

**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:

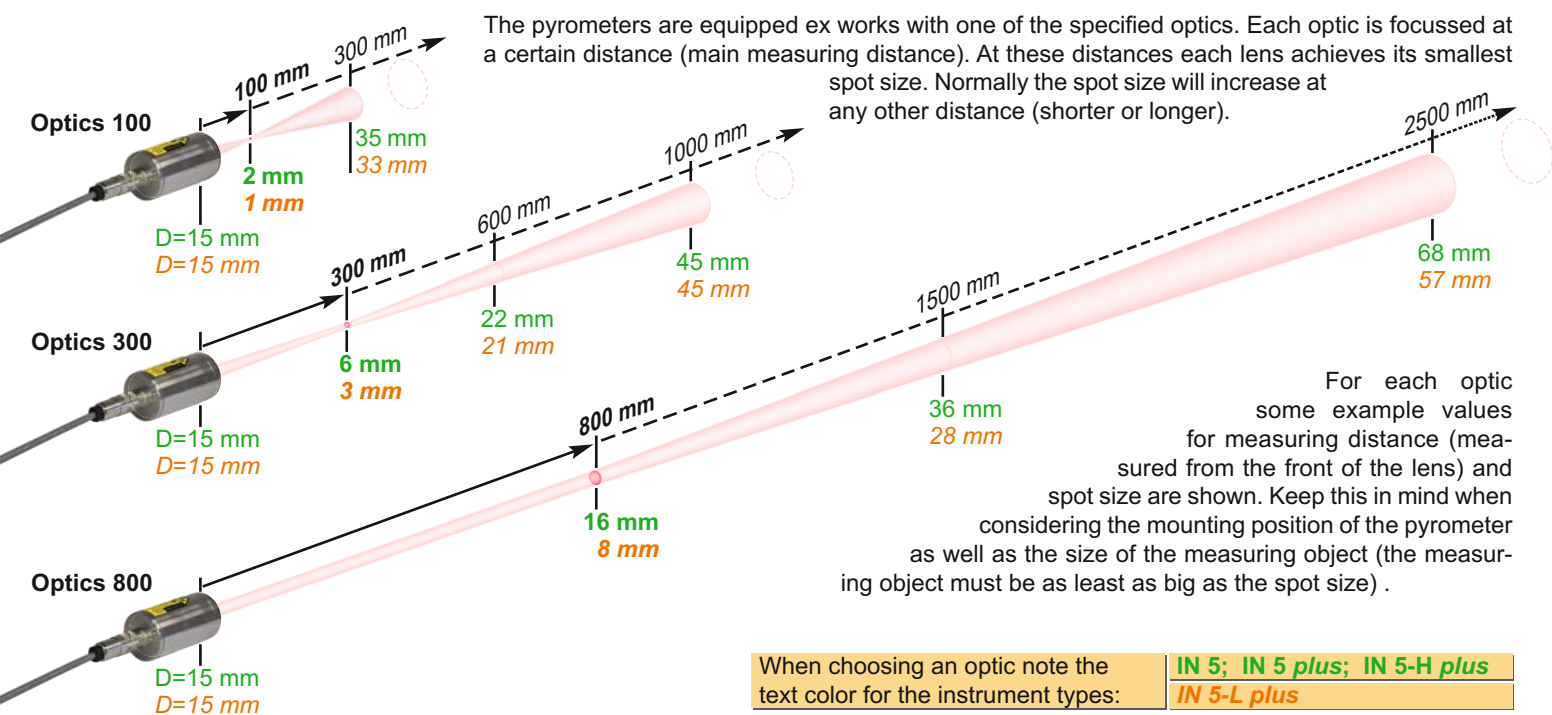
- |                 |                 |
|-----------------|-----------------|
| • Plastics      | • Ceramics      |
| • Fluids        | • Wood          |
| • Rubber        | • Textiles      |
| • Painted parts | • Glass         |
| • Paper         | • Food          |
| • Asphalt       | • Coated metals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

## Technical Data

|   |   |
|---|---|
| Temperature ranges:   | <b>IN 5:</b> 0 to 100°C (MB 1) 0 to 500°C (MB 5) <b>IN 5 plus; IN 5-H plus:</b> -32 to 900°C (MB 9)<br>0 to 200°C (MB 2) 0 to 900°C (MB 9) <b>IN 5-L plus</b> 0 to 900°C (MB 9)<br>0 to 300°C (MB 3) -32 to 50°C (MB 0.5)<br>0 to 400°C (MB 4) (other MB on request)  |
| Sub range:  | The <i>plus</i> 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)<br>IN 5 <i>plus</i> , IN 5-H <i>plus</i> : Zinc-Sulfide (ZnS)<br>IN 5-L <i>plus</i> : Zinc-Selenide (ZnSe)   |
| Power supply:   | IN 5: 24 V DC (10 to 30 V); <i>plus</i> instruments: 24 V DC (18 to 30 V); nominal, ripple must be less than 0.5 V  |
| Power consumption:  | IN 5: max. 20 mA; <i>plus</i> instruments: max. 70 mA   |
| Analog output:  | IN 5: 4 to 20 mA (linear); <i>plus</i> 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)<br><i>plus</i> instruments: max. 500 Ω at 24 V (max. 200 Ω at 18 V)   |
| Interface ( <i>plus</i> instruments):   | RS232 or RS485 (addressable, half duplex), baud rate 1.2 up to 19.2 kbd, resolution 0,1°C   |
| Isolation ( <i>plus</i> instruments):   | Power supply, analog outputs and digital interfaces are electrically isolated from each other   |
| Parameters:   | Adjustable on the pyrometer:<br>Emissivity, exposure time. Additionally on <i>plus</i> instruments: switch for selecting the analog output of 0 or 4 to 20 mA, online- / offline switch.<br>Via interface / PC adjustable and readable (only <i>plus</i> instruments in online mode):<br>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 ( <i>plus</i> 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 $\epsilon$ :   | 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,<br>IN 5 <i>plus</i> : 0.08 s } adjustable in the pyrometer: 0.5 s; 1 s; 2 s; 5 s,<br>IN 5-H <i>plus</i> : 0.01 s } adjustable via interface: 0.5 s; 1 s; 2 s; 5 s; 10 s; 30 s<br>IN 5-L <i>plus</i> : 0.18 s }   |
| Measurement uncertainty:<br><br>Dependent on object temperature T and ambient temperature $T_{amb}$ ( $\epsilon = 1, t_{90} = 1$ s) | IN 5; IN 5 <i>plus</i> : T= -32 to 0°C: 1.5°C ( $T_{amb} = 15...30°C$ ); 2°C ( $T_{amb} = 0...15$ or $30...63°C$ )<br>T=0 to 300°C: 0.6% of reading in °C or 1°C ( $T_{amb} = 15...30°C$ ) *)<br>1% of reading in °C or 1.5°C ( $T_{amb} = 0...15$ or $30...63°C$ ) *)<br>T=300 to 900°C: 1% of reading in °C ( $T_{amb} = 15...30°C$ )<br>1.3 % of reading in °C ( $T_{amb} = 0...15$ or $30...63°C$ )<br>IN 5-H <i>plus</i> : T= -32 to 0°C: 3°C ( $T_{amb} = 15...30°C$ ); 4°C ( $T_{amb} = 0...15$ or $30...63°C$ )<br>T=0 to 300°C: 0.6% of reading in °C or 1.5°C ( $T_{amb} = 15...30°C$ ) *)<br>1% of reading in °C or 2°C ( $T_{amb} = 0...15$ or $30...63°C$ ) *)<br>T=300 to 900°C: 1% of reading in °C ( $T_{amb} = 15...30°C$ )<br>1.3 % of reading in °C ( $T_{amb} = 0...15$ or $30...63°C$ )<br>IN 5-L <i>plus</i> : T=0 to 300°C: 0.6% of reading in °C or 2°C ( $T_{amb} = 15...30°C$ ) **)<br>1% of reading in °C or 3°C ( $T_{amb} = 0...15$ or $30...63°C$ ) **)<br>T=300 to 900°C: 1% of reading in °C ( $T_{amb} = 15...30°C$ )<br>1.5 % of reading in °C ( $T_{amb} = 0...15$ or $30...63°C$ )<br><br>*) 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<br>)*) 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:<br>( $\epsilon = 1, t_{90} = 1$ 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 <i>plus</i> or IN 5-H <i>plus</i> ) or 30 minutes (IN 5-L <i>plus</i> ).   |
| Noise Equivalent Temperature Difference (NETD):<br>( $\epsilon = 1, T_{amb} = 23°C$ )   | IN 5; IN 5 <i>plus</i> : at $t_{90} = 80$ ms: 0.2°C (at 23°C measuring temperature)<br>at $t_{90} = 1$ s: 0.05°C (at 23°C measuring temperature)<br>IN 5-H <i>plus</i> : at $t_{90} = 10$ ms: 0.7°C (at 23°C measuring temperature)<br>at $t_{90} = 1$ s: 0.1°C (at 23°C measuring temperature)<br>IN 5-L <i>plus</i> : at $t_{90} = 180$ ms: 0.3°C (at 23°C measuring temperature)<br>at $t_{90} = 180$ ms: 0.2°C (at 200°C measuring temperature)<br>at $t_{90} = 1$ s: 0.15°C (at 23°C measuring temperature)<br>at $t_{90} = 1$ s: 0.1°C (at 200°C measuring temperature)   |
| Ambient temperature:  | IN 5: 0 to 70°C; <i>plus</i> instruments: 0 to 63°C   |
| Storage temperature:  | -20 to 70°C   |
| Weight:   | 410 g   |
| Housing:  | Stainless steel   |
| Sighting ( <i>plus</i> instruments):  | Laser targeting light (max. power level < 1 mW, $\lambda = 630-680$ nm, CDRH class II)  |
| Relative humidity:  | Non condensing conditions   |
| Protection class:   | IP65 (DIN 40050)  |
| CE-label:   | According to EU directives about electromagnetic immunity   |



## Optics

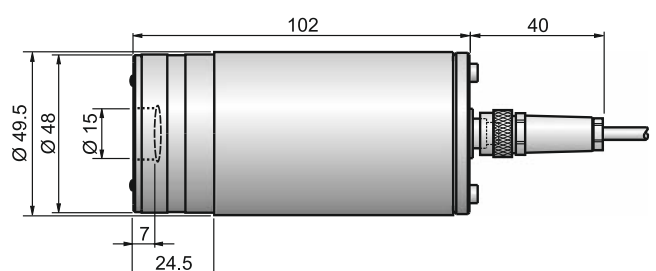
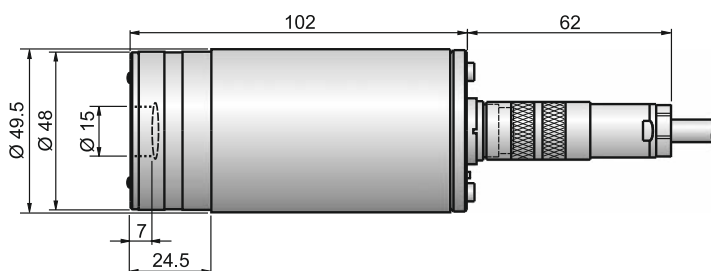


The determination of the main spot size "M" in the main measuring distance "a" occurs at 90% measuring signal.

## 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  $\epsilon$

Exposure time  $t_{90}$



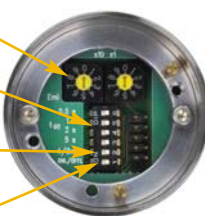
plus types:

Emissivity  $\epsilon$

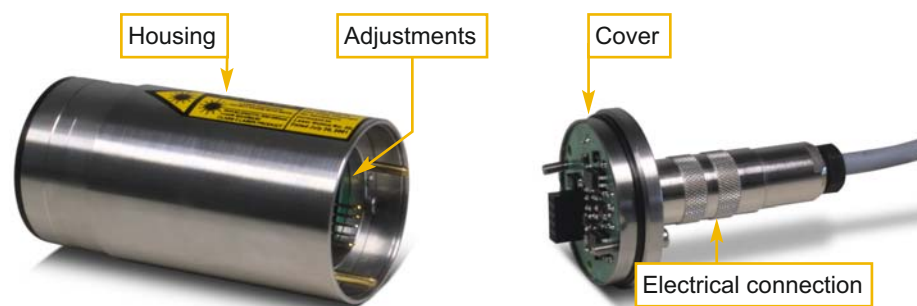
Exposure time  $t_{90}$

Analog output  
0 or 4 to 20 mA

Online / Offline



"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.



## Reference Numbers

| Type | Optics   | Temp. range *) | Ref. number | Type               | Optics    | Temp. range         | Interface         |           |
|------|--|----------------|-------------|--------------------|-----------|---------------------|-------------------|-----------|
|      |  |                |             |                    |           |                     | RS232             | RS485     |
| IN 5 | When ordering please select one optics (optics a = 100, 300 or 800). | 0 to 100°C     | 3 869 010   | IN 5 <i>plus</i>   | 100       | -32 to 900°C (MB 9) | 3 869 400         | 3 869 410 |
|      |  | 0 to 200°C     | 3 869 020   |                    | 300       |                     | 3 869 420         | 3 869 430 |
|      |  | 0 to 300°C     | 3 869 030   |                    | 800       |                     | 3 869 440         | 3 869 450 |
|      |  | 0 to 400°C     | 3 869 040   | IN 5-H <i>plus</i> | 100       | -32 to 900°C (MB 9) | 3 871 200         | 3 871 210 |
|      |  | 0 to 500°C     | 3 869 050   |                    | 300       |                     | 3 871 220         | 3 871 230 |
|      |  | 0 to 900°C     | 3 869 090   |                    | 800       |                     | 3 871 240         | 3 871 250 |
|      |  |                |             | -32 to 50°C        | 3 869 100 | IN 5-L <i>plus</i>  | 0 to 900°C (MB 9) | 3 871 600 |
|      |  | -32 to 900°C   | 3 869 080   | 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:  | 3 852 460 | Protocol converter RS485 ↔ Profibus-DP for 32 instruments  |         |         |         |  |
|           | 2 m   | 5 m       | 10 m   | 15 m    | 30 m    |         |  |
| 3 820 ... | ... 210   | ... 560   | ... 570  | ... 580 | ... 590 |         |  |
|           | Connection cable for <i>plus</i> 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 <i>plus</i> instruments, 5 m (angled connector, additional laser targeting light push button)    | 3 835 160 | Air purge unit   |         |         |         |  |
| 3 820 740 | Connection cable <i>plus</i> instruments, 5 m, (straight connector, temperature resistant up to 200°C )               | 3 835 440 | Air purge unit, stainless steel  |         |         |         |  |
| 3 852 290 | Power supply NG DC (100...240 V AC ⇒ 24 V DC, 1 A)  | 3 837 230 | Water cooling jacket (heavy design) with integrated air purge unit (metric mounting threads) (same with UNC mounting threads)  |         |         |         |  |
| 3 890 640 | DA 4000-N: LED digital display (specify 230 or 115 V AC)  | 5 837 230 | 5 837 230  |         |         |         |  |
| 3 890 650 | DA 4000: as DA 4000-N, additionally with 2 limit switches (specify 230 or 115 V AC)                                   | 3 837 350 | Heavy water cooling jacket with protection window (with metric mounting threads) (same with UNC mounting threads)  |         |         |         |  |
| 3 890 560 | DA 6000-N: LED digital display with digital input RS232 and possibility for pyrometer parameter settings              | 3 837 370 | Water cooling jacket (lightweight design) with integrated air purge unit (metric mounting threads) (same with UNC mounting threads)  |         |         |         |  |
| 3 890 570 | DA 6000-N with RS485  | 3 837 400 | Lightweight water cooling jacket with protection window (with metric mounting threads) (same with UNC mounting threads)  |         |         |         |  |
| 3 890 520 | DA 6000: LED digital display, digital and analog input, 2 limit switches, maximum value storage, analog output, RS232 | 5 837 400 | 5 837 400  |         |         |         |  |
| 3 890 530 | DA 6000 with RS485  | 3 846 100 | Mounting tube  |         |         |         |  |
| 3 826 500 | HT 6000: portable battery driven indicator and instrument for pyrometer parameter settings; RS232 and RS485 interface | 3 846 120 | Flange tube  |         |         |         |  |
| 3 826 510 | PI 6000: programmable PID controller  | 3 846 630 | Vacuum flange KF16 with protection window  |         |         |         |  |
| 3 852 430 | Converter I-7520; RS485 ↔ RS232 (half duplex)   | 3 846 660 | Spare protection window, Ø 25 x 3 with Viton-O-ring  |         |         |         |  |
| 3 852 440 | Protocol converter RS485/RS232 (switchable) ↔ Profibus-DP for 1 instrument  |           | 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 |         |         |         |  |



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