

# Single-Wavelength Pyrometers

There are three distinct technologies for single-wavelength Pro series pyrometers: Short-Wavelength, Long-Wavelength and Specialty-Wavelength.

For most applications, select the shortest wavelength compatible with the measurement conditions and desired temperature span.

## Short-Wavelength (SW)

- 4-20 times less sensitive to emissivity variation and optical obstruction compared to general purpose long-wavelength models
- Certain wavelengths can view through common interferences such as steam, flames, combustion gasses, and plasmas without error
- Available in traditional and fiber optic configuration (SWF)

## Long-Wavelength (LW)

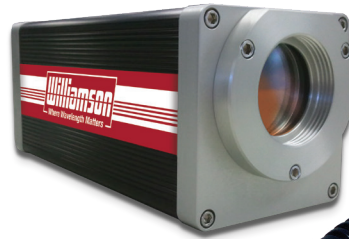
- General purpose pyrometer used for high-emissivity materials
- Can make low temperature readings (near ambient). Ideal for applications under 200°F/100°C

## Specialty-Wavelength (SP)

- Used for certain materials that are least reflective and most opaque at a particular wavelength
- Used when optical obstructions are most transparent at a specific wavelength
- Popular applications: plastics, glass, flames, etc.

## Specifications

### Single-Wavelength Technologies



*Traditional Style  
SW, LW, SP*



*Fiber Optic Style  
SWF*

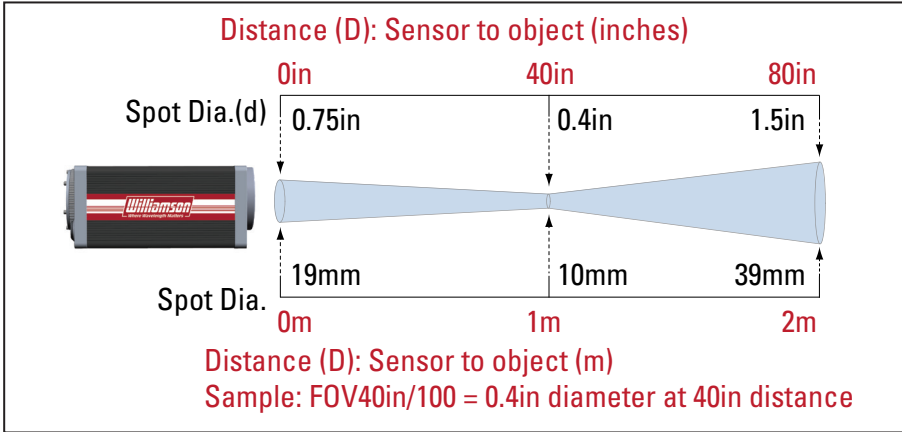
## Single-Wavelength Specifications

|                                   |  |
|-----------------------------------|--|
| <b>Temperature Limits</b>         | 0 to 5500°F / 0 to 3040°C (actual ranges vary by model)  |
| <b>Spectral Response</b>          | SW: 0.9µm, 1.6µm, 2.2µm, 2.9µm<br>LW: 8-12µm<br>SP: 1.15µm, 1.86µm, 2.4µm, 3.43µm, 4.65µm, 5µm, 7.9µm  |
| <b>Optical Resolution</b>         | Range of optics selectable by model  |
| <b>Accuracy</b>                   | SW: 0.25% of reading or 2°C whichever is greater<br>LW: 0.5% of reading or 2°C whichever is greater<br>SP: 0.5% of reading or 2°C whichever is greater   |
| <b>Repeatability</b>              | Better than 1°C  |
| <b>Emissivity</b>                 | 0.010 to 1.500   |
| <b>Response and Update Time</b>   | 10ms initial response with 5ms update time<br>with Auto Null: 100ms initial response with 50ms update time   |
| <b>Analog Output</b>              | 0/4-20mA output (max impedance 1000 ohms)  |
| <b>Alarm</b>                      | One field-selectable N.O. or N.C. Relay rated 1A @ 24V   |
| <b>Analog Input</b>               | 4-20mA/0-20mA input (impedance 250 ohms)   |
| <b>Digital Communications</b>     | Bi-Directional RS485 and RS232 Multidrop communications available  |
| <b>Human Interface</b>            | Built-in menu system with Averaging, Peak/Valley Hold (Time or Temp Reset), Programmable Outputs & Alarms  |
| <b>Measured Parameters</b>        | Filtered and Unfiltered Temperature, Ambient Temperature & Rate of Change. (Auto Null Models: Cell Strength)   |
| <b>Input Power</b>                | 24Vdc (300mA)  |
| <b>Ambient Temperature Limits</b> | 0 to 150°F / -17 to 65°C<br>with Water Cooling Plate: 350°F / 175°C (varies with water rate & temp)<br>with Protective Cooling Jacket: 600°F / 315°C<br>Fiber Optic Cable & Lens Barrel: 400°F / 200°C |
| <b>Enclosure Rating</b>           | Corrosion resistant enclosure w/ NEMA4X (IP65) rating. Optional IECEx and ATEX enclosures are available  |
| <b>Weight</b>                     | 3.6lbs (1.6kg)   |
| <b>Dimensions</b>                 | 3.5in x 3.5in x 8.25in / 89mm x 89mm x 210mm   |
| <b>Certification</b>              | Calibration certificate is standard with each unit<br>CE: EMI / RFI for heavy industry; LVD ( Low Voltage Directive)   |
| <b>Warranty</b>                   | 2 years  |

# Single-Wavelength Technology

## Sample Field of View

Single-wavelength pyrometers may be used at any distance as long as the measured target fills the sensor's viewing area (i.e. a full FOV). The diameter (d) of the viewing area is calculated as  $d=D/F$  where D is the focal distance of the sensor from the target and F is the optical resolution factor of the sensor.



## Short-Wavelength Pyrometer Comparison

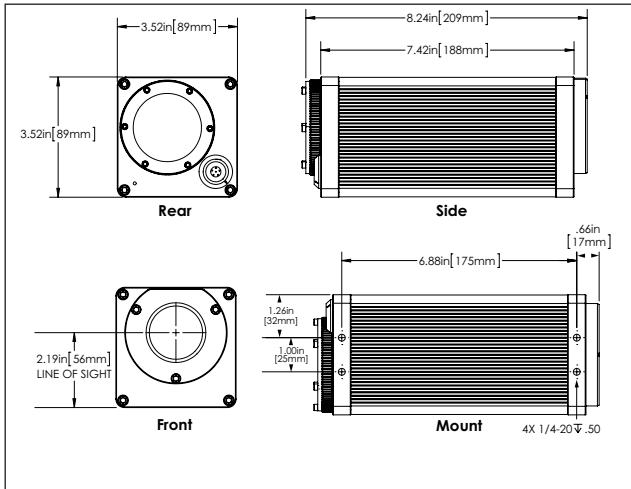
| Intervening Media | SW Wavelength Code |    |    |    |    |
|-------------------|--------------------|----|----|----|----|
|                   | 09                 | 16 | 2A | 22 | 29 |
| Water 0-13mm      | ✓                  |    |    |    |    |
| Water 0-5mm       | ✓                  |    |    |    |    |
| Steam             |                    | ✓  | ✓  | ✓  |    |
| Flames            |                    | ✓  | ✓  | ✓  |    |
| Combustion Gas    |                    | ✓  | ✓  | ✓  |    |
| Plasma*           |                    | ✓* | ✓* | ✓* |    |
| Dust & Smoke      | ✓                  | ✓  | ✓  | ✓  |    |

\*Consult Williamson for plasma compatibility

## Speciality Wavelength Pyrometer Applications

| Wavelength | Application  |
|------------|--|
| WA-1.15µm  | Views through <5 mm water  |
| CH-2.4µm   | Views through high density Hydrocarbon plasma cloud  |
| FH-1.86µm  | Hydrogen, Ammonia, Hydrocarbon based flames  |
| PF-3.43µm  | Thin films of H-C based plastics (polyethylene & polypropylene)  |
| FC-4.65µm  | Hot combustion gas, carbon based flames (CO, CO2 flames)   |
| GL-5µm     | Glass surfaces - inside furnaces, ovens & Quartz IR heaters  |
| PG-7.9µm   | Thin film plastics such as polyester, acrylic & Teflon epoxy, and painted surfaces. Applications using IR heaters. |

## Pro Series Dimensions



## Local and Remote User Interface



Local Interface

- Increase Value
- Decrease Value
- Menu
- Enter
- Aiming On/Off
- Through Lens Aiming  
*(local interface only)*



Remote Interface

## Sample Part Numbers

| A – Model | B – Wavelength | C – Temp Code | Temp Scale | D – Field of View | E – Sensor Output | F – Options | G – Accessories | H – Electrical Cable |
|-----------|----------------|---------------|------------|-------------------|-------------------|-------------|-----------------|----------------------|
| SW-       | 16-            | 30-           | F- or C-   | FOV5ft/110-       | A- or D-          | LA-         | IM-WC-SB-       | CF040                |
| SWF-      | 16 -           | 30-           | F- or C-   | FOV6in/50-        | A- or D-          | SSB-G10     | IM-STSB-        | CF040                |

| Model  | Wavelength | Temp Code  | Temperature Range |            | Traditional Style Optical Res. | Fiber Optic Optical Res. | Type of Fiber Cable | Max Fiber Cable Length |
|--------|------------|------------|-------------------|------------|--------------------------------|--------------------------|---------------------|------------------------|
|        |            |            | Fahrenheit        | Celsius    |                                |                          |                     |                        |
| SW SWF | 09         | 50         | 1000-2500°F       | 540-1375°C | D/100                          | D/15                     | Glass               | 20ft / 6m              |
|        |            | 60         | 1200-3200°F       | 650-1750°C | D/100                          | D/35                     | Glass               | 20ft / 6m              |
|        |            | 70         | 1400-4500°F       | 760-2475°C | D/150                          | D/50                     | Glass               | 30ft/ 9.1m             |
|        | 16         | 20         | 500-2100°F        | 260-1150°C | D/110                          | D/35                     | Quartz              | 10ft / 3m              |
|        |            | 25         | 600-2500°F        | 315-1375°C | D/110                          | n/a                      | n/a                 | n/a                    |
|        |            | 30         | 700-3200°F        | 375-1750°C | D/110                          | D/50                     | Quartz              | 20ft / 6m              |
|        | 2A*        | 29         | 300-800°F         | 150-425°C  | D/75                           | n/a                      | n/a                 | n/a                    |
|        |            | 30         | 150-800°F         | 65-425°C   | D/50                           | D/15                     | Quartz              | 3ft / 1m               |
|        |            | 32         | 200-1000°F        | 95-540°C   | D/75                           | D/35                     | Quartz              | 6ft / 2m               |
|        | 22         | 36         | 300-1500°F        | 150-815°C  | D/100                          | D/15                     | Quartz              | 30ft / 9.1m            |
|        |            | 37         | 300-2000°F        | 150-1100°C | D/50                           | n/a                      | n/a                 | n/a                    |
|        |            | 40         | 400-2500°F        | 200-1375°C | D/100                          | D/35                     | Quartz              | 30ft / 9.1m            |
|        | 29*†       | 08         | 100-800°F         | 40-425°C   | D/35                           | n/a                      | n/a                 | n/a                    |
|        |            | 10         | 125-800°F         | 50-425°C   | D/50                           | n/a                      | n/a                 | n/a                    |
|        |            | 20         | 150-800°F         | 65-425°C   | D/100                          | n/a                      | n/a                 | n/a                    |
| SP SPF | WA         | 21         | 700-2000°F        | 375-1100°C | D/50                           | D/35                     | Quartz              | 20ft / 6m              |
|        | CH         | 25         | 900-2500°F        | 480-1370°C | D/100                          | D/60                     | Quartz              | 10ft / 3m              |
|        | FH         | 33         | 700-3200°F        | 375-1750°C | D/50                           | D/50                     | Quartz              | 30ft / 9.1m            |
|        | PF*†       | 30         | 250-1000°F        | 125-535°C  | D/35                           | n/a                      | n/a                 | n/a                    |
|        | FC†        | 40         | 1000-4000°F       | 550-2200°C | D/100                          | n/a                      | n/a                 | n/a                    |
|        | GL†        | 10         | 200-1000°F        | 95-540°C   | D/50                           | n/a                      | n/a                 | n/a                    |
|        |            | 20         | 500-2500°F        | 250-1375°C | D/100                          | n/a                      | n/a                 | n/a                    |
|        | PG†        | 30         | 150-1000°F        | 60-535°C   | D/50                           | n/a                      | n/a                 | n/a                    |
| 40     |            | 500-2500°F | 260-1375°C        | D/50       | n/a                            | n/a                      | n/a                 |                        |
| LW     | GP         | 20         | 0-1000°F          | 0-550°C    | D/50                           | n/a                      | n/a                 | n/a                    |

\*Denotes Auto Null. †Wavelength not available as a fiber optic configuration.  
 Note: Not all temperature ranges shown. Consult Williamson for longer fiber cable lengths.

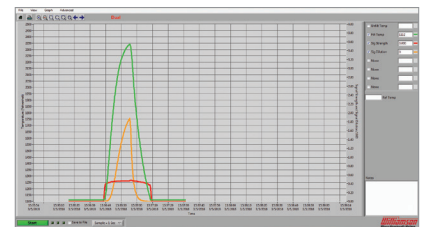
### E – Sensor Output (Select One)

| Part No. | Description   |
|----------|---|
| A        | Set to Analog Output/Input with linear mA output  |
| D        | Set to Digital Communications for operation w/ Interface Module or for 4-wire digital operation |

### F – Options (Must Be Specified at Time of Order)

| Part No.                 | Description  |
|--------------------------|--|
| <b>Traditional Style</b> |  |
| LA                       | Laser Aiming   |
| VALA                     | Visual Aiming and Laser Aiming   |
| <b>Fiber Optic Style</b> |  |
| AL                       | Built in Aim Light   |
| FLB                      | Flanged Lens Barrel  |
| LBMB                     | Lens Barrel Mounting Thread, Brass   |
| 4QT                      | Non-conductive Ceramic Quartz Tip, 4in/102mm long, threads onto end of fiber cable |

### ProView PC software

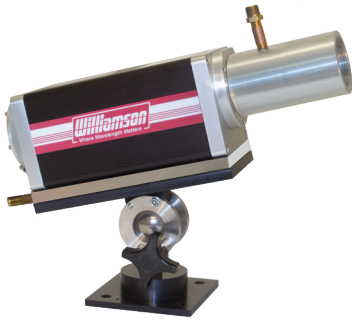


ProView PC software is compatible with Williamson Pro Series sensors. It may be used to log and analyze data and to make remote sensor adjustments.

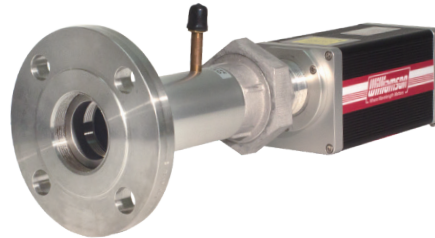
## Single-Wavelength Technology

### Traditional Style Mounting and Protective Accessories

Popular Williamson accessories include: Swivel Bracket (SB), Water Cooling Plate (WC), Air Purge (AP), Protective Cooling Jacket (PCJ) and a selection of Flange Mounts (FMxx)



Swivel Bracket, Water Cooling Plate and Air Purge



Flange Mount (includes AP)



Protective Cooling Jacket

### Fiber Optic Mounting and Protective Accessories

To simplify the installation and alignment of the pyrometers, Williamson offers a Fiber Optic Swivel Bracket (FOSB), Sight Tube Swivel Bracket (STSB), and a selection of Flange Mounts (FOFMxx/STFMxx).



Fiber Cable Mounting Brackets



Fiber Optic Flange Mount (includes AP)

### Fiber Optic Cable Options



Standard Fiber Optic Cable (Gn and Qn)



Cable with Stainless Steel Braid (SSB)



Cable with Heavy Duty ArmorGuard (AG)



Monofilament Cable (Mn)

Standard fiber optic cables are sealed with a Teflon jacket over a stainless steel sheath and are available in lengths of 3-30 feet (1-9 meters). For added protection, the flexible, lightweight Stainless Steel Braid or heavy duty ArmorGuard is available. These options include an air purge and stainless steel sight tube with a 1 inch pipe thread. For applications with very confined access or a high potential for electromagnetic interference, the monofilament fiber cables with a Teflon sheathing and Teflon outer jacket offer a smaller diameter of 0.05in/1.3mm and non-conductive packaging.

### G – Accessories

| Part No.                       | Description  |
|--------------------------------|--|
| <b>Traditional Style</b>       |  |
| AP                             | Air Purge  |
| SB                             | Swivel Bracket   |
| FMxx                           | Flange Mounts  |
| PCJ                            | Protective Cooling Jacket  |
| <b>Fiber Optic Style</b>       |  |
| FOSB                           | Fiber Optic Swivel Bracket   |
| FOMAQ                          | Non-conductive Fiber Optic Mounting Assembly, Quartz Window                                      |
| STSB                           | Sight Tube Swivel Bracket (for use with SSB & AG)  |
| FOFMxx                         | Fiber Optic Flange Mounts  |
| STFMxx                         | Sight Tube Flange Mounts (for use with SSB and AG)   |
| <b>Pro Series – All Models</b> |  |
| IM                             | Interface Module, 1/4DIN, Outputs, Inputs, Relay Alarms Power to Sensor, Input Power (90-260Vac) |
| VCS                            | Vortex Cooling System includes Filter & Regulator  |
| ABF                            | Adjustable Bellows Flange 2" ANSI both ends  |
| WC                             | Water Cooling Plate  |

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