

# M-2300 Series High-Purity PFA Straight Tube Ultrasonic Flow Meter





## M-2300 Series High-Purity PFA Straight Tube Ultrasonic Flow Meter

Utilizing the latest digital signal processing (DSP) technology, the Malema M-2300 Series High-Purity PFA Straight Tube Ultrasonic Flow Meter combines an inline ultrasonic flow sensor with electronics in a single compact unit to minimize cabling, optimize space and simplify installation.

Featuring a straight-through PFA tube with angled wedges mounted with piezoelectric crystals, the M-2300 Series is designed with corrosion-resistant wetted parts and no moving components or mechanical seals for reliable metering accuracy.

With seamless integration and ease of use, the M-2300 Series Ultrasonic Flow Meter is engineered to help operators achieve precise flow measurement without compromising performance in demanding high-purity semiconductor applications in minimal footprints.

### Key Features

- Sensors and electronics in one compact unit
- Easy installation with minimized cabling
- No dead legs or other obstructions
- Straight flow path with no moving parts
- Corrosion-resistant with PFA-wetted parts
- Free from ion/particle contamination
- Accuracy  $\pm 1\%$  Full Scale
- Repeatability  $\pm 0.5\%$  Full Scale
- Minimal pressure loss

### Applications

- CMP
- Cooling Systems
- ECD
- Electroless Deposition
- Laser Equipment
- Solar PV Equipment
- Track Tools
- Wet Clean
- Wet Process / Chemical Distribution Systems



## How it Works

The M-2300 Series Ultrasonic Flow Meter utilizes transit-time ultrasonic technology to determine the flow rate of the liquid. Two piezoelectric crystals (transducers) are attached to the outer diameter of the flow tube (or on angled wedges attached to the outer diameter of the flow tube) and are excited to produce ultrasound signals. Each transducer alternately transmits and receives ultrasound signals. The difference in transit time of the signals (transmitting upstream and downstream) is proportional to the velocity of the fluid, which determines the flow rate.

## Performance Advantages

With its inline straight tube design and seamless integration, the Malema M-2300 Series High-Purity Ultrasonic Flow Meter is a suitable alternative to vortex, paddle wheel and differential pressure flow meter technology flow meter technology.

- No pressure drop
- No metering cutoff
- Better accuracy
- Better repeatability

## Operation Specifications

- Measurable Fluid: Liquids
- Fluid Temperature: 50° – 140°F (10° – 60°C)
- Fluid Pressure: 0 – 70 psig
- Ambient Temperature: 32° – 115°F (0° – 46°C)
- PFA Tube End or others\*
- Enclosure Classification: IP65

\*Consult Malema for any special requirements.



# Performance Specifications

<b>Tube Size / End Connections</b>	1/4"	3/8"	1/2"
<b>Standard Full Scale Range</b>	3 L/min	8 L/min	40 L/min
<b>Accuracy</b>	±1% Full Scale**		
<b>Repeatability</b>	± 0.5% Full Scale**		

\*Custom flow ranges available upon request.

\*\*The accuracy and repeatability specifications for custom flow ranges will always be per the Standard Full Scale Range above.

<b>Output Options</b>	Analog Output	Current O/p: Active: 4-20 mA (Max. Load < 900 Ω) Passive: 4-20 mA (Max. Load < 1,200 Ω) Voltage O/p: 0-10 V DC (min. impedance > 10 K Ω)
	Digital Output	Open Collector / Max. 30 V DC, 200 mA max. Configurable for Low Flow Rate, High Flow Rate, Totalizer Greater Than, Totalizer Less Than, Signal Strength Less, Positive Totalizer Pulse*
<b>Digital Input</b>	Zeroing – Momentary pull-up to 24 V DC for activation	
<b>Power Supply</b>	24 V DC ±10%	
<b>Power Consumption</b>	125 mA	
<b>EMC</b>	EMC Directive 2014/30/EU	
<b>Digital Communication</b>	MODBUS over RS-485	

\*Pulse frequency configurable up to 1 kHz; Pulse weight configurable from 0.01 ml.

# Material Specifications

<b>Enclosure Classification</b>	IP65
<b>Optional Cable</b>	Consult factory for available cable lengths and configurations
<b>Non-Wetted Parts</b>	PEEK, PP, SS
<b>Wetted Parts</b>	High-Purity PFA

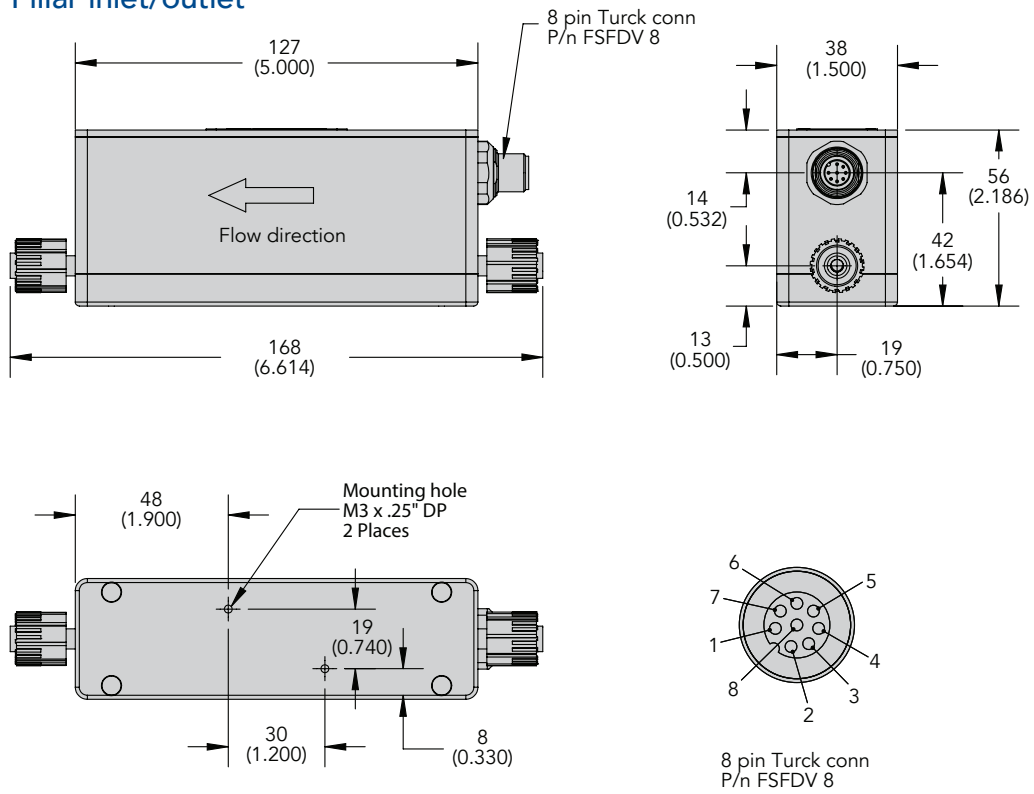
Pin #	Wire Color	Function
1	White	Signal OUT (4-20 mA or 0-10 V DC)
2	Brown	Power IN (+24 V DC)
3	Green	Remote Zero IN*
4	Yellow	Alarm or Pulse OUT
5	Gray	RS-285 A, Data -
6	Pink	RS-485 B, Data +
7	Blue	Ground (Power and Signal)
8	Red	Not Used

\*Momentary pull-up to 24 V DC

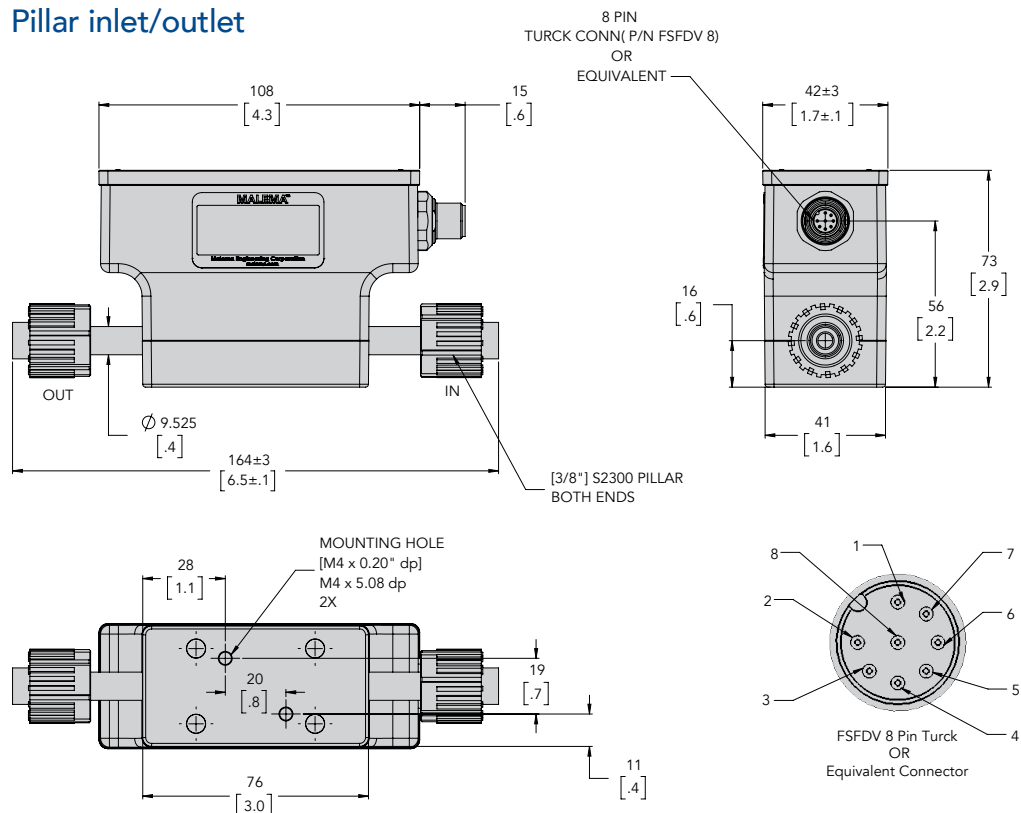
NOTE: Consult the factory for other cable and pin-out options

# Dimensional Drawings For Reference Only

## 1/4" Pillar inlet/outlet

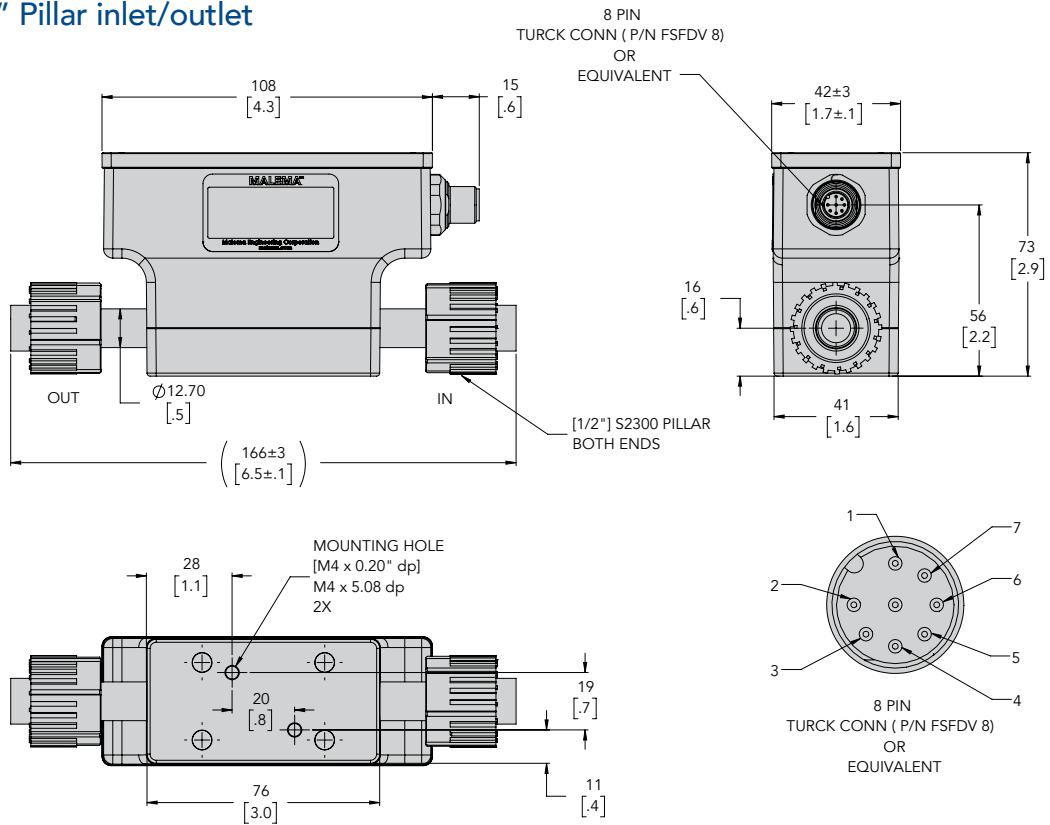


## 3/8" Pillar inlet/outlet



# Dimensional Drawings For Reference Only

## 1/2" Pillar inlet/outlet



# Ordering Information

Model Code															Description
M-2300	-	*	-	*	*	*	-	*	*	*	*	*	**	_*	
Electronics Type	-	I													M-2300 PFA Flow Meter with Integrated Electronics
Wetted Parts	-	F													PFA
Connection Size (O.D.)			1												
			2												1/4" ( Full scale: 3 L/min)
			3												3/8" ( Full scale: 8 L/min)
			4												1/2" ( Full scale: 40 L/min)
			6												3/4" ( Full scale: 80 L/min)
			8												1" ( Full scale: 250 L/min)
Connection Type			1												Tube Ends
			2												Female Pillar S300
			5												Female Flare
			Z												Custom (consult factory)
			-	X											Reserved
						X									Reserved
Reserved							X								Reserved
Analog Output										1					1 x Analog 0 - 10 VDC (0VDC = 0 LPM and 10VDC = full scale value), 1 x Digital Output- Alarm, 1 x Digital input- remote zero, 1 x RS485
										2					Active 4 - 20 mA (4mA = 0 LPM and 20mA = full scale value), 1 x Digital Output- Alarm, 1 x Digital input- remote zero, 1 x RS485
										3					Passive 4 - 20 mA (4mA = 0 LPM and 20mA = full scale value), 1 x Digital Output- Alarm, 1 x Digital input- remote zero, 1 x RS485
										4					1 x Analog 0 - 10 VDC (0VDC = 0 LPM and 10VDC = full scale value), 1 x Digital Output- Pulse, 1 x Digital input- remote zero, 1 x RS485
										5					Active 4 - 20 mA (4mA = 0 LPM and 20mA = full scale value), 1 x Digital Output- Pulse, 1 x Digital input- remote zero, 1 x RS485
										6					Passive 4 - 20 mA (4mA = 0 LPM and 20mA = full scale value), 1 x Digital Output- Pulse, 1 x Digital input- remote zero, 1 x RS485
Electrical Connection												T			8 Pin Turck or Equivalent
												C			8 core cable
Electrical Cable													00		No cable
													01		1 meter cable (supplied only when Electrical connection C is selected)
													03		3 meter cable (supplied only when Electrical connection C is selected)
													05		5 meter cable (supplied only when Electrical connection C is selected)
													ZZ		Custom (consult factory)
Ordering Extension (Standard and Custom Options)														-S01	For Standard Version select this
														-XXX	For any custom options, factory will assign 3 digit unique ID in place of XXX



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