

# SumoFlo CPFM-8103

## SINGLE-USE CORIOLIS FLOW METER



Extreme precision is achievable with the SumoFlo® CPFM-8130 Series Single-Use Coriolis Flow Meter from PSG Biotech. The SumoFlo meters accuracy is within  $\pm 1\%$  of reading, no matter the changes in viscosity or temperature with flow ranges from 0.05 to 100kg/min. The SumoFlo Coriolis Flow Meter comes in eight models and is specially designed for measuring liquids in high-purity bio-pharmaceutical and other applications that require all gamma-sterilizable wetted surfaces. Due to patented Coriolis technology, SumoFlo Flow Meters offer  $\pm 1\%$  accuracy of mass flow rate readings that is unaffected by flow regime or variations to the velocity profile, allowing for accurate measurements of bubbly or frothy fluids.

The SumoFlo Coriolis Flow Meter is the world's only Single-Use PEEK Coriolis mass flow meter, and is available in a disposable, drop-in form factor for single-use applications. The fluid contacting surfaces are made of unreinforced PEEK (Polyether ether ketone) that meet USP Class VI, USP 661, and USP 788 standards.

Designed and Assembled in California, USA, from American and imported materials. This product is protected by U.S. and International patents.

### FEATURES

- Accuracy:  $\pm 1\%$  of mass flow rate reading; unaffected by flow regime or variations to the velocity profile
- Multiple size sensors from 1/8" to 1" for flow ranges from 50 g/min to 100 kg/min
- Fluid measurement performance is independent of fluid properties; eliminating the need to calibrate on different fluids
- USP Class VI wetted materials
- PEEK sensor is compatible with gamma irradiation to 40 kGy
- CE marketing certified
- Custom sensor mounting cradle available
- Transmitter with integral display options available

U.S. PATENTS 8404076 & 8887578 & 9677921 & 10209113 JAPANESE PATENTS 5602884 & 6581309 CHINESE PATENTS ZL 201480046308.8 & ZL 201680077990.6. TAIWANESE PATENTS I657231 & I528021. EUROPEAN UNION PATENT 3036083. OTHER PATENTS PENDING See [www.psgdover.com/biotech](http://www.psgdover.com/biotech) for latest information.

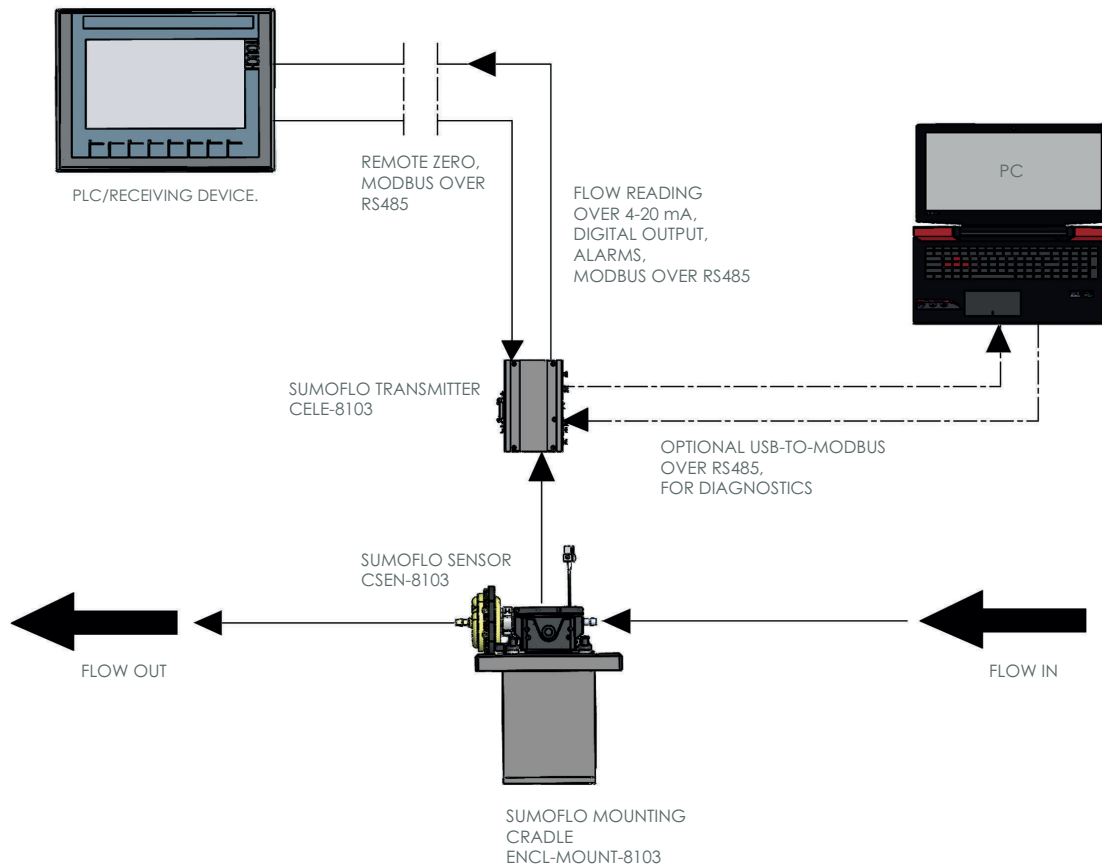
## MEASUREMENT PRINCIPLE

Fluid flows into the sensor consisting of two flow sensitive elements which are vibrated relative to one another – similar to the tines of a tuning fork. Fluid interacts with the sensor dynamically in such a way that the sensor's response is immune to the fluid's chemical and physical properties, flow regime, or variations in flow velocity profile. Fluid mass flow rate is determined by measuring the relative motion of the vibrating flow sensitive elements.

## APPLICATIONS

- Chromatography
- Cell Culture
- Depth Filtration and Tangential Flow Filtration
- Continuous Processing

## TYPICAL BLOCK DIAGRAM



SumoFlo CPFM-8103-Series Coriolis Flow Meter consists of three components: the single-use Coriolis flow sensor, the durable transmitter, and the sturdy mounting cradle, as well as cables to connect the transmitter to the sensor and the transmitter to the system control device. When properly installed in the mounting cradle, the SumoFlo flow meter meets CE specifications.

Optional components include a stand to mount the cradle for stand alone installation, an RS485-to-USB connector, and a Windows 10 Pro laptop computer running PSG Biotech Coriolis GUI software. Three display options are also available in a panel mount version, a Tabletop in a NEMA 4X Stainless Steel enclosure and a table top transmitter and display with an integrated SumoFlo cradle. Contact PSG Biotech for additional information.

Sensor Style	Description	Electrical Connections	Fluid Connections
C	Cradle-Mount Sensor	Top (same side as fluid connections)	6° from vertical
P	Panel-Mount Sensor	Bottom (opposite side as fluid connections)	6° from vertical
R	Standard Inline Sensor	Either top or bottom	Inline (90° from vertical)
T	Tall Inline Sensor	Either top or bottom	Inline (90° from vertical)

## MEASUREMENT SPECIFICATIONS

Model CSEN-8103-**	031	032	062	063	082	151	152	153
Accuracy	±1% of rate for 10% to 100% of full scale rated flow rate ±(1% of rate + Z.O.S) for < 10% of full scale rated flow rate							
Temperature	Ambient: 0° – 50°C Fluid: 4° – 40°C For applications involving temperatures below 10°C, consult factory for special calibration.							
Operating Pressure	60 psig (414 kPa gauge) max		80 psig (550 kPa gauge) max					
Flow Range*	0.05 – 1.5 kg/min	0.02 – 3 kg/min	0.5 – 5 kg/min	0.9 – 9 kg/min	2 – 20 kg/min	4 - 40 kg/min	6 - 60 kg/min	10 – 100 kg/min
Zero Offset Stability (Z.O.S.)	0.75 g/min	1 g/min	2 g/min	4 g/min	10 g/min	20 g/min	20 g/min	40 g/min

\* Lower minimum flow rates available with special calibration fee.

## MATERIAL SPECIFICATIONS

Model CSEN-8103-**	031	032	062	063	082	151	152	153
Process Connections*	1/8" barb	1/8" barb 1/4" barb	1/4" barb	3/8" barb 3/8" Mini TC	1/2" barb 1/2" Mini TC	3/4" barb 3/4" Mini TC	3/4" barb 3/4" Mini TC	1" barb 1"-1.5" TC
Wetted Materials)	Unreinforced PEEK (Polyether ether ketone), 316L Stainless Steel (for temperature sensor only), Silicone. All polymeric wetted materials are USP Class VI compliant.							
Interconnecting Cable Length	All polymeric wetted materials are USP Class VI compliant							
Ingress Rating For Connectors	IP65							

\* Consult the factory for other types of process connection options.

**CELE-8103 C & D ELECTRICAL SPECIFICATIONS**

Supply Voltage	24 V DC
Power Consumption	CELE-8103-C: Max 6W. CELE-8103-D: Max 7.5 W
Programming	Operator Parameter configuration through configuration port with a PC
Analog Output Module	1x 4–20 mA, 2x 4–20 mA, 3x 4–20 mA, or 4x 4–20 mA; configurable as Mass Flow Rate, Temperature
Digital Input/Output Module	0x D/O, 1x D/O, or 2x D/O; Configurable as Frequency or Digital I/O
Frequency Output	0 to 10 kHz proportional to flow rate
Digital Output over MODBUS*	Mass Flow Rate, Volumetric Flow Rate**, Density**, Temperature***, Rezeroing, Totalizer Reset; via MODBUS RTU/ASCII over RS485

\* Requires CELE-8103 model configured for MODBUS communications.  
 \*\* Requires CELE-8103 and CSEN-8103 models configured for density measurement.  
 \*\*\* Requires CELE-8103 and CSEN-8103 models configured for temperature compensation.

**CELE-8103 B & I ELECTRICAL SPECIFICATIONS**

Supply Voltage	100 - 240 V AC, 50/60 Hz
Power Consumption	Max 15 W
Programming	Graphical user interface on Windows 10 PC through USB port for operation programming and reporting
Analog Output Module	1x 4–20 mA or 2x 4–20 mA
Digital Input/Output Module	1x D/O or 2x D/O; Configurable as Frequency or Digital I/O; 1 D/I for sensor zeroing
Frequency Output	0 to 10 kHz proportional to flow rate
Digital Output over MODBUS*	Mass Flow Rate, Volumetric Flow Rate*, Density*, Temperature**, Rezeroing, Totalizer Reset; via MODBUS RTU/ASCII over RS485

\* Requires CELE-8103 and CSEN-8103 models configured for density measurement.  
 \*\* Requires CELE-8103 and CSEN-8103 models configured for temperature compensation.

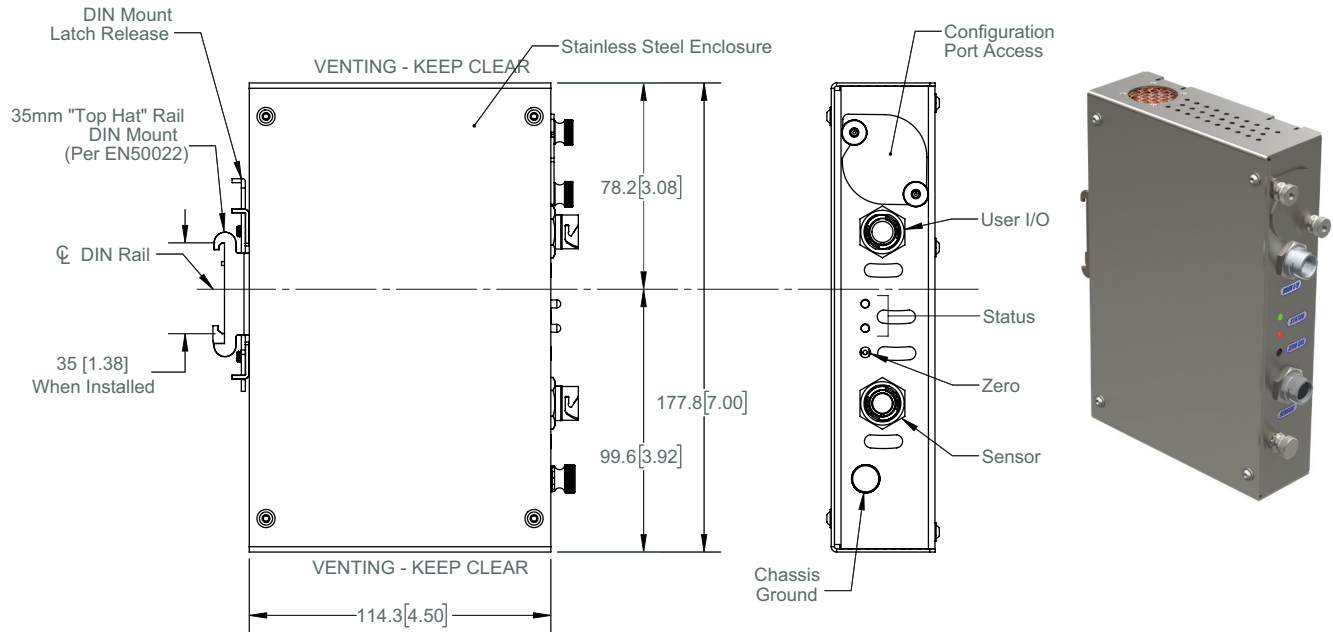
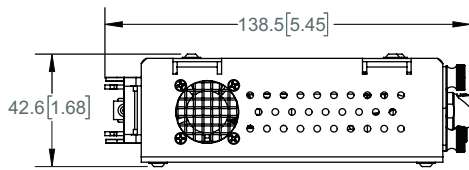
**CERTIFICATIONS/COMPLIANCES**

USP Class VI Material Certification	CE Compliance via the following testing: 1. EN61000-4-2: Electrostatic Discharge 2. EN61000-4-3: Radiated Immunity (and Radiated Emissions) 3. EN61000-4-4: Electrical Fast Transients 4. EN61000-4-5: Surge – Power Line 5. EN61000-4-6: Conducted Immunity
USP 661.2 for Containers/Plastics	
USP 788.1 for Containers/Plastics	
Directive 2011/65/EU (RoHS)	

### DIMENSIONAL DRAWINGS

For reference only

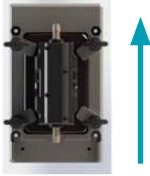
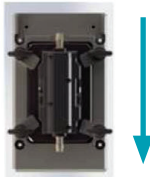
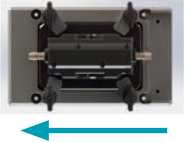
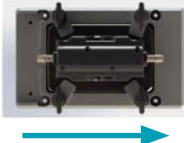

### CELE-8103 TRANSMITTER



## INSTALLATION & COMMISSIONING

Installation and Commissioning of all SumoFlo Series Coriolis Flow Meters requires specific instructions dependent on mounting configuration.

The mounting orientation of SumoFlo Series Coriolis Flow Meters is critical. Five different mounting orientation options are available. The options are:

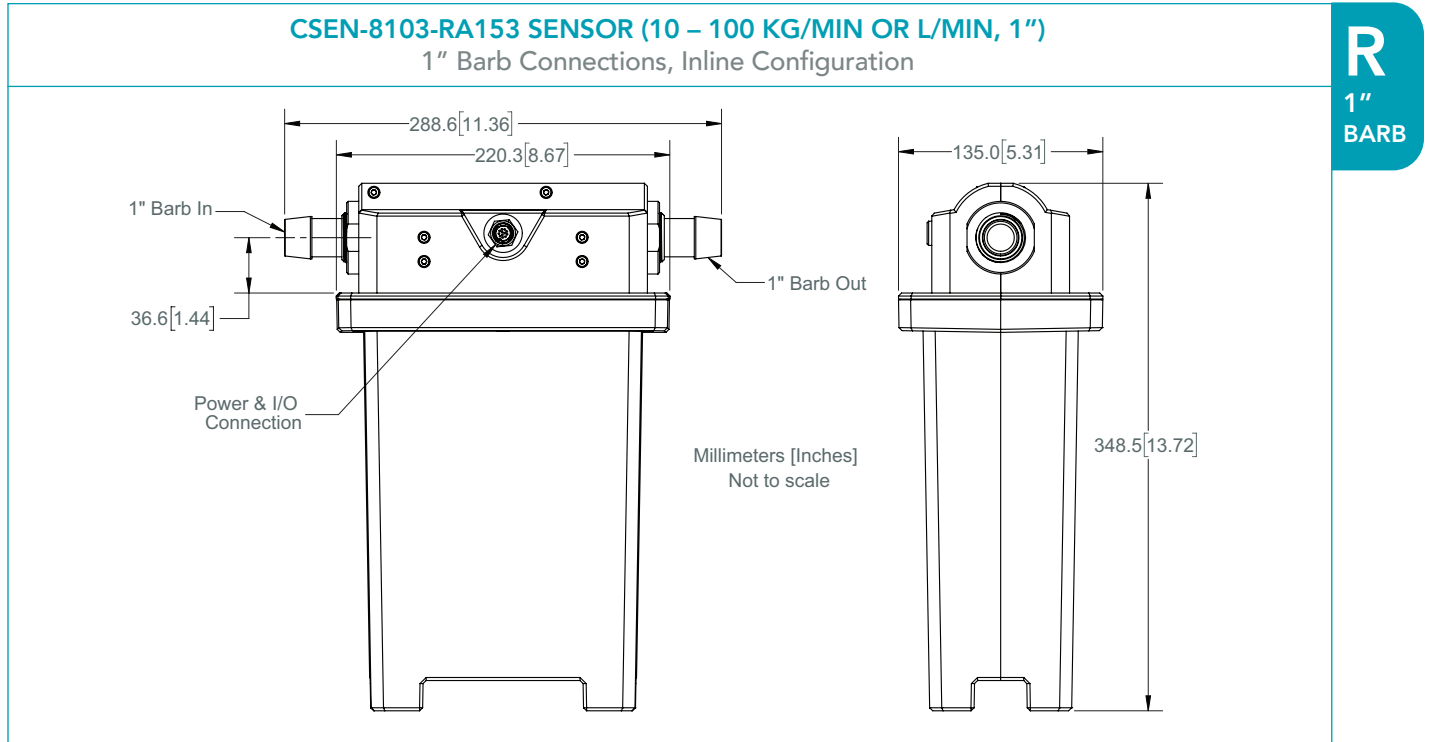
	<p><b>Horizontal Mount - H</b> Flow Enters Bottom to Top. U tubes are horizontal to the ground. This is the most recommended orientation.</p>
	<p><b>Horizontal Mount - D</b> Flow Enters Top to Bottom. U tubes are horizontal to the ground. Please discuss with your PSG Biotech representative as this design not recommended for most applications.</p>
	<p><b>Horizontal Mount - R</b> Flow Enters Right to Left. U tubes are horizontal to the ground.</p>
	<p><b>Horizontal Mount - L</b> Flow Enters Left to Right. U tubes are horizontal to the ground.</p>
	<p><b>Vertical Mount - V</b> Flow enters left to right or Right to Left to Top. U tubes are vertical to the ground.</p>

If you have questions regarding these orientations, please work with your PSG BioTech representative.

### DIMENSIONAL DRAWINGS

For reference only

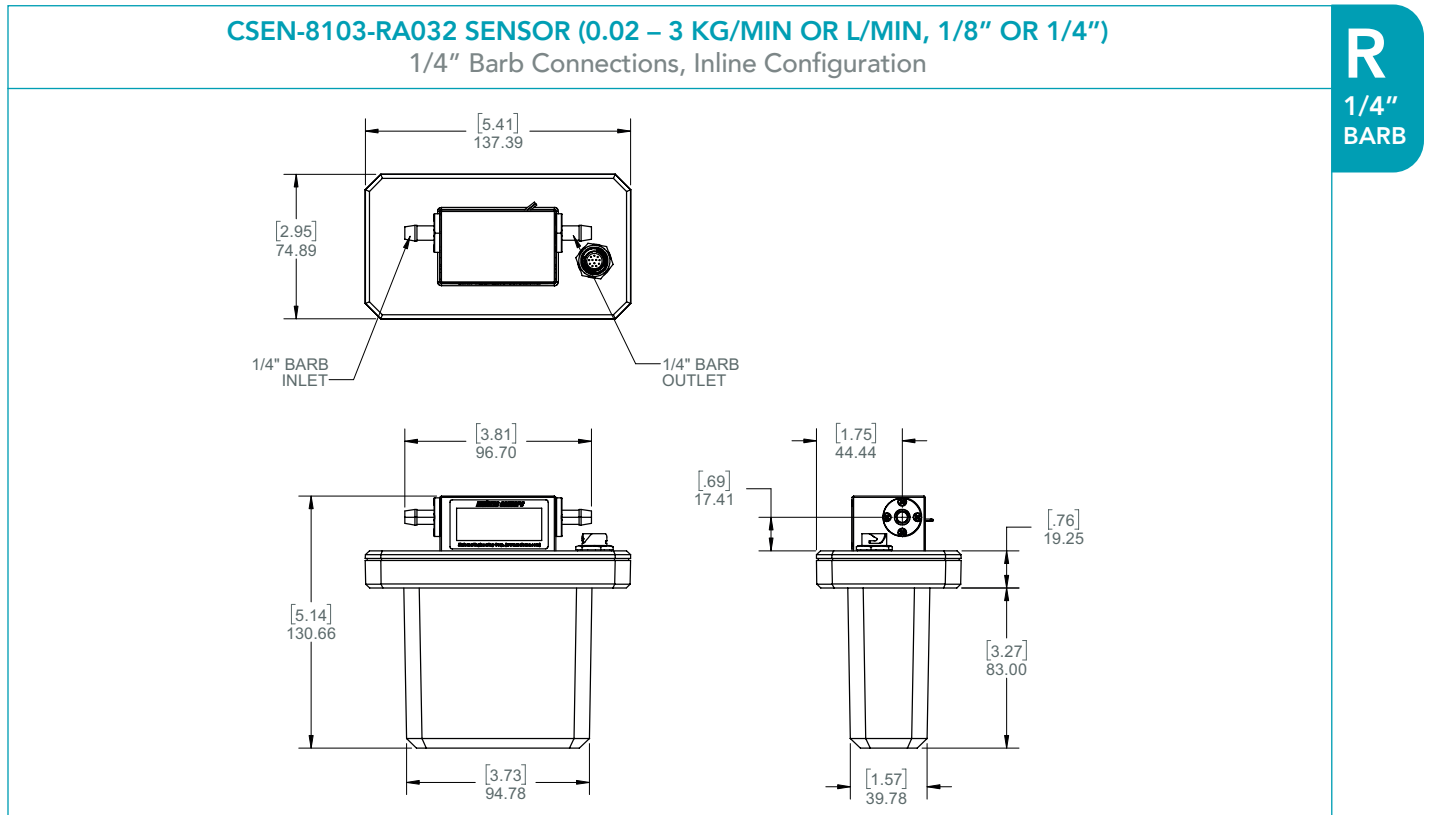
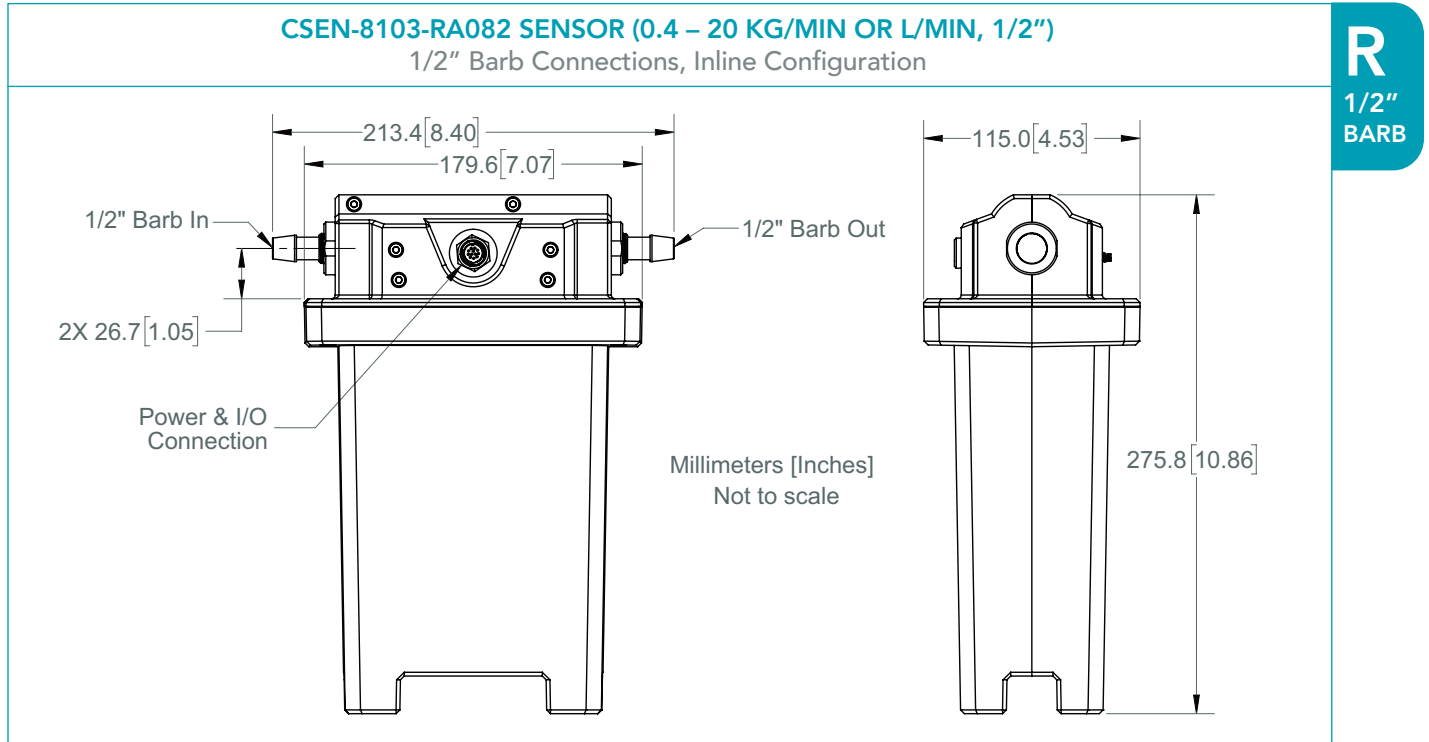
Note: Mounting Cradle is required for CE compliance



**DIMENSIONAL DRAWINGS**

For reference only

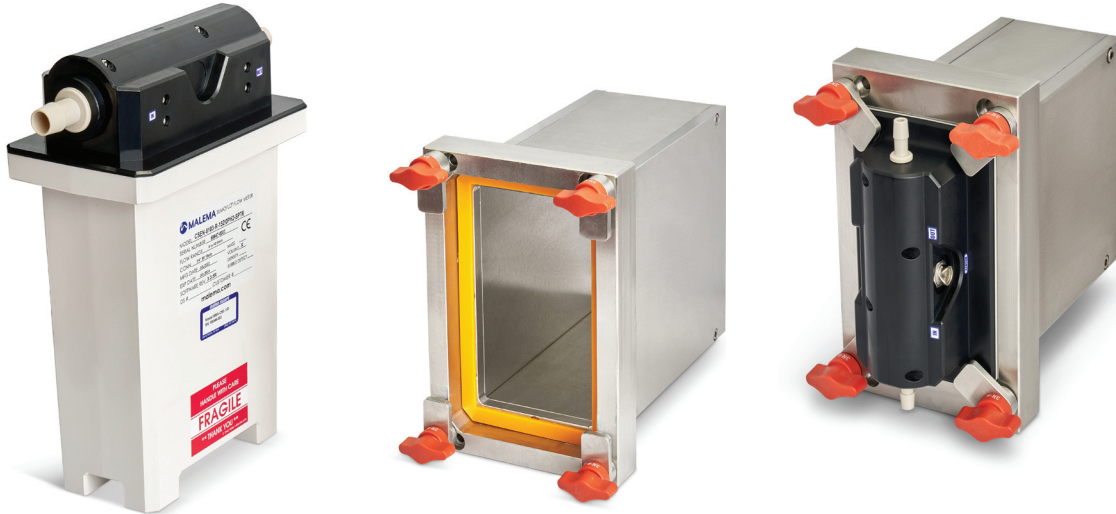
Note: Mounting Cradle is required for CE compliance





**CRADLE**

Durable, reusable, vibration resistant cradles are available for all SumoFlo Flow Meter sizes. Designed to isolate outside vibration from affecting the SumoFlo Flow Meter, the cradles provide an exact fit for each SumoFlo meter. Additionally with various mounting configurations the cradle can be oriented in many different directions, all while keeping your SumoFlo unit protected and secured.



**MOUNTING CRADLE**

Model Code						Description
ENCL-MOUNT	-	Series Code	-	Size	Unique ID	
ENCL-MOUNT						
	-	8103				To Be Used With CSEN-8100 or CSEN-8103
			-	03HC		Standard Panel Mount Cradle For use with Range Codes U08 and 03X
				03HHC		Table-top or Panel Mount Cradle For use with range codes U08 and 03X
				08HC		Standard Panel Mount Cradle For use with Range Codes 06X and 08X
				08HHC		Table-top or Panel Mount Cradle For use with range codes 06X and 08X
				15HC		Standard Panel Mount Cradle For use with Range Code 15X
				15HHC		Table-top or Panel Mount Cradle For use with range codes 15X
				15MH		Hybrid Heavy Mounting Cradle for use with range codes 06X, 08X, and 15X
					-S01	Standard Mounting Cradle
					-XXX	Consult Factory for Unique PN Identifier for Customized Versions
<b>ENCL-MOUNT</b>	<b>-</b>	<b>8103</b>	<b>-</b>	<b>XXXX</b>	<b>-S01</b>	

## DISPLAY

Three Display options available for the SumoFlo Sensor. These include a panel mounted transmitter in a 1/2 DIN cutout with a 4-line display, a Tabletop mounted in a NEMA 4X Stainless Steel enclosure, and a Tabletop transmitter and display with an integrated SumoFlo sensor cradle.



Panel mounted transmitter  
in a 1/2 DIN cutout with  
a 4-line display



Tabletop mounted in a  
NEMA 4X Stainless Steel  
enclosure



Tabletop transmitter and  
display with an integrated  
SumoFlo sensor cradle

**PRESSURE DROP IN DI WATER**

Test Conditions: DI Water at 25°C

Sensor Range Code 031 (1/8" & 1/4")	
Hold Up Volume	6 ml
Flow Rate	Pressure Drop
50 g/min	0.01 psi (0.08 kPa)
150 g/min	0.10 psi (0.69 kPa)
400 g/min	0.71 psi (4.90 kPa)
800 g/min	2.84 psi (19.61 kPa)
1200 g/min	6.40 psi (44.13 kPa)
1500 g/min	10.00 psi (68.95 kPa)

Sensor Range Code 062 (1/4" barb)	
Hold Up Volume	25 ml
Flow Rate	Pressure Drop
500 g/min	0.10 psi (0.69 kPa)
750 g/min	0.23 psi (1.55 kPa)
1500 g/min	0.90 psi (6.21 kPa)
2500 g/min	2.50 psi (17.24 kPa)
3750 g/min	5.63 psi (38.78 kPa)
5000 g/min	10.00 psi (68.95 kPa)

Sensor Range Code 082 (1/2" barb)	
Hold Up Volume	52 ml
Flow Rate	Pressure Drop
2000 g/min	0.10 psi (0.69 kPa)
5000 g/min	0.63 psi (4.31 kPa)
7500 g/min	1.41 psi (9.70 kPa)
10000 g/min	2.50 psi (17.24 kPa)
15000 g/min	5.63 psi (38.78 kPa)
20000 g/min	10.00 psi (68.95 kPa)

Sensor Range Code 153 (1" barb)	
Hold Up Volume	261 ml
Flow Rate	Pressure Drop
10000 g/min	0.10 psi (0.69 kPa)
20000 g/min	0.40 psi (2.76 kPa)
50000 g/min	2.50 psi (17.24 kPa)
75000 g/min	5.63 psi (38.78 kPa)
87000 g/min	7.57 psi (52.19 kPa)
100000 g/min	10.00 psi (68.95 kPa)

Sensor Range Code 032 (1/4" barb)	
Hold Up Volume	5.1 ml
Flow Rate	Pressure Drop
3000 g/min	10.38 psi
2700 g/min	8.47 psi
2400 g/min	6.8 psi
2100 g/min	5.29 psi
1800 g/min	3.92 psi
1500 g/min	2.83 psi
1200 g/min	1.89 psi
900 g/min	1.14 psi
600 g/min	0.55 psi
300 g/min	0.17 psi

Sensor Range Code 063 (3/8" barb)	
Hold Up Volume	25 ml
Flow Rate	Pressure Drop
900 g/min	0.10 psi (0.69 kPa)
1688 g/min	0.35 psi (2.42 kPa)
3375 g/min	1.40 psi (9.70 kPa)
5063 g/min	3.16 psi (21.82 kPa)
6750 g/min	5.63 psi (38.78 kPa)
9000 g/min	10.00 psi (68.95 kPa)

Sensor Range Code 151 & 152 (3/4" barb)	
Hold Up Volume	249 ml
Flow Rate	Pressure Drop
6000 g/min	0.10 psi (0.69 kPa)
12000 g/min	0.40 psi (2.76 kPa)
21000 g/min	1.23 psi (8.45 kPa)
35000 g/min	3.40 psi (23.46 kPa)
50000 g/min	6.94 psi (47.88 kPa)
60000 g/min	10.00 psi (68.95 kPa)

ORDERING INFORMATION - SENSOR

CSEN-8103		Model Ordering Code										Description				
		-	*	*	***	*	*	*	*	*	*	-	*	***	PEEK Sensor	
Sensor Type	C											Standard Vertical inlet and outlet ports				
	P											Panel Mount Vertical inlet and outlet ports				
	R											Inline inlet and outlet ports				
	T											Tall inline inlet and outlet ports (-063 and -082 only)				
Electrical Connector	A											Electrical connection on lid (top)				
	V											Electrical connection on cup (bottom)				
Range Code	031											0.05 – 1.5 kg/min				
	032											20 - 3,000 g/min				
	062											0.5 - 5 kg/min for C & P, 0.15 - 5 kg/min for R				
	063											0.9 - 9 kg/min for C & P, 0.18- 9 kg/min for R & T				
	082											2 - 20 kg/min for C & P, 0.4 - 20 kg/min for R & T				
	151											4 - 40 kg/min				
	152											6 - 60 kg/min				
	153											10 - 100 kg/min				
Temperature Sensor		I											Integrated Internal Temp Sensor (all other range codes)			
Sterilization	0												No Sterilization			
	1												Gamma Irradiated to 25 - 40 kGy			
	Z												Other Requests (Consult Factory)			
Fluid Connections	A											1/8" Hose Barb (Range code 031)				
	B											1/8" Hose Barb with Tubing (Range code 031)				
	E											1/4" Barb (RC 031 & 062)				
	F											1/4" Barb with Tubing (RC 062)				
	H											H 3/8" Barb (RC 063)				
	J											3/8" Barb with Tubing (RC 063)				
	K											3/8" to Mini TC (RC 063)				
	L											1/2" Barb (RC 082)				
	M											1/2" Barb with Tubing (RC 082)				
	N											1/2" to Mini TC (RC 082)				
	P											3/4" Barb (RC 151 & RC 152)				
	Q											3/4" Barb with Tubing (RC 151 & RC 152)				
	R											3/4" to Mini TC (RC 151 & RC 152)				
	S											1" Barb (RC 153)				
	T											1" Barb with Tubing (RC 153)				
	U											1" to 1-1.5" TC (RC 153)				
Z											Custom fluid connection (please consult factory)					
Mounting Orientation	H											Horizontal Mount with Upwards Flow*				
	D											Horizontal Mount with Downwards Flow				
	R											Horizontal Mount with Flow Right to Left				
	L											Horizontal Mount with Flow Left to Right				
	V											Vertical Mount **				
Calibrations and Outputs	1											Calibrated for Mass Flow Rate Only				
	2											Density Measurement Enabled, Analog Output 1 for Volumetric Flow Rate				
	3											Density Measurement Enabled, Analog Output 1 for Density				
	4											Density Measurement Enabled, Analog Output 1 for Mass Flow Rate				
Firmware	A											Version 3.3.0R				
	B											Version 3.3.2R				
	C											Version 3.3.5R				
	D											Compatible with Versions 3.3.5R, 3.3.6R, 3.3.7R, 3.3.8R				
												XXX	Unique PN Identifier			

\* Factory recommended option for all sizes except RC 031

\*\* Factory recommended option for RC 031



ORDERING INFORMATION - ELECTRONICS

Model Ordering Code														Description	
CELE-8103	-	*	-	*	*	*	*	*	X	X	X	-	*	***	Transmitter
		C												DIN Rail Mounting (Non Display Only; CE)	
		D												Panel Mount with Integral Display (CE)	
Temperature Compensation		-	T												Use with Temperature Comp Sensors
			Z												Custom (Consult Factory)
Output				1											1x 4-20mA, 1x D/O*
				2											1x 4-20mA, 2x D/O*
				3											1x 4-20mA, 1x D/O, MODBUS (RS485)*
				7											4x 4-20 mA, 0x D/O*
				8											2x 4-20 mA, 1x D/O, MODBUS (RS485) (i.e. analog for flow rate and density)*
				9											3x 4-20 mA, 1x D/O (i.e. analog output for flow rate, density, temperature)**
				D											4x 4-20 mA, 2x D/O, MODBUS (RS485)
				Z											Custom (Consult Factory)
I/O Cable				0											Standard I/O Cable
				Z											Custom (Consult Factory)
I/O Cable Length				A											3 m
				Z											Custom (Consult Factory)
Interconnecting Cable Length				A											3 m
				Z											Custom (Consult Factory)
Measurement				X											For Use with Sensors Calibrated for Mass Flow Rate Only
				D											For Use with Sensors Calibrated for Density and/or Volumetric Flow Rate
				X											Reserved for Factory
				X											Reserved for Factory
Firmware				A											Version 3.3.0R
				B											Version 3.3.2R
				C											Version 3.3.3R
				D											Compatible with Versions 3.3.5R, 3.3.6R, 3.3.7R, 3.3.8R
														XXX	Unique PN Identifier

\* DIN Rail Mount only  
 \*\* Panel Mount Integral Display only

ORDERING INFORMATION - ELECTRONICS WITH DISPLAY

Model Ordering Code						Description										
CELE	-	Series Code	-	Mounting	-	Temperature Compensation	Output	I/O Cable	I/O Cable Length	Interconnecting Sensor Cable Length	Density	Power Cable and Plug	Reserved	Reserved	Unique ID	
CELE	-	8103	-	D												To be Used With CSEN-8103
				B												1/2 DIN Cutout with 4-line Display mounted in NEMA 4X Stainless Steel Enclosure
				I												1/2 DIN Cutout with 4-line Display mounted in NEMA 4X Stainless Steel Enclosure with integral sensor Cradle ENCL-MOUNT-8103-03
				Z												Custom (Consult Factory)
					-	T										Use with Temperature Comp Sensors
						Z										Custom (Consult Factory)
							D									4x 4-20mA, 2 D/O, MODBUS (RS485) 32-pin connector (CELE-8103-D only)
							3									1x 4-20mA, 1 D/O, MODBUS (RS485) 12-pin Hirose connector (CELE-8103-B and I only)
							8									2x 4-20mA, 1 D/O, MODBUS (RS485) 12-pin Hirose connector (CELE-8103-B and I only)
							Z									Custom (Consult Factory)
								0								No I/O Cable
For Mounting version B and I Only								I								I/O cable included for Mounting version B and I
								Z								Custom (Consult Factory)
									0							No I/O Cable Supplied
For Mounting version B and I Only									3							3 m I/O cable with 90° connector on Transmitter side and Free leads on the other side
									Z							Custom (Consult Factory); where Z = Length in m

ORDERING INFORMATION - ELECTRONICS WITH DISPLAY

Model Ordering Code							Description								
CELE	-	Series Code	-	Mounting	-	Temperature Compensation	Output	I/O Cable	I/O Cable Length	Interconnecting Sensor Cable Length	Density	Power Cable and Plug	Reserved	Reserved	Unique ID
CELE															
										1					1 m Interconnecting cable with 90° connector at Transmitter end
										3					3 m Interconnecting cable with 90° connector at Transmitter end
										Z					Custom (Consult Factory); where Z = Length in m
											D				Density Measurement Enabled
											X				Density Not Enabled
												B			Type B NEMA 5-15 AC Power Cable (US), 6-ft length
												E			Type E/F Hybrid CEE 7/7 AC Power Cable (EU), 2m length
												G			Type G BS1363 AC Power Cable (UK), 2m length
												X			No Cable Provided
												-			For other options, please consult factory
													X		Reserved
														-X	Reserved
															S01 Standard Configuration
															XXX For Customized Options the Factory will assign a 3-digit ID instead of XXX
<b>CELE</b>	<b>-</b>	<b>8103</b>	<b>-</b>	<b>D</b>	<b>-</b>	<b>T</b>	<b>D</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>D</b>	<b>X</b>	<b>X</b>	<b>-X</b>	<b>S01</b>

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PSG Biotech | Malema  
 2329 Zanker Road  
 San Jose, California 95131  
 Tel: 1-408-970-3419  
 biotech@psgdover.com  
[psgdover.com/biotech](http://psgdover.com/biotech)