

VORTEX FLOW METERS FOR LIQUID APPLICATIONS

SCANDIUM Series
Vortex Shedding Flow Meter



APPLICATION IDEAS

Data center cooling systems
Petrochemical refining and processing
Mining operations
Waste water treatment

Product Description

McMillan's SCANDIUM Series Vortex Flow Meter is a compact, reliable, and cost-effective solution for monitoring low viscosity liquids. Operating on the naturally occurring phenomenon known as vortex shedding, this meter achieves stable and accurate performance without the use of moving parts, ensuring minimal maintenance. With options for frequency and analog outputs, it serves as an ideal choice for measuring various fluids, including aggressive, and high-purity solutions. Its compact design makes it particularly advantageous for installations where space is at a premium. The SCANDIUM Series Vortex Flow Meter is a versatile solution for many different industrial applications.

Principle of Operation

The SCANDIUM Series Vortex Flow Meter is built upon the profound insights of the vortex shedding principle, originally discovered by the distinguished physicist, Theodore von Kármán. This principle quantifies the phenomenon of vortices that emerge in the wake of a solid obstruction (called a bluff body) that is strategically placed in the flow path. This is illustrated in more detail in Figure 1 below.

The flowing medium (blue arrow) is directed along the flow path and into an obstruction known as a bluff body (outlined in orange). This induces an alternating pattern of vortices (pink and blue swirls) that generate a rhythmic oscillation. The frequency of these alternating vortices is directly proportional to the flow rate, allowing for an accurate and stable measurement of flow. Leveraging the dynamics of this vortex shedding process, the SCANDIUM series employs a highly sensitive pressure sensor (outlined in yellow) that measures these subtle oscillations and translates them into precise flow rate measurements.

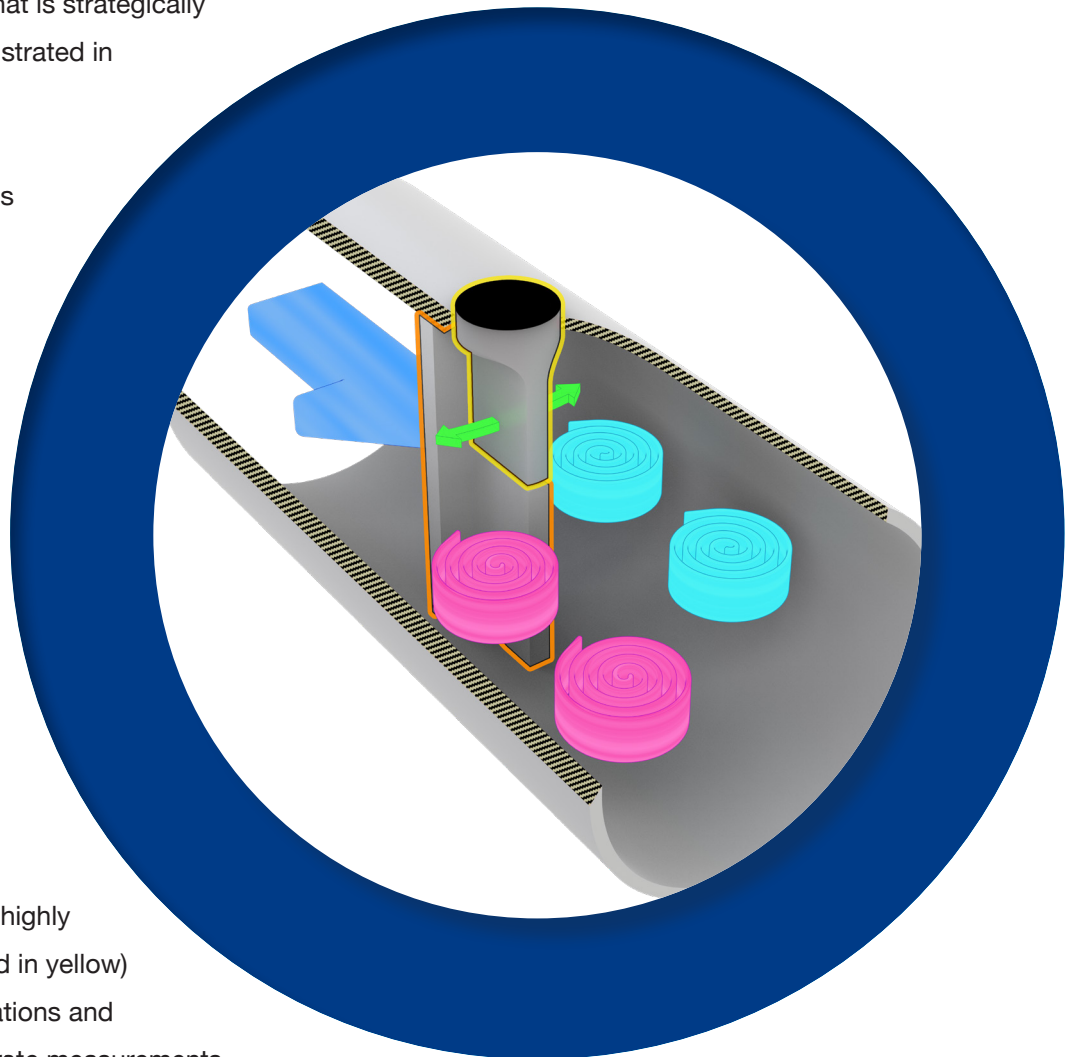


Figure 1
SCANDIUM Sensor Illustration

Features

FLOW RANGES

The SCANDIUM Series flow meter can support ranges as low as 0.5 – 4.5 L/min and as high as 3.2 – 22.0 L/min.

SIGNAL OUTPUTS

Options for frequency pulse or analog 4-20 mA are available.

ELECTRICAL CONNECTION

All units come standard with a 4-Pin Micro DC connection.

ACCURACY

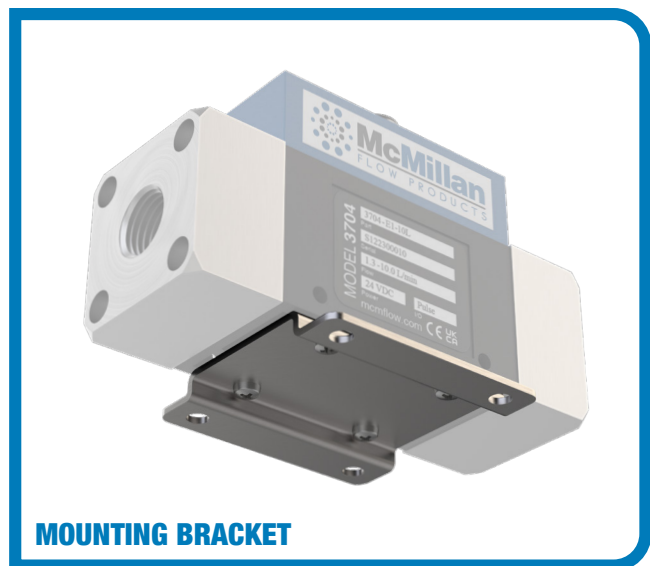
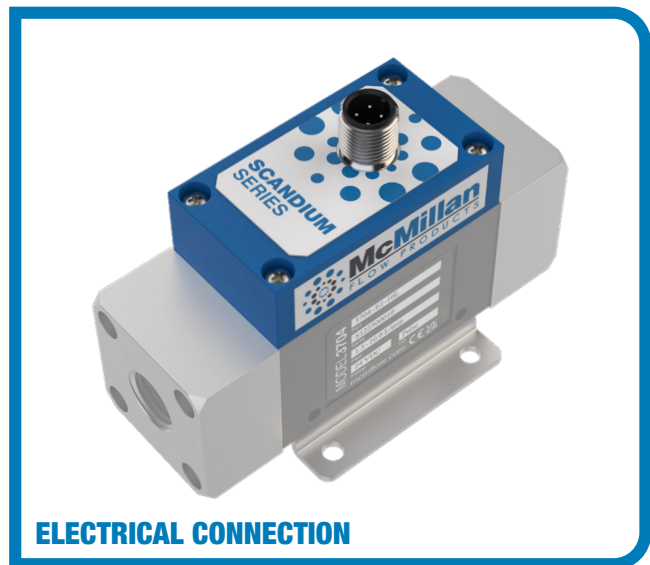
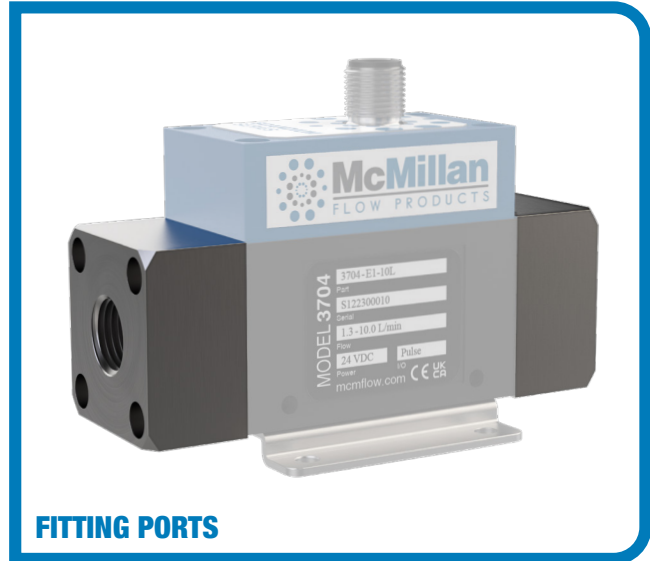
The SCANDIUM's accuracy is $\pm 2.5\%$ of full scale with $\pm 1\%$ F.S. repeatability.

FLUID CONNECTIONS

Range 4.5L units come with 1/4" FNPT ports. Range 10L | 22L units come with 3/8" FNPT ports. Options for various tube connections in several materials are available.

INTEGRATED MOUNTING

All units feature an integrated mounting bracket.



Specifications

Except where noted, all specifications apply to operation at 25°C

SCANDIUM Series	
Accuracy	± 2.5% of full scale
Repeatability	± 1.0% of full scale
Response Time	1 second (at flow changes > 10%)
Straight Pipe Requirement	10x diameter upstream 2x diameter downstream
Media Temperature Range	32 to 176 °F [0 to 80 °C]
Ambient Temperature Range	14 to 140 °F [-10 to 60 °C]
Maximum Pressure	145 PSIG [10 bar]
Maximum Pressure Drop	3.6 PSI [0.25 bar] at 100% rated flow
Wetted Parts	Sensor Housing: PPS Sensing Diaphragm: PVDF Bluff Body: PPS Seals: FKM Fittings: 316 SS

Maximum Media Viscosity*					
Code	Measuring Range Start Point (L/min)				Maximum Viscosity
	1 cSt	1.5 cSt	2 cSt	4 cSt	
4.5L	0.5	1.5	3.0	-	2 cSt
10L	1.3	1.3	3.5	-	2 cSt
15L	3.2	3.2	3.2	6.0	4 cSt

* When using viscous media, the decreased Reynolds number causes a displacement of the measuring range start point to a higher value. The measuring range end point values remain unchanged.

Electrical Information

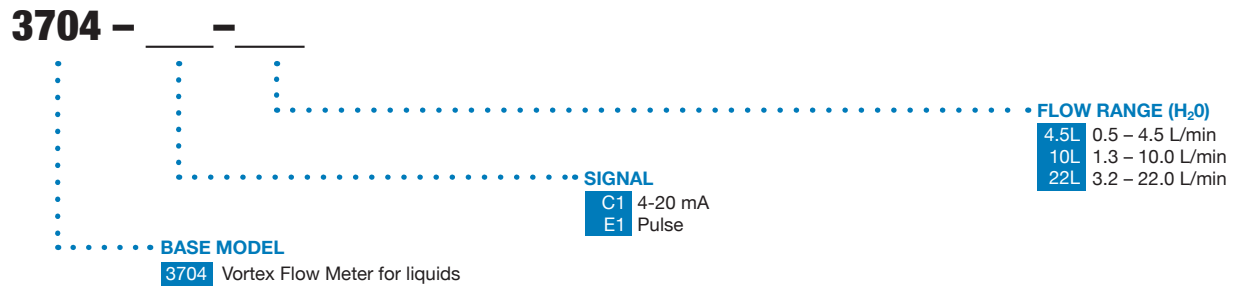
4-20 mA (Option C1)	
Output	4-20 mA, 3-wire
Max. Load	500 Ω
Power Supply	24 VDC ± 20%
Electrical Connection	Micro-DC, 4-pin Male
Electrical Protection	IP 65

Pulse (Option E1)	
Output	PNP Open Collector, max. 200 mA
Frequency	500 Hz at full scale
Power Supply	24 VDC ± 20%
Electrical Connection	Micro-DC, 4-pin Male
Electrical Protection	IP 65

Ordering Information

Form part number as follows:

(Base Model) - (Signal) - (Flow Range)



EXAMPLES

3704-C1-4.5L would provide a vortex flow meter body for liquids, would have a 4-20 mA signal, and would be calibrated to have a flow range of 0.5 – 4.5 L/min.

3704-E1-22L would provide a vortex flow meter body for for liquids, would have a pulse signal, and would be calibrated to have a flow range of 3.2 – 22.0 L/min.

OPTIONAL FITTING SETS

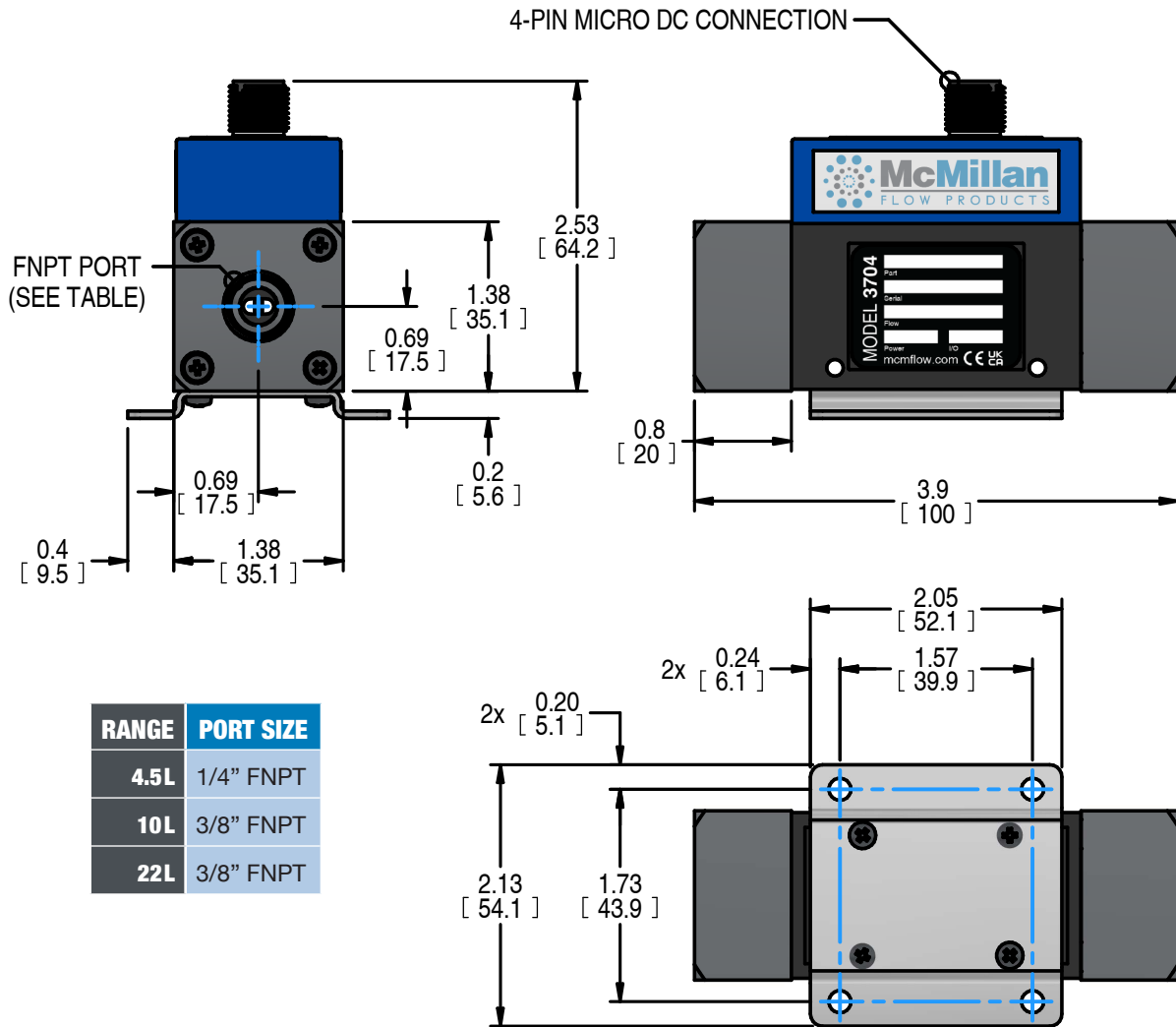
All fitting sets supplied in pairs.

RANGE 4.5L	
CODE	FITTING DESCRIPTION
9860-2-T4	PFA 1/4" tube fittings with 1/4" MNPT threads
9860-2-T6	PFA 3/8" tube fittings with 1/4" MNPT threads
9863-2-T4	316L SS 1/4" tube fittings with 1/4" MNPT threads
9863-2-T6	316L SS 3/8" tube fittings with 1/4" MNPT threads
9864-2-T4	Acetal 1/4" tube fittings with 1/4" MNPT threads
9864-2-T6	Acetal 3/8" tube fittings with 1/4" MNPT threads
9866-2-T4	PVDF 1/4" tube fittings with 1/4" MNPT threads
9866-2-T6	PVDF 3/8" tube fittings with 1/4" MNPT threads

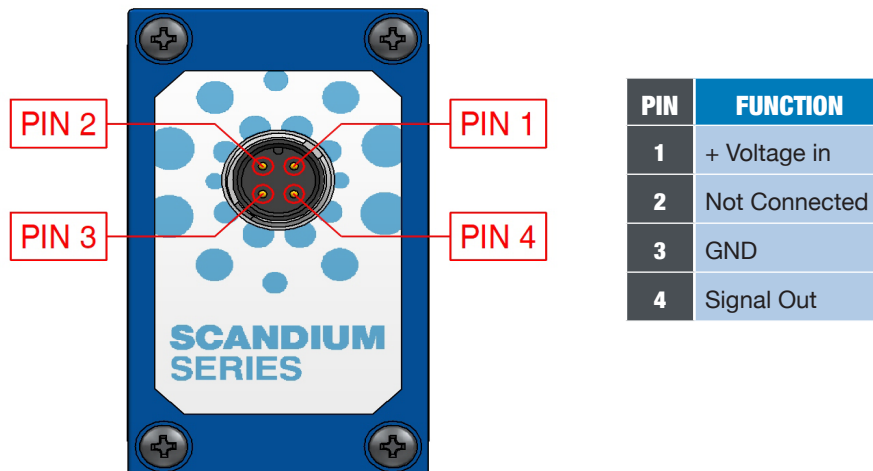
RANGE 10L 22L	
CODE	FITTING DESCRIPTION
9860-3-T6	PFA 3/8" tube fittings with 3/8" MNPT threads
9860-3-T7	PFA 1/2" tube fittings with 3/8" MNPT threads
9863-3-T6	316L SS 3/8" tube fittings with 3/8" MNPT threads
9863-3-T8	316L SS 5/8" tube fittings with 3/8" MNPT threads
9864-3-T6	Acetal 3/8" tube fittings with 3/8" MNPT threads
9864-3-T7	Acetal 1/2" tube fittings with 3/8" MNPT threads
9864-3-T8	Acetal 5/8" tube fittings with 3/8" MNPT threads
9866-3-T6	PVDF 3/8" tube fittings with 3/8" MNPT threads
9866-3-T7	PVDF 1/2" tube fittings with 3/8" MNPT threads

Dimensions

Basic unit configurations are shown. Contact factory or an authorized representative for dimensions of units not shown. All dimensions shown in inches [mm] unless otherwise noted.



Wiring Diagram



Optional Accessories

CODE	DESCRIPTION
9971-4-2M	Cable with M12 female connector, 4-conductor, 6.6 ft [2m]

Related Products



COBALT Series Meters

Electromagnetic flow meters for conductive liquids



IRIDIUM Flow Controllers

Modular flow controller platform for liquid applications



OSMIUM Flow Switch

Thermal flow switch for liquid applications



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