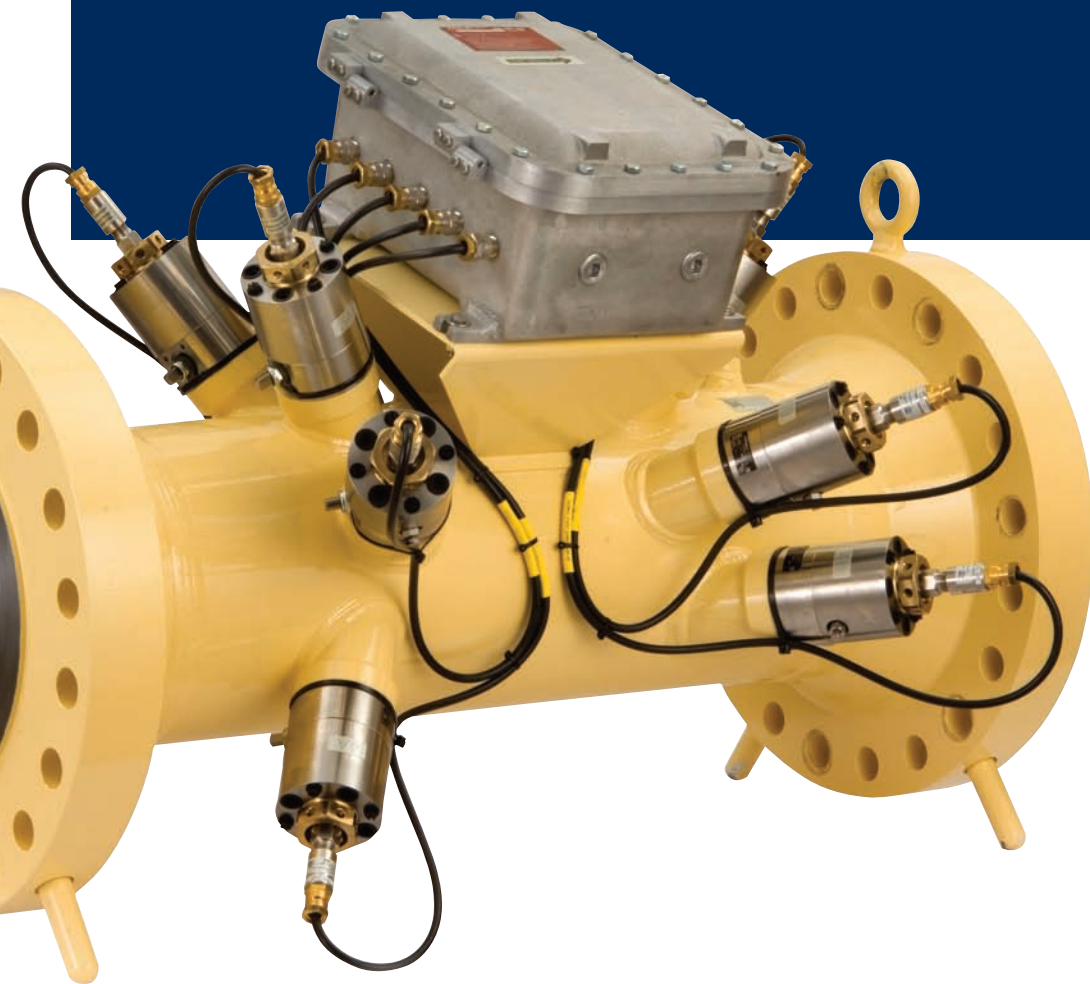


Q.Sonic 5 Path Ultrasonic Flow Meter



Elster Instromet

Q.Sonic 5 Path Ultrasonic Flow Meters

Patented measuring path arrangements, advanced ultrasonic sensors and digital signal processing allow for high accuracy with excellent long term stability.

Advantages

- No pressure drop
- Wide rangeability/turn down ratio 100:1
- Bi-directional flow
- No moving parts
- Very low cost ownership (maintenance)
- Insensitive to contamination
- Interfaces with major flow computer manufacturing
- Transducer exchange without recalibration
- Elster Instromet offers 5-path meters for pipe sizes from 12" to 42"

Applications

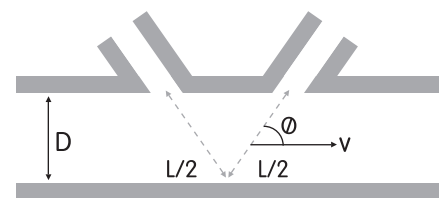
- Custody transfer measurement
- Underground (natural) gas storage
- Gas compressor control
- Gas processing plants
- Measurement and regulation stations
- In-plant metering
- Power plants
- LNG



The Elster Instromet Q.Sonic 5 Path Ultrasonic Flow Meter is one-of-a-kind. The combination of sophisticated transducers, digital electronics and the unique patented path configuration results in a meter unsurpassed in gas measurement accuracy. Its proven accuracy (better than $\pm 0.5\%$) and ability to analyze swirl and asymmetrical flow profiles has resulted in the approval of this meter for custody transfer by numerous natural gas pipeline operators in the United States.

Using the Absolute Digital Time Travel method (ADTT), the flow meter measures gas flow by comparing the time taken by an ultrasonic pulse to travel upstream and downstream. The larger the difference in time taken, the greater the velocity or flow of the gas.

Theory of Operation

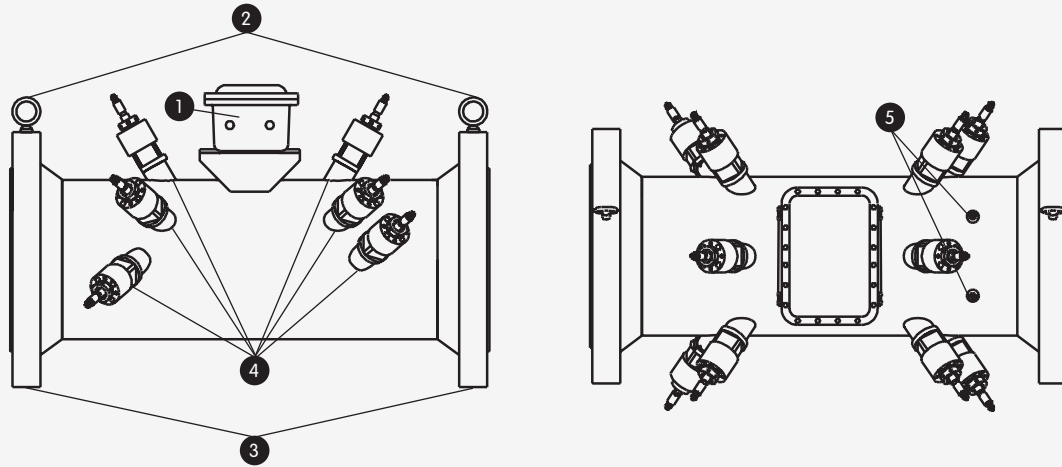


Travel Time Equations

$$t_D = \frac{L}{c+v \cdot \cos \theta} \quad t_U = \frac{L}{c-v \cdot \cos \theta}$$

Velocity Equation

$$\hat{v} = \frac{L}{2 \cdot \cos \theta} \left[\frac{1}{t_D} - \frac{1}{t_U} \right]$$



Material Specifications

- 1 Electronic Box or Junction Box
- 2 Lifting Eyes
- 3 Flanges
- 4 Transducers
- 5 Pressure Taps

Standard Spool Piece Specifications

- Body design code: CFR 49 Part 192**
- Flange design code: ANSI B16.5 or MSS SP 44
- Design temperature: -20°F to 200° F, -28°C to 93°C (meter body only)
- Design factor: 0.5
- Design pressure: 1480 PSIG, 100 Bar for 600 ANSI**
- Testing pressure: Standard; 1.5 x Design Pressure for 8 hours.
- Transducer ratings: Standard: 220 to 2250 PSIG**, -20°F to 176°F; 15 to 172 Bar, -28°C to 80°C
- Sandblasting: To near white metal
- Internal coating: Rust preventative Solvent
- External coat: Standard; Ameron Amercoat 385, Light Gray, DFT 4 - 6 mils.

** Additional design codes, ANSI or pressures and transducers ratings are available, please contact your sales representative for specifications.

The Ultrasonic flowmeter is in full compliance with the requirements of AGA Report #9 and approved for custody transfer by Nmi, Measurement Canada, PTB, DTI, Gost and etc.

Specifications

Outputs	- Four pulse outs: 0 to 10,000 Hz - "Uniform" and/or Modbus RTU - (2) RS-485 + (2) RS-232
Performance	- Rangeability of 2' to 100' per second (.6m to 30m per second) - Accuracy within 0.5% - Repeatability equal or <0.2%, Bidirectional flow - Velocity Range: -100' to 100' per second (-30m to 30m per second) - Extended Range of 1' to 120' per second (0.3m to 36m per second)
Response Time	- 1 update per second
Approvals	- FM Class, Div 1, Group C,D
Power	- 12/24 VDC, 7 Watts consumption
Included	- Frequency Splitter Card - Uniform software program for monitoring and configuring flow meter with a laptop computer - All documentation as per AGA Report #9

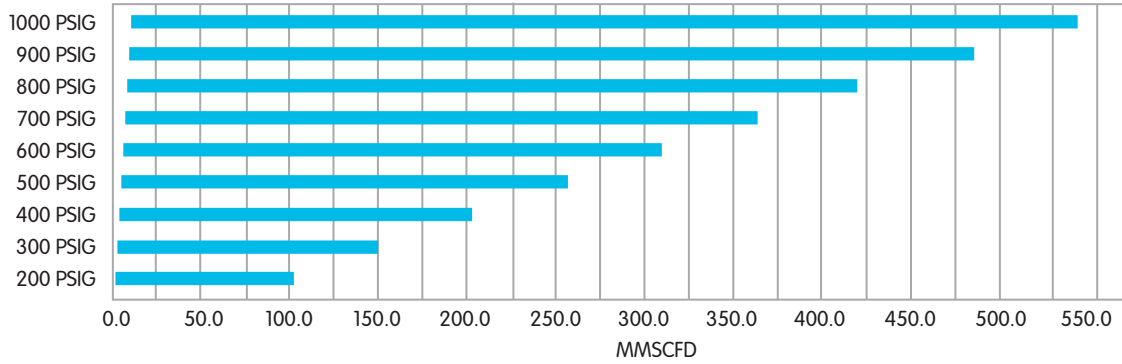
Meter Material and Dimensional Specifications

Size ANSI 600	ID - Inches (mm)	Length - Inches (mm)	Weight - Lbs (kg)	Body Materials	Flange Materials
12" Q5	11.938 (303.23)	40 (1016.0)	876 (398)	API 5L X52	ASTM A694 F52
16" Q5	15.000 (381.0)	48 (1219.2)	1559 (707)	API 5L X52	ASTM A694 F52
20" Q5	19.000 (482.6)	60 (1524.0)	2132 (967)	API 5L X60	ASTM A694 F60
24" Q5	22.876 (581.05)	72 (1828.8)	3260 (1478)	API 5L X65	ASTM A694 F65
30" Q5	28.750 (730.25)	72 (1828.8)	4684 (2125)	ASTM A517 Gr.70	ASTM A694 F52

Ultrasonic Flow Meter Capacity Tables

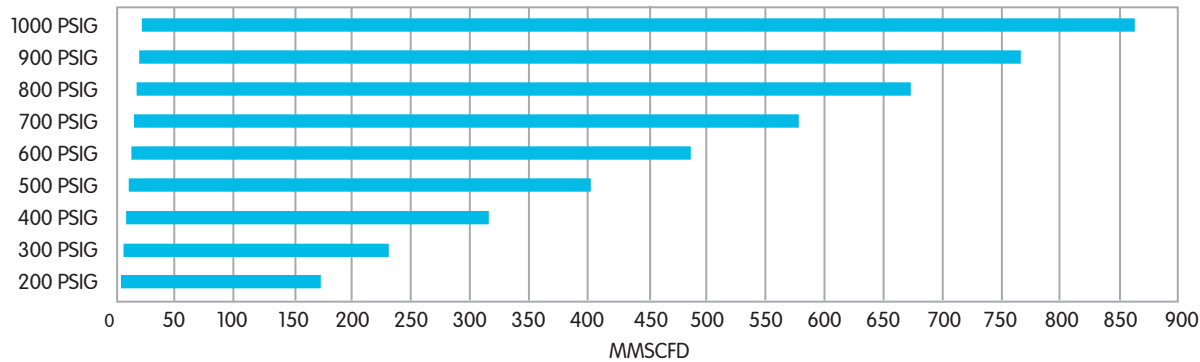
12" Q.Sonic Ultrasonic Flow Meter

12" MMSCFD	200 PSIG	300 PSIG	400 PSIG	500 PSIG	600 PSIG	700 PSIG	800 PSIG	900 PSIG	1000 PSIG
Q_{min}	2.0	3.0	4.0	5.1	6.2	7.3	8.5	9.6	10.9
Q_{max}	101.0	150.5	201.5	254.2	308.6	364.7	422.5	482.0	543.1



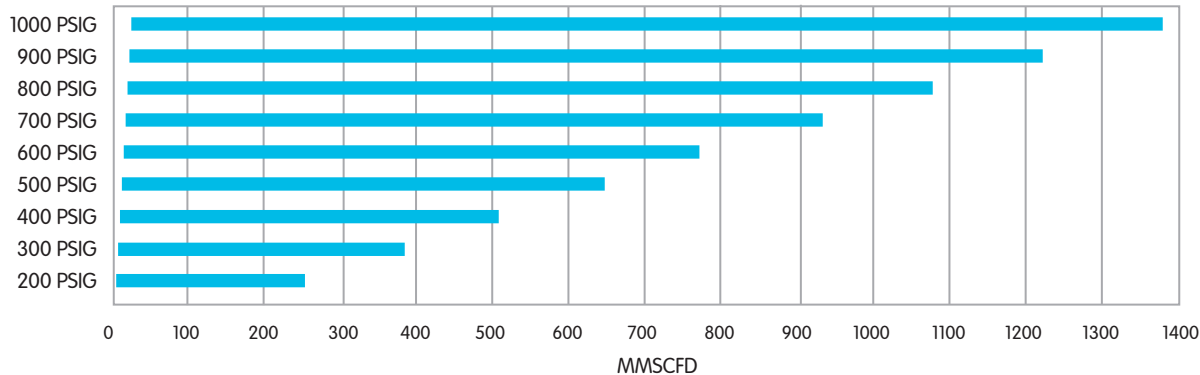
16" Q.Sonic Ultrasonic Flow Meter

16" MMSCFD	200 PSIG	300 PSIG	400 PSIG	500 PSIG	600 PSIG	700 PSIG	800 PSIG	900 PSIG	1000 PSIG
Q_{min}	3.2	4.8	6.4	8.0	9.7	11.5	13.3	15.2	17.2
Q_{max}	159.5	237.6	318.2	401.4	487.2	575.8	667.1	761.0	857.5



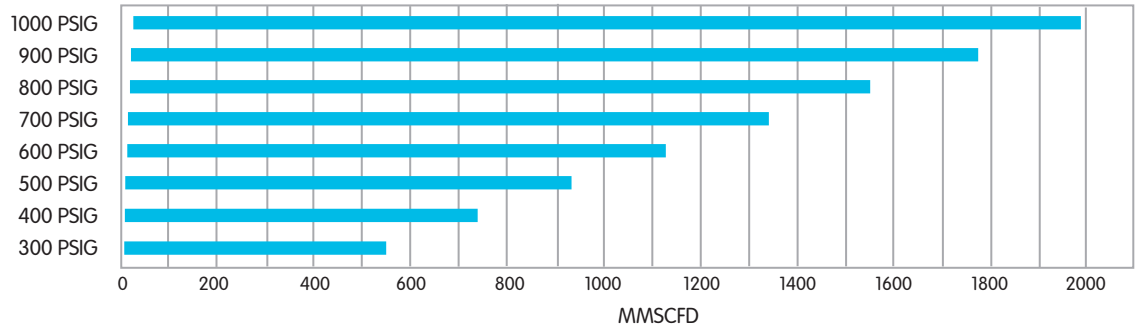
20" Q.Sonic Ultrasonic Flow Meter

20" MMSCFD	200 PSIG	300 PSIG	400 PSIG	500 PSIG	600 PSIG	700 PSIG	800 PSIG	900 PSIG	1000 PSIG
Q_{min}	5.1	7.6	10.2	12.9	15.6	18.5	21.4	24.4	27.5
Q_{max}	255.9	381.2	510.5	644.0	781.7	923.8	1070.3	1221.0	1375.8



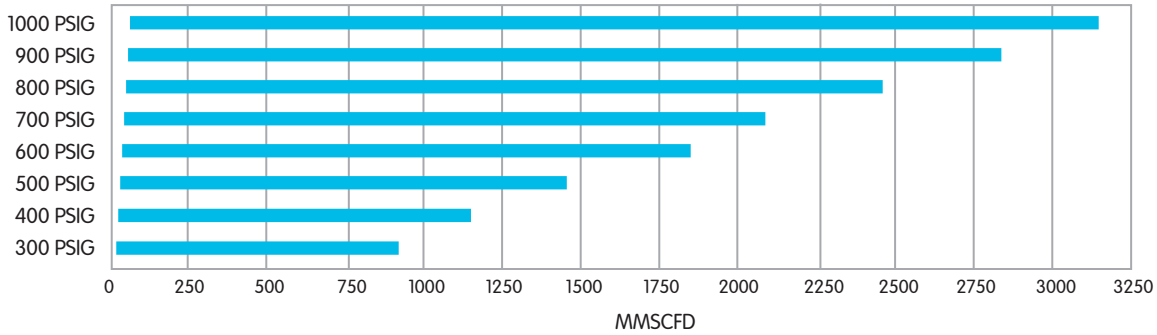
24" Q.Sonic Ultrasonic Flow Meter

24" MMSCFD	300 PSIG	400 PSIG	500 PSIG	600 PSIG	700 PSIG	800 PSIG	900 PSIG	1000 PSIG
Q_{min}	11.1	14.8	18.7	22.7	26.8	31.0	35.4	39.9
Q_{max}	552.6	740.0	933.5	1133.2	1339.2	1551.5	1769.9	1994.4



30" Q.Sonic Ultrasonic Flow Meter

30" MMSCFD	300 PSIG	400 PSIG	500 PSIG	600 PSIG	700 PSIG	800 PSIG	900 PSIG	1000 PSIG
Q_{min}	17.5	23.4	29.5	35.8	42.3	49.0	55.9	63.0
Q_{max}	872.8	1168.8	1474.5	1789.9	2115.2	2450.5	2795.6	3150.1



For larger sizes, please contact your Elster Instromet sales representative.

About Elster Group

A world leader in advanced metering infrastructure, integrated metering, and utilization solutions to the gas, electricity and water industries. Elster's metering and system solutions reflect over 170 years of knowledge and experience in measuring precious resources and energy.

Elster provides solutions and advanced technologies to help utilities more easily, efficiently and reliably obtain and use advanced metering intelligence to improve customer service, enhance operational efficiency, and increase revenues. Elster's AMI solutions enable utilities to cost-effectively generate, deliver, manage, and conserve the life-essential resources of gas, electricity, and water.

Elster has a staff of over 7,500 serving customers globally in North America, Central America, South America, Europe, Asia, Africa and the Middle East.

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