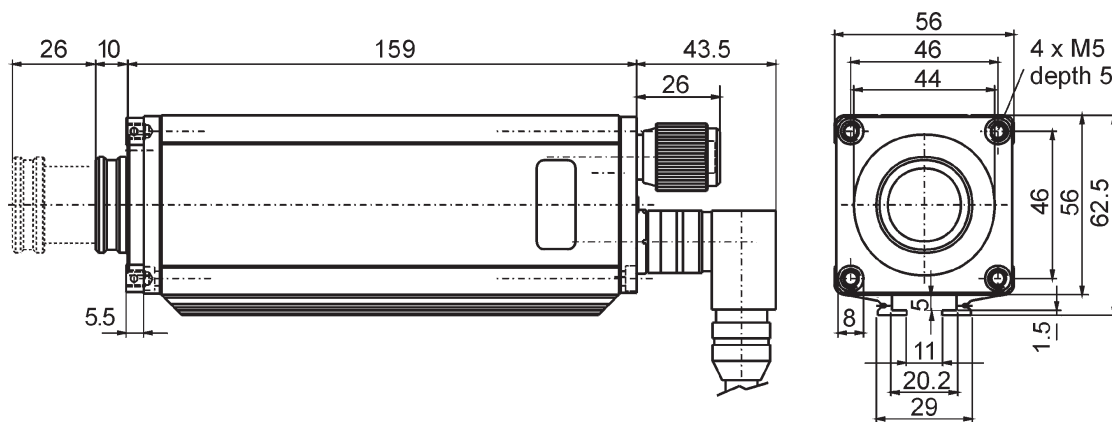
TECHNICAL DATA (CONTINUED)

Environmental Specifications	
Protection Class	IP65 (DIN 40 050)
Ambient Temperature	0 to 70°C (32 to 158°F) at housing
Storage Temperature	-20 to 80°C (-4 to 176°F)
Weight	~550 g (~1.21 lbs)
CE Label	According to EU directives about electromagnetic immunity

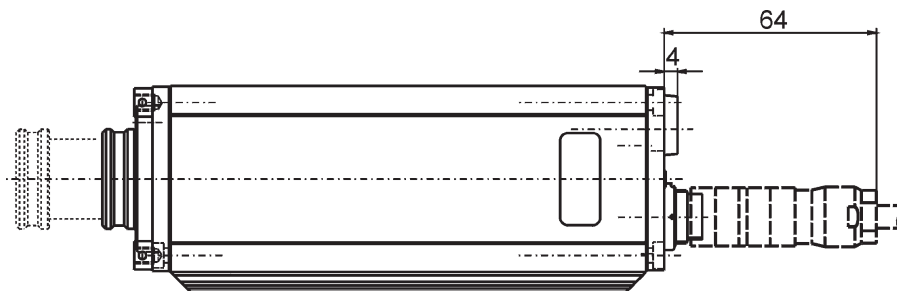
Interface Specifications	
Operation Signal	Green LED
LC display	Illuminated LC display for temperature indication or parameter settings
Parameters	Emissivity, exposure time, analog output, temperature sub range, settings of the maximum value storage, address, baud rate, internal temperature of the pyrometer

DIMENSIONS

Pyrometer With Through Lens Viewfinder



Pyrometer With Laser Targeting Light



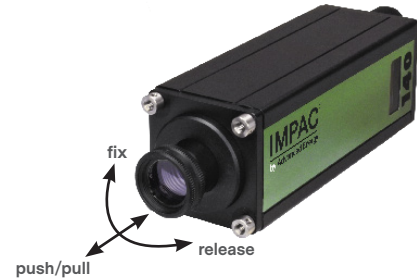
Dimensions in mm

IMPAC IN 140/5 SERIES

OPTICS

The pyrometers are available with different focusable optics. They offer the smallest possible spot size at any distance (exception: the optics of the IN 140/5-L with MB 15 and view finder is fixed adjusted). The adjustment can be done easily without additional tools with help of the "turn and clamp" mechanism (one hand).

The spot sizes are shown in the following table (all distances are measured from the front of the lens). The different optics are exchangeable without recalibration of the pyrometer. For spot sizes between those in the table, values can be found by interpolation.



IN 140/5 & IN 140/5-H Focusable Optics					
Optics	Measuring Distance a [mm]	Spot Diameter M [mm]			
		MB 14	MB 16	MB 15	MB 25
1-N	100	1.3		1	
	111	1.3		1	
	128	1.4		1.1	
2-N	187	1.6		1.3	
	229	2.1		1.7	
	322	2.9		2.4	
3-N	362	3.3		2.4	
	508	5		3.6	
	2170	21		15	
Aperture D [mm] ¹		14 to 17			

IN 140/5-L Focusable Optics					
Optics	Measuring Distance a [mm]	Spot Diameter M [mm]			
		MB 14	MB 16	MB 15	MB 25
2-NL	159	1.3		0.9	
	178	1.6		1.1	
	235	2.2		1.5	
	Aperture D [mm] ¹		14 to 17		

IN 140/5-L Fixed Optics		
Optics	Measuring Distance a [mm]	Spot Diameter M [mm]
		MB 15 (view finder)
2-NL (fixed)	163	0.9
Aperture D [mm]		17

¹ Note: The aperture D depends on the objective length

SIGHTING OPTIONS

Pyrometer With Laser Targeting Light



Pyrometer With Through Lens View Finder



ADVANTAGES OF DIGITAL SIGNAL PROCESSING

The signal processing of series 140 pyrometers is fully digital, i.e. the detector signal is digitized immediately and digitally processed. With this technique, an extremely high accuracy and repeatability as well as very long measuring ranges are achieved.

Accuracy

The high accuracy is achieved by the digital linearization of the sensor output as well as the digital compensation of the ambient temperature.

Temperature Range

Due to the digital technique, the user can set any temperature sub range within the full temperature range. The minimum span of the sub range is 51°C. The analog measuring output automatically corresponds to the selected sub range. This setting of a sub range can be done without recalibration of the pyrometer and does not affect the high accuracy and repeatability. As

almost any sub range is adjustable, the storage of spare instruments or the replacement of other pyrometers is simplified.

Output

The analog measuring outputs 0 to 20 mA or 4 to 20 mA are selectable as well as the serial digital interfaces RS232 or RS485. The interface also allows the pyrometer to be controlled via the PC.

Bus Control

The serial interface RS485 facilitates the integration of the pyrometer into existing field bus systems

Calibration

If a suitable calibration source is available, a calibration of the pyrometers can be done via serial interface without opening the housing.

REFERENCE NUMBERS

IN 140/5 Series				
Type	MB	Temperature Range	Targeting Light	View Finder
IN 140/5 (focusable optics)	14	250 to 1400°C (482 to 2552°F)	3 877 380	3 877 390
	16	300 to 1600°C (572 to 2912°F)	3 877 360	3 877 370
	15	450 to 1500°C (842 to 2732°F)	3 877 400	3 877 410
	25	500 to 2500°C (932 to 4532°F)	3 877 420	3 877 430
IN 140/5-H (focusable optics)	14	250 to 1400°C (482 to 2552°F)	3 877 580	3 877 590
	16	300 to 1600°C (572 to 2912°F)	3 877 560	3 877 570
	15	450 to 1500°C (842 to 2732°F)	3 877 600	3 877 610
	25	500 to 2500°C (932 to 4532°F)	3 877 620	3 877 630
IN 140/5-L (focusable optics)	14	250 to 1400°C (482 to 2552°F)	3 877 480	3 877 490
	16	300 to 1600°C (572 to 2912°F)	3 877 460	3 877 470
	15	450 to 1500°C (842 to 2732°F)	3 877 900	3 877 910
	25	500 to 2500°C (932 to 4532°F)	3 877 520	3 877 530
IN 140/5-L (fixed optics)	15	450 to 1500°C (842 to 2732°F)	3 877 500	3 877 510

Scope of Delivery

Device with through lens sighting or laser targeting light, selectable optics, InfraWin software, allen key 3 mm, and operation manual.

Ordering Notes

When ordering a type IN 140/5 or IN 140/5-H, please select one optics (1-N, 2-N or 3-N). 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
3 820 340	Connection cable, 5 m, 90° connector
3 820 530	Connection cable, 10 m, 90° connector
3 820 540	Connection cable, 15 m, 90° connector
3 820 830	Connection cable, 20 m, 90° connector
3 820 840	Connection cable, 25 m, 90° connector
3 820 550	Connection cable, 30 m, 90° connector
3 820 740	Connection cable, 5 m, straight connector, temperature resistant up to 200°C
3 820 750	Connection cable, 5 m, 90° connector, temperature resistant up to 200°C
3 852 290	Power supply NG DC for DIN rail mounting; 100 to 240 VAC ⇒ 24 VDC, 1 A
3 852 430	Converter I-7520; RS485 ↔ RS232 (half duplex)
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
3 835 060	Air purge for cooling jacket
3 835 230	Air purge
3 837 240	Cooling plate
3 897 290	Cooling jacket, stainless steel
3 834 270	Ball and socket mounting
3 834 140	Ball and socket mounting (steel) for rough ambience or for cooling jacket
3 834 280	Adjustable mounting angle
3 835 460	90° mirror with CaF ₂ window
3 843 530	SCA 140, Rugged scanner with CaF ₂ window for Series 140
3 835 290	Air purge for scanner SCA 140

INFRAWIN 5 OVERVIEW

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

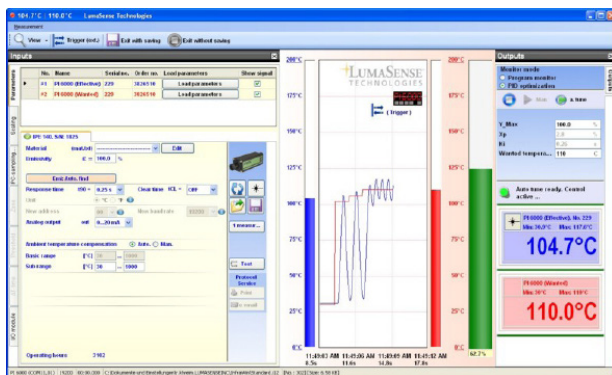
This software allows the user to remotely adjust and control settings for one or two pyrometers from a single computer. InfraWin also allows the user to simultaneously monitor and control temperatures.

- 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)

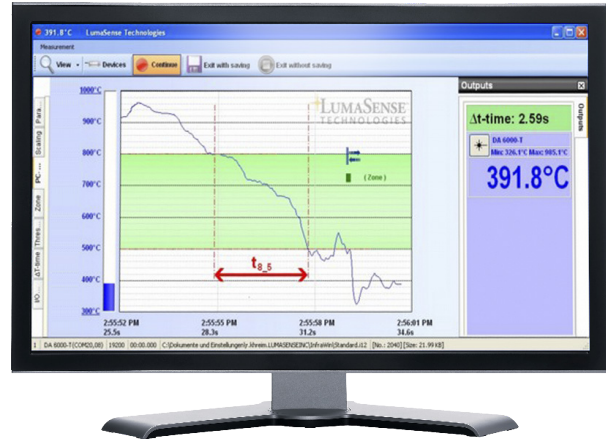
Pyrometer Settings

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.



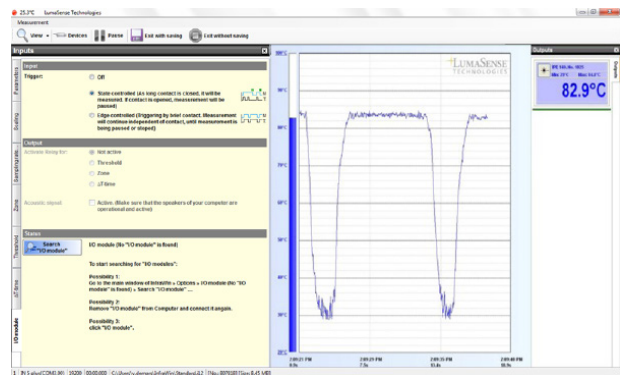
Measurement with Color Bar

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 measured 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.



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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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