LUMASENSE TECHNOLOGIES

IMPAC Infrared Thermometers

For non-contact temperature measurement of non-metallic surfaces or painted, coated or anodized metals with temperature ranges between -32 and 900°C.

Series
IN 5 • IN 5 *plus*

- Series IN 5: pyrometers in two wire form with analog output 4 to 20 mA, several temperature ranges available

  Series IN 5 *plus*: pyrometers with analog output 0 or 4 to 20 mA, digital interface RS232 or RS485 and laser targeting light sighting system
- High accuracy due to digital linearisation of the output
- Small spot sizes, min. 1 mm
- Adjustable exposure time
- Compact housing

The pyrometers of series **IN 5** and **IN 5 *plus*** are specially designed for non-contact temperature measurements on non-metallic surfaces and also on painted, coated or anodized metals.

The instruments differ in their specification:

The **IN 5** is a digital pyrometer in two wire format. This format combines the high accuracy of the digital signal processing with the simple connection and operating with two wires.

Additionally to the analog output the ***plus* types** 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.

The version **IN 5-L *plus*** is equipped with optics with better fields of view for the measurements of small objects.

The high-speed version **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, *plus* types are equipped with a laser targeting light.

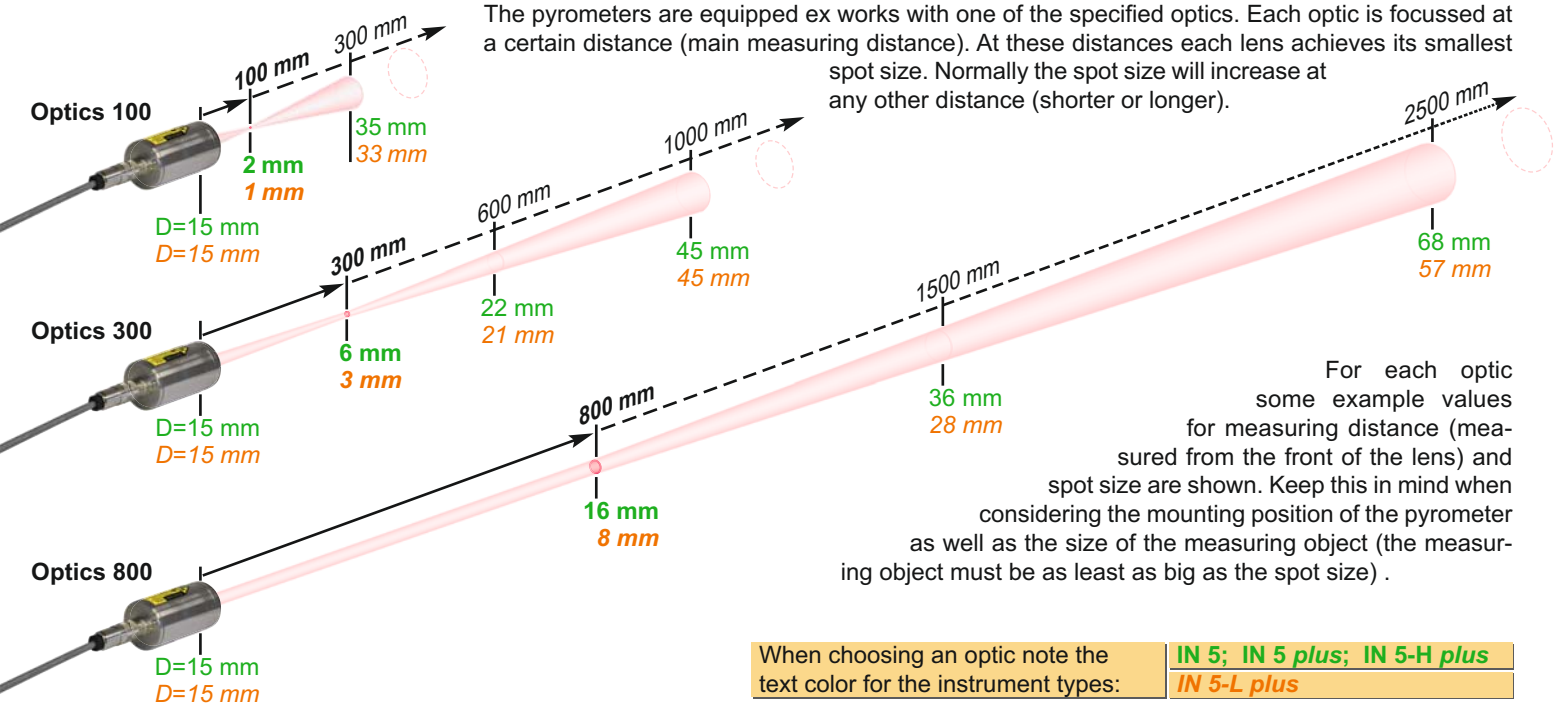
Typical applications
are measurements on:

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

Technical Data

Temperature ranges:	**IN 5:** 0 to 100°C (MB 1) 0 to 500°C (MB 5) **IN 5 *plus*; IN 5-H *plus*:** -32 to 900°C (MB 9) 0 to 200°C (MB 2) 0 to 900°C (MB 9) **IN 5-L *plus*** 0 to 900°C (MB 9) 0 to 300°C (MB 3) -32 to 50°C (MB 0.5) 0 to 400°C (MB 4) (other MB on request)
Sub range:	The *plus* instruments are user adjustable with minimum span of 51°C
IR detector:	Thermopile
Data handling:	Digital
Spectral range:	8 to 14 µm
Optics:	IN 5: Germanium (Ge) IN 5 *plus*, IN 5-H *plus*: Zinc-Sulfide (ZnS) IN 5-L *plus*: Zinc-Selenide (ZnSe)
Power supply:	IN 5: 24 V DC (10 to 30 V); *plus* instruments: 24 V DC (18 to 30 V); nominal, ripple must be less than 0.5 V
Power consumption:	IN 5: max. 20 mA; *plus* instruments: max. 70 mA
Analog output:	IN 5: 4 to 20 mA (linear); *plus* instruments: 0 to 20 mA or 4 to 20 mA (linear), adjustable
Load:	IN 5: max. 700 Ω at 24 V (max. 100 Ω at 12 V) *plus* instruments: max. 500 Ω at 24 V (max. 200 Ω at 18 V)
Interface (*plus* instruments):	RS232 or RS485 (addresable, half duplex), baud rate 1.2 up to 19.2 kBd, resolution 0,1°C
Isolation (*plus* instruments):	Power supply, analog outputs and digital interfaces are electrically isolated from each other
Parameters:	Adjustable on the pyrometer: Emissivity, exposure time. Additionally on *plus* instruments: switch for selecting the analog output of 0 or 4 to 20 mA, online- / offline switch. Via interface / PC adjustable and readable (only *plus* instruments in 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, temperature display in °C or °F, activation of ambient temperature compensation
Maximum / minimum value storage (*plus* instruments):	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
Emissivity ε:	0.2 ... 1 adjustable
Exposure time t_{90}:	IN 5: 0.08 s; adjustable in the pyrometer: 0.5 s; 1 s; 2 s; 5 s, IN 5 *plus*: 0.08 s IN 5-H *plus*: 0.01 s } adjustable in the pyrometer: 0.5 s; 1 s; 2 s; 5 s, IN 5-L *plus*: 0.18 s adjustable via interface: 0.5 s; 1 s; 2 s; 5 s; 10 s; 30 s
Measurement uncertainty: Dependent on object temperature T and ambient temperature T_{amb} (ε = 1, t_{90} = 1 s)	IN 5; IN 5 *plus*: T= -32 to 0°C: 1.5°C (T_{amb} = 15...30°C); 2°C (T_{amb} = 0…15 or 30…63°C) T=0 to 300°C: 0.6% of reading in °C or 1°C (T_{amb} = 15...30°C) *) 1% of reading in °C or 1.5°C (T_{amb} = 0...15 or 30...63°C) *) T=300 to 900°C: 1% of reading in °C (T_{amb} = 15...30°C) 1.3 % of reading in °C (T_{amb} = 0...15 or 30…63°C) IN 5-H *plus*: T= -32 to 0°C: 3°C (T_{amb} = 15...30°C); 4°C (T_{amb} = 0...15 or 30…63°C) T=0 to 300°C: 0.6% of reading in °C or 1.5°C (T_{amb} = 15...30°C) *) 1% of reading in °C or 2°C (T_{amb} = 0...15 or 30...63°C) *) T=300 to 900°C: 1% of reading in °C (T_{amb} = 15...30°C) 1.3 % of reading in °C (T_{amb} = 0...15 or 30...63°C) IN 5-L *plus*: T=0 to 300°C: 0.6% of reading in °C or 2°C (T_{amb} = 15...30°C) **) 1% of reading in °C or 3°C (T_{amb} = 0...15 or 30...63°C) **) T=300 to 900°C: 1% of reading in °C (T_{amb} = 15...30°C) 1.5 % of reading in °C (T_{amb} = 0...15 or 30...63°C) *) Whichever value is greater. The instrument must be at a const. amb. temp. for min. 15 min. and has to be connected to the power supply **) Whichever value is greater. The instrument must be at a const. amb. temp. for min. 30 min. and has to be connected to the power supply
Repeatability: (ε = 1, t_{90} = 1 s)	0.3 % of reading in °C or 0.6 °C (Whichever value is greater. The instrument must be at a constant ambient temperature for a minimum of 15 minutes (IN 5; IN 5 *plus* or IN 5-H *plus*) or 30 minutes (IN 5-L *plus*).
Noise Equivalent Temperature Difference (NETD): (ε = 1, T_{amb} = 23°C)	IN 5; IN 5 *plus*: at t_{90} = 80 ms: 0.2°C (at 23°C measuring temperature) at t_{90} = 1 s: 0.05°C (at 23°C measuring temperature) IN 5-H *plus*: at t_{90} = 10 ms: 0.7°C (at 23°C measuring temperature) at t_{90} = 1 s: 0.1°C (at 23°C measuring temperature) IN 5-L *plus*: at t_{90} = 180 ms: 0.3°C (at 23°C measuring temperature) at t_{90} = 180 ms: 0.2°C (at 200°C measuring temperature) at t_{90} = 1 s: 0.15°C (at 23°C measuring temperature) at t_{90} = 1 s: 0.1°C (at 200°C measuring temperature)
Ambient temperature:	IN 5: 0 to 70°C; *plus* instruments: 0 to 63°C
Storage temperature:	-20 to 70°C
Weight:	410 g
Housing:	Stainless steel
Sighting (*plus* instruments):	Laser targeting light (max. power level < 1 mW, λ = 630-680 nm, CDRH class II)
Relative humidity:	Non condensing conditions
Protection class:	IP65 (DIN 40050)
CE-label:	According to EU directives about electromagnetic immunity

Optics



The pyrometers are equipped ex works with one of the specified optics. Each optic is focussed 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).

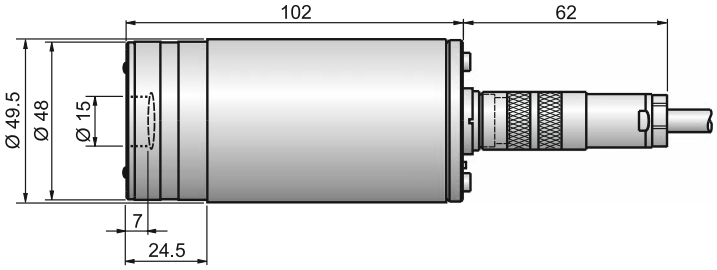
For each optic some example values for measuring distance (measured from the front of the lens) and spot size are shown. Keep this in mind when considering the mounting position of the pyrometer as well as the size of the measuring object (the measuring object must be as least as big as the spot size)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

When choosing an optic note the text color for the instrument types:	**IN 5; IN 5 *plus*; IN 5-H *plus***
	IN 5-L plus

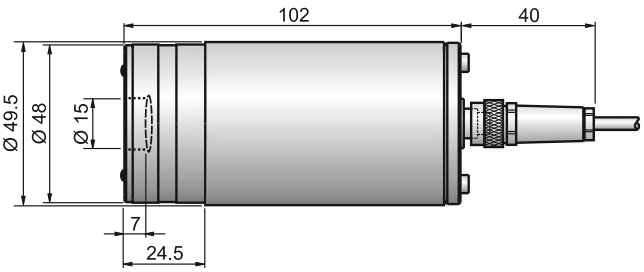
The determination of the main spot size *"M"* in the main measuring distance *"a"* occurs at 90% measuring signal.

Dimensions

IN 5 *plus*; IN 5-H *plus*; IN 5-L *plus*:



IN 5



All dimensions in mm

Instrument Settings

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

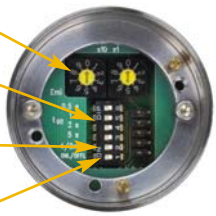
IN 5:

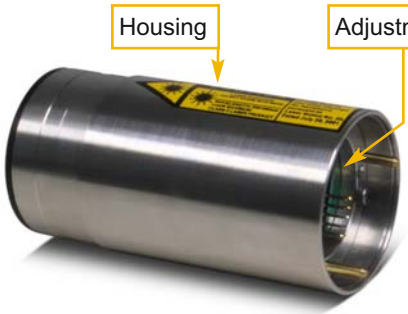
- Emissivity ε
- Exposure time t_{90}

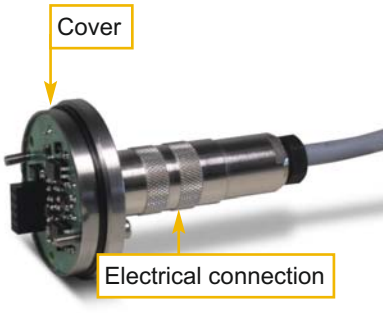
***"plus"* types** can alternatively switched in online mode to enable the communication via serial interface and software *InfraWin* (in scope of delivery) on a PC. This allows additional setting options as well as the graphical temperature display combined with subsequent analysis of the measurement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

***plus* types:**

- Emissivity ε
- Exposure time t_{90}
- Analog output 0 or 4 to 20 mA
- Online / Offline







Reference Numbers

Type	Optics	Temp. range *)	Ref. number
IN 5	When ordering please select one optics (optics a = 100, 300 or 800).	0 to 100°C	3 869 010
		0 to 200°C	3 869 020
		0 to 300°C	3 869 030
		0 to 400°C	3 869 040
		0 to 500°C	3 869 050
		0 to 900°C	3 869 090
		-32 to 50°C	3 869 100
		-32 to 900°C	3 869 080

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

*) Other temperature ranges on request

Scope of delivery: Instrument with selectable optics, works certificate, PC measurement and evaluation software *InfraWin*.

Ordering note: A connection cable is not included with the instrument and has to be ordered separately

Accessories:

Connection cable for IN 5:

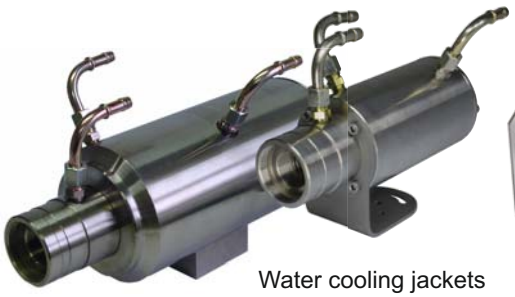
	2 m	5 m	10 m	15 m	30 m
3 820 ...	... 210	... 560	... 570	... 580	... 590

Connection cable for *plus* instruments (straight plug):

	5 m	10 m	15 m	20 m	25 m	30 m
3 820 ...	... 330	... 500	...510	... 810	... 820	... 520

3 820 320 Connection cable for *plus* instruments, 5 m (angled connector, additional laser targeting light push button)
3 820 740 Connection cable *plus* instruments, 5 m, (straight connector, temperature resistant up to 200°C)
3 852 290 Power supply NG DC (100...240 V AC ⇒ 24 V DC, 1 A)
3 890 640 DA 4000-N: LED digital display (specify 230 or 115 V AC)
3 890 650 DA 4000: as DA 4000-N, additionally with 2 limit switches (specify 230 or 115 V AC)
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 with RS485
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 with RS485
3 826 500 HT 6000: portable battery driven indicator and instrument for pyrometer parameter settings; RS232 and RS485 interface
3 826 510 PI 6000: programmable PID controller
3 852 430 Converter I-7520; RS485 ⇔ RS232 (half duplex)
3 852 440 Protocol converter RS485/RS232 (switchable) ⇔ Profibus-DP for 1 instrument
3 852 460 Protocol converter RS485 ⇔ Profibus-DP for 32 instruments
3 890 610 Galvanic separator for IN 5 (DIN rail mounting)
3 863 010 Converter IW 5-C (4 to 20 mA in 0 to 20 mA)
3 834 210 Adjustable mounting support
3 835 160 Air purge unit
3 835 440 Air purge unit, stainless steel
3 837 230 Water cooling jacket (heavy design) with integrated air purge unit (metric mounting threads)
5 837 230 (same with UNC mounting threads)
3 837 350 Heavy water cooling jacket with protection window (with metric mounting threads)
5 837 350 (same with UNC mounting threads)
3 837 370 Water cooling jacket (lightweight design) with integrated air purge unit (metric mounting threads)
5 837 370 (same with UNC mounting threads)
3 837 400 Lightweight water cooling jacket with protection window (with metric mounting threads)
5 837 400 (same with UNC mounting threads)
3 846 100 Mounting tube
3 846 120 Flange tube
3 846 630 Vacuum flange KF16 with protection window
3 846 660 Spare protection window, Ø 25 x 3 with Viton-O-ring

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



Water cooling jackets (heavy and lightweight design)

Mounting support

Air purge units

Example for flange system

Programmable PID controller PI 6000

Power supply NG DC

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