

Non-Contact Infrared Temperature Measurement

for Industrial Process and Research Applications



- Steel
- Metal Processing
- Induction Heating
- Glass

- Kilns
- Pipe Bending
- Wire Heating
- Semi-conductor Reactors

Mission

Since the company's founding in 1996, Process Sensors Corporation has focused on the development and implementation of non-contact, moisture measurement instruments for on-line industrial process applications. More recently, we have drawn on our Near Infrared Technology expertise to introduce a comprehensive range of Non-Contact Infrared Temperature Measurement Sensors, Thermal Imaging Systems and Blackbody Calibration Sources.

Our corporate mission is a simple one: to utilize the least complex, most reliable technology in order to provide outstanding value, sound solutions and long term, maintenance-free reliability in industrial environments. Accurate measurement is vital to product quality and cost effective production. The instruments we manufacture and apply are designed to achieve those objectives effectively and economically.

From the outset, PSC has recognized that product excellence would be an important factor in our company's success and growth. Just as important, however is the support and care of our customer base. Therefore, in parallel with development of our products, we aim to always put the consumer at the forefront of our technical and strategic plans.

Process Sensors is very fortunate to have experienced application specialists who can provide unique sensor solutions for both temperature and moisture measurement applications. We have learned to combine product training, installation guidance assistance, and ongoing technical and commercial support to effectively address our customers' needs. PSC is a company totally dedicated to customer support.

Our customers, partners, products and our dedicated employees have built Process Sensors into the world class operation it is today.



Infrared Radiation Theory and the Application of Infrared Pyrometers

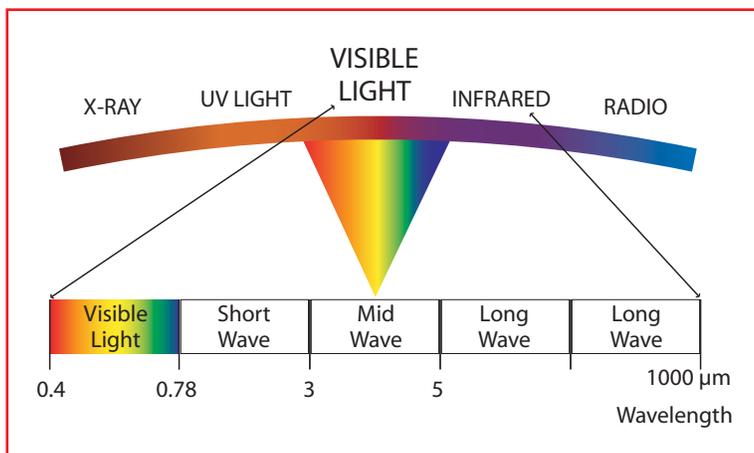
Infrared radiation (IR) is a component of the electromagnetic spectrum that falls between the frequencies of visible light radiation and radio waves.

Electromagnetic radiation is sinusoidal in nature (having a succession of waves or curves) and the components of the total spectrum are differentiated by the frequency bands they occupy.

IR occupies the wave band between 0.78 microns and 1000 microns, although IR sensors at a spectral wavelength of 0.65 μ (visible light region) are also used to measure temperature.

By focusing the IR energy radiated by a surface onto an IR sensitive detector, it is possible to determine the temperature of the surface by measuring the output from the detector.

Though infrared radiation energy is invisible to the human eye, it is helpful to think of it as visible light because it behaves in an identical manner: it travels in straight lines, and can be reflected, absorbed and attenuated by objects and conditions in its path. The temperature of a glowing hot object (emitting in the visible region) can be determined visually based on its radiated color by a trained human eye.



Rule of Thumb

Optimizing IR Measurements for Metal Surfaces

Select the shortest wavelength to raise absolute emissivity and to minimize temperature errors due to changes in emissivity.

Short wavelength: 0.65 to 3 μ
Medium wavelength: 3 to 5 μ
Long wavelength: 5 μ +

PSC Process Thermal Imaging Camera Systems

Process Sensors Thermal Imaging Camera Systems provide thousands of single-point measurements, mapping in multiple colors the thermal distribution of temperatures over an area defined by their optics. Thermal imaging systems are now used routinely to continuously monitor and control industrial processes. To meet this demand, Process Sensors offers a comprehensive range of real-time imaging systems covering an overall temperature span from -4°F to 4532°F.

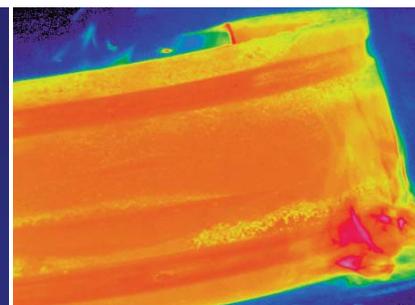
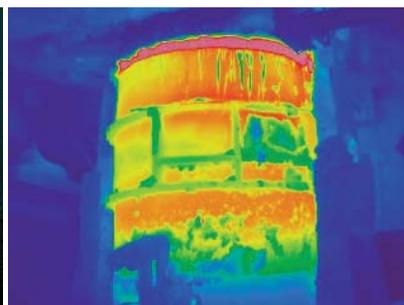
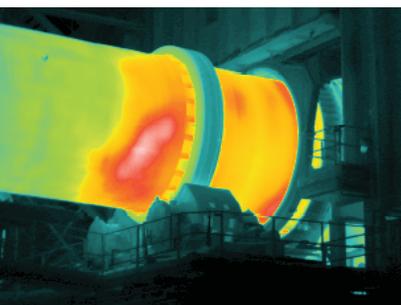


The ultra compact, radiometric PSC Surveyor and the Metis Vision imaging cameras are designed for compatibility and integration within existing systems and feature simple-to-use intuitive and powerful software. Choose from complete turn-key process control systems, touch screen displays, process interface modules and IR+VIS dual-spectrum features to create custom solutions for every application. The “armored tank” design construction of the industrial stainless steel housings or explosion proof enclosures make these systems virtually indestructible, allowing for operation in the most severe industrial environments.

The Surveyor IR Imaging Series Cameras monitor and control process temperatures in real time. There is a full range of cameras to choose from – the industry specific PSC-450-G7 model designed for glass applications, the short wavelength PSC-764-1M for the metals industry, the high resolution PSC-640 and PSC-400/450 cameras, and the compact, cost effective PSC-160. Keeping pace with the latest technological developments, for infrared video and images from the air utilizing a drone, the PSC-400-LWK is the newest addition to the product line. This ultra light-weight model with on-board PC is uniquely suited for maintenance work and quality inspections of solar and wind power systems as well as thermographic surveys of buildings and agricultural fields.



Known for its ability to produce crisp, clear images, the Metis Vision MV09 features extremely high, drift free stability for high temperature applications with over 300,000 points of measurement and a temperature range up to 2500°C/4532°F with Gigabit Ethernet interface. A wide selection of variable focus lenses enables the user to define the measurement area under inspection from a distance. The included comprehensive software allows the selection of points, lines, areas, isotherms, color palettes, alarms and a multitude of other features.



PSC Process Thermal Imaging Camera Systems Specifications

MODEL NUMBER		ARRAY SIZE	TEMPERATURE RANGE	THERMAL SENSITIVITY	FIELD OF VIEW	SPECTRAL RANGE
PSC-X400LT		382 x 288	-4° to 212°F 32° to 482°F 302° to 1652°F	0.08°C	23°x17°FOV / f=10mm or 6°x5°FOV / f=35.5mm or 41°x31°FOV / f=5.7mm or 72°x52°FOV / f=3.3mm	7.5–13μm
PSC-X80LT		80 x 80	-4° to 212°F 32° to 482°F 302° to 1652°F	0.01°C	12°FOV / f=12.7mm or 30°FOV / f=5mm or 55°FOV / f=3.1mm or 80°FOV / f=2.3mm	7.5–13μm
PSC-400		382 x 288	-4° to 212°F 32° to 482°F 302° to 1652°F Add'l Optional Range: 392° to 2732°F	0.08°C	32°x24°FOV / f=17mm or 62°x49°FOV / f=8mm or 13°x10°FOV / f=41mm	7.5–13μm
PSC-450		382 x 288	-4° to 212°F 32° to 482°F 302° to 1652°F	0.04°C	32°x24°FOV / f=17mm or 62°x49°FOV / f=8mm or 13°x10°FOV / f=41mm	7.5–13μm
PSC-450-G7		382 x 288	392 to 2732°F Visual Sighting Range: 32 to 482°F	0.13°C	38° x 29°FOV 62° x 49°FOV	7.9μm (thin glass)
PSC-640		640 x 480	-4 to 212°F 32 to 482°F 302 to 1652°F Optional Range: 392 to 2732°F	0.075°C	33° x 25°FOV 60° X 45°FOV 90° X 66°FOV	7.5–13μm
PSC-400-LWK		382 x 288	-4°F to 1652°F	0.08°C	62° FOV 38° FOV optional	7.5–13μm

Applications: Glass, Painted Metals, Ladle Shell, Torpedo, Cars, PC Boards, Kiln Shell, Paper Web, Reactors, Vessels, Furnace Shell, Gypsum, Bulk Solids, Conveying, Solar Cell, Fire Detection, Thermoforming, Molds, R&D, Waste Bunkers, Textiles, Ceramics, Composites, Wood, Wood Piles, Coal Piles, Rubber, Plastics, Medical, Motors, Motor Bearings, Switch Gear

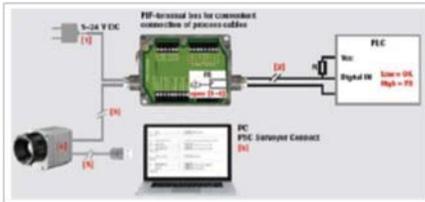
High Temperature, High Resolution PSC Process Thermal Imaging Camera Systems Specifications

MODEL NUMBER		ARRAY SIZE	TEMPERATURE RANGE	THERMAL SENSITIVITY	FIELD OF VIEW	SPECTRAL RANGE
PSC-764-1M		764 x 480 @ 32 Hz 382 x 288 @ 80 Hz 72 x 56 @ 1000 Hz	842 to 3272°F 932 to 3272°F 1112 to 3272°F	<1°C at 700 °C <2°C at 1000 °C	FOV @ 382x288 pix 51° x 39° 26° x 20° 20° x 15° 3° x 10° 7° x 5° 4° x 3° FOV @ 764x480 pix 87° x 62° 51° x 33° 39° x 25° 26° x 16° 13° x 8° 9° x 5°	0.92–1.1 μm
MV09		640 x 480	1112° to 2372°F 1382° to 2732°F 1652° to 3272°F Add'l Optional Range: 2192° to 4532°F	1°C	Interchangeable Lenses Define Camera's Rectangular Measurement Area Refer to MV09 Brochure	0.75–1.08μm
MV05		640 x 480	2192° to 3632°C	1°C	58° x 44°	0.35–0.6μm

Applications: Induction Heating, Furnace, Welding, Metal Heat Treating, Steel, Metal Pouring Stream, Composites, Ceramics, R&D, Molten Glass, Laser Heating



USB Server in Nema 4X wall mount enclosure, consisting of: 1 USB and 1 Ethernet port. 10/100BaseT Autosensing (max. 100 Mbit/s), Data rates: 1.5 / 12 / 480 mbps, Power-over-Ethernet (PoE) Class 3 (6.49-12.95W) or via screw terminal DC 24V...48V (+/-10%) and a 24VDC power supply.

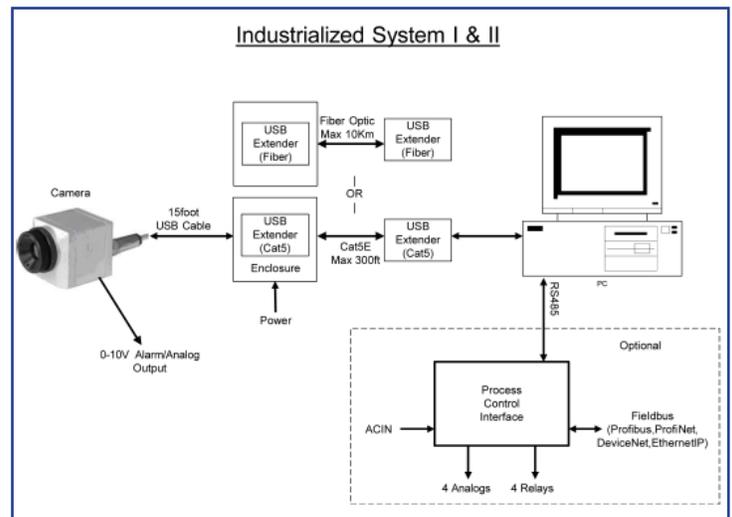


PIF Process Interface with Output Connection Box and 20 meter PIF cable: (Includes Quantity 3, 0 /10VDC analog alarm outputs and 3 alarm relays directly from connection box) 500 VAC RMS isolation voltage between PSC Surveyor Series camera & process



PSC Netbox, Mini Field PC for stand-alone operation. Includes: Windows 7® Professional Operating System, Intel® E3845 Quad Core/1.91 GHz with 16 GB SSD and 2 GB RAM, 2 USB 2.0 Connections, 1 USB 3.0, 1 Mini USB 2.0, Micro HDMI, Gigabit Ethernet and Micro SDHC/SDXC Card, Power Supply Voltage Range 8–48 VDC or Power Over Ethernet (POE), Easily Integrated Cooling Jacket, 24 VDC Power Supply, Rail Mount Adapter, USB System Recovery Stick (2GB), HDMI Cable)

BASIC WIRING CONFIGURATION



Selection of Infrared Temperature Sensors

<p>New Metis M3</p>  <p>1 or 2 color versions. Self-contained, high accuracy pyrometer with multiple analog and digital inputs/ outputs. On board display, adj. focus optics with laser, thru lens, and color video sighting. Temp. range from 300° to 3300°C.</p>	<p>Metis Series</p>  <p>Self-contained high accuracy with adj. focus optics, small spot size, and fast response. Offers a fiber optic 1-color model. Features laser, thru lens, or video sighting. Temp. range 75° to 3300°C.</p>	<p>Transfer Std. Diadem DS/DI</p>  <p>Ultra precision transfer standard pyrometer. A high-accuracy solution for calibration verification compliance. Temperature ranges from 250° to 3500°C.</p>	<p>Sirius Series</p>  <p>Self-contained sensor with digital and analog outputs. Focusable laser sighted optics with PSCWin graphical software. Temp. range from 122°F to 3632°C.</p>	<p>Polaris Series</p>  <p>IR Heat switch hot metal detector with focusable laser sighting optics and 2 solid state alarm relays. Adjustable temp. range from 300° to 1800°C.</p>	<p>PSC-SRF11N</p>  <p>1 and 2 color fiber optic pyrometers with laser sighted focusable optics, fast 5ms response, small spot sizes, and built in temp. display. Temp. ranges from 600° to 3000°C.</p>
<p>PSC-56 Series</p>  <p>Self-contained 2-color sensor with thru lens, laser, or color video sighting. Has built-in interactive temp. display, and push buttons. Temp ranges from 932° to 5792°F.</p>	<p>PSC-54 Series</p>  <p>Self-contained 2-color sensor with RS-485 and 4-20 mA outputs. Laser or video sighting. Fixed focus optics, small spot sizes and 5 ms fast response. PSC-spot software. Temp ranges from 932° to 5792°F.</p>	<p>PSC-44 Series</p>  <p>Self-contained 1-color sensor with RS-485 modbus interface, 4-20mA outputs, fixed or adjusted focus optics. Variety of wavelengths with laser sighting. Temp. ranges from -40° to 5432°F. 1 color.</p>	<p>PSC-42 Series</p>  <p>Low cost, Self-contained, 2-wire sensor with 4 -20 mA output, on-board emissivity adjust., small spot sizes and laser aiming (on high temp. models). Temp ranges from -40° to 4532°F.</p>	<p>PSC-40 Series</p>  <p>Self-contained, 2-wire sensor with 4-20 mA output, small spot sizes and laser sighting (for high temp models) Graphical software with Temp ranges from -40° to 5432°F.</p>	<p>PSC-30/34 Series</p>  <p>1-color fiber optic 2-wire sensor with 4-20 mA or RS-485 output. Temp range 1112° - 3272°F. Fixed focus optics with high ambient temp rating of 600°F.</p>
<p>PSC-CS-Laser Series</p>  <p>Self-contained 2/4 wire sensor with dual lasers, small spot sizes, built-in relay, on-board emissivity adjust. and IR sensor parameter adjust. software. Variety of wavelengths. Temp. ranges -20° to 2912°F.</p>	<p>PSC-SSS-Laser Series</p>  <p>2-piece sensor system with dual lasers, multiple analog/digital outputs, built-in temp. display, and alarms. Small spot sizes and fast response time. Temp ranges from -22° to 2912°F.</p>	<p>PSC-IR-USB Series</p>  <p>Low cost, compact loop-powered 2-wire sensors feature 4-20mA output and Modbus. Fast response time. USB configurable. Temperature ranges from -40° to 3632°F.</p>	<p>PSC-SSS Series</p>  <p>Low cost, 2-piece sensor system with ultra small sensing head, analog and digital outputs, built in temp. display. Sensor head rating up to 482°F. Ideal for OEM projects. Temp ranges from -58° to 2900 F.</p>	<p>PSC-CMS Series</p>  <p>Low cost ultra compact 2/4 wire sensor with 4-20 mA or 0-10 VDC output. Sensor head rating of 248 F. Small spot size, fast response, alarm and a variety of wavelengths. Temp. ranges -22° to 2900°F.</p>	<p>PSC-CS</p>  <p>Low cost, Digital Self-contained pyrometer with K thermocouple and 0-10VDC outputs. Has a built-in alarm with optional real time software. FOV 15:1. Temp. ranges from -40° to 1886°F .</p>

The PSC Metis M3 Series



The most powerful, highly advanced, self-contained Metis M3 Series of one and two-color pyrometers are of short wavelength design for precise non-contact temperature measurement of industrial and laboratory processes. These highly sophisticated pyrometers provide multiple digital and analog outputs, on-board rear temperature display menu with powerful 16 bit processing and free SensorsTools analytical software. Sighting methods include laser, through lens and video. The product line offers integrally a bright rear LED display, dual relays or fiber optic versions for use in high temperature locations, use in tight spaces or in areas of high magnetic RF fields.

APPLICATIONS	TEMPERATURE RANGE	MODEL NUMBER	SPECTRAL RESPONSE	FIBER OPTIC	OPTICAL ALIGNMENT Laser * Visual Video	MIN. SPOT SIZE	RESPONSE TIME	OUTPUTS
Steel Metals Processing	122° to 2732°F (50° to 1500°C)	M323	2 to 2.6µm			0.6mm	<1ms	4-20mA, 0 to 20mA, RS-232, RS-485.
Induction Composites	572° to 5972°F (300° to 3300°C)	M322	2-color 1.45 to 1.8µm	✓		1.2mm	2ms	4-20mA, 0 to 20mA, RS-232, RS-485.
Molten Glass Graphite Furnace	1112° to 5792°F, (600° to 3300°C)	M311	2-color 0.7 to 1.1µm	✓		1mm	2ms	4-20mA, 0 to 20mA, RS-232, RS-485.
Semiconductor Vacuum	1022° to 4532°F (550° to 2500°C)	M309	0.7 to 1.1µm	✓		0.35mm	1ms	4-20mA, 0 to 20mA, RS-232, RS-485.
Laser Heating Ceramics	1652° to 5972°F (900° to 3300°C)	M309	0.78µm	✓		1.8mm	1ms	4-20mA, 0 to 20mA, RS-232, RS-485.
Molten Metal Pour Streams Welding	392° to 5972°F (200° to 3300°C)	M316	1.45 to 1.8µm	✓		0.35mm	1ms	4-20mA, 0 to 20mA, RS-232, RS-485.
Poly Silicon Production Thin Film Deposition	932° to 5972°F (500° to 3300°C)	M316	1.4µm	✓		0.7mm	1ms	4-20mA, 0 to 20mA, RS-232, RS-485.
Kilns Tube and Pipe Mills	212° to 2372°F (100° to 1300°C)	M318	1.65 to 2.1µm	✓		0.7mm	1ms	4-20mA, 0 to 20mA, RS-232, RS-485.



The PSC Metis Series

The Metis "Self-Contained" series of IR Pyrometers was developed for precision on-line process measurement applications. By utilizing digital signal processing, the Metis line exceeds standard analog pyrometers as far as accuracy, repeatability and wide temperature ranges are concerned.

APPLICATIONS	TEMPERATURE RANGE	MODEL NUMBER	SPECTRAL RESPONSE	OPTICAL ALIGNMENT Laser * Visual	MIN. SPOT SIZE	RESPONSE TIME	OUTPUTS
Metals Composites Graphite Ceramics Vacuum	95° to 1832°F, (35° to 1000°C)	MB35	2.0 to 5µm		0.7mm	3ms	4-20mA, 0 to 20mA, RS-232, RS-485, Optional Profibus
Glass Surface Glass Subsurface	302° to 4532°F (150° to 2500°C)	MB39	3.95µm		0.7mm	3ms to 10s	4-20mA, 0 to 20mA, RS-232, RS-485, Optional Profibus
Flame Treating Furnaces Boilers Incinerators Kilns	752° to 3632°F, (400° to 2000°C)	MY45/46	CO ² GAS		2.5mm	100ms to 10s	4-20mA, 0 to 20mA, RS-232, RS-485, Optional Profibus
Polyester Film Plastics Paper Textiles Rubber Bulk Materials	176° to 4532°F (80° to 2500°C)	MY51	5.14µm		1.7mm	5ms, 30ms, 100ms	4-20mA, 0 to 20mA, RS-232, RS-485, Optional Profibus
	122° to 1472°F (50° to 800°C)	MY80	8.05µm		2.5mm	100ms to 10 sec	4-20mA, 0 to 20mA, RS-232, RS-485, Optional Profibus
	32° to 1832°F (0° to 1000°C)	MY84	8 to 14µm		1.8mm	100ms	4-20mA, 0 to 20mA, RS-232, RS-485, Optional Profibus

Process Sensors Integrated Color Video Models

PSC Pyrometers with Integrated Color Video Sighting provide either a composite or USB transmitted video output that can be connected to a video monitor or to a PC, allowing the operator to visually monitor the target under measurement in real time and color. Video sighting is recommended for remote observation of glowing hot targets as it allows for reliable and precise targeting. Especially useful for viewing down sight tubes and viewing hot illuminous targets, video cameras provide automatic, highly dynamic adjustment of picture brightness. Equally suited for low temperature targets starting at 50°C/122°F, parallel use of a video module and laser crosshair sighting ensure precise measuring spot adjustment for limited access locations. Depending on the pyrometer model selected, focus will be manually adjusted or fixed. Integrated video sighting modules eliminate the need for a separate color CCD visible camera, the alignment of the pyrometer can be monitored visually via a PC or video monitor, and the entire process can be recorded and documented

M311/M322 Series (2 Color)



Temperature ranges from 300° to 2500°C. Integral temperature display and menu. Automatic compensation for viewing through dirty windows, dust and partial smoke between sensor and target. Automatic compensation for changes in target emissivity. Unaffected by moving targets within the FOV.

M309/M316/M318 Series (1 Color)



Wide temperature ranges between 100° and 3300°C. Integral temperature display and menu. Highest accuracy and repeatability, ambient temperature up to 80°C (176°F) without cooling. Fully digital and very fast with response time <1 ms. Optics with extremely small spot sizes from 0.3 mm can be selected.

PSC-SSS-Laser-Video-1M/2M (1 Color)



Temperature ranges 250° to 1800°C. High performance, short wavelength digital non-contact infrared thermometer. Built in temperature display crosshair laser for precise aiming, high resolution optics and peak picker. Optical resolution up to 330:1 with adjustable focus.

PSC-SSS-Laser-Video-3M (1 Color)



Temperature ranges from 50° to 1800°C. Video and crosshair sighting for pinpointing targets as small as 0.020 (0.5mm). Adjustable manual focus optics from 3.6 to infinity. Fast response time from 1ms Short wavelength (2.3 μ).

PSC-CS-Laser-Video-2ML/2MH (1 Color)



Temperature ranges 250° to 1600°C. Two wire IR thermometer with adjustable focus, dual lasers and video sighting for temperature measurements of metals and semi/shiny targets. Measuring small targets from 3.5"/90mm. Simple two-wire interface for reliable operation.

PSC-G54NV/S54NV (1 Color)



Real-time color video camera sighting with ten temperature ranges from 200° to 3000°C, small spot size with four high-res fixed focus optics. Fast response time from 2ms, Available with rugged protective hardware designed specifically for reliability in harsh industrial applications.

PSC-SR54NV Series (2 Color)



Temperature ranges from 550° to 3000°C. Automatic compensation for viewing through dirty windows, dust and partial smoke between target and sensor. Rugged hardware for harsh industrial continuous operations.

PSC-SR56NV Series (2 Color)



Temperature ranges from 550° to 3000°C. Fixed focus optics. Integral temperature and menu display. RS-485 Modbus interface integration into existing data acquisition systems. Unaffected by moving targets within FOV. Compensation for changes in target emissivity.

Process Sensors Fiber Optic Models

The Process Sensors Series of one and two-color fiber optic sensors features wide temperature ranges from 100° to 3300°C, small spot sizes, high speed measurements down to 50 micro-seconds, on-board temperature displays and adjustable laser sighted focusable optics. Excellent reasons to select fiber optic sensors Include:

- High Ambient Temperature Rating up to 600°F
- Compact Size and Flexibility
- Immunity to Electromagnetic / Radio Frequency Interference
- Useful for Vacuum Applications

Metis M311



Temperature range from 600° to 3300°C. Two-color. Spectral Response 0.75 to 1.1µm. Three aiming methods. Minimum spot size 0.7mm. Response time 1ms. Metals, Induction Heating, Kilns, Molten Glass, Composites, Vacuum Furnace, Ceramics, Graphite, Semiconductor Applications

Metis M322



Temperature range from 300° to 3300°C. Two color. Spectral Response 1.45 to 1.8µm. Three aiming methods. Minimum spot size 0.9mm. Response time 1ms. Metals, Induction Heating, Kilns, Molten Glass, Composites, Vacuum Furnace, Ceramics, Graphite, Semiconductor Applications

Metis M309



Temperature range from 550° to 3300°C. One-color. Spectral Response 0.7 to 1.1µm. Three aiming methods. Minimum spot size 0.3mm. Response time 1ms. Metals, Induction Heating, Kilns, Molten Glass, Composites, Vacuum Furnace, Ceramics, Graphite, Semiconductor Applications

Metis M316



Temperature range from 250° to 3300°C. One-color. Spectral Response 1.45 to 1.8µm. Three aiming methods. Minimum spot size 0.3mm. Response time 1ms. Metals, Induction Heating, Kilns, Molten Glass, Composites, Vacuum Furnace, Ceramics, Graphite, Semiconductor Applications

Metis M318



Temperature range from 100° to 1300°C. One-color. Spectral Response 1.65 to 2.1µm. Three aiming methods. Minimum spot size 0.3mm. Response time 1ms. Metals, Induction Heating, Kilns, Molten Glass, Composites, Vacuum Furnace, Ceramics, Graphite, Semiconductor Applications

PSC-SSS-Ratio



Temperature range from 700° to 1800°C. Two-color. Spectral Response 0.7 to 1.1µm. Laser aiming. Minimum spot size 5.1mm. Response time 5-10ms. Metals, Induction Heating, Ceramics, Composites, Vacuum Furnace Applications.

PSC-SRF11N



Temperature range from 600° to 3000°C. Two-color. Spectral Response 0.7 to 1.1µm. Laser aiming. Minimum spot size 0.7mm. Response time 5-10ms. Metals, Induction Heating, Composites, Molten Glass, Graphite, Vacuum, Semiconductor Applications

PSC-GF40N



Temperature range from 250° to 1800°C. One-color. Spectral Response 1.5 to 1.8µm. Laser or LED aiming. Minimum spot size 1.75mm. Response time 10ms adj. up to 10s. Metals, Semiconductor Wafers, Molten Glass, Composites, Vacuum Applications

PSC-SF40N



Temperature range from 600° to 2500°C. One-color. Spectral Response 0.8 to 1.1µm. Laser or LED aiming. Minimum spot size 10ms adj. up to 10s. Metals, Semiconductor Wafers, Molten Glass, Composites, Vacuum Applications

PSC-SF30NG



Temperature range from 600° to 1800°C. One-color. Spectral Response 0.8 to 1.1µm. Minimum spot size 10mm. Response time <10ms adj. up to 10s. Glass Tanks, Glass Forehearths, Glass Feeders, Glass Gob and Metals Applications.

Two-Wire, Loop Powered Pyrometers



PSC-CS-Laser

The PSC-CS-Laser Series are digital two-wire, self-contained IR thermometers with precision dual laser targeting from -22° to 2912°F and optical resolution up to 300:1 with selectable optics. This robust series simplifies installation with two wires and offers fast measurements with ultra-small spot sizes and high accuracy as well as scalable 4-20 mA output in combination with simultaneous alarm output. The PSC-CS-Laser series operates at up to 185°F without cooling, and specially designed, rugged protective hardware assemblies ensure secure operation at higher temperatures. On board emissivity adjustment is easily accessible, or can be accomplished remotely via PSCConnect software.



PSC-40 Series

The innovative designs of the 40 Series models with digital technology, are compact, rugged and based on simplicity of installation. Used in a two-wire loop powered configuration, the sensors' 4-20 mA linear output signal can be easily integrated into existing instrumentation for recording and process control. Integrated USB interface is used for sensor setting parameters. Compact and robust, they feature a laser or green LED to facilitate aiming. Fiber Optic Models PSC-SF40N and PSC-GF40N are also available.

- Selection of temperature ranges from -40°C to 3000°C
- Integrated USB interface for sensor parameter settings
- Built-in peak picker
- Robust stainless steel housing

MODEL NUMBER	TEMPERATURE RANGE	SPECTRAL RESPONSE	APPLICATIONS
PSC-CS-Laser-LT	-22°F to 1832°F	8 -14µm	Non-metals, Metals, Paper, Food, Building Materials, Glass, Ceramics, Composites, Plastics >100mils
PSC-CS-Laser-G5	392°F to 2642°F	5µm	Glass Surface Measurement
PSC-CS-Laser-2ML/2MH	482° to 2912°F	1.6µm	Steel, Metals Processing, Induction Heating, Ceramics, Composites, Furnaces, Semi Conductor, Solar
PSC-T40L	-40°to 1832°F	8 -14µm	Ovens and Dryers, Thermoforming, Aggregate, Powders and Organics, Paper, Packaging and Food, Textiles, Rubber and Plastics >100mils
PSC-T40F	572°to 2372°F	3.9µm	Furnace/Flame Treating applications. Sights through hot combustible gases and clean flames.
PSC-T40G	212°to 2552°F	5µm	Glass Surface Measurement
PSC-T42L	-40° to 1832°F	8 -14µm	Non-metals, Coated Metals, Paper and Packaging, Building Materials, Food Industry, Plastics, Organics
PSC-T42G	212° to 4532°F	5µm	Glass Surface Measurement
PSC-S42N	1112° to 4532°F	0.8 – 1.1µm	Metals, Hot Rolling Mills, Molten Glass, Ceramics, Furnaces
PSC-G42N	482° to 3272°F	1.5 – 1.8µm	Steel, Metals Processing, Induction Heating, Ceramics, Composites, Furnaces, Semi Conductor, Solar
PSC-52LT	32° to 1832°F	8 to 14µm	Ovens and Dryers, Thermoforming, Aggregate, Powders and Organics, Paper, Packaging and Food, Textiles, Rubber and Plastics >100mils
PSC-IR-USB	-40° to 1832°F	8 -14µm	Paper, Food, Hard Plastic, Rubber, Asphalt
PSC-IR-USB 2.2	113° to 3632°F	2.2µm	Reflective Materials
PSC-PC	4° to 932°F	8 -14µm	Non-Reflective Material, Paper, Asphalt, Food, Plastic



PSC-42 Series

The PSC Models PSC-T42L, PSC-T42G, PSC-S42N and PSC-G42N are digital two-wire Self-contained pyrometers that offer high performance with value driven pricing. They are designed for quick, simple installation and feature on-board emissivity adjustment capability and a variety of fixed focus optics as well as adjustable sub-temperature ranges. The higher temperature PSC-G42N/PSC-S42N Series is equipped with laser sighting. Typical application areas include: steel and metals, heat treating, induction heating, semiconductor, vacuum, welding, furnaces, molten glass, composites and measurement of metal molds.



PSC-52LT Pyrometer

The PSC-52LT integrated laser pyrometer provides a temperature range from 32° to 1832°F and was specially designed for the temperature measurement of low reflective surfaces. The stainless steel pyrometer is contained in a housing with quick disconnect cable. It can be connected to a operator's PC via USB interface to adjust it's parameters- except for emissivity. Emissivity can only be changed using the potentiometers located on the rear panel of the sensor. The companion cooling jacket with air purge enables operation in harsh environments.

Process Sensors Blackbody Calibration Sources

PSC offers a unique selection of precise, high performance Blackbody Calibration Sources for calibrating and verifying temperature of pyrometers, thermal imaging systems, spectrophotometers, heat flux meters, radiometers and UFPA detectors. Process Sensors Blackbody Calibration Sources are all about precision. Our first rate blackbodies exhibit high emissivity, high uniformity and high resolution capability. They are extremely stable and offer many unique features including large apertures and fast slew rates.

The innovative design and precision features of each blackbody is the direct result of partnership with our parallel manufacture

of infrared thermometers and thermal imaging camera systems. State of the art design teams work in tandem to craft instruments known for their high quality performance, outstanding value and long term reliability.

The PSC line of blackbody sources has overall capability from subzero -5°C to 1700°C and includes models that are distinguished by their size, portability or other unique and versatile features. All PSC calibration sources are designed to provide the highest emissivity possible and are traceable to worldwide standard calibration laboratory specifications.

BBS1700



High emissivity bench type design stabilizes temperature reading to within 0.5°C . For high temperature calibration of IR thermometers, thermal imaging cameras and FPA detectors.

572° to 3092°F
(300° to 1700°C)
1" (25mm) aperture
+0.99 emissivity

BBS1500-40



High accuracy with a 1.57" aperture and fast heat up time of 40 minutes to 1450°C . For on-site precision laboratory calibration or testing. Cylindrical cavity for uniform temp. radiation."

482° to 2732°F
(250° to 1500°C)
1.57" (40mm) aperture
+0.99 emissivity

BBS1150



Extremely stable, mid to high temp bench type design with large 2" aperture for precision calibration of IR thermometers, thermal imaging devices and spectrophotometers.

392° to 2102°F
(200° to 1150°C)
2" (51mm) aperture
+0.99 emissivity

BBS1200 COMPACT



Compact, two-piece design for automated calibration configuration. Light weight and portable, and offers excellent stability and high uniformity. Eight aperture sizes increase versatility.

122° to 2192°F
(50° to 1200°C)
Choice of 8 aperture sizes
+0.99 emissivity

BBS100-TE



Thermo-electrically cooled, light-weight (8 lbs.) and portable, with the versatility of multiple operating modes and large 4" aperture. Fast slew rates of $0.10^{\circ}\text{C}/\text{S}$, $-0.08^{\circ}\text{C}/\text{S}$, and high emissivity/uniformity. Temperature resolution is 0.01°C

32° to 212°F
(0° to 100°C)
4" (100mm) aperture
 0.96 ± 0.01 emissivity

BBS35...150FP Series



Quick, calibration checks for factory, workshop or laboratory. Eighteen rugged, portable models having fixed target temperatures with outstanding stability. Less than $\pm 0.2^{\circ}\text{C}$ deviation. Fast heat up time.

95° to 302°F
(35° to 150°C)
2" (50.8mm) aperture
 0.98 ± 0.004 emissivity

BBS400-2



Compact, two-piece design offers portability for calibration of on-line, fixed mounted IR sensors as well as imaging detectors in automated calibration processes. External pyrometer correction adjustment.

Ambient + 122° to 752°F
(Ambient + 50° to 400°C)
1.18" (30mm) aperture
 0.96 ± 0.01 emissivity

BBS-EX Series



Extended area blackbody sources with emitter sizes from $2.5'' \times 2.5''$ to $12'' \times 12''$ with separate controllers for use as standard radiation sources for collimated scene projection and calibration of focal plane arrays and thermal imaging cameras. Resolution 0.1°C

23° to 932°F
 -5° to 500°C
Up to 12" x 12"
(304mm x 304mm) apertures
 0.96 ± 0.02 emissivity

Process Sensors Portable Single Point Non-Contact Thermometers

	MODEL NUMBER	TEMPERATURE RANGE	SPECTRAL RESPONSE	ACCURACY	RESPONSE TIME
	Capella C311 Robust, handheld IR thermometers for non-contact temperature measurement in the short-wave spectral range especially suitable for measurements on shiny metals. Measurement of molten metals and pouring reams is simplified with C311 models.	1112° to 2552°F (600° to 1400°C) 1382° to 3272°F (750° to 1800°C) 1652° to 4532°F (900° to 2500°C)	0.75µm to 0.93µm / 0.93µm to 1.1µm (2 color)	± 0.5% of measured value in °C +2K	< 1 ms
	Capella C322 Robust, handheld IR thermometers for non-contact temperature measurement in the short-wave spectral range especially suitable for measurements on shiny metals. Includes switchable bright green laser targeting light and through-lens view finder sighting.	572° to 1832°F (300° to 1000°C) 662° to 2372°F (350° to 1300°C) 932° to 3272°F (500° to 1800°C)	1.45 µm to 1.65µm / 1.65µm to 1.8µm (2 color)	± 0.5% of measured value in °C +2K	< 1 ms
	Capella C309, C316, & C318 Robust, handheld IR thermometers for non-contact temperature measurement in the short-wave spectral range especially suitable for measurements on shiny metals. Includes switchable bright green laser targeting light and through-lens view finder sighting.	Various Ranges from 180°C to 3300°C	0.7-1.1 µm 1.45-1.8 µm 1.65-2.1 µm	≤2500°C 0.25% of value in °C+1K > 2500°C 0.5% of value in °C	< 1 ms
	PSC-90 Series Versatile, high performance digital IR thermometers with high accuracy/repeatability, focusable through lens sighting optics and dual temperature displays	1112° to 5432°F (600° to 3000°C) 1652° to 5432°F (900° to 3000°C) -58° to 1832°F (-50° to 1000°C)	0.96µm 0.65µm 8 to 13µm	± 0.5% of reading ± 1% of reading	0.5 sec 1 sec
	PTLST-20-1M/2M Portable telescopic and dual-laser sighting thermometers for mid-high temperature applications. Built-in alarms and optional software	725° to 2912°F (385° to 1600°C) 1202° to 3272°F (650° to 1800°C)	1.0µm 1.6µm	± 0.3% of reading	100ms
	PTLST-20-LT Portable telescopic and dual-laser sighting thermometer with small spot size for general purpose, low reflective surface applications	32° to 2372°F (0° to 1300°C)	8 to 14µm	± 1% of reading	300ms
	Portable Laser Sight Thermometer IR thermometer with crosshair laser sighting, high resolution 75:1 optics, built-in alarms and spot size of 1mm. Large multi-colored temperature display.	-31° to 1652°F (-35° to +900°C)	8 to 14µm	± 0.75% of reading	150ms
	PSC-IRVT Series Professional IR video thermometers with CCD video recording and playback. FOV 50:1 Dull surface measurement for low reflective surface applications	32° to 1832°F (0° to 1000°C) 32° to 2912°F (0° to 1600°C)	8 to 14µm	± 1.0% of reading From 0 to 40°F ± 3°C	Less than 300ms
	PSC-MS Series Most economical, smart IR thermometers with high precision optics, laser sighting, USB interface and software. Built-in alarms. FOV up to 30:1 Accepts K-type thermocouple input.	-25° to 788°F (-32° to 420°C) -25° to 980°F (-32° to 530°C) -25° to 1440°F (-32° to 760°C)	8 to 14µm	± 1% of reading	300ms

PSC Custom Engineered Turn-Key System Solutions

Process Sensors Corporation offers custom engineered turn-key system solutions to simplify and assist with industrial process and research applications. Experienced application specialists providing unique sensor guidance for customers' demanding temperature measurement applications work with state of the art design teams to conceive and develop a comprehensive range of system solutions that reflect PSC's reputation for high quality performance, outstanding value and long term reliability.



A wide array of complete custom turn-key IR systems include touch screens, protective hardware with air activated ball valves, industrial enclosures and explosion proof housings, make custom installations simple for integration within existing process and control systems. Our PSC Surveyor Series, Model PSC-SC384 and MV09 thermal imaging cameras feature simple-to-use intuitive and powerful software for process measurement and control applications. Engineering support through every step of the design process ensures customer satisfaction with guaranteed results.

Process Sensors PSC-160 IMMS Injection Mold Minder System



Injection mold part presses have a high risk factor of experiencing critical damage due to molded parts sticking within the mold. The PSC-160 IMMS Injection Mold Minder System detects and prevents the problems before they occur. The PSC thermal imaging camera views and identifies parts that are retained in the mold. The smart logic system sends a signal to the mold machine to activate the mold ejection pins until all the molded parts are ejected and then signals the mold to close. This prevents damage to expensive molds, increasing yield and eliminating down time.

Process Sensors Plug and Play Modules And Accessories



PSC can simplify customers' system installation efforts utilizing touch screen displays for remote IR sensor communication, digital indicators, stack light alarms, push button IR sensor activation, laser aiming, and customized turn-key solutions to reduce costs and improve productivity.

Technical information

Pyrometer Sighting Methods

To measure accurately, an IR pyrometer must be aimed at the surface or part of the surface of interest. For very large areas such as steel slabs or web processes this does not present a problem, but for smaller surfaces such as wire, pc board components, weld bead etc., a more precise aiming method is required.

Process Sensors' pyrometers can incorporate a variety of sighting methods such as through-lens, where an installer can aim through the same lens that focuses the IR energy on the detector; or laser aiming via a built-in laser beam that illuminates the center of the target area. The pyrometers can also incorporate a video output that presents a picture of the area being measured on the image. A reticle defines the exact spot size of temperature measurement.

Where there is no direct line-of-sight between the pyrometer and the target, a flexible fiber optic cable can be used to carry the IR energy around obstacles and corners. Specifically used in high-strength magnetic fields, high ambient temperature and vacuum environments, it allows the IR sensor' electronics to be placed remotely, outside of these upsetting conditions.

Lenses and Fiber-Optic Cable

The infrared energy radiated by the target is transferred via focusable lenses either directly on the detector (standard version) or onto one end of a fiber optic cable. For applications where the lens must be refocused during operation, a remote focusable lens is available.

Focusing

Some pyrometers are designed with adjustable focusing. This does not necessarily mean that the target must be a sharp, clear image in order to obtain an accurate measurement, as would be the case with a camera. Pyrometer focusing is simply intended to permit the pyrometer to "see" the smallest spot size at a given distance. This is helpful when measuring through small openings or for avoiding obstacles in the sight path.

Sight Path

The sight path is the space between the pyrometer lens and the object being measured. For accurate measurement the sight path must be clear and free of obstacles, steam and water droplets, and heavy concentrations of particles. Devices such as fans and air purges, or careful sighting can usually ensure that this condition is met, but sometimes the use of a Two Color or ratio pyrometer can be helpful.

Focusing, Sight Path and Field of View

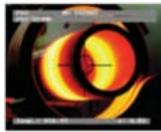
Unlike other temperature sensors, a well designed infrared pyrometer is inherently a very accurate measurement device, but



Laser Aiming



Thru-Lens Sighting



Video Sighting

because it measures from a distance, the focus and field of view (FOV) play an important part in the quality of the measurement.

The FOV is an invisible cone that extends from the lens out to infinity. The FOV ratio is the diameter of the cone (Spot size) at a given distance from the lens. It is expressed in inches as a ratio e.g. 20:1, 60:1 etc.

So if a 60:1 FOV pyrometer is focused at a distance of 120", it will gather energy from a 2" dia. area on the object being measured. It will see only a small percentage of energy outside that circular FOV area based on the quality of its optics.

The equation to determine spot size is:

$$\frac{\text{Focus Distance}}{\text{FOV}} = \text{Spot Size}$$

To obtain an accurate temperature measurement, the FOV must be filled, smaller than the target at whatever distance the pyrometer is from the object being measured. The exception to this rule is the Two Color or Ratio Pyrometer which can measure accurately when only part of the FOV is filled. Listed below is an explanation of operation for one and two color pyrometry.

Single Color Thermometers

1. Depend on the emissivity of the target:
 - Short wavelength selection reduces the effect of emissivity errors for metals
 - Offer a variety of wavelengths for specific applications.
 - Used for low temperature measurements (sub zero temperatures)
2. Measure the average temperature within the field of view:
 - Field of View must be completely filled by the target
 - Focus dependent on the target
 - Affected by dirty windows or dusty atmosphere

Two Color Thermometers

1. Independent of emissivity of the target - (If emissivity changes proportionally, for each single color wavelength)
2. Measure the weighted peak temperature within the field of view.
 - Tolerates up to 99% blockage of the target
 - Unaffected by dust and other contaminants in the field of view i.e. dirty viewing windows
 - Unaffected by moving targets within the field of view
3. Limited low temperature measurements to about 300° C
4. Higher cost solution compared to Single-Color.

PSC ACCESSORIES

The circumstances under which Process Sensors pyrometers are used are many and varied. In order to accommodate these differences and to ensure durable, trouble-free operation, we have designed a large comprehensive family of accessories. Some are purely protective, while others simplify a measurement that would otherwise be difficult or impossible. Pictured below is a sampling.

			
<p>Metis Water Cooling Jacket KG10-00 with Separate Air Purge BL12-00</p>	<p>PSC-SSS-Laser and PSC-CS-Laser Water Cooled Jacket with Separate Air Purge and Adjustable Mtg. Bracket</p>	<p>Surveyor Thermal Imaging Camera Series Water Cooled Jacket with Integrated Air Purge and Separate Adj. Mtg. Bracket</p>	<p>42/40/44 Series Cooling Jacket with Integrated Air Purge and Separate Mtg. Bracket PSC-3310A23010</p>
			
<p>Removable Sealed Window Assembly Includes Sapphire, Quartz, Pyrex or Other Window Types 950-133A-x</p>	<p>Plug & Play Module W/Touch Screen Display for Metis or Sirius Sensors</p>	<p>Swivel Base Mount for Metis Series HA20-00</p>	<p>Swivel Base Split Ring Mount 950-208 for PSC-CS-Laser, PSC-SSS-Laser and PSC 54/56 Series</p>
			
<p>SC10 Scanning Mirror for Metis or Sirius</p>	<p>PSC-SSS Air Purge AC-SSS-AP and 54 Series Air Purge, PSC-3310A22050</p>	<p>Air Purge Assembly For Fiber Optic Lens PSC-3310A22529</p>	<p>54 Series Cooling Jacket with integrated Air Purge PSC-3310A23050</p>

Precision Non-Contact (NIR) Moisture Measuring Systems

Unlike infrared (IR) pyrometers that measure temperature by detecting infrared energy radiated by a particular material, NIR moisture measuring systems aim selected wavelengths of energy at the material and detect the amount of energy **reflected** back from the material. The difference between the amount of reflected NIR energy and the NIR energy generated by the source indicates the amount of moisture and/or other elements remaining in the material.

Process Sensors Corp. **MCT460 NIR Transmitter**, designed in response to industry's need for a high quality sensor at an economical price, provides accurate and repeatable moisture, oil, and coating measurements and communicates directly with computers, controllers and PLCs. The stand alone design eliminates the need for proprietary electronics and greatly reduces installation and maintenance costs. Scanning frames are available to profile webs or conveyed materials.

World Leader In Advanced NIR Process Moisture Measurement

Process Sensors Corporation is a leading manufacturer of precise near infrared (NIR) measurement systems for industries worldwide. Our NIR sensors are routinely used in the food, converting, tobacco, wood and glass industries for the measurement of moisture, oil/fat and coatings.

Some of the many benefits of utilizing PSC's non-contact NIR sensors include:

- Easy operation and integration into existing systems
- Fast and repeatable measurements
- Reliable performance and low maintenance
- Simple to standardize across multiple lines or plants



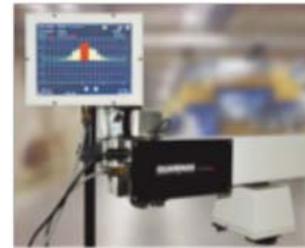
The **MCT466-SF Food Grade Sensor** is a wash-down tolerant NIR analyzer for challenging processing environments. Heat resistant up to 80°C, it withstands the harsh conditions of most food production facilities. The optional stack alarm, with color-coded status lights and an annunciator for alarm conditions, enables users to detect out-of-spec product and make immediate adjustments to reduce waste.



The **MCT460 On-Line Moisture Meter** has been designed to maximize production efficiency, reduce waste and lower energy costs. Available in stand-alone or system configuration, it features a bright 5.7" touch-screen display, built in cooling panel and air purge assembly. For system integration, the MCT460 offers numerous analog and digital communication outputs including Ethernet, Ethernet IP, Modbus TCP, Profibus and DeviceNet.



Suitable for use at-line or in a laboratory, the **MCT466-QC "Quick-Check" Benchtop Tester** takes measurements of grab samples in less than 10 seconds. Operators require minimal training and can quickly switch between product calibration for rapid testing.



The **Guardian Scanning Frame System** is designed for monitoring constituents across a web. Featuring an NIR sensor and industrial scanning frame, it delivers accurate and reliable measurements of moisture, water based coat weight and film thickness on a wide variety of substrates including paper, film and foil. The ViewerSuite software puts users in control of roll reports and data archiving, cross direction zoned web profiles, designated land and machine-direction measurements, and zone, profile and roll averages.

PROCESS SENSORS CORPORATION

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