Malema Sensors® SumoFlo® Ultra Low Flow
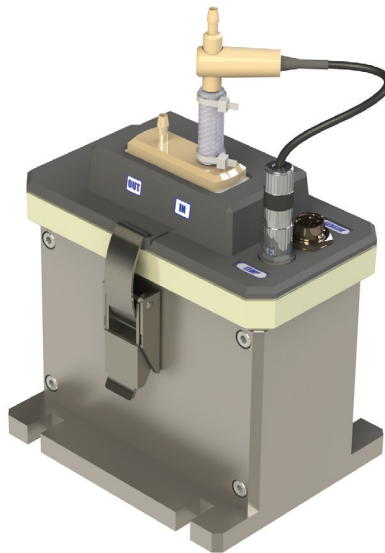# Single-Use Coriolis Flow Meter
CPFM-8103-ULF Series

Advancements

- Flow rates as low as 0.5 g/min
- Usable turndown ratio of 100:1
- Advanced electronics offering better accuracy at lower flow rates
- Multiple signal output options available

Installation and Operation Manual

SUMO*flo*®

SINGLE-USE CORIOLIS MASS FLOW METER

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IM.SUMOFLO:S3/024150

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Introduction

Malema's SumoFlo® **CPFM-8103**-ULF series Single-Use Coriolis Flow Meter is specifically designed for measuring low flow rates of liquids in biopharmaceutical and other applications that require all gamma-stable wetted surfaces. The fluid contacting surfaces are made of unreinforced polyether ether ketone (PEEK) that meets USP Class VI, USP 661, and USP 788 standards.

A SumoFlo® Coriolis flow meter consists of three components: the single-use Coriolis flow sensor, the durable transmitter, and the durable mounting cradle. When properly installed in the mounting cradle, the SumoFlo® flow meter meets CE specifications.

Fluid flows into the sensor consisting of a flow sensitive element which is vibrated relative to stationary pickup coils. 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 element.

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Storage and Handling

Storage conditions
Store the product under packed conditions in an anti-static bag. The storage place should be free from moisture, mechanical shock and vibration. The storage temperature should be between 10°C and 35°C and the humidity between 5% and 80% R.H. without condensation.

If the sensor has been gamma irradiated, do not open the inner bag until ready to install in the single-use assembly.

Unpacking and Product Inspection
Upon delivery, inspect the product for damage. Confirm that the model code on the label matches the specification in the purchase order.

## Installation Instructions

Selecting location:

The following must be considered when selecting the installation location of the flow sensor:

1. Ambient temperature: 0°C to 50°C (32°F to 122°F), protected from direct sunshine.

2. Free from electromagnetic interference. Keep away from such heavy inductive devices as motors, pumps, power-relays and solenoid valves.

3. Free from vibrational interference. Keep away from sources of vibration such as motors, pumps, actuators, or vehicular traffic.

4. The location must be protected from water jets or corrosive gases.

5. The location should allow easy access for maintenance.

Mounting of Flow Sensor:

Consider the following when selecting and installing the Flow Sensor for accurate measurement.

1. Flow sensor can be installed vertically or horizontally. For sensors with range code 062, 063, 082, 152, or 153, mounting the sensor horizontally with inlet on bottom and outlet on top will allow for gravity draining of the sensor. Do not install sensor upside down to avoid air traps.

2. Flow sensor needs to be installed inside a mounting cradle that holds the sensor securely and helps isolate it from external vibrations. Malema can provide a mounting cradle if requested. The mounting cradle should be installed on the tool, or can be mounted to a cradle stand, also available from Malema. See image at right.

3. If using a Malema-provided mounting cradle and stand, attach the cradle to the stand using the included screws. If installing on a tool, matching hole patterns for the cradle need to exist on the tool surface to attach the cradle. Securely mount the cradle to the desired location.
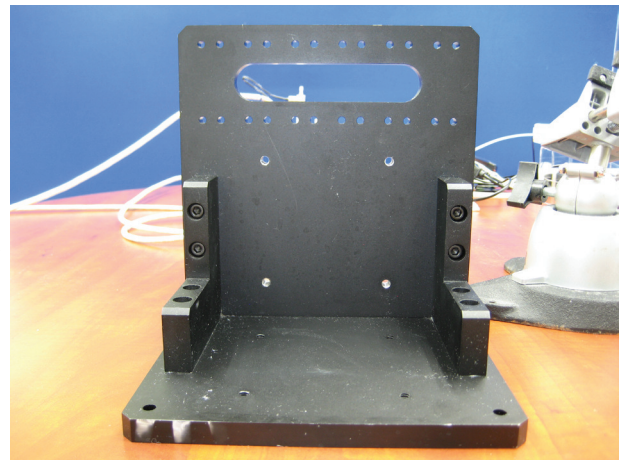
4. Place the sensor inside the cradle and close the cradle lid. Tighten the thumb screws to secure the sensor.

5. For cradle selection, please refer to the datasheet.
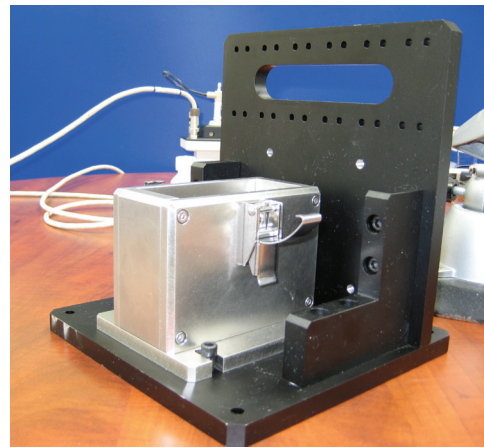
Plumbing Connections

1. Attach tubing to the inlet and outlet barbs on the sensor. Make sure that the barb size on the sensor matches the tubing. Typical sizes are 1/8", 1/4", 3/8", 1/2", 3/4", and 1".

2. Tighten the fluid connections with either cable ties or hose clamps. Note, cable ties may not be sufficient at system pressures above 1 bar(g).

3. Secure the inlet and outlet tubes a few inches from the inlet and outlet barb, to prevent external vibration from degrading the performance of the flow meter.

Caution

To avoid stress on the flow tube/housing interface, follow the precautions below:

1. Tube should be held firmly while working on the hose barb fittings during installation.

2. There should not be any relative displacement/movement between the tube and the housing at any point in time.

3. Do not overtighten hose clamps, as this may cause damage.

Electrical Connections

1. Connect the red and black wires of the User I/O cable, CABLE-CMETER 046, to +24 V DC and Ground, respectively.

2. If monitoring the analog 4-20 mA output, connect the violet (pin 12, Flow Rate 4-20mA+) and green (pin 11, Flow Rate GND) wires to a multimeter or analog input module.

3. Connect the flow sensor cable, CABLE-CMETER 047. The female end on the cable goes to the sensor. The male end on the cable goes to the electronics. Follow the connector labels on both the sensor and electronics.

4. Connect the appropriate temperature sensor cable. This cable must be connected for the Temperature Compensation algorithm to work properly.

5. If using the Malema Coriolis PC GUI, connect the communication cable, CBL-CS2-006. The stereo jack inserts into the PC Configuration Port on the electronics, and the USB adapter is plugged into the PC. PC must include appropriate drivers, available on Installation CD or from **Malema Field Support**.

6. Turn power ON to the flow meter (i.e. the electronics) after priming to ensure the sensor is filled with liquid. The red and green status LEDs will blink during initialization. When initialization is complete, the green LED will remain ON while the red LED will turn OFF.
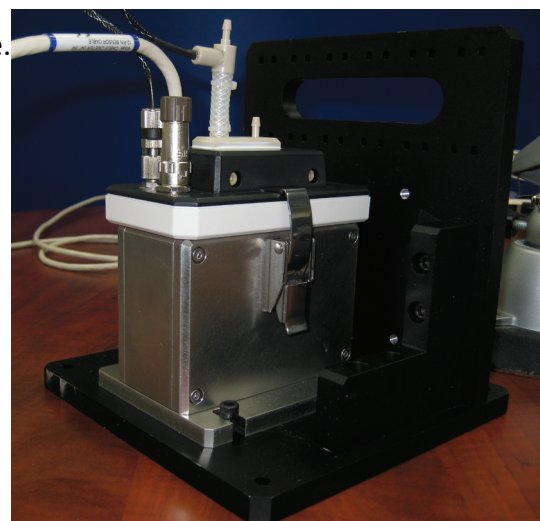
    NOTE: Allow 45 minutes for the sensor and transmitter to warm-up only on <u>initial startup</u> or from <u>cold start</u>.

PC Software / GUI Communication

If using the Malema Coriolis GUI to monitor or log flow meter performance, follow the following steps:

1. Make sure the converter is installed on the PC by checking its COM port in Device Manager. If there is a yellow exclamation mark on the device in Device Manager, install the proper driver from the device manufacturer. The driver package for CBL-CS2-006 is available on the CD that comes with the cable. If you have any difficulty, please contact the factory.

2. Copy the Malema software GUI (an .exe executable file) to a folder on the local drive. The software GUI is on the provided CD that came with the transmitter, and also available from the factory.

3. Double-click the .exe to open the GUI. A COM port should appear in the upper-right box.

4. Double-click the COM port to connect to the flow meter. If the connection is successful, various fields on the left side and tabs in the middle of the GUI will appear.

5. Click the "Collect Data" checkbox to start monitoring the flow rate.

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SumoFlo® CPFM-8103-ULF   SINGLE-USE CORIOLIS FLOW METER
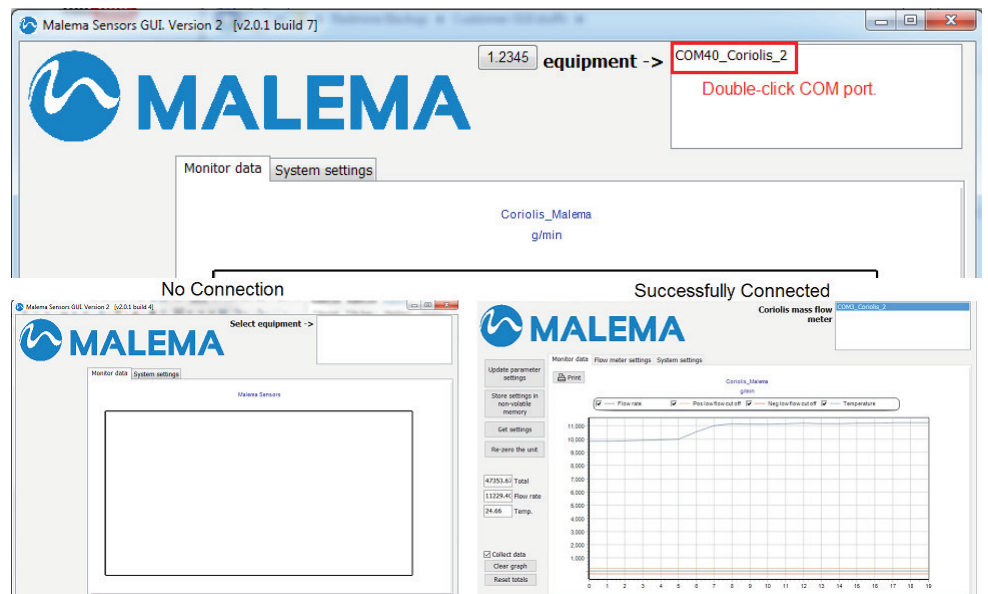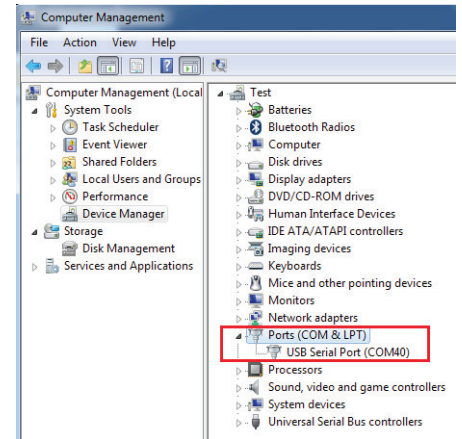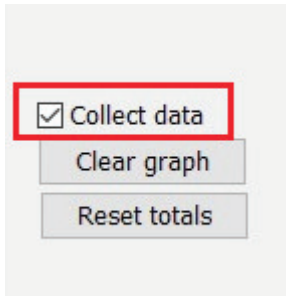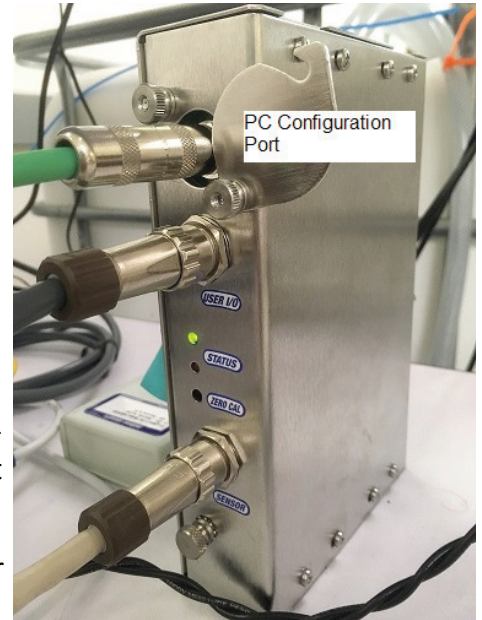
RS-485 / MODBUS Communication

If communicating via MODBUS over RS-485, make the following connections at the tool:

1. Connect pin 7 (red/black) of the User I/O cable to the TDB+ terminal of your RS-485 module.
2. Connect pin 8 (white/black) of the User I/O cable to the GND terminal of your RS-485 module.
3. Connect pin 9 (yellow) of the User I/O cable to the TDA- terminal of your RS-485 module.

If using a multi-converter (such as the ULinks model shown), make sure all switches are on RS-485.
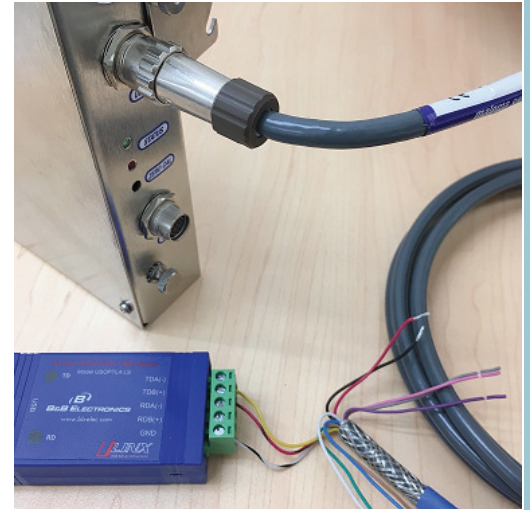
Start Up

The SumoFlo® series Coriolis flow meter system requires a full tube of liquid medium at rest before a successful startup can be completed.

Preliminary Checks:

1. Make all the necessary electrical connections as per the connection details above.
2. Ensure that the power supply rating is 24 V DC ± 10%, 300 mA.
3. Confirm that the inlet and outlet ports are connected to the tubing reflecting the physical flow direction.

Start up Process:

1. Turn on the power. The instrument will go through initialization process and start measuring flow.
Note: It is not necessary to power cycle the transmitter after changing a single-use sensor.
2. Please allow the instrument to warm up for about 45 minutes only on initial startup or when starting cold.
3. Verify that the flow tube is full of stationary liquid without bubbles in the flow sensor.
4. Perform a ZERO RESET if necessary (see next section)
5. The flow meter is now ready for making valid measurements.

NOTE: To read valid flow rates, a ZERO reset needs to be performed whenever the installation set-up is different than the one used for the previous ZERO setting. Zeroing the meter before each batch is advisable.

Zero Reset

1. Purge all air <u>OUT</u> of the flow sensor and the hoses by running the pump at a high flow rate (ex. 50% of flow range).
2. Turn off the pump and, if possible, close all valves to ensure no actual flow.
Note: Fluid flowing through the sensor (or air pockets in the sensor) while performing a zero reset will result in an inaccurate zero setting and therefore, inaccurate flow rate readings. Make sure there is no fluid flow in the sensor during zeroing.
3. Perform a zero reset by pressing the "zero cal" button on the electronics or clicking the "Re-zero the unit" button in the left side of the GUI (shown at right). Zero reset may also be performed remotely by momentarily contacting the pink wire (pin 3) to +24 V (pin 1).
4. This zero reset procedure will take 10 seconds to complete. During zeroing, the red status LED on the electronics will be blinking. The red LED will turn off and the green LED will light when zeroing is complete.

SumoFlo® CPFM-8103-ULF   SINGLE-USE CORIOLIS FLOW METER
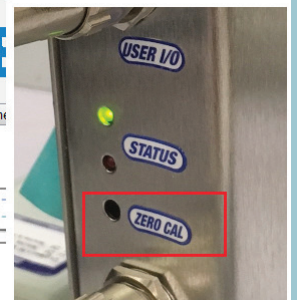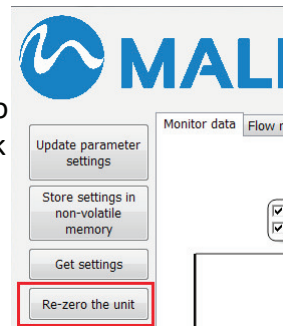
Measurement Specifications

Model	8103-U08
Accuracy	±2% of rate for 0.5 – 2 g/min ±1% of rate for 2 – 50 g/min
Temperature	Ambient: 0° – 50°C Fluid: 2° – 40°C
Operating Pressure	30 psig (max.) (80 psig max upon request)
Flow Range	**0.5 – 50 g/min**

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 ±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
USP 661.2 for Containers/Plastics
USP 788.1 for Containers/Plastics
Directive 2011/65/EU (RoHS)

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

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.

## Electrical Connections of Transmitter (Pin-outs)

Analog Output: Analog output for flow rate is 4-20 mA by default and on pins 12 and 11.

Remote Zero: To zero the meter remotely, momentarily connect, or short, pin 3 (ZERO) to pin 1 (24V+). Wait 10 seconds for this procedure to complete and for the LEDs to stop blinking before continuing operation. PLC digital outputs can be used to perform remote zeroing.

PC GUI: The Configuration Port is for GUI communication via CBL-CS2-006.

Chassis Ground: CE Compliance requires the transmitter chassis be connected to earth ground. The screw near the bottom of the transmitter is available for this purpose.
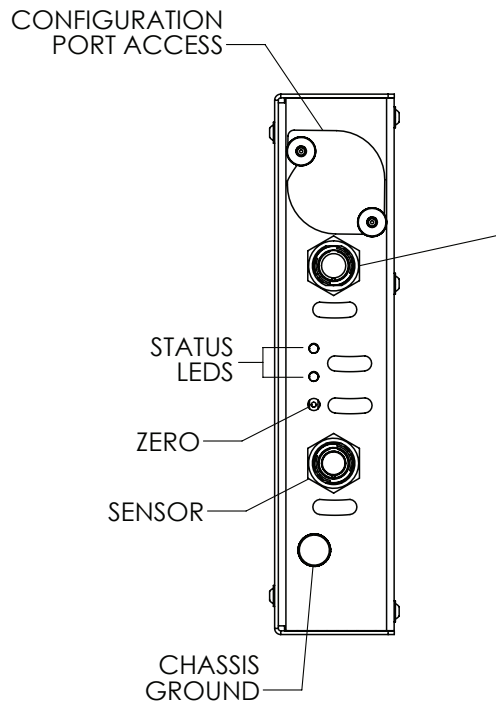
Maintenance Note

Single-Use Coriolis flow sensor requires no daily maintenance since it has no moving parts that can be subject to wear and tear. However, we recommend the following checks to ensure smooth and reliable operation.

Connection of Flow Sensor
- Check for leakage around pipe connections or liquid penetration into Flow Sensor tube.
- Check for any loose nuts.
- Make sure that the connection ports are leak free.

Connecting pipe
- Check for mechanical stress to the single-use flow sensor caused by possible warping of connecting pipes or loose connections caused by heavy pipe vibration.
- Check to ensure tube movement caused by pumps or other equipment is not transferred to the flow sensor.

CONFIGURATION PORT ACCESS

STATUS LEDS

ZERO

SENSOR

CHASSIS GROUND

CONNECTION DETAIL [1 ANALOG, 1 or 2 D/O]
CELE-8103-C-T1
CELE-8103-C-T2

PIN	WIRE COLOR	FUNCTION
1	RED	POWER +24V
2	BLACK	POWER GND
3	PINK	REMOTE ZERO
4	GRAY	DIO OUT 1
5	BLUE	DO NOT CONNECT
6	WHITE	DIO GND
7	RED/BLACK	DIO IN 1+
8	WHITE/BLACK	DIO OUT 2
9	YELLOW	DIO IN 1-
10	BROWN	ALARM OUT O/C
11	GREEN	CL-
12	VIOLET	CL+

LABEL-CMETER 022

CONNECTION DETAIL [1x ANALOG, 1x D/O, MODBUS]
CELE-8103-C-T3

PIN	WIRE COLOR	FUNCTION
1	RED	POWER +24V
2	BLACK	POWER GND
3	PINK	REMOTE ZERO
4	GRAY	DIO OUT 1
5	BLUE	DO NOT CONNECT
6	WHITE	DIO GND
7	RED/BLACK	RS485 A+
8	WHITE/BLACK	RS485 GND
9	YELLOW	RS485 B-
10	BROWN	ALARM OUT O/C
11	GREEN	CL-
12	VIOLET	CL+

LABEL-CMETER 021

CONNECTION DETAIL [4x ANALOG OPTION]
CELE-8103-C-T7

PIN	WIRE COLOR	FUNCTION
1	RED	POWER +24V
2	BLACK	POWER GND
3	PINK	REMOTE ZERO
4	GRAY	ALARM OUT O/C
5	BLUE	VOL FLOW 4-20 mA (-)
6	WHITE	VOL FLOW 4-20 mA (+)
7	RED/BLACK	DENSITY 4-20 mA (-)
8	WHITE/BLACK	DENSITY 4-20 mA (+)
9	YELLOW	TEMP 4-20 mA (-)
10	BROWN	TEMP 4-20 mA (+)
11	GREEN	MASS FLOW 4-20 mA (-)
12	VIOLET	MASS FLOW 4-20 mA (+)

GL1-CS1-003

CONNECTION DETAIL [2x ANALOG, 1x D/O, MODBUS]
CELE-8103-C-T8

PIN	WIRE COLOR	FUNCTION
1	RED	POWER +24V
2	BLACK	POWER GND
3	PINK	REMOTE ZERO
4	GRAY	ALARM OUT O/C
5	BLUE	ANALOG 1 4-20mA (-)
6	WHITE	ANALOG 1 4-20mA (+)
7	RED/BLACK	RS485 A+
8	WHITE/BLACK	RS485 GND
9	YELLOW	RS485 B-
10	BROWN	DIO 1 (REF PWR GND)
11	GREEN	ANALOG 0 4-20mA (-)
12	VIOLET	ANALOG 0 4-20mA (+)

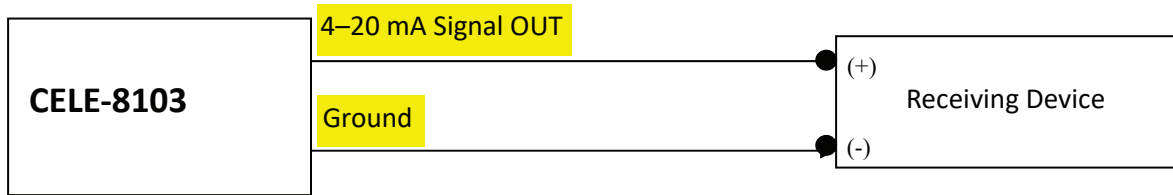GL1-CS3-003

CONNECTION DETAIL [3x ANALOG, 1x DIGITAL]
CELE-8103-C-T9

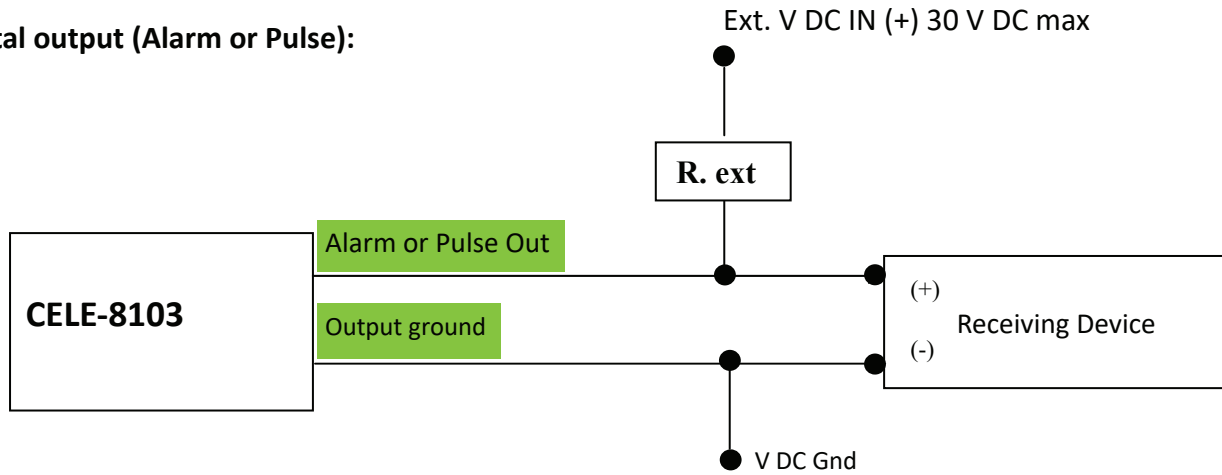| PIN	WIRE COLOR	FUNCTION
1	RED	POWER +24V
2	BLACK	POWER GND
3	PINK	REMOTE ZERO
4	GRAY	ALARM OUT O/C
5	BLUE	ANALOG 1 4-20mA (-)
6	WHITE	ANALOG 1 4-20mA (+)
7	RED/BLACK	ANALOG 2 4-20mA (-)
8	WHITE/BLACK	ANALOG 2 4-20mA (+)
9	YELLOW	DO NOT CONNECT
10	BROWN	DIO 1 (REF PWR GND)
11	GREEN	ANALOG 0 4-20mA (-)
12	VIOLET	ANALOG 0 4-20mA (+)

GL1-CS2-003

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Wiring Examples

Analog 4-20 mA active current output:

CELE-8103

4–20 mA Signal OUT

Ground

(+)

Receiving Device

(-)

Digital output (Alarm or Pulse):

Ext. V DC IN (+) 30 V DC max

R. ext

CELE-8103

Alarm or Pulse Out
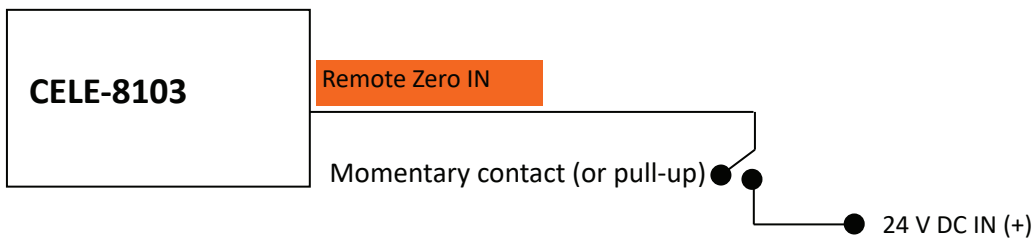
Output ground

(+)

Receiving Device

(-)

V DC Gnd

R. ext is an external resistor that may be needed for some installations.

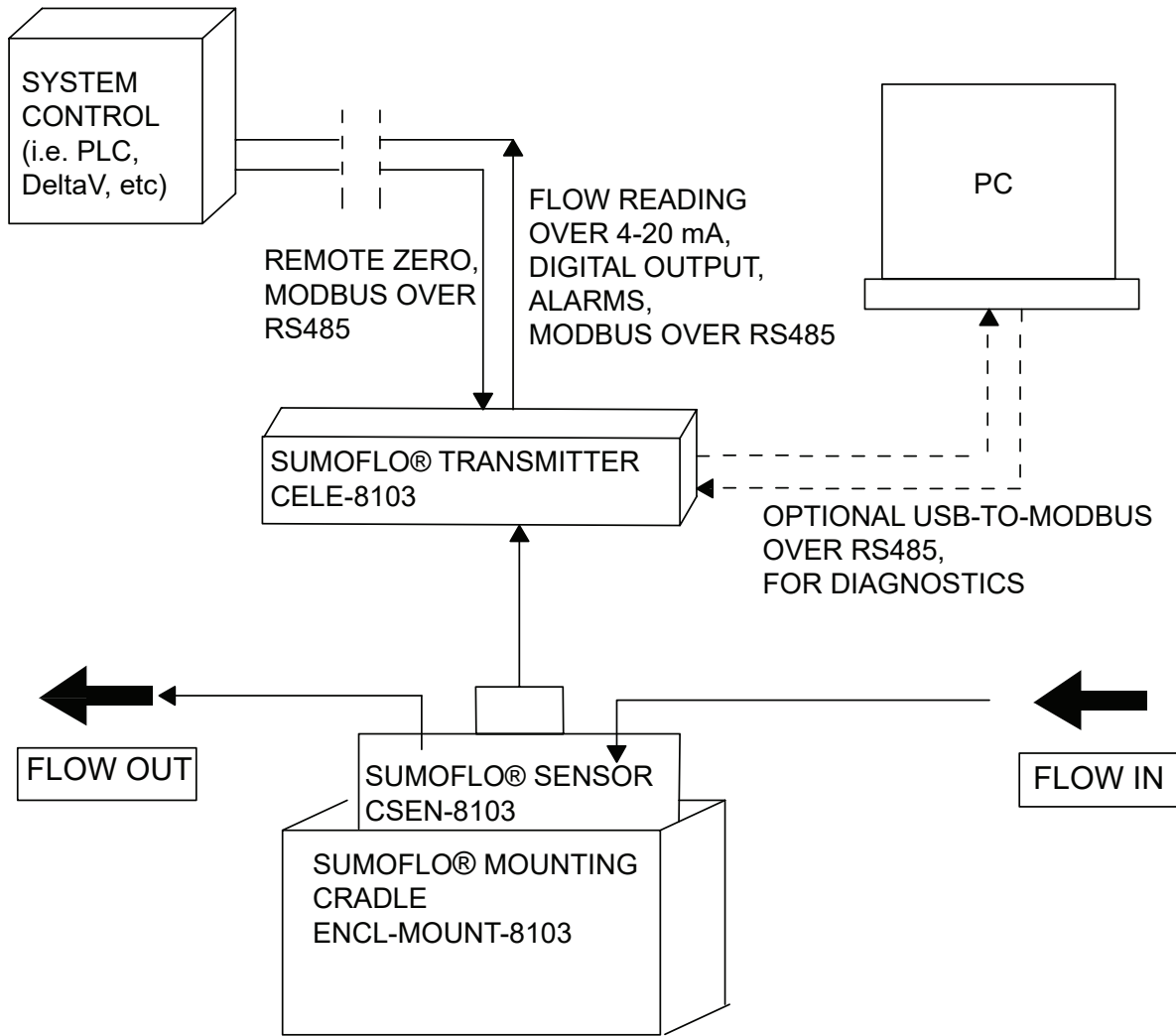Choose R. ext so that the maximum current through the terminal does not exceed 200 mA.

R. ext can be calculated as follows:

R. ext (kΩ) = Ext. V DC IN / Max. current (mA)

Remote Zero IN:

CELE-8103

Remote Zero IN

Momentary contact (or pull-up)

24 V DC IN (+)

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Typical Block Diagram

SYSTEM CONTROL (i.e. PLC, DeltaV, etc)

PC

REMOTE ZERO, MODBUS OVER RS485

FLOW READING OVER 4-20 mA, DIGITAL OUTPUT, ALARMS, MODBUS OVER RS485

SUMOFLO® TRANSMITTER CELE-8103

OPTIONAL USB-TO-MODBUS OVER RS485, FOR DIAGNOSTICS

FLOW OUT

SUMOFLO® SENSOR CSEN-8103

FLOW IN

SUMOFLO® MOUNTING CRADLE ENCL-MOUNT-8103

A SumoFlo® **CPFM-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 connecter, and a Windows 10 Pro Laptop Computer running Malema's Coriolis GUI. Stand-alone remote displays are also available. Contact Malema for additional information if needed.

Sensor Style	Description	Electrical Connections	Fluid Connections
C-U08	1/8" Cradle-Mount Sensor	Top (same side as fluid connections)	Vertical

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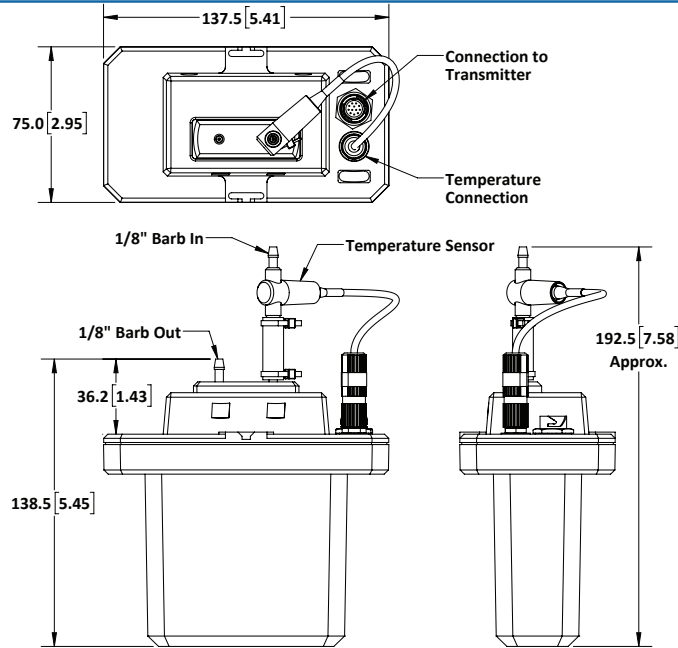Singapore 739257
P: (65) 6482-3533   F: (65) 6484-4231

Transmitter Dimensions
FOR REFERENCE ONLY

CELE-8103 Transmitter

138.5 [5.45]

42.6 [1.68]

DIN Mount
Latch Release

Stainless Steel Enclosure

Configuration
Port Access

VENTING - KEEP CLEAR

35mm "Top Hat" Rail
DIN Mount
(Per EN50022)

User I/O

₵ DIN Rail

78.2 [3.08]

35 [1.38]
When Installed

Status

Zero

177.8 [7.00]

99.6 [3.92]

Sensor

VENTING - KEEP CLEAR

Chassis
Ground

114.3 [4.50]

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Single-Use Sensor Dimensions
FOR REFERENCE ONLY
Note: Mounting Cradle is required for CE compliance

CSEN-8103-C-U08 Sensor (0.5 – 50 g/min or ml/min, 1/8")
1/8" Barb Connections

137.5 [5.41]

75.0 [2.95]

Connection to Transmitter

Temperature Connection

1/8" Barb In

Temperature Sensor

1/8" Barb Out

192.5 [7.58] Approx.

36.2 [1.43]

138.5 [5.45]

Millimeters [Inches] - Not to scale

Mounting Cradle Dimensions
FOR REFERENCE ONLY
Note: Mounting Cradle is required for CE compliance

ENCL-MOUNT-8103-U08-001 Mounting Cradle

86.9 [3.42]

$84.0\,^{+6.0}_{0.0}\,[3.31\,^{+.24}_{-.00}]$

Millimeters [Inches]
Not to scale

4X 8.0 [.31]

115.3 [4.54]

96.5 [3.80]

2X R44.7 [1.76]
LATCH CLEARANCE

125.0 [4.92]

104.0 [4.09]

C
1/8"
BARB

Hold-Up Volumes and Pressure Drop in Water

Test Conditions: DI Water at 25°C

Model CSEN-8103-C-U08	
Hold-Up Volume	0.3 ml
Flow Rate	**Pressure Drop**
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)

Problem Statement: No analog flow output even with physical flow running		
Noted Symptom	**Possible Cause**	**Follow up checks and possible fix**
Flow readings on Malema GUI are zero	Incorrect flow direction.	Ensure physical flow direction is in accordance with the labels on the flowmeter.
	Huge zero offset	Zeroing must be done properly - zeroing should be done with any liquid (DI Water or WFI for example), preferably without bubbles in the line. See page 7 for zeroing procedure.
	Incorrect parameters	Ensure sensor parameters have not been accidentally changed. If needed, contact Malema for factory parameters and reset the parameters.
	Faulty Electronics	Open Malema GUI and monitor Flow readings. If readings drop to zero sporadically (intermittent readings), check and record a sequence of events how such drop occurs and how it recovers, e.g. flow rate change, pump speed change, liquid temperature change, power cycle, etc. and communicate to Malema for further guidance.
Flow readings on Malema GUI shows valid and stable flow rates	Analog output wiring connection is incorrect	Check analog output wiring to tool's input/output interface. Make sure wiring is connected correctly and all terminals are clean and secured. Please note - if the analog output is wired incorrectly, permanent damage can be caused to the Malema sensor circuit board.
	Load resistance or impedance of input/output terminal not within specification	Confirm if load resistance or impedance of external input/output terminal is within specification. Max. Load < 900 ohms in case of current output and min. impedance > 10 K Ohm in case voltage output.
	Analog output of the transmitter is bad	Check analog signal directly on analog output wires of the transmitter (with the wires not connected to tool's input/output interface). Please consult factory if the analog output is bad or incorrect.

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Flow readings on Malema GUI shows an unstable flow rate	Bubbles in the line.	Check for large bubbles in the line (in excess of 30% by volume) and if needed purge the line.
	Actual flow is unstable	Check flow and pressure stability and take necessary actions to fix it
	Electrical noise in tool analog input/output board	Check signal with oscilloscope; if noisy, find source of noise and repair
	Issues with Power supply	Make sure power supply is able to supply required current; 24 V DC supplied is stable and clean; if required repair or replace power supply

Problem Statement: Accuracy is off - unacceptable difference between flow readings and observed flow rate

Noted Symptom	Possible Cause	Follow up checks and possible fix
Flow readings on GUI are different from what's transmitted to tool software interface	Analog output wiring connection is incorrect	Check analog output wiring to tool's input/output interface. Make sure wiring is connected correctly and all terminals are clean and secured. Please note - if the analog output is wired incorrectly, permanent damage can be caused to the Malema sensor circuit board.
	Load resistance or impedance of input/output terminal not within specification	Confirm if load resistance or impedance of external input/output terminal is within specification. Max. Load< 900 ohms in case of current output and min. impedance> 10 K Ohm in case voltage output.
	Analog output of the flowmeter is bad	Check analog signal directly on analog output wires of the meter (with the wires not connected to tool's input/output interface).Please consult factory if the analog output is bad or incorrect.
	Wrong parameter settings	Check parameter settings of the meter such as full scale and flow unit, flow meter analog output specification (e.g. voltage vs. current outputs), scaling setting on tool's software, etc.
Flow readings on GUI are identical to what's transmitted to tool software interface	Huge Zero offset	Zero must be done properly - zeroing should be done with any liquid (DI Water or WFI for example), preferably without bubbles in the line. See page 7 for zeroing procedure.

Service Contacts

For service support or technical assistance, please contact the Malema Engineering Corp. Technical Support Team at:

TEL: +1 (800) 637-6418
         +1 (408) 970-3419
E-mail: technicalsupport@malema.com

Service and Repair

To return the products, please obtain an RMA number for the product by contacting the Malema Sensors Life Sciences Division, San Jose, California, USA, at +1 (800) 637-6418 or +1 (408) 970-3419, or email bio@malema.com.

Unless otherwise specified with the RMA number, all equipment must be returned to the following address:

> Malema Sensors
> 2329 Zanker Road
> San Jose, CA 95131, USA

Kindly note: Flow sensors cannot be returned once exposed to gamma radiation.

Warranty

Malema Sensors warrants to the buyer that its products are free from defects in materials and workmanship at the time of shipment and during the WARRANTY PERIOD. Malema Sensors's obligation under this warranty is limited to the replacement of the product(s) by same product(s) manufactured by Malema Sensors or repair of the product(s) at the Malema Sensors's facility.

Malema Sensors products are sold with the understanding that the buyer has determined the applicability of the product(s) to its intended use. It is the responsibility of the buyer to verify acceptability of performance to the actual conditions of use. Performance may vary depending upon these actual conditions.

Warranty Period

This warranty is in effect for twelve (12) months from the date of shipment from Malema Sensors's place of business.

Warranty Claim

If Malema Sensors® products are found to be defective in materials or workmanship within twelve (12) months of the date of shipment, they will be repaired or replaced with same product at the discretion of Malema Sensors at its place of business at no charge to the buyer.

Ordering Information for Sensors

Model Ordering Code												Description
CSEN-8103	-	*	-	***	*	*	*	*	*	-	***	PEEK Sensor
Sensor Type	C											CE Compliant Sensor
		-										
Range Code		U08										0.5 – 50 g/min
Temperature Sensor			W									External Temperature Sensor
Sterilization				0								No Sterilization
				1								Gamma Irradiated to 50 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

SumoFlo® CPFM-8103-ULF · SINGLE-USE CORIOLIS FLOW METER

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**