

U.S. PATENTS 8404076 & 8887578 & 9677921. JAPANESE PATENT 5602884.  
 CHINESE PATENT ZL 201480046308.8. TAIWANESE PATENT I657231.  
 EUROPEAN UNION PATENT 3036083. OTHER PATENTS PENDING  
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# SUMOflo<sup>®</sup>

**SINGLE-USE CORIOLIS MASS FLOW METER**

1/8" Barb Single-Use Sensors for 2 – 50 g/min

## Description

The Malema Sensors<sup>®</sup> Ultra-Low Flow SumoFlo<sup>®</sup> CPFM-8103 series Single-Use Coriolis Mass Flow Meters are specifically designed for measuring liquids in bio-pharmaceutical and other applications requiring all gamma-stable wetted surfaces. Fluid contacting surfaces are made of unreinforced polyether ether ketone (PEEK) that meet USP Class VI, USP 661, and USP 788 standards. Sensors provide measurement of 2 – 50 g/min.

The CE compliant ultra-low flow SumoFlo<sup>®</sup> series Coriolis Mass Flow Meters include the single-use sensor assembly, supporting electronics, sensor mounting enclosure, and a graphical user interface (GUI). Temperature sensors provide feedback to the electronics that allow temperature compensation to ensure the mass flow accuracy regardless of temperature changes to the application fluid.

## Measurement Principle

Fluid flows into the sensor consisting of one flow sensitive element which is vibrated relative to stationary position detectors – 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 motion of the vibrating flow sensitive element.

## Applications

- Chromatography
- Fluids with varying density or viscosity
- Depth Filtration
- Tangential Flow Filtration
- Pure water or ultra high purity chemicals

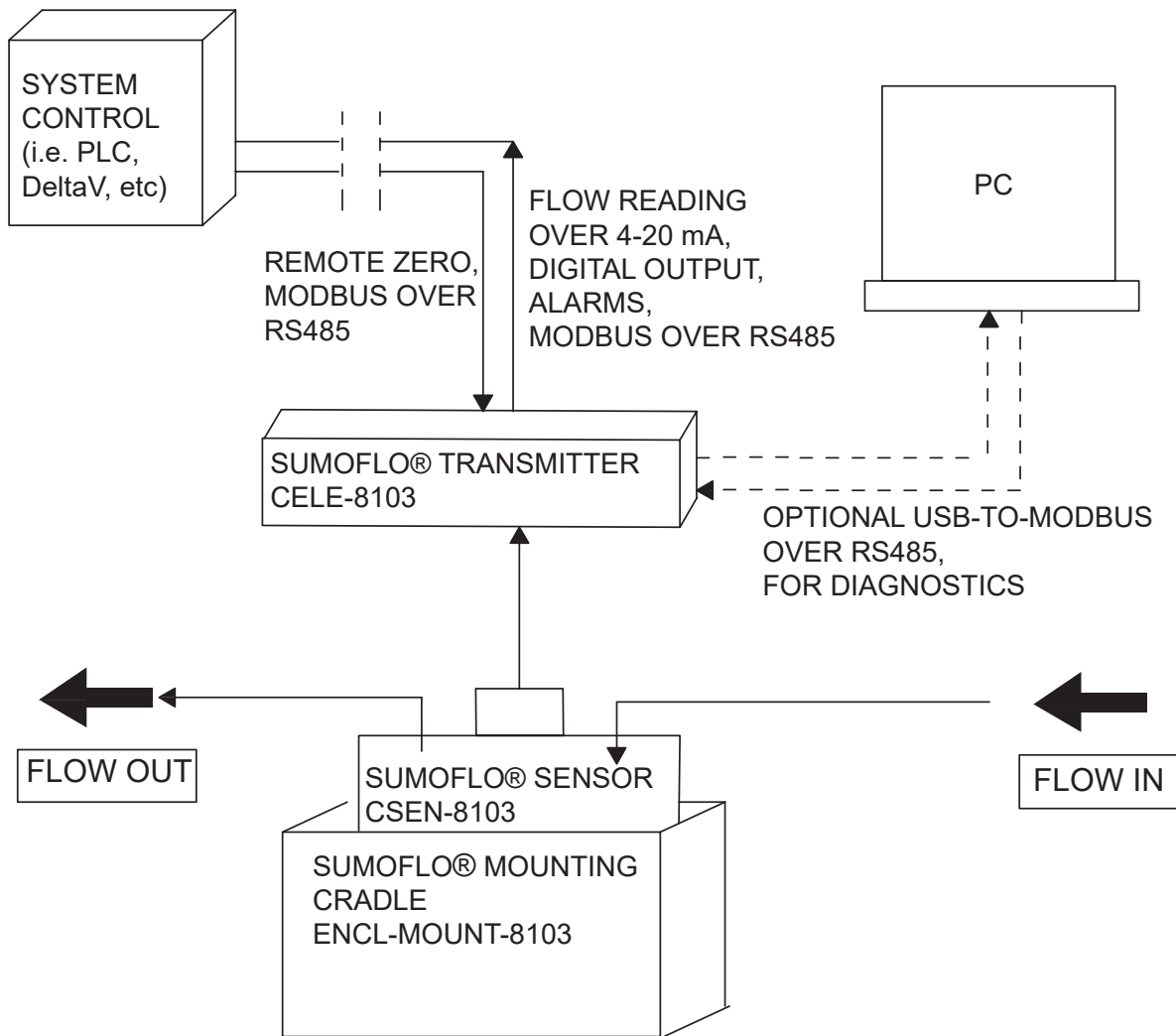
## Key Features

- Accuracy:  $\pm 1.5\%$  of mass flow reading, unaffected by flow regime or variations to the velocity profile
- Fluid measurement performance is independent of fluid properties
- USP Class VI wetted materials
- Meets UPS 661.2 and USP 788.1 specification
- PEEK sensor is gamma irradiatable to 40 kGy
- Measurement to 2 g/min

\* Other flow ranges available. Please consult Malema for more information

CPFM-8103-U08  
**Typical Block Diagram**

Ultra-low Flow Single-Use Coriolis Flow Meter



An ultra-low flow SumoFlo® CPM-8103-series Coriolis flow meter consists of three components: the single-use Coriolis flow sensor, the durable transmitter, and the durable mounting cradle, as well as the durable 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 durable 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 Malema’s Coriolis GUI. Stand-alone remote displays for instantaneous flow rate and/or totalized flow are also available. Contact Malema for additional information if needed.

Sensor Style	Description	Electrical Connections	Fluid Connections
C	Cradle-Mount Sensor	Top (same side as fluid connections)	Vertical

## Measurement Specifications

<b>Model</b>	<b>8103-U08</b>
Accuracy	$\pm 1.5\%$ of reading or $\pm 0.3$ g/min, whichever is higher
Temperature	Ambient: $0^{\circ} - 50^{\circ}\text{C}$ Fluid: $2^{\circ} - 40^{\circ}\text{C}$
Operating Pressure	30 psig (max.) (80 psig max upon request)
<b>Flow Range</b>	<b>2 – 50 g/min</b>

Note: Pressure drop at max. flow range = 10 psi in water (1 cP)

## Material Specifications

Process Connections	1/8" barb connection*
Wetted Materials	Unreinforced PEEK (Polyether ether ketone), Adhesive compliant with ISO 10993, 316L stainless steel. All polymeric wetted materials are USP Class VI compliant.
Interconnecting Cable Length	Standard 3 m; Maximum up to 30 m
Ingress Rating For Connectors	IP65

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

## Electrical Specifications

Supply Voltage	24 V DC $\pm 10\%$
Power Consumption	Max 6 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. Volumetric flow rate under development.
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, Temperature. Volumetric flow rate under development.

\* Requires CELE-8103 model configured for MODBUS communications.

## 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)	

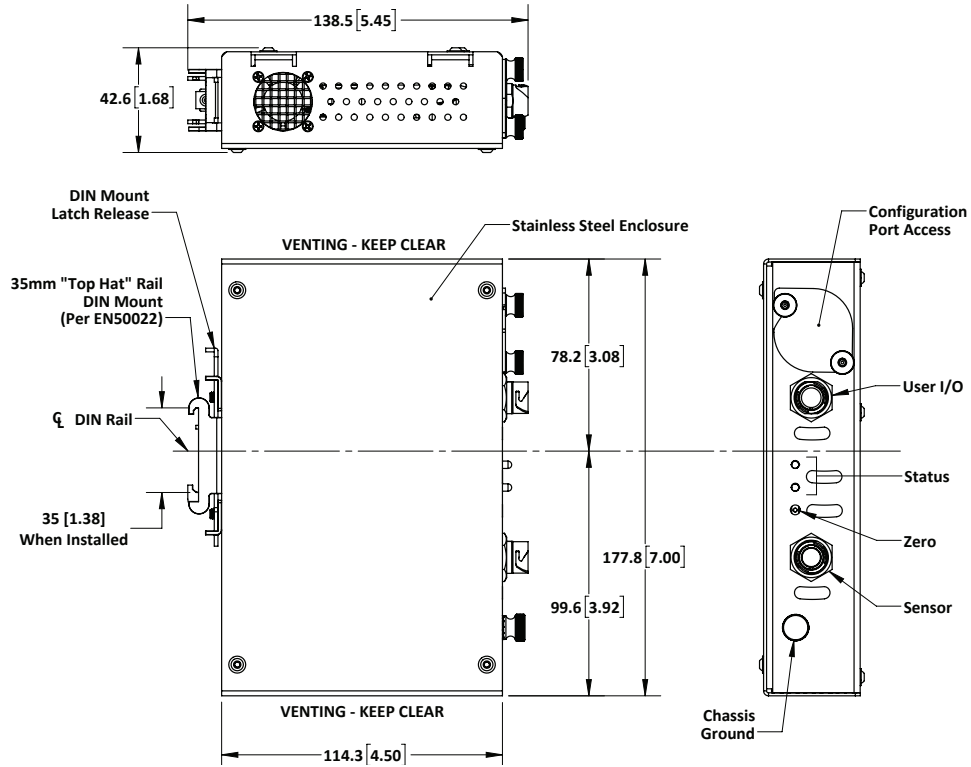
## Mounting Orientation

The Malema Sensors® SumoFlo® series Coriolis mass flow meters with range codes U08 should be mounted in a vertical orientation **ONLY**, with the fluid connections pointing up (see installation drawings). Mounting of the flow sensor in a stainless steel enclosure is required for CE compliance.

Dimensional Drawings

For reference only

Electronics



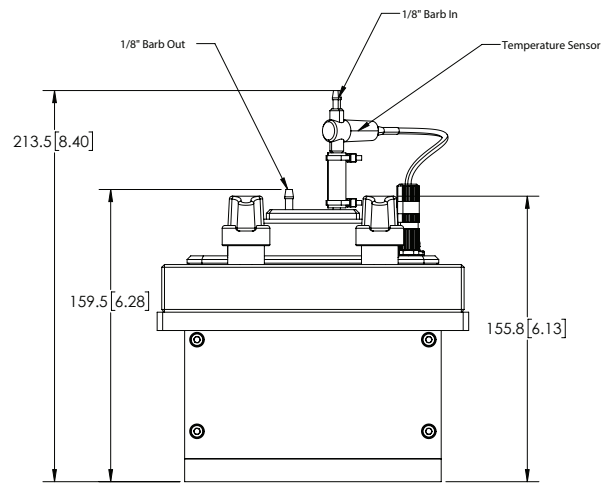
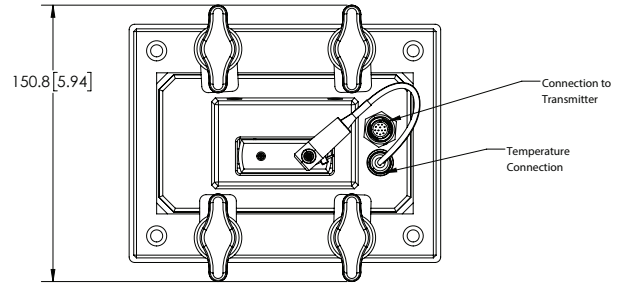
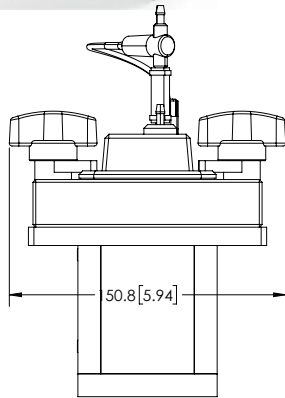
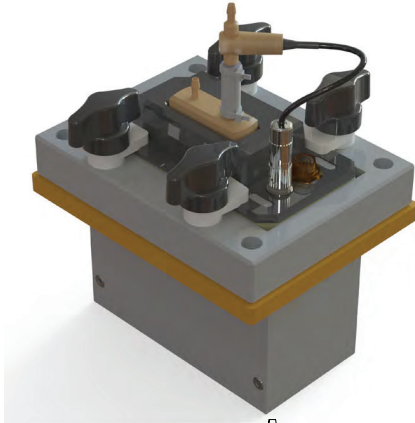
**Dimensional Drawings**

For reference only

Note: Mounting Cradle is required for CE compliance

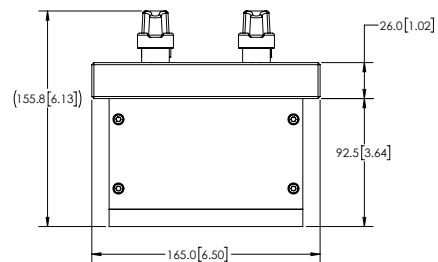
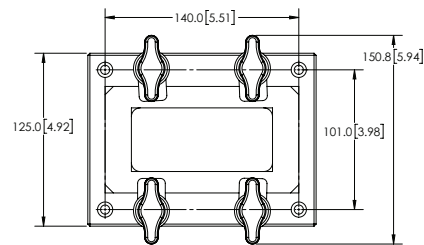
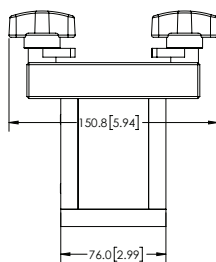
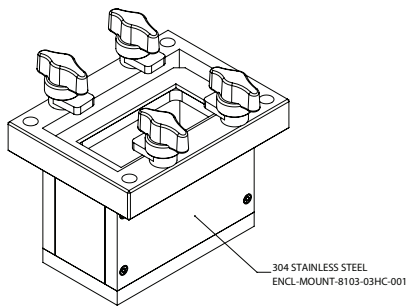
**Model CSEN-8103-C-U08 Sensor (2 – 50 g/min, 1/8" barb)**

CRADLE WITH ULF STANDARD VERTICAL CONNECTION



**ENCL-MOUNT-8103-03HC-XXX**

Heavy Cradle for 1/8" sensors



## Hold-Up Volumes and Pressure Drop in Water

Model CSEN-8103-C-U08	
Hold-Up Volume	0.3 ml
<b>Flow Rate</b>	<b>Pressure Drop</b>
5 g/min	0.025 psi
10 g/min	0.10 psi (0.69 kPa)
33.8 g/min	1.60 psi (4.90 kPa)
45.25 g/min	2.40 psi (19.61 kPa)

## Ordering Information for Sensors

Model Ordering Code											Description	
CSEN-8103	-	*	-	***	*	*	*	*	*	-	***	PEEK Sensor
Sensor Type	C											CE Compliant Sensor
	-											
Range Code	U08											2 – 50 g/min
Temperature Sensor	W											External Temperature Sensor
Sterilization	0											No Sterilization
	1											Gamma Irradiated to 40 kGy
	Z											Other Requests (Consult Factory)
Fluid Connections	A											1/8" Hose Barb
	B											1/8" Hose Barb with Tubing
	*											Other Options Available. Please Consult Factory
Mounting Orientation	V											Vertical (flow ports pointing upwards)*
Calibrations and Outputs	1											Calibrated for Mass Flow Rate Only
	-											
	XXX											Unique PN Identifier

\* Factory recommended option

## Ordering Information for Mounting Cradles

Model Ordering Code					Description
ENCL-MOUNT-8103	-	***	-	***	Mounting Cradle
Size	U08		For use with Sensor Range Code U08		
	-				
	XXX		Unique PN Identifier		

Ordering Information for Electronics

Model Ordering Code													Description		
CELE-8103	-	*	-	*	*	*	*	*	X	X	X	-	***	Transmitter	
		C											DIN Rail Mounting (Non Display Only; CE)		
		Z											Custom (Consult Factory)		
		-													
Temperature Compensation		N											Standard for Non-Temperature Comp Sensors		
		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)		
		8											2x 4–20 mA, 1x 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		
									X				Reserved for Factory		
										X			Reserved for Factory		
											-				
												XXX	Unique PN Identifier		

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