

# SILVER SERIES C, M & U CLASS

## Line of Sight, Single-Wavelength ( $1\lambda$ ) Noncontact Temperature Sensors

SSCMU08

### SILVER SERIES

The Silver Series is a family of compact industrial infrared thermometers. They are recommended for applications that typically involve, but are not limited to:

- target temperatures below 1000°F/550°C
- non-reflective target materials
- moving targets
- a need for a small sensor size
- high reliability and performance

### Features

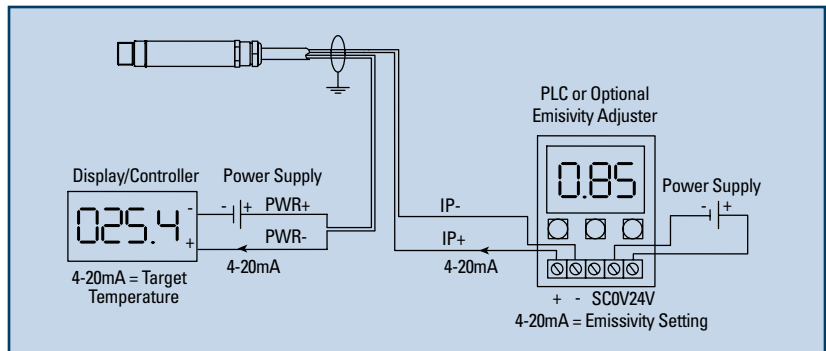
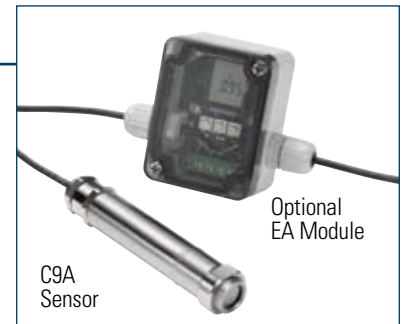
The Silver Series contains the latest advances in digital processing to provide the most accurate, repeatable, and reliable measurements for this type of sensor. With a choice of sensor configurations and outputs, they are easy to install and maintain for a wide range of applications. Features include:

- 1% or +/-1°C accuracy from -40 to 1832°F (-40 to 1000°C)
- A choice of D/2, D/15, D/30 and Close Focus optics
- 8-14 $\mu$ m wavelength
- Line of sight alignment with optional external laser aiming
- 2-wire or 4 wire configurations
- 4-20mA and voltage outputs which are linear with temperature
- J, K or T Thermocouple outputs
- USB 2.0 interface
- OPC server capabilities
- Internal sensor and process ambient temperature output
- 3ft/1m electrical cable with optional extended lengths
- Emissivity settings are offered as fixed or adjustable
- Stainless steel NEMA4X (IP65)
- Optional accessories such as mounting brackets, water cooling, and air purge

### Silver C Class Sensors

The C9 Class offers current, voltage or thermocouple outputs with a fixed emissivity setting of 0.95. In the 4-wire configuration, a second 4-20mA output provides the internal sensor temperature which can also be used as an indication of the process ambient temperature surrounding the sensor.

The C9A Class has a 4-20mA output plus a 4-20mA input for remote emissivity adjustment. The emissivity input can be supplied by a PLC or adjusted manually with the optional Emissivity Adjuster (EA) Module.



### Silver M Class Sensors

The M9 Class features a two piece design and miniature sensing head with up to D/30 optical resolution. There is a choice of 4-20mA, voltage, and thermocouple outputs with fixed emissivity setting of 0.95. As with the C9 Class, the M9 offers a second 4-20mA output of the internal sensor temperature or process ambient temperature.



### Silver U Class Sensors with USB and OPC Interface

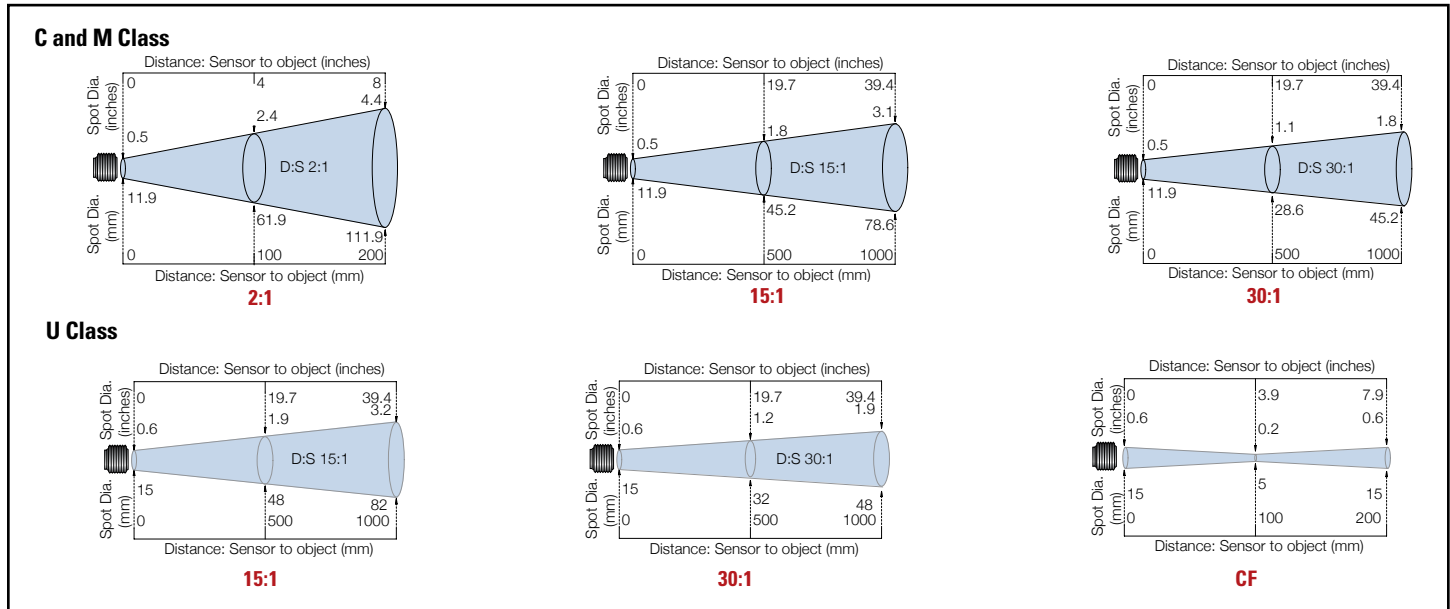
The U9 Class features a 4-20mA output and an innovative design with adjustable settings using a USB port, cable, and SilverView PC software which are all included with each sensor. The user friendly SilverView software provides full set-up and configuration of the sensor settings as well as data acquisition and graphical display.



- set the temperature range and emissivity
- compensate for reflected energy
- apply filtering, peak or valley hold processing
- select max, min, average or instantaneous readings
- OPC server capabilities

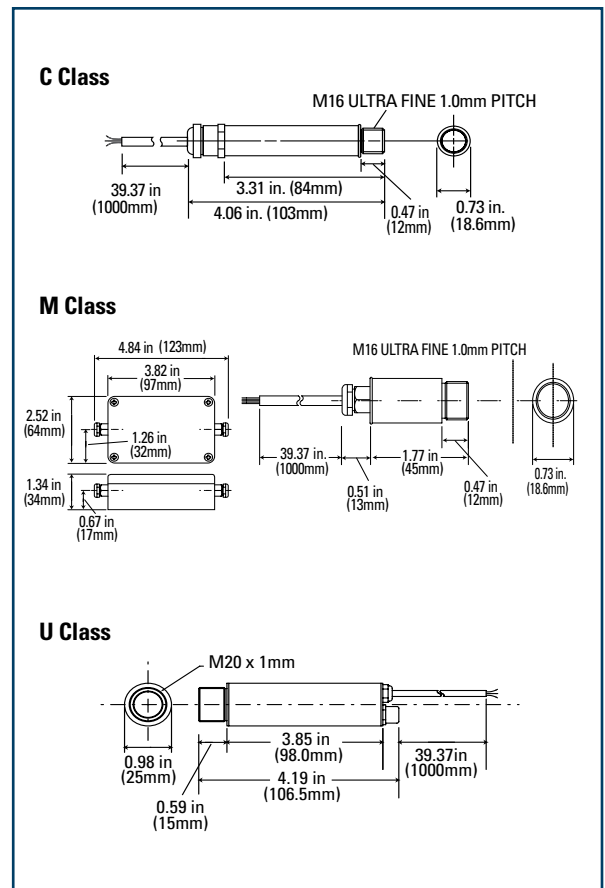
## Field of View Specifications

The nominal spot size of the sensors is based on 90% of measured energy. Because the target must fill the measured area of the sensor, it is recommended that the measured target should be larger than the sensor's spot size in addition to having an unobstructed view of the target.



Sensor Specifications	
<b>Accuracy</b>	±1% of Reading or ±1°C whichever is greater
<b>Repeatability</b>	±0.5% of Reading or ±0.5°C whichever is greater
<b>Response Time</b>	240 ms (90% of Response)
<b>Input Power</b>	6 to 28Vdc (20mA)
<b>Loop Impedance</b>	900 ohms maximum
<b>Sensor Ambient Temperature Limits</b>	32-158°F / 0-70°C with water cooling the limit is 482°F/250°C
<b>Enclosure Rating</b>	<ul style="list-style-type: none"> <li>Sensors are Stainless Steel Enclosures with NEMA 4X (IP65) Rating</li> <li>M Class electronics module is die cast aluminum with NEMA 4 (IP65) Rating</li> </ul>
<b>Relative Humidity</b>	95% max non condensing
<b>Mounting Thread (Nut Included)</b>	C and M Class - M16 x 1.0mm pitch U Class - M20 x 1.0mm pitch
<b>Weight with Cable</b>	C Series – 0.2 lbs / 95 g M Series – 0.6 lbs / 295 g U Series – 0.4 lbs / 175 g
<b>Sensor Dimensions</b>	C Series – 0.7in/18mm Diameter x 4in/103mm Long M Series – 0.73in/18mm Diameter x 1.8in/45mm Long U Series – 0.98in/25mm Diameter x 4.2in/106.5mm Long
<b>Optional Emissivity Adjuster (EA)</b>	<ul style="list-style-type: none"> <li>Polycarbonate enclosure with NEMA 4 (IP65) Rating</li> <li>2.6in/65mm tall x 2in/50mm wide x 1.4in/35mm deep</li> <li>24Vdc (13V to 28Vdc) Input power</li> <li>4-20mA output for emissivity 0.2-1.0</li> <li>3.5 digit LCD Display with push buttons</li> </ul>
<b>CE Certification</b>	EN61326-1: 2006 for EMC
<b>Warranty</b>	2 year

## Sensor Dimensions



The Silver Series sensors feature a variety of configurations, temperature ranges, and optics to meet many application requirements. Simply select the appropriate part numbers from the tables below to configure a sensor for your application.

	A - Sensor Model		B - Field of View (FOV)		C - Output		D - Cable		E - Accessory(s)
<b>Silver</b>	-	-	-	-	<b>0</b>	-	<b>3C</b>	-	-

**Sample Part Number:** Silver C9-2-15-0-3C-AP2-FB1 (FOV Code B: 2:1 = 2, 15:1 = 15, 30:1 = 30 Optics)

Part Code A - Sensor Model				Part Code B - FOV			Emissivity Setting
Model Number	Spectral Response	Temperature Range		Field of View (select one FOV)			
		Fahrenheit	Celsius				
<b>C9-1</b>	8 to 14um	-4 - 212 °F	-20 - 212 °C	2:1	15:1	30:1	Fixed at 0.95
<b>C9-2</b>	8 to 14um	32 - 482 °F	0 - 250 °C	2:1	15:1	30:1	
<b>C9-3</b>	8 to 14um	32 - 932 °F	0 - 500 °C	n/a	15:1	30:1	
<b>C9A-1</b>	8 to 14um	-4 - 212 °F	-20 - 100 °C	2:1	15:1	30:1	Adjustable 0.2-1.0 with 4-20mA input
<b>C9A-2</b>	8 to 14um	32 - 482 °F	0 - 250 °C	2:1	15:1	30:1	
<b>C9A-3</b>	8 to 14um	32 - 932 °F	0 - 500 °C	n/a	15:1	30:1	
<b>M9-1</b>	8 to 14um	-4 - 212 °F	-20 - 100 °C	2:1	15:1	30:1	Fixed at 0.95
<b>M9-2</b>	8 to 14um	32 - 482 °F	-0 - 250 °C	2:1	15:1	30:1	
<b>M9-3</b>	8 to 14um	32 - 932 °F	0 - 500 °C	n/a	15:1	30:1	
<b>U9-4</b>	8 to 14um	-40 - 1832 °F	-40 - 1000 °C	15:1	30:1	CF	Adjustable 0.10-1.00 w/ USB & SilverView
<b>U9-5 (1)</b>	8 to 14um	0 - 500 °F	-17 - 260 °C	15:1	30:1	CF	

Part Code C - Output	
Part No.	Description
<b>C9 and M9 Class (2)</b>	
<b>0</b>	2-wire, 4-20mA
<b>1</b>	4-wire, 0-50mV
<b>2</b>	4-wire, T Thermocouple
<b>3</b>	4-wire, J Thermocouple
<b>4</b>	4-wire, K Thermocouple
<b>C9A Class</b>	
<b>0</b>	4-wire, 4-20mA and 4-20mA input for emissivity
<b>U9A Class (3)</b>	
<b>0</b>	2-wire, 4-20mA and USB 2.0 connection

Part Code D - Sensor Cable	
Part No.	Description
<b>All Silver Sensors (4)</b>	
<b>3C</b>	3ft/1m Cable
<b>3CHT</b>	3ft/1m Cable with Water Cooling
<b>10C</b>	10ft/3m Cable
<b>10CHT</b>	10ft/3m Cable with Water Cooling

Part Code E - Sensor Accessories	
Part No.	Description
<b>Silver C and M Series</b>	
<b>AP1</b>	Air Purge for 2:1 Optics
<b>AP2</b>	Air Purge for 15:1 & 30:1 Optics
<b>WCAP1 (5)</b>	Water Cooling Air Purge (C Class)
<b>AB1</b>	Adjustable Bracket
<b>FB1</b>	Fixed Bracket
<b>EA</b>	Remote Emissivity Adjuster
<b>Silver U Series</b>	
<b>AP3</b>	Air Purge
<b>WCAP3 (5)</b>	Water Cooling Air Purge
<b>AB3</b>	Adjustable Bracket
<b>FB3</b>	Fixed Bracket
<b>All Silver Series Sensors</b>	
<b>LST</b>	Laser Sighting Tool
<b>PSD</b>	Power Supply DIN Rail 24Vdc 600mA output, 85-264Vac input, -10 to 70C ambient
<b>CLA</b>	Calibration Certificate
<b>CLB</b>	Re-Calibration and Certificate

## Silver Series Notes

1. The U9-4 sensor can be configured to any temperature range within the specified range (minimum span of 100°C). The U9-5 model is pre-configured to the specified range and can be re-scaled to any range within the U9-4.
2. Output options 1-4 include a second 4-20mA output for the sensor ambient temperature (scaled to same range as sensor target temperature). Output option 2 is not available with the -3 Temp Range.
3. The 4-20mA and USB connections of the U9 class sensors can be used independently or simultaneously. The 3ft/1m USB cable has an NEMA4X (IP65) connector at the sensor end and a protective NEMA4 (IP65) cap for when the USB cable is not connected.
4. The sensor cable length (Part Code D) must be specified at the time of the order. The cable may be cut or spliced in the field. The type of cable varies with the sensor output. For example, a sensor with output 3 includes a Type J thermocouple wire. With the M Class, the specified cable length refers to the cable from the sensor to the electronics module.
5. The water cooling option must be ordered with the sensor as it can not be added in the field.



**Fixed Mounting Bracket**

The L-shaped fixed mounting bracket offers a rigid support for the sensor and allows fine adjustment in a single plane.



**Adjustable Mounting Bracket**

The adjustable mounting bracket offers a rigid support for the sensor and allows fine adjustment in two planes.



U Class Air Purge (AP3)

**Air Purge**

The air purge is used to keep dust, fumes, moisture and other contaminants away from the lens. Air flows into the fitting on the side and out of the aperture at the front. The Silver C, M, and U Class each include an optional air purge accessory.



U Class Water Cooling (WCAP3)

**Water Cooling Air Purge**

The water cooling air purge allows the sensor to withstand ambient temperatures which exceed the normal 70°C limit. Air or water (depending on the degree of cooling required) flows into one of the fittings on the side and out of the other. To prevent condensation from forming on the lens, the air/water cooled housing includes an air purge. The Silver C, M, and U Class each include an optional water cooling air purge accessory. Please note, the water cooling air purge must be ordered with the sensor as it cannot be added to the sensor in the field.

