The Impac® ISR 12-LO and IGAR 12-LO are digital, highly accurate 2-color infrared thermometers with fiber optics for non-contact temperature measurement. The pyrometers measure using the 2-color principle in which two adjacent wavelength are used to calculate the temperature and can be switched to 1-color mode and used like a conventional pyrometer. The metal mode allows for measurements of metals and alloys with unknown K-factor (emissivity slope). Optical head and fiber can be used in very high ambient temperatures up to 250°C without cooling and are unaffected by electromagnetical interferences.

**PRODUCT HIGHLIGHTS**

- Extremely fast exposure time
- Very small spot sizes with built-in laser targeting light
- Built-in lens contamination control system
- Switchable 2-color, 1-color, and metal modes
- All parameters adjustable at the instrument
- Output 0 to 20 mA or 4 to 20 mA (switchable)

**TYPICAL APPLICATIONS**

- Induction heating
- Welding
- Casting
- Forging
- Annealing
- Sintering
- Rolling mill
- Rotary kilns
- Glass drop
- Pouring drop
- Research and development
- Laser applications

**AT A GLANCE**

**Temperature Ranges**

<table>
<thead>
<tr>
<th>Instrument</th>
<th>Range</th>
<th>Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>ISR 12-LO</td>
<td>600 to 1300°C</td>
<td>MB 13</td>
</tr>
<tr>
<td></td>
<td>750 to 1800°C</td>
<td>MB 18</td>
</tr>
<tr>
<td></td>
<td>900 to 2500°C</td>
<td>MB 25</td>
</tr>
<tr>
<td></td>
<td>1000 to 3300°C</td>
<td>MB 33</td>
</tr>
<tr>
<td>IGAR 12-LO</td>
<td>300 to 1000°C</td>
<td>MB 10</td>
</tr>
<tr>
<td></td>
<td>350 to 1300°C</td>
<td>MB 13</td>
</tr>
<tr>
<td></td>
<td>450 to 1700°C</td>
<td>MB 17</td>
</tr>
<tr>
<td></td>
<td>500 to 2200°C</td>
<td>MB 22</td>
</tr>
<tr>
<td></td>
<td>550 to 2500°C</td>
<td>MB 25</td>
</tr>
</tbody>
</table>

**Measurement Uncertainty**

<table>
<thead>
<tr>
<th>Instrument</th>
<th>Uncertainty</th>
<th>Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>ISR 12-LO</td>
<td>0.4% oR °C + 1°C</td>
<td>&lt; 1500°C</td>
</tr>
<tr>
<td></td>
<td>0.6% oR °C + 1°C</td>
<td>&gt; 1500°C</td>
</tr>
<tr>
<td>IGAR 12-LO</td>
<td>0.5% oR °C + 1°C</td>
<td>&lt; 1500°C</td>
</tr>
<tr>
<td></td>
<td>0.7% oR °C + 1°C</td>
<td>&gt; 1500°C</td>
</tr>
</tbody>
</table>

**Repeatability**

<table>
<thead>
<tr>
<th>Instrument</th>
<th>Repeatability</th>
<th>Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>ISR 12-LO</td>
<td>0.2% oR °C + 1°C</td>
<td></td>
</tr>
<tr>
<td>IGAR 12-LO</td>
<td>0.3% oR °C + 1°C</td>
<td></td>
</tr>
</tbody>
</table>
## Measurement Specifications

| Temperature Ranges | ISR 12-LO       | 600 to 1300°C (1112 to 2372°F) (MB 13)  
|                   |                | 750 to 1800°C (1382 to 3272°F) (MB 18)  
|                   |                | 900 to 2500°C (1652 to 4532°F) (MB 25)  
|                   |                | 1000 to 3300°C (1832 to 6172°F) (MB 33)  
| IGAR 12-LO        |                | 300 to 1000°C (572 to 1832°F) (MB 10)  
|                   |                | 350 to 1300°C (662 to 2372°F) (MB 13)  
|                   |                | 450 to 1700°C (842 to 3092°F) (MB 17)  
|                   |                | 500 to 2200°C (932 to 4092°F) (MB 22)  
|                   |                | 550 to 2500°C (1022 to 4972°F) (MB 25)  
| Sub Range         | Any range adjustable within the temperature range, min span 51°C  
| Spectral Range    | ISR 12-LO       | Channel 1: 0.8 µm  
|                   |                | Channel 2: 1.05 µm  
|                   | IGAR 12-LO (MB 10) | Channel 1: 1.52 µm  
|                   |                | Channel 2: 1.64 µm  
|                   | All other MB    | Channel 1: 1.28 µm  
|                   |                | Channel 2: 1.65 µm  
| Resolution        | Display: 1°C; Interface: 0.1°C  
|                   | Analog output: < 0.025% of adjusted temperature range  
| Accuracy          | ISR 12-LO       | 0.4% of reading in °C + 1°C (< 1500°C)  
|                   |                | 0.6% of reading in °C + 1°C (> 1500°C)  
|                   | IGAR 12-LO      | 0.5% of reading in °C + 1°C (< 1500°C)  
|                   |                | 0.7% of reading in °C + 1°C (> 1500°C)  
| Repeatability     | ISR 12-LO       | 0.2% of reading in °C + 1°C  
|                   | IGAR 12-LO      | 0.3% of reading in °C + 1°C  
| Signal Processing | Photo current, digitized immediately  
| Emissivity Slope K| ε₁/ε₂: 0.800 to 1.200 adjustable in steps of 0.001  
| Emissivity ε      | 0.1 to 1 adjustable in steps of 0.001  
| Measuring Modes   | Adjustable: ratio (2-color), mono (1-color), and metal mode  
| Switch-off Limit  | 2 to 50% in 1% steps  
| Exposure Time t₉₀ | 2 ms (with dynamical adaption at low signal levels), adjustable up to 10 s  
| Maximum Value Storage | Built-in single or double storage. Cleared by preselected time interval tₖₑₐₑ (off, 0.01 s, 0.05 s, 0.25 s, 1 s, 5 s, 25 s) or extern or automatically with the next measuring object  
| Sighting System   | Laser targeting (max power level < 1 mW, λ = 630 to 680 nm, CDRH class II)  

## Electrical Specifications

| Power Supply | 24 VDC (15 to 40 VDC) or 24 VAC (12 to 30 VAC), 48 to 62 Hz  
| Current Consumption | Max 600 mA  
| Isolation | Power supply, analog output, and digital interface are galvanically isolated against each other  
| Switch Contact | Max 0.15 A  

---

1 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.
Environmental Specifications

- **Operating Temperature** (At the converter housing):
  - ISR 12-LO: 0 to 60°C (32 to 140°F)
  - IGAR 12-LO: 0 to 50°C (32 to 122°F)
- **Storage Temperature**: -20 to 70°C (-4 to 158°F)
- **Relative Humidity**: Non-condensing conditions
- **Weight**:
  - Converter: 2.2 kg (~2.20 lbs)
  - Optical head II: 140 g (~4.94 oz)
  - Fiber (2.5 m): 250 g (~8.82 oz)
- **Protection System**: IP65 (according to DIN 40 050)
- **CE Label**: According to EU directives about electromagnetic immunity

Interface and Communication Specifications

- **Analog Output**: 0 to 20 or 4 to 20 mA switchable, load 0 to 500 Ohm
- **Test current**: 10 mA for inspection of wiring and connected instruments
- **Interfaces**:
  - Switchable: RS232 or RS485 addressable, half duplex; baud rate 2.4 up to 115.2 kBd
- **Display**:
  - Built-in 4-digit 7-segment-LED, height 13 mm; LED for °C/°F; clear mode "auto", "ext", ratio (2-color), mono (1-color), metal mode
- **Control Panel**: 4 keys, switch for interface, key for test current
- **Parameters**:
  - Adjustable at the instrument or via serial interface: Emissivity ε, Emissivity slope K, response time t₉₀, clear times t₉₅₁₀ for maximum value storage, automatic or external deletion of the maximum value storage, setting of ratio, mono, or metal mode, switch-off limit, analog output 0 to 20 or 4 to 20 mA, Temperature sub range, address, baud rate, Temperature display in °C / °F

Fiber Optics

The radiation, coming in through the optical head, is transported via the lens system into the mono glass fiber with flexible stainless steel protection tube where it is transmitted along to the converter. As the optical head contains only the lens system and the sensor and the electronics are located in the converter box, fiber and optical head can withstand ambient temperatures up to 250°C without cooling. Depending on the measuring range 2 different fibers are used. They are marked red or blue.

- **Length**: 2.5 m, 5 m, 7.5 m, 10 m, 15 m, 30 m on request
- **Color mark at the fiber**:
  - Blue: ISR 12-LO, MB 13; IGAR 12-LO, MB 10
  - Red: ISR 12-LO, MB 18, 25, 33; IGAR 12-LO MB 13, 17, 22, 25
- **Max ambient temperature**: Max 250°C (instrument’s side with color mark max 125°C)
- **Minimum bending radius**:
  - Blue: 100 mm for short time, 300 mm permanently
  - Red: 50 mm for short time, 120 mm permanently
DIMENSIONS

Converter

Optical head type I

Optical head type II
(Fixed adjusted)

Optical head type II
(Focusable)

All dimensions in mm

FEATURES

°C or °F display
Temperature or parameter display
Parameter indicator
Switch for interface
RS232 / RS485
Push-button for test current
Electrical connection
Indication of clear mode
Operating mode display:
- Mono mode
- Ratio mode
- Metal mode
Adjusting keys
Laser targeting light
Mounting hole
Optical fiber
Depending on the application the instrument will be delivered with a small or a large optical head. The selection of the optical head depends not only on its size but also on the required spot size (size of the measuring object) and the measuring distance.

**Optical Head I**
With the very small dimensions the optical head I is suited for use in confined spaces. The optics is adjusted to one of the measuring distances mentioned in the table. The mentioned spot size will be achieved in exactly this distance (other distances on request).

**Optical Head II**
The optics II is bigger, but smaller spot sizes can be achieved. Two designs are available, fixed adjusted or focusable.

<table>
<thead>
<tr>
<th>Optical Head</th>
<th>Measuring Distance a [mm]</th>
<th>Spot Size M₉₀ [mm]</th>
<th>Aperture D [mm]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Optical head I</td>
<td>Adjusted to: 120</td>
<td>2.2</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>Adjusted to: 260</td>
<td>5</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>Adjusted to: 700</td>
<td>14</td>
<td>7</td>
</tr>
<tr>
<td>Optical head II (fixed adjusted)</td>
<td>Adjusted to: 87</td>
<td>0.75</td>
<td>17</td>
</tr>
<tr>
<td></td>
<td>Adjusted to: 200</td>
<td>1.5</td>
<td>17</td>
</tr>
<tr>
<td></td>
<td>Adjusted to: 600</td>
<td>5.3</td>
<td>17</td>
</tr>
<tr>
<td></td>
<td>Adjusted to: 4500</td>
<td>42</td>
<td>15</td>
</tr>
<tr>
<td>Optical head II (focusable)</td>
<td>Range: 88 to 110</td>
<td>0.8 to 1.1</td>
<td>17</td>
</tr>
<tr>
<td></td>
<td>Range: 95 to 129</td>
<td>0.9 to 1.3</td>
<td>16</td>
</tr>
<tr>
<td></td>
<td>Range: 105 to 161</td>
<td>1.1 to 1.7</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>Range: 200 to 348</td>
<td>1.5 to 2.8</td>
<td>17</td>
</tr>
<tr>
<td></td>
<td>Range: 247 to 606</td>
<td>2.0 to 5.2</td>
<td>16</td>
</tr>
<tr>
<td></td>
<td>Range: 340 to 4500</td>
<td>2.8 to 42</td>
<td>15</td>
</tr>
</tbody>
</table>

Similar to optics I, the fixed adjusted type is adjusted to one of the measuring distances mentioned in the table (other distances on request).

The focusable type is available for 6 different distance ranges. Each measuring distance can be adjusted within the mentioned limits to achieve the smallest spot size in the required distance.
The pyrometers ISR 12-LO and IGAR 12-LO can be configured with different optical fiber lengths and optical heads as well as with various optional extras. To determine the part number and the price for the desired combination, please contact your Advanced Energy sales representative.

**Scope of Delivery**
Converter, optical fiber and optical head as per configuration, works certificate, PC software InfraWin, and user manual.

**Ordering Note**
A connection cable is not included in the scope of delivery and needs to be ordered separately.

### ACCESSORIES

<table>
<thead>
<tr>
<th>PN</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 820 330</td>
<td>Connection cable, straight connector, 5 m</td>
</tr>
<tr>
<td>3 820 600</td>
<td>Connection cable, straight connector, 10 m</td>
</tr>
<tr>
<td>3 820 510</td>
<td>Connection cable, straight connector, 15 m</td>
</tr>
<tr>
<td>3 820 810</td>
<td>Connection cable, straight connector, 20 m</td>
</tr>
<tr>
<td>3 820 820</td>
<td>Connection cable, straight connector, 25 m</td>
</tr>
<tr>
<td>3 820 520</td>
<td>Connection cable, straight connector, 30 m</td>
</tr>
<tr>
<td>3 852 290</td>
<td>Power supply NG DC 100 to 240 VAC ⇒ 24 VDC, 1 A</td>
</tr>
<tr>
<td>3 852 550</td>
<td>Power supply NG 2D for DIN rail mounting; 85 to 265 VAC ⇒ 24 VDC, 600 mA with 2 settable limit switches</td>
</tr>
<tr>
<td>3 852 440</td>
<td>Protocol transducer RS485/RS232 (switch.) ⇒ Profibus-DP for 1 device</td>
</tr>
<tr>
<td>3 852 460</td>
<td>Protocol transducer RS485 ⇔ Profibus DP for 32 devices</td>
</tr>
<tr>
<td>3 852 620</td>
<td>Protocol converter UPP RS485 or RS232 ⇔ ProfiNet, for 1 pyrometer</td>
</tr>
<tr>
<td>3 852 630</td>
<td>Protocol converter UPP RS485 ⇒ ProfiNet, for max. 32 pyrometers</td>
</tr>
<tr>
<td>3 891 220</td>
<td>DA 4000: LED-display, 2-wire power supply, 2 limit switches (relay contacts), 115 VAC</td>
</tr>
<tr>
<td>3 890 650</td>
<td>DA 4000: LED-display, 2-wire power supply, 2 limit switches (relay contacts), 230 VAC</td>
</tr>
<tr>
<td>3 890 560</td>
<td>DA 6000-N: LED digital display with digital input RS232 and possibility for pyrometer parameter settings</td>
</tr>
<tr>
<td>3 890 570</td>
<td>DA 6000-N digital display, to allow adjustment of pyrometer through RS485 interface</td>
</tr>
<tr>
<td>3 890 520</td>
<td>DA 6000: LED digital display, digital and analog input, 2 limit switches, maximum value storage, analog output, RS232</td>
</tr>
<tr>
<td>3 890 530</td>
<td>DA 6000: like the DA 6000-N, but with analog input and 2 limit switches for the RS485 interface.</td>
</tr>
<tr>
<td>3 890 150</td>
<td>DA 6000-T, digital display, for measurement of the cool down time $t_{90%}$ from 800 to 500°C (for welding processes)</td>
</tr>
<tr>
<td>3 826 510</td>
<td>PI 6000: PID programmable controller, extremely fast, for digital IMPAC pyrometers</td>
</tr>
<tr>
<td>3 838 280</td>
<td>Laser protection filter for fiber vario-optics (built in), 920 to 1100 nm, for IGAR 12-LO</td>
</tr>
<tr>
<td>3 834 390</td>
<td>Ball and socket mounting for optical head I or II</td>
</tr>
<tr>
<td>3 834 230</td>
<td>Adjustable mounting support for optical head II</td>
</tr>
<tr>
<td>3 835 170</td>
<td>Air purge unit, stainless steel, for optical head I</td>
</tr>
<tr>
<td>3 835 180</td>
<td>Air purge unit, stainless steel, for optical head II</td>
</tr>
<tr>
<td>3 835 240</td>
<td>Air purge unit with 90° mirror for optical head II</td>
</tr>
</tbody>
</table>
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 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 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.

Measurement with Internal Temperature of radiation temperature and internal instrument temperature. Parameters can be changed during the measurement.

I/O Module allows users to trigger measurement externally and gives a potential free output contact.
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.

Specifications are subject to change without notice. Not responsible for errors or omissions. ©2019 Advanced Energy Industries, Inc. All rights reserved. Advanced Energy®, Impac®, and AE® are U.S. trademarks of Advanced Energy Industries, Inc.