

**X** Non-contact thermometry best done with *INFRATHERM* pyrometers



# IN 140/5

Highly accurate, fully digital, fast

Digital pyrometer for measurement of glass surfaces with a spectral response of 5.14  $\mu\text{m}$

- ◆ Temperature ranges between 250 and 2500°C
- ◆ Very short response time, min 10 ms
- ◆ Extremely small spot sizes, min 0.9 mm
- ◆ Focusable optics
- ◆ Optimized thru-lens view finder or laser targeting light
- ◆ Built-in digital display
- ◆ Interface RS232 / RS485 switchable
- ◆ Test current output



The **IN 140/5** is a digital pyrometer for non-contact temperature measurement of glass and quartz glass surfaces with temperature ranges between 250 and 2500°C.

The instrument is characterized by a very short response time and extremely small spot sizes. Thus it is applicable for fast measuring tasks and for the measurement of smallest objects.

The type **IN 140/5-L** is equipped with a 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 ms.

For optimal match of the instrument to the application (size of the measuring object, measuring distance) different focusable optics are available. The exact alignment of the measuring object will be achieved by a laser targeting light or a optimized thru-lens view finder.

The pyrometer is equipped with a display which shows in measuring mode the current temperature. Additionally all parameters can be read if they are changed via the integrated keys at the instrument.

Via serial interface and the provided software *InfraWin* the temperature can be displayed and stored on a PC, parametrizing can also be done. The diagnostics function allows to check pyrometer and wiring.

#### Typical applications:

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

## Technical Data

|  |   |
|--|---|
| Temperature ranges:  | 250 ... 1400°C (MB 14)      450 ... 1500°C (MB 15)<br>300 ... 1600°C (MB 16)      500 ... 2500°C (MB 25)  |
| Sub range:   | any range adjustable within the temperature range, minimum span 51°C  |
| Data handling:   | digital   |
| Spectral range:  | 5.14 µm (narrow band, for glass surfaces)   |
| IR detector:   | Thermopile  |
| Power supply:  | 24 V AC or DC (14 ... 30 V AC or DC) (AC: 48 ... 62 Hz)   |
| Power consumption:   | max. 1.2 W  |
| Analog output:   | 0 ... 20 mA or 4 ... 20 mA (linear), switchable; test current 10 mA or 12 mA by pressing test key   |
| Load:  | 0 ... 500 Ω   |
| Digital Interface:   | RS232 or RS485 addressable (half duplex), switchable; baud rate 1200 up to 115200 Bd  |
| Resolution:  | 0.1°C on interface; 0.1°C/°F (450...999°C / 842...999°F), 1°C (= 1000°C/°F) on display; < 0.1% of the adjusted temperature sub range at the analog output   |
| Isolation:   | power supply, analog output and digital interface are galvanically isolated from each other   |
| 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.  |
| Emissivity:  | 10 ... 120% adjustable in the instrument or via interface in steps of 0.1%  |
| Exposure time $t_{90}$ :   | IN 140/5; IN 140/5-L: 40 ms; adjustable at 0.05 s; 0.25 s; 1 s; 3 s; 10 s<br>IN 140/5-H: 10 ms; adjustable at 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   |
| Uncertainty:<br>( $\epsilon = 1$ , $t_{90} = 1$ s)   | up to 1300°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 $30...70°C$ ) *)<br>above 1300°C: 0.8 % of reading in °C ( $T_{amb.} = 15...30°C$ )<br>1.2 % of reading in °C ( $T_{amb.} = 0...15$ or $30...70°C$ )<br>*) whichever value is greater. The instrument must be at a constant ambient temperature for a minimum of 30 minutes |
| Repeatability ( $\epsilon = 1$ , $t_{90} = 1$ s):  | 0.3% of measured value in °C  |
| Noise Equivalent Temperature Difference (NETD):<br>(at $\epsilon=1$ , $t_{90}=1$ s, $T_{amb.}=10...40°C$ ) | MB 15 / 25: at $t_{90} = \min$ : 1.2°C (at 500°C measuring temperature)<br>at $t_{90} = \min$ : 0.6°C (at 1200°C measuring temperature)<br>MB 14 / 16: at $t_{90} = \min$ : 0.7°C (at 310°C measuring temperature)<br>at $t_{90} = \min$ : 0.2°C (at 500°C measuring temperature)<br>at $t_{90} = \min$ : 0.15°C (at 1200°C measuring temperature)  |
| Ambient temperature:   | 0 ... 70°C  |
| Storage temperature:   | -20 ... 80°C  |
| Protection class:  | IP65 (DIN 40050)  |
| Weight:  | approx. 550 g   |
| Dimensions:  | see drawing   |
| Sighting:  | thru-lens view finder or laser targeting light (laser class 2, max. power < 1 mW, 630-660 nm)   |
| CE-label:  | according to EU directives about electromagnetic immunity   |

## Features

**Advantages or the digital signal processing:** The signal processing of series 140 pyrometers is fully digital, i.e. the detector signal are digitized immediately and digitally processed. With this technique an extremely high accuracy and repeatability is achieved.

**Accuracy:** The high accuracy is achieved by the digital linearisation of the sensor output as well as the digital compensation for the ambient temperature.

**Temperature range:** Due to the digital technique any temperature sub range within the full temperature range can be set. The analog measuring output corresponds automatically to the selected sub range. This setting of a sub range does not effect the high accuracy and repeatability.

**Output:** The analog measuring outputs 0 ... 20 mA or 4 ... 20 mA are selectable as well as the serial digital interfaces RS232 or RS485. Additionally the interface allows the controlling of the pyrometer via PC.

**Bus control:** The serial interface RS485 facilitates the integration of the pyrometer into existing field bus systems.

**Calibration:** A calibration of the pyrometer can be done with help of a PC and a calibration source without opening the housing.



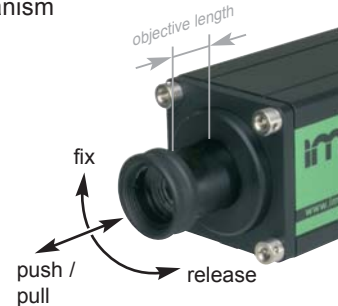
## Focusable Optics

| Focusable optics IN 140/5 und IN 140/5-H |                              |                         |                 |
|--|------------------------------|-------------------------|-----------------|
|  | Measuring distance<br>a [mm] | Spot size $M_{90}$ [mm] |                 |
|  |                              | MB 14 and MB 16         | MB 15 and MB 25 |
| Optics<br>1-N                            | a = 100                      | 1.3                     | 1.0             |
|  | a = 111                      | 1.3                     | 1.0             |
|  | a = 128                      | 1.4                     | 1.1             |
| Optics<br>2-N                            | a = 187                      | 1.6                     | 1.3             |
|  | a = 229                      | 2.1                     | 1.7             |
|  | a = 322                      | 2.9                     | 2.4             |
| Optics<br>3-N                            | a = 362                      | 3.3                     | 2.4             |
|  | a = 573                      | 5.7                     | 4.1             |
|  | a = 2170                     | 21                      | 15              |
| Aperture D [mm] *):                      |                              | 14 ... 17               |                 |

| Focusable optics IN 140/5-L |                              |                         |                                  |
|-----------------------------|------------------------------|-------------------------|----------------------------------|
|                             | Measuring distance<br>a [mm] | Spot size $M_{90}$ [mm] |                                  |
|                             |                              | MB 14 and MB 16         | MB 15 (targeting light)<br>MB 25 |
| Optics<br>2-NL              | a = 159                      | 1.3                     | 0.9                              |
|                             | a = 178                      | 1.6                     | 1.1                              |
|                             | a = 235                      | 2.2                     | 1.5                              |
| Aperture D [mm] *):         |                              | 14 ... 17               |                                  |

\*) Note: The aperture D depends on the objective length

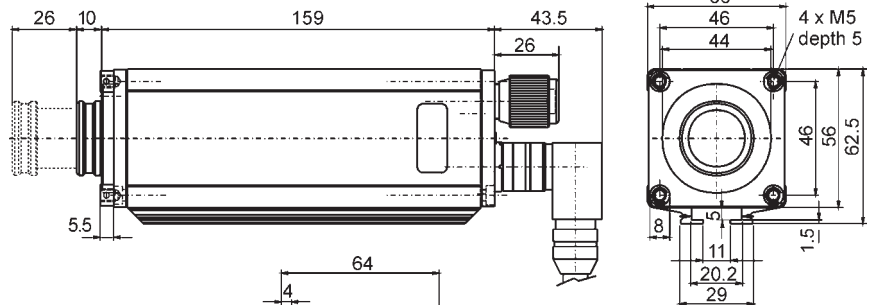
The pyrometers are available with different focusable optics. They offer the smallest possible spot size at any distance (exception: the optics of the IN 140/5-L with MB 15 and view finder is fixed adjusted). The adjustment can be done easily without additional tools with help of the „turn and clamp“ mechanism (one hand). The spot sizes are shown in the following table (all distances are measured from the front of the lens). For spot sizes between those in the table, values can be found by interpolation.



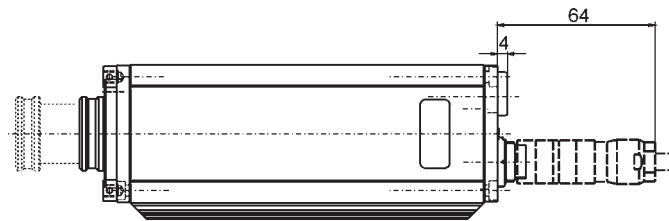
| Fixes optics IN 140/5-L      |  |
|------------------------------|--|
| Measuring distance<br>a [mm] | Spot size $M_{90}$ [mm]<br>MB 15 (view finder) |
| a = 163                      | 0.9  |
| Aperture D [mm]:             | 17   |

## Dimensions

Pyrometer with thru-lens view finder



Pyrometer with laser targeting light



All dimensions in mm

## Reference Numbers

| IN 140/5            | With laser targeting light | With thru-lens view finder |
|---------------------|----------------------------|----------------------------|
| MB 14: 250...1400°C | 3 877 380                  | 3 877 390                  |
| MB 16: 300...1600°C | 3 877 360                  | 3 877 370                  |
| MB 15: 450...1500°C | 3 877 400                  | 3 877 410                  |
| MB 25: 500...2500°C | 3 877 420                  | 3 877 430                  |

| IN 140/5-L          | With laser targeting light | With thru-lens view finder |
|---------------------|----------------------------|----------------------------|
| MB 14: 250...1400°C | 3 877 480                  | 3 877 490                  |
| MB 16: 300...1600°C | 3 877 460                  | 3 877 470                  |
| MB 15: 450...1500°C | 3 877 500                  | 3 877 510                  |
| MB 25: 500...2500°C | 3 877 520                  | 3 877 530                  |

**Ordering notes:**

- When ordering please select one optics (1-N, 2-N, 3-N or 2-NL for IN 140/5-L).
- A connection cable is not included in scope of delivery and has to be ordered separately.

**Scope of delivery:** Device with thru-lens sighting or laser targeting light, selectable optics, PC software "InfraWin", allen key 3 mm, user manual.



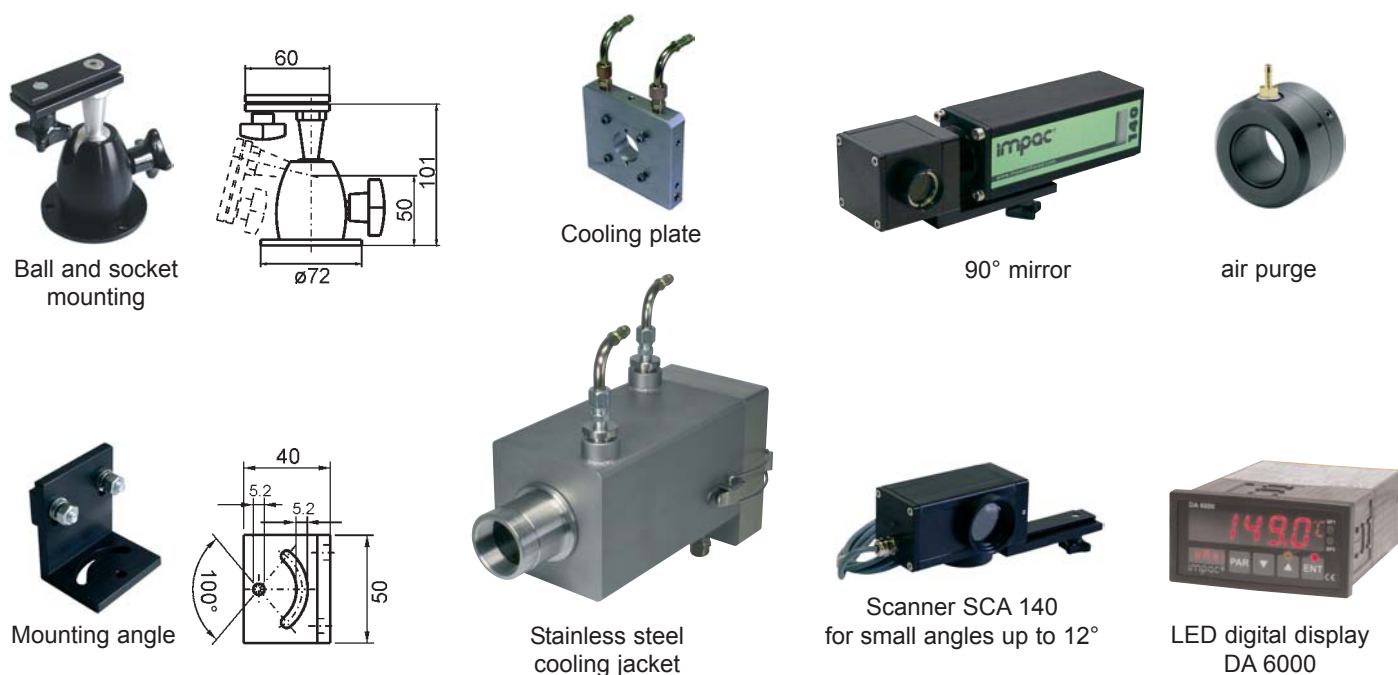
| IN 140/5-H          | With laser targeting light | With thru-lens view finder |
|---------------------|----------------------------|----------------------------|
| MB 14: 250...1400°C | 3 877 580                  | 3 877 590                  |
| MB 16: 300...1600°C | 3 877 560                  | 3 877 570                  |
| MB 15: 450...1500°C | 3 877 600                  | 3 877 610                  |
| MB 25: 500...2500°C | 3 877 620                  | 3 877 630                  |



## Reference Numbers Accessories

|           |   |           |  |
|-----------|---|-----------|--|
| 3 820 340 | Connection cable, length 5 m, 90° connector   | 3 835 460 | 90° mirror with CaF <sub>2</sub> window  |
| 3 820 530 | Connection cable, length 10 m, 90° connector  | 3 843 530 | Scanner SCA 140, (scanning angle 0 ... 12°, 1 ... 5 Hz), with CaF <sub>2</sub> window  |
| 3 820 540 | Connection cable, length 15 m, 90° connector  | 3 835 290 | Air purge for scanner SCA 140  |
| 3 820 830 | Connection cable, length 20 m, 90° connector  | 3 852 540 | Power supply NG 0D for DIN rail mounting; 85 ... 265 V AC ⇒ 24 V DC, 600 mA  |
| 3 820 840 | Connection cable, length 25 m, 90° connector  | 3 852 550 | Power supply NG 2D, as NG 0D: additionally with 2 limit switches   |
| 3 820 550 | Connection cable, length 30 m, 90° connector  | 3 890 640 | LED digital display DA 4000-N  |
| 3 820 330 | Connection cable, length 5 m, straight connector                                    | 3 890 650 | LED digital display DA 4000: with 2 limit switches   |
| 3 820 500 | Connection cable, length 10 m, straight connector                                   | 3 890 560 | LED digital display DA 6000-N: with possibility for pyrometer parameter settings for digital IMPAC pyrometers; RS232 interface |
| 3 820 510 | Connection cable, length 15 m, straight connector                                   | 3 890 570 | LED digital display DA 6000-N: with possibility for pyrometer parameter settings for digital IMPAC pyrometers; RS485 interface |
| 3 820 810 | Connection cable, length 20 m, straight connector                                   | 3 890 520 | LED digital display DA 6000; DA 6000-N additional with 2 limit switches and analog input and output, RS232 interface           |
| 3 820 820 | Connection cable, length 25 m, straight connector                                   | 3 890 530 | LED digital display DA 6000; DA 6000-N additional with 2 limit switches and analog input and output, RS485 interface           |
| 3 820 520 | Connection cable, length 30 m, straight connector                                   | 3 825 430 | I-7520, RS232 ⇔ RS485 converter  |
| 3 820 740 | Connection cable, length 5 m, straight connector, temperature resistant up to 200°C |           |  |
| 3 820 750 | Connection cable, length 5 m, 90° connector, temperature resistant up to 200°C      |           |  |
| 3 834 280 | Adjustable mounting angle   |           |  |
| 3 834 270 | Ball and socket mounting  |           |  |
| 3 835 230 | Air purge   |           |  |
| 3 837 290 | Cooling jacket, stainless steel   |           |  |
| 3 835 060 | Air purge for cooling jacket  |           |  |
| 3 834 140 | Heavy ball and socket mounting for cooling jacket                                   |           |  |
| 3 837 240 | Cooling plate   |           |  |

## Overview Accessories



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Temperature Measurement

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