

X Non-contact thermometry best done with infratherm pyrometers

impac[®]



IN 5 plus · IN 5/5 plus

New. Compact. Digital.

→ **Application**

IN 5 plus: for temperatures between -32 to 900 °C
IN 5/5 plus: for glass and quartz glass surfaces

→ **Basic temperature range**

IN 5 plus: -32...900 °C
IN 5/5 plus: 100...1300 °C
or 400...2500 °C

Sub-temperature ranges user-adjustable

→ **Response time t_{90}**

80 ms, adjustable up to 30 s

→ **Spot size**

IN 5 plus: down to 2.0 mm
IN 5/5 plus: down to 2.5 mm

→ **Accuracy**

down to 0.6 % of measured value in °C

→ **Sighting system**

Built-in laser pilot light (optional)

→ **Digital interface**

RS 232 or RS 485 (half-duplex)

→ **Analog output**

0/4 ... 20 mA

→ **Built-in minimum/maximum value store**

→ **Inaccuracies in temperature measurement caused by the reflection of other hot objects may be compensated.**



Infratherm IN 5 plus and IN 5/5 plus are robust, digital pyrometers for contact-free temperature measurement and are 40 % more precise than their analog predecessors.

Customers can choose between interfaces RS 232 or RS 485. A built-in laser pilot light is optionally available for all types.

IN 5 plus is suitable for the temperature measurement of non-metallic surfaces and coated metal surfaces.

IN 5/5 plus is specifically designed for the temperature measurement of glass and quartz glass surfaces.

Connectable: Analog and Digital

Equipped with interface RS 232, the measuring device can be connected to

the PC individually, from where it can be set up and the results evaluated using the InfraWin software.

Equipped with interface RS 485, **IN 5 plus** and **IN 5/5 plus** can be integrated into modern, automated measuring and monitoring systems.

Furthermore, up to 32 pyrometers can be networked and, with a gateway, be used in almost all common bus systems. The integration process using the given user software is easy because IMPAC has disclosed the interface protocol.

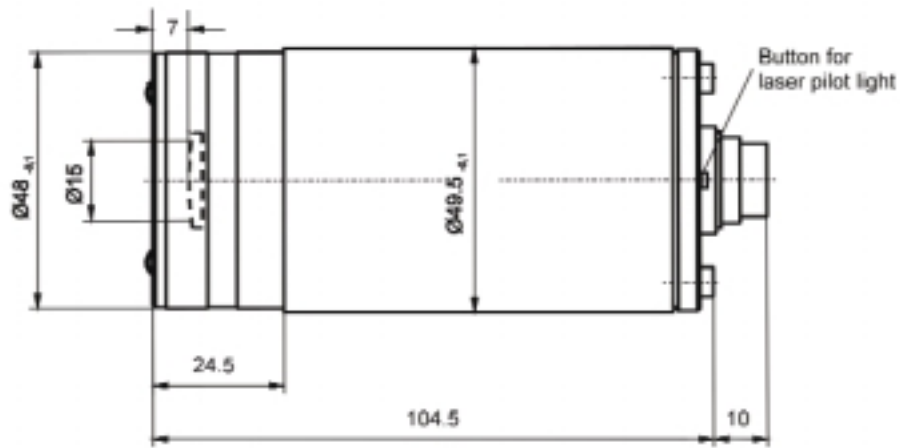
The extra analog output in all series means that the **IN 5 plus** and the **IN 5/5 plus** can also be connected in the traditional way.



→ Emissivity, response time, analog output (0...20 mA or 4...20 mA) and online/offline mode can be set directly on the measuring device itself.

	IN 5 plus	IN 5/5 plus
Basic temperature range:	-32... 900 °C	Type MB 13: 100... 1300 °C Type MB 25: 400... 2500 °C
Sub-temperature range:	User-adjustable within the full measuring range, minimum span: 51 °C	
Signal processing:	Digital	Digital
Spectral range:	8... 14 μm	5.14 μm
Optics:	With laser pilot light: ZnS-lens Without laser pilot light: Ge-lens	With laser pilot light: ZnS-lens Without laser pilot light: ZnS-Lens
IR-detector:	Thermopile	
Power supply:	24 V DC nominal (± 25 %) ripple must be less than 0.5 V, max. 70 mA	
Analog output:	0...20 or 4...20 mA, user selectable direct current, linear, resolution: 3600 steps (0...20mA)	
Load:	0...500 Ω at 24 V (max. 200 Ω at 18 V)	
Digital interface:	RS 232 or RS 485 addressable (half-duplex), baud rate 1.2 - 19.2 kbaud, resolution 0.1 °C	
Isolation:	Power supply, analog outputs and digital interfaces are electrical isolated from each other	
Parameters:	Adjustable on the pyrometer or remotely via the digital interface: Emissivity (ε), response time t ₉₀ , analog output range, online-/offline-switchable for adjustment at PC/pyrometer Only remotely adjustable via the digital interface: Sub-temperature range (within the full basic temperature range), external delete of stored maximum or minimum temperature value, hold time for the stored max. or min. temperature, °C/°F, max./min. selection, activation of ambient temperature correction	
Emissivity (ε):	User-adjustable from 0.20 - 1.00 in 0.01 increments on the pyrometer or remotely with the InfraWin software	
Minimum value store/ maximum value store:	Built-in single or double store. Clear with set time t _{CL} , external clear contact or via interface or also automatically with each new item to be measured	
Response time t₉₀:	User-adjustable from 0.08 to 5 s on the pyrometer or 0.08 to 30 s user-adjustable via interface	
Accuracy*:	(T ₁ ...T ₂ °C = Object temp, T _A = Ambient temp) für ε = 1; t ₉₀ = 1 s	
T _A = 15... 30 °C	0...300 °C: 0.6 % of measured value in °C or 1 °C*	100... 1300 °C: 0.6% of measured value in °C or 2 °C
T _A = 15... 30 °C	300... 900 °C: 1 % of measured value in °C	1300... 1800 °C: 0.8 % of measured value in °C
T _A = 15... 30 °C	-32... 0 °C: 1.5 °C	1800... 2500 °C: 1% of measured value in °C
T _A = 0... 15 °C or 30... 63 °C	0... 300 °C: 1 % of measured value in °C or 1.5 °C	100... 1300 °C: 1 % of measured value in °C or 3 °C
T _A = 0... 15 °C or 30... 63 °C	300... 900 °C: 1.3 % of measured value in °C	1300... 1800 °C: 1.2 % of measured value in °C
T _A = 0... 15 °C or 30... 63 °C	-32... 0 °C: 2 °C	1800... 2500 °C: 1.4 % of measured value in °C
Repeatability*:	0.3 % of measured value in °C or 0.6 °C	
Noise Equivalent Temp.		
Difference (NETD):	0.2 K (σ = 1); measured temperature = 23 °C, t ₉₀ = 80 ms and ε = 1 0.05 K (σ = 1); measured temperature = 23 °C, t ₉₀ = 1 s and ε = 1	
Laser aiming syst. (optional):	Laser pilot light (650 nm), Laser power level <1 mW, Laser class 2 per IEC 60825 1-3-4	
Ambient temperature:	0...+63 °C (0 ... +60 °C for IN 5/5 plus MB 25)	
Storage temperature:	-20...+70 °C	
Safety system:	IP 65 (acc. to DIN 40 050)	
Weight:	410 g	
Dimensions:	114.5 mm x 49.5 mm (l x d)	
Housing:	Stainless steel	
Operating position:	Any	
CE Approval/EMV tests:	Satisfies EU regulations for electromagnetic immunity (industry norm)	
Scope of delivery:	Device with chosen lens and disk with PC operating software InfraWin. Attention: Connection cable is <u>not</u> included. However, it is absolutely necessary for the operation of the device so please make sure to order a connection cable as well.	

*) The larger value is valid. The instrument must be at a constant ambient temperature for a minimum of 15 minutes.



Optics - general information

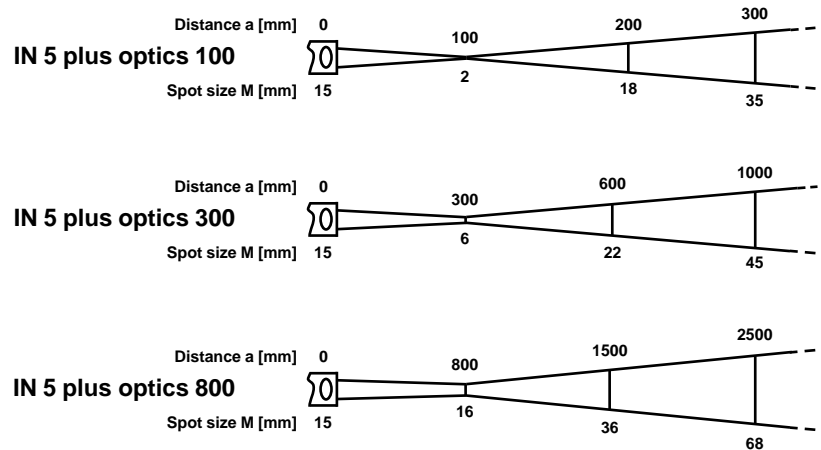
The optics available for IN 5 plus and IN 5/5 plus are fixed-focus optics which cannot be changed by the user.

The spot size M at a distance $a = 0$ mm is equal to the diameter of the aperture behind the lens.

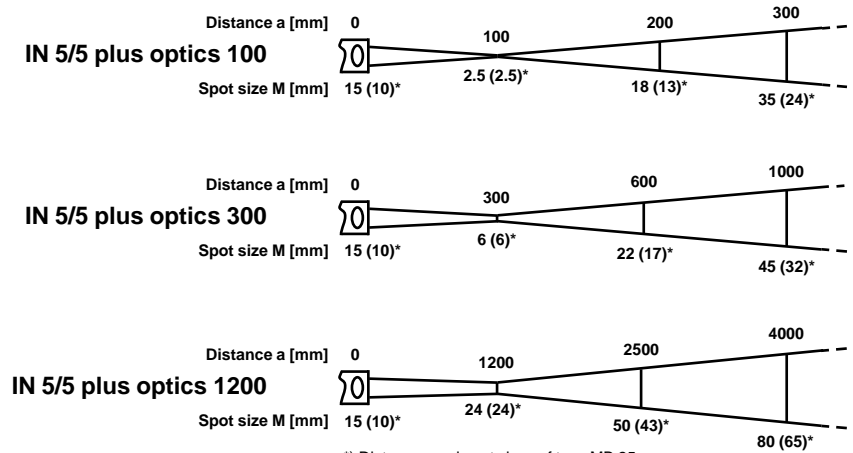
The diagrams below give an overview of the spot sizes M at distances a.

Distance a is measured from the front surface of the lens.

Optics IN 5 plus



Optics IN 5/5 plus



*) Distances and spot sizes of type MB 25

Order numbers: Measuring devices

(Attention: A connection cable must be ordered separately. Please also see example orders and accessories)

Order no.	Device model, optics	Order no.	Device model, optics	Order no.	Device model, optics
3 869 200	IN 5 plus, optics 100	3 869 260	IN 5/5 plus MB13, optics 100	3 869 320	IN 5/5 plus MB25, optics 100
3 869 220	IN 5 plus, optics 300	3 869 280	IN 5/5 plus MB13, optics 300	3 869 340	IN 5/5 plus MB25, optics 300
3 869 240	IN 5 plus, optics 800	3 869 300	IN 5/5 plus MB13, optics 1200	3 869 360	IN 5/5 plus MB25, optics 1200

Order numbers: Options (when ordering just add the option numbers to the device order number)

Order no.	Preferred options
+ 010	Interface RS 485 (addressable) instead of RS 232
+ 200	Built-in laser pilot light



Ordering example

Order no.	Orders
3 869 430	IN 5 plus with optics 300, interface RS 485 and integrated laser pilot light would be the following addition: 3 869 220 (IN 5 plus, optics 300) + 010 (RS 485) + 200 (built-in laser pilot light) = 3 869 430 (final order no.)
3 820 330	Connection cable (Accessory order numbers are never added on. They have to be written separately).

Order numbers: Accessories

Order no.	Mechanical accessories	Order no.	Electrical accessories
3 834 210	Mounting bracket (adjustable)	3 820 330	Standard connection cable, 5 m long, inc. RS 232 adapter with 9-pole SUB-D connector
3 835 160	Air purge	3 820 500	Connection cable 10 m long (straight connector)
	<u>Water cooling system (combination):</u>	3 820 510	Connection cable 15 m long (straight connector)
3 837 080	Standard water cooling jacket for ambient temperatures up to 170 °C	3 820 520	Connection cable 30 m long (straight connector)
3 835 100	Connecting flange	3 820 320	Special connection cable with angled connector and additional pilot light push button, 5 m long
3 835 080	Mounting angle	3 890 600	Power supply for DIN rail mounting (230 V AC to 24 V DC)
3 835 070	Mounting flange	3 890 640	DA 4000-N: LED digital display to be built into the switchboard
3 835 160	Air purge	3 890 650	DA 4000: like DA 4000-N, but additionally with 2 limit switches
3 835 090	Mounting socket	3 890 660	IP 65 front cover for DA 4000-N, DA 4000 (additional cover for protection)
3 835 110	Rear wall for cooling jacket	3 890 520	DA 6000: LED digital display to be built into switchboard that enables user additionally to set up digital IMPAC pyrometers via this device and can also digitalize analog signals. Equipped with interface RS 232, analog in- and output, power supply: 85...265 V AC and 24 V DC
3 837 230	Water cooling jacket (heavy duty) with integrated air purge for ambient temperatures up to 280 °C	3 890 530	DA 6000: LED digital display like presented above, with interface RS 485 instead of RS 232
3 846 100	Mounting tube	3 852 410	Converter RS 485 (half-duplex) <=> RS 232
3 846 120	Flange tube		
3 846 620	Vacuum flange KF16 with CaF ₂ -window for IN 5/5 plus		
3 846 630	Vacuum flange KF16 with ZnSe-window for IN 5 plus		
3 846 650	Spare window CaF ₂ Ø 25x3 with Viton-O-ring		
3 846 660	Spare window ZnSe Ø 25x3 with Viton-O-ring		

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Temperature Measurement

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IN 5/5-H *plus*

Digital, precise, compact.

Special digital pyrometers with very short response times for fast temperature measurements of glass surfaces (Additional data sheet to IN 5/5 plus)

- ◆ 2 long temperature ranges:
200 ... 1300°C or **400 ... 2500°C**
- ◆ Subrange adjustable
- ◆ Response time **10 ms**
- ◆ Laser targeting light



Reference numbers:

Temperature range: 200 ... 1300°C		
Optics	Interface	
	RS232	RS485
100	3 871 260	3 871 270
300	3 871 280	3 871 290
1200	3 871 300	3 871 310

Temperature range: 400 ... 2500°C		
Optics	Interface	
	RS232	RS485
100	3 871 320	3 871 330
300	3 871 340	3 871 350
1200	3 871 360	3 871 370

Noise equivalent temperature difference (NETD)

meas. temperature	response time t_{90}	NETD
500°C	10 ms	0.5°C
1100°C		0.3°C

(Emissivity $\epsilon = 1$; $\sigma = 1$)

Specifications are subject to change without notice.

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IN 5/5-L plus

Digital, precise, compact

Digital pyrometer with very small spot sizes for measurements of glass surfaces
(Additional data sheet to "IN 5/5 plus")

- ◆ 3 optics with very small spot sizes
- ◆ Response time 80 ms
- ◆ Laser targeting light
- ◆ 2 temperature ranges
- ◆ Serial interface RS232 or RS485



Reference numbers:

Optics	Temperature range: 200 ... 1300°C	
	Interface	
	RS232	RS485
105	3 871 660	3 871 670
370	3 871 680	3 871 690
800	3 871 700	3 871 710

Optics	Temperature range: 400 ... 2500°C	
	Interface	
	RS232	RS485
105	3 871 720	3 871 730
370	3 871 740	3 871 750
800	3 871 760	3 871 770

Noise Equivalent Temperature Difference:

Measurement temperature	NETD	NETD
	$\sigma = 1$ with $t_{90} = 80$ ms	$\sigma = 1$ with $t_{90} = 1$ s
300°C	1.5°C	0.4°C
500°C	0.6°C	0.2°C

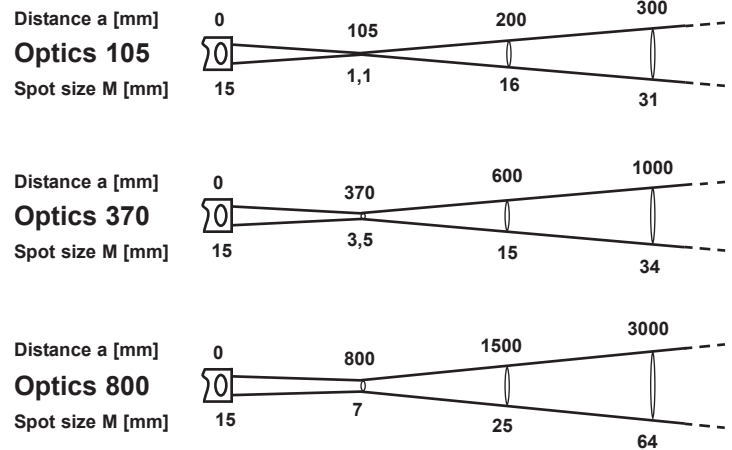
Emissivity = 1, $T_U = 23^\circ\text{C}$

Measurement uncertainty dependent on object temperature T and ambient temperature T_U ($\epsilon = 1, t_{90} = 1$ s):

T	T_A	15 ... 30°C	0 ... 15°C oder 30 ... 63°C
	200...1300°C		0.8% of reading in °C or 3°C *)
1300...1800°C		1% of reading in °C	1% of reading in °C
1800...2500°C		1.2% of reading in °C	1.3% of reading in °C

The instrument must be at a constant ambient temperature for a minimum of 30 minutes and has to be connected to the power supply

*) Whichever value is greater.



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IN 5-H *plus*

Digital, precise, compact.

Digital pyrometers IN 5 *plus* with very short response times for measurement of fast moving objects or fast heating processes (Additional data sheet to IN 5 *plus*)

- ◆ Temperature range **-32 ... 900°C**
- ◆ Subrange adjustable
- ◆ Response time **10 ms**
- ◆ Laser targeting light



Reference numbers:

Optics	Interface	
	RS232	RS485
100	3 871 200	3 871 210
300	3 871 220	3 871 230
800	3 871 240	3 871 250

Noise equivalent temperature difference (NETD)

meas.temp.	response time t_{90}	NETD
23°C	10 ms	0,7°C
	1 s	0,1°C

(Emissivity $\epsilon = 1$; $\sigma = 1$)

Measurement uncertainty:

T	T_U	15 ... 30°C	0 ... 15°C or 30 ... 63°C
-32 ... 0°C		3°C	4°C
0 ... 300°C		0.6% of reading in °C or 1.5°C *)	1% of reading in °C or 2°C *)
300 ... 900°C		1% of reading in °C	1.3% of reading in °C

Measurement uncertainty dependent on object temperature T and ambient temperature T_A ($\epsilon = 1$, $t_{90} = 1$ s). The instrument must be at a constant ambient temperature for a minimum of 15 minutes

*) The greater value is valid.

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IN 5-L plus

Digital, precise, compact

Digital pyrometer with very small spot sizes for measurements of smallest objects
(Additional data sheet to "IN 5 plus")

- ◆ Temperature range 0 ... 900°C
- ◆ 2 optics with very small spot sizes
- ◆ Short response time 180 ms
- ◆ Laser targeting light
- ◆ Serial interface RS232 or RS485



Reference numbers:

Optics	Interface	
	RS232	RS485
100	3 871 600	3 871 610
300	3 871 620	3 871 630
800	3 871 640	3 871 650

Noise Equivalent Temperature Difference (NETD):

Meas. temp.	response time t_{90}	NETD
23°C	180 ms	0.3°C
200°C	180 ms	0.2°C

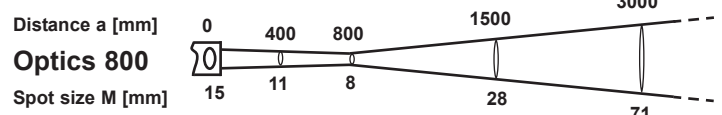
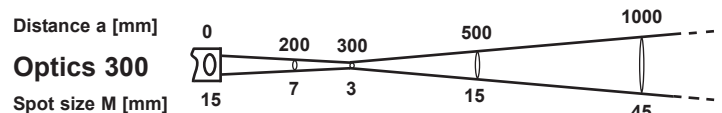
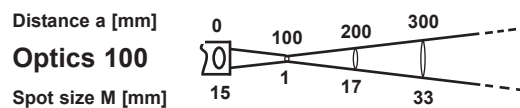
($\epsilon = 1, \sigma = 1, T_U = 23^\circ\text{C}$)

Measurement uncertainty:

T	T_U	15 ... 30°C	0 ... 15°C or 30 ... 63°C
		0.6% of reading in °C or 2°C *)	1% of reading in °C or 3°C *)
0...300°C			
300...900°C		1% of reading in °C	1.5% of reading in °C

Measurement uncertainty dependent on object temperature T and ambient temperature T_A ($\epsilon = 1, t_{90} = 1$ s). The instrument must be at a constant ambient temperature for a minimum of 15 minutes

*) The greater value is valid.



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