

Rosemount™ SeniorSonic™ 3414

4-Path Gas Ultrasonic Flow Meter



Intelligence for custody transfer

Engineered for custody transfer applications, the Rosemount SeniorSonic 3414 4-Path Gas Ultrasonic Flow Meter offers high accuracy and reliable, long-term performance to minimize lost and unaccounted for natural gas. To reduce measurement risk and minimize operating costs, the advanced meter is available in 4–42 in. (DN100 to DN1050)⁽¹⁾ line sizes and offers bidirectional flow capabilities, increased flow capacity, and no incremental pressure drop.

Powerful next-generation 3410 Series Electronics work with the Rosemount SeniorSonic 3414 flow meter to significantly increase the sampling rate and provide high-volume data capture, including extensive hourly and daily logs. The streamlined electronics feature a plug-in ready, integrated CPU and I/O board assembly and a local LCD display (optional) to increase reliability, simplify maintenance, and facilitate future expansion. Operators can also easily monitor and troubleshoot the meters in real time from a PC or laptop. MeterLink™ Diagnostics Software is an intuitive user interface that provides critical information, including expert flow analysis, flow disturbance alerts, and suggested corrective actions to enhance reliability and improve functionality.

The Rosemount SeniorSonic 3414 flow meter is also supplied with robust titanium non-wetted T-200 transducers that ensure reliable measurement in harsh environments where wet, rich and/or dirty gas is present. The transducers are engineered to simplify servicing and maximize meter uptime.

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(1) Consult factory on meter sizes above 36 in. (DN900).

Typical application

- Custody transfer for natural gas transmission lines

Figure 1: Rosemount SeniorSonic 3414 Gas Ultrasonic Flow Meter



Application sites

- Power plants – inlets
- Gas processing plants – inlets/outlets
- Underground storage sites – inlets/outlets
- Gas production – onshore/offshore
- City gate stations – receipt/delivery points

Features and benefits

- 4-path chordal design allows accuracy, stability, redundancy, and operational cost savings
- Excellent long-term performance reduces maintenance costs
- High rangeability of >100:1 ensures fewer meter runs, smaller line sizes, and lower capital costs
- Cast or forged body construction minimizes measurement uncertainty caused by pressure changes.
- Equipped with robust titanium encapsulated T-200 transducers for optimal performance in wet, sour, and corrosive environments (standard for line sizes up to 36 in. or DN900 and optional for 42 in. or DN1050).
- T-200 transducers are safely extractable under pressure without special tools and the non-wetted design eliminates the possibility of greenhouse gas emissions.
- 3410 Series Electronics provide fast sampling, an expandable electronics platform and an archive data log containing pressure, temperature and gas composition information allowing the meter to calculate standard condition flow rates like a redundant flow computer.
- 3410 Series Electronics calculate corrected volume rates, mass rates and energy rates.
- 3410 Series Electronics calculate speed of sound from pressure, temperature, and gas composition using AGA 10 2003 and GERG-2008 (AGA 8 Part 2, 2017).
- Local LCD display (optional) with up to ten user-selectable scrolling variables

- The Rosemount 3414 gas ultrasonic flow meter is now available with Smart Meter Verification, giving users access to expert flow analysis and providing a simplified and intuitive overall measurement status result minimizing time spent analyzing data. This new feature can be accessed through Modbus® or MeterLink Diagnostic Software.
- Predictive diagnostics allow personnel to quickly detect and respond to abnormal situations to avoid process upsets and unscheduled downtime.
- The Rosemount SeniorSonic 3414 meter is part of Emerson's broad range of intelligent field devices that power the PlantWeb™ digital plant architecture.

Access information when you need it with asset tags

Newly shipped devices include a unique QR code asset tag that enables you to access serialized information directly from the device. With this capability, you can:

- Access device drawings, diagrams, technical documentation, and troubleshooting information in your MyEmerson account
- Improve mean time to repair and maintain efficiency
- Ensure confidence that you have located the correct device
- Eliminate the time-consuming process of locating and transcribing nameplates to view asset information

Standard specifications

If requirements are outside of the listed specifications, consult an Emerson Ultrasonics product specialist. Depending on the application, other product and material offerings may be available.

Meter specifications

Characteristics

- 4-path (eight transducers) chordal design

Meter performance

- Flow calibrated accuracy is $\pm 0.1\%$ of reading over entire flow calibration range
- Repeatability is $\pm 0.05\%$ of reading for 5 to 100 ft/s (1.5 to 30.5 m/s)

Velocity range

- Nominal 1.7 to 100 ft/s (0.5 to 30 m/s) with over-range performance exceeding 125 ft/s (38 m/s) on some sizes
- Meter meets or exceeds AGA 9, 2017 3rd Edition / ISO 17089 performance specifications

Table 1: AGA 9 / ISO 17089 Flow rate values (US Customary units)

| Meter size (in.) | 4 to 24 | 30 | 36 |
|-------------------------|---------|-----|-----|
| q _{min} (ft/s) | 1.7 | 1.7 | 1.7 |
| q _t (ft/s) | 10 | 8.5 | 7.5 |
| q _{max} (ft/s) | 100 | 85 | 75 |

Table 2: AGA 9 / ISO 17089 Flow rate values (Metric units)

| Meter size (DN) | 100 to 600 | 750 | 900 |
|------------------------|------------|-----|-----|
| q _{min} (m/s) | 0.5 | 0.5 | 0.5 |

Table 2: AGA 9 / ISO 17089 Flow rate values (Metric units) (continued)

| Meter size (DN) | 100 to 600 | 750 | 900 |
|------------------------|------------|-------|-------|
| q _t (m/s) | 3.048 | 2.591 | 2.29 |
| q _{max} (m/s) | 30.48 | 25.91 | 22.86 |

Electronics performance

Power

- 10.4 Vdc to 36 Vdc
- 8 watts typical; 15 watts maximum

Mechanical ratings

Line sizes

- DN100 to DN1050 (4–42-in.)⁽²⁾
- DN100 to DN150 (4–6-in.) are 45° dual X orientation
- DN200 (8-in.) and larger are British Gas (BG) orientation

Operating gas temperature (transducers)

- T-200⁽³⁾: -58 °F to +257 °F (-50 °C to 125 °C)
- T-21: -4 °F to +212 °F (-20 °C to +100 °C)
- T-41: -58 °F to +212 °F (-50 °C to +100 °C)
- T-22: -58 °F to +212 °F (-50 °C to +100 °C)

Operating pressure range (transducers)

- T-200⁽³⁾: 15 to 3,750 psig (1.03 to 258.55 bar)
- T-21/T-41/T-22: 100 to 4,000 psig (6.89 to 275.79 bar)
- T-21/T-41/T-22: 50 psig (3.44 bar) available with reduced Q_{max}⁽⁴⁾
- T-22: 0 to 3,750 psig (0 to 258.55 bar)⁽⁵⁾

Flanges

- Raised Face and Ring Type Joint (RTJ) for ANSI Classes 300 to 2,500 (PN 50 to 420)
- Compact flanges and hub end connectors (optional)

NACE, NORSOK, and PED compliance

- Designed for NACE compliance⁽⁶⁾
- NORSOK available upon request
- PED available upon request

(2) Consult factory on meter sizes above DN900 (36-in.).

(3) Available for line sizes up to DN1050 (42-in). Minimum operating pressure varies by line size. Consult factory for minimum pressures below 100 psig (6.89 bar).

(4) Refer to [Operation limits](#) for additional information pertaining to operation limits.

(5) To use T-22 for low pressure applications below 100 psig (6.89 bar), the meter must be equipped with isolated transducer mounts.

(6) It is the equipment user's responsibility to select the materials suitable for the intended services.

Electronics ratings

Operating temperature

- -40 °F to +140 °F (-40 °C to +60 °C)

Operating relative humidity

- Up to 95% non-condensing

Storage temperature

- -40 °F to +185 °F (-40 °C to +85 °C) with a low temperature storage limit of -4 °F (-20 °C) for T-21 transducers and -58 °F (-50 °C) for T-41/T-22 transducers

Electronic housing options

- Integral mount (standard)
- Remote mount (optional) with 15 ft. (4.6 m) cable
 - Required for process temperature above 140 °F (60 °C)

Materials of construction

The materials of construction are dependent upon application requirements that must be specified by the customer. If needed, an Emerson representative can provide material guidance.

Material specifications

Body and flange

Cast

- ASTM A352 Gr LCC Carbon Steel⁽⁷⁾
-50 °F to +302 °F (-46 °C to +150 °C)
- ASTM A351 Gr CF8M 316 Stainless Steel
-50 °F to +302 °F (-46 °C to +150 °C)
- ASTM A351 Gr CF8M 316L Stainless Steel
-50 °F to +302 °F (-46 °C to +150 °C)
- ASTM A995 Gr 4A Duplex Stainless Steel⁽⁸⁾
-58 °F to +302 °F (-50 °C to +150 °C)

Forgings

- ASTM A350 Gr LF2 Carbon Steel⁽⁷⁾
-50 °F to +302 °F (-46 °C to +150 °C)
- ASTM A182 Gr F316 Stainless Steel
-50 °F to +302 °F (-46 °C to +150 °C)
- ASTM A182 Gr F316L Stainless Steel
-50 °F to +302 °F (-46 °C to +150 °C)
- ASTM A182 Gr F51 Duplex Stainless Steel⁽⁸⁾
-58 °F to +302 °F (-50 °C to +150 °C)
- ASTM A105 Carbon Steel
-20 °F to +302 °F (-29 °C to +150 °C)

Enclosure housing

- Standard: ASTM B26 Gr A356.0 T6 Aluminum
- Optional: ASTM A351 Gr CF8M Stainless Steel
- Optional: (retrofit): ASTM B26-92A Aluminum

Transducer components

Transducer mounts and holders O-rings

- Standard: Nitrile Butadiene Rubber (NBR)
- Other materials available

Transducer mounts and holders

- ASTM A564 Type 630 Stainless Steel Mounts

(7) Impact tested per specified ASTM standard.

(8) A995 4A material is not yet approved in Canada.

- ASTM A479 316L Stainless Steel Holders
- INCONEL® ASTM B446 (UNS N06625) Gr 1 Mount (optional)
- INCONEL ASTM B446 (UNS N06625) Gr 1 Holder (optional)

Paint specifications

Body and flange exterior

Carbon Steel body material

- Two coat paint; inorganic zinc primer and acrylic lacquer topcoat (standard)

Stainless Steel or Duplex body material

- Paint (optional)

Enclosure housing

Aluminum material

- Standard: 100% conversion coated and exterior coated with a polyurethane enamel
- Optional (retrofit): 100% conversion coated and exterior coated with a polyurethane enamel

Stainless Steel material

- Optional: Passivated

Table 3: Body and flange maximum pressure ratings by construction materials [psi meter sizes 4– 42 in.](¹)

| ANSI Class | Cast Carbon Steel | Forged Carbon Steel | Cast 316 SS, 316L SS, Forged 316 SS | Forged 316L SS | Duplex SS |
|------------|-------------------|---------------------|-------------------------------------|----------------|-----------|
| 300 | 750 | 740 | 720 | 600 | 750 |
| 600 | 1,500 | 1,480 | 1,440 | 1,200 | 1,500 |
| 900 | 2,250 | 2,220 | 2,160 | 1,800 | 2,250 |
| 1,500 | 3,750 | 3,705 | 3,600 | 3,000 | 3,750 |
| 2,500 | 6,250 | 6,170 | 6,000 | 5,000 | 6,250 |

(1) Pressure rating information is for -20 °F to +100 °F (-29 °C to +38 °C). Other temperatures may reduce the maximum pressure rating of the materials.

Table 4: Body and flange maximum pressure ratings by construction materials [bar meter sizes DN100 to DN1050](¹)

| DN | Cast Carbon Steel | Forged Carbon Steel | Cast 316 SS, 316L SS, Forged 316 SS | Forged 316L SS | Duplex SS |
|-----|-------------------|---------------------|-------------------------------------|----------------|-----------|
| 50 | 51.7 | 51.1 | 49.6 | 41.4 | 51.7 |
| 100 | 103.4 | 102.1 | 99.3 | 82.7 | 103.4 |
| 150 | 155.1 | 153.2 | 148.9 | 124.1 | 155.1 |
| 200 | 258.6 | 255.3 | 248.2 | 206.8 | 258.6 |
| 250 | 430.9 | 425.5 | 413.7 | 344.7 | 430.9 |

(1) Pressure rating information is for -20 °F to +100 °F (-29 °C to +38 °C). Other temperatures may reduce the maximum pressure rating of the materials.

Flow meter sizing

US Customary units

Table 5 and Table 6 can be used to determine the flow range at reference conditions for all meter sizes. All calculations are based on Schedule 40 bore, 60 °F (15.6 °C) and typical gas composition (AGA 8 Amarillo). These values are intended to be a guide in sizing.

Calculating meter capacity

To calculate a volume rate for a given velocity, first find the capacity (flow rate) in Table 5 or Table 6 for the meter size and operating pressure. Next, multiply the capacity by the ratio of the desired velocity divided by 100 ft/s to obtain the desired volume rate.

Example: Determine the hourly flow rate at 70 ft/s for an 8-inch meter operating at 800 psig.

$$\text{Flow rate} = 7,842 \text{ MSCFH} \quad \text{Velocity} = 70 \text{ ft/s} \quad \text{Answer} = \frac{7,842 \text{ MSCFH} \times 70 \text{ ft/s}}{100 \text{ ft/s}} = 5,489.4 \text{ MSCFH}$$

Table 5: Flow rates (MSCFH) based upon Max rated velocity [4–24 in. = 100 ft/s] [30 in. = 85 ft/s] [36 in. = 75 ft/s]

| Meter size (in.) | 4 | 6 | 8 | 10 | 12 | 16 | 18 | 20 | 24 | 30 | 36 | |
|---------------------------|-------|-------|--------|--------|--------|--------|--------|--------|---------|---------|---------|---------|
| Operating pressure (psig) | 100 | 252 | 571 | 989 | 1,559 | 2,213 | 3,494 | 4,423 | 5,495 | 7,948 | 10,910 | 13,862 |
| | 200 | 478 | 1,086 | 1,880 | 2,963 | 4,207 | 6,641 | 8,406 | 10,446 | 15,108 | 20,738 | 26,349 |
| | 300 | 712 | 1,616 | 2,799 | 4,412 | 6,263 | 9,888 | 12,515 | 15,552 | 22,493 | 30,875 | 39,229 |
| | 400 | 954 | 2,164 | 3,747 | 5,906 | 8,384 | 13,236 | 16,754 | 20,819 | 30,111 | 41,331 | 52,515 |
| | 500 | 1,202 | 2,729 | 4,725 | 7,448 | 10,572 | 16,690 | 21,126 | 26,251 | 37,968 | 52,117 | 66,219 |
| | 600 | 1,459 | 3,311 | 5,733 | 9,037 | 12,828 | 20,252 | 25,635 | 31,854 | 46,071 | 63,239 | 80,350 |
| | 700 | 1,723 | 3,911 | 6,772 | 10,675 | 15,153 | 23,923 | 30,281 | 37,627 | 54,422 | 74,701 | 94,914 |
| | 800 | 1,996 | 4,529 | 7,842 | 12,362 | 17,547 | 27,703 | 35,065 | 43,572 | 63,020 | 86,504 | 109,910 |
| | 900 | 2,276 | 5,165 | 8,943 | 14,096 | 20,009 | 31,590 | 39,986 | 49,686 | 71,863 | 98,642 | 125,333 |
| | 1,000 | 2,563 | 5,817 | 10,073 | 15,877 | 22,537 | 35,581 | 45,038 | 55,964 | 80,943 | 111,105 | 141,169 |
| | 1,100 | 2,858 | 6,486 | 11,231 | 17,702 | 25,128 | 39,671 | 50,214 | 62,393 | 90,246 | 123,875 | 157,394 |
| | 1,200 | 3,159 | 7,169 | 12,414 | 19,567 | 27,774 | 43,850 | 55,504 | 68,969 | 99,752 | 136,923 | 173,973 |
| | 1,300 | 3,466 | 7,865 | 13,619 | 21,467 | 30,471 | 48,107 | 60,893 | 75,665 | 109,437 | 150,217 | 190,865 |
| | 1,400 | 3,777 | 8,571 | 14,842 | 23,395 | 33,208 | 52,428 | 66,362 | 82,462 | 119,267 | 163,711 | 208,009 |
| | 1,500 | 4,092 | 9,285 | 16,079 | 25,344 | 35,975 | 56,797 | 71,892 | 89,333 | 129,205 | 177,352 | 225,341 |
| | 1,600 | 4,408 | 10,004 | 17,323 | 27,306 | 38,760 | 61,193 | 77,456 | 96,247 | 139,205 | 191,079 | 242,782 |
| | 1,700 | 4,725 | 10,724 | 18,570 | 29,270 | 41,548 | 65,595 | 83,029 | 103,172 | 149,221 | 204,826 | 260,250 |
| | 1,800 | 5,041 | 11,441 | 19,811 | 31,227 | 44,326 | 69,981 | 88,580 | 110,069 | 159,197 | 218,520 | 277,649 |
| | 1,900 | 5,354 | 12,151 | 21,041 | 33,166 | 47,079 | 74,327 | 94,081 | 116,905 | 169,083 | 232,090 | 294,891 |
| | 2,000 | 5,663 | 12,852 | 22,255 | 35,079 | 49,793 | 78,612 | 99,505 | 123,645 | 178,832 | 245,472 | 311,894 |

Table 6: Flow rates (MMSCFD) based upon Max rated velocity [4–24 in. = 100 ft/s] [30 in. = 85 ft/s] [36 in. = 75 ft/s]

| Meter size (in.) | 4 | 6 | 8 | 10 | 12 | 16 | 18 | 20 | 24 | 30 | 36 | |
|---------------------------|-------|-------|-------|-------|---------|---------|---------|---------|---------|---------|---------|---------|
| Operating pressure (psig) | 100 | 6.0 | 13.7 | 23.7 | 37.4 | 53.1 | 83.9 | 106.1 | 131.9 | 190.8 | 261.8 | 332.7 |
| | 200 | 11.5 | 26.1 | 45.1 | 71.1 | 101.0 | 159.4 | 201.8 | 250.7 | 362.6 | 497.7 | 632.4 |
| | 300 | 17.1 | 38.8 | 67.2 | 105.9 | 150.3 | 237.3 | 300.4 | 373.2 | 539.8 | 741.0 | 941.5 |
| | 400 | 22.9 | 51.9 | 89.9 | 141.8 | 201.2 | 317.7 | 402.1 | 499.6 | 722.7 | 991.9 | 1,260.4 |
| | 500 | 28.9 | 65.5 | 113.4 | 178.7 | 253.7 | 400.6 | 507.0 | 630.0 | 911.2 | 1,250.8 | 1,589.3 |
| | 600 | 35.0 | 79.5 | 137.6 | 216.9 | 307.9 | 486.1 | 615.2 | 764.5 | 1,105.7 | 1,517.7 | 1,928.4 |
| | 700 | 41.4 | 93.9 | 162.5 | 256.2 | 363.7 | 574.2 | 726.7 | 903.1 | 1,306.1 | 1,792.8 | 2,277.9 |
| | 800 | 47.9 | 108.7 | 188.2 | 296.7 | 421.1 | 664.9 | 841.6 | 1,045.7 | 1,512.5 | 2,076.1 | 2,637.8 |
| | 900 | 54.6 | 123.9 | 214.6 | 338.3 | 480.2 | 758.2 | 959.7 | 1,192.5 | 1,724.7 | 2,367.4 | 3,008.0 |
| | 1,000 | 61.5 | 139.6 | 241.7 | 381.1 | 540.9 | 854.0 | 1,080.9 | 1,343.1 | 1,942.6 | 2,666.5 | 3,388.1 |
| | 1,100 | 68.6 | 155.7 | 269.5 | 424.8 | 603.1 | 952.1 | 1,205.1 | 1,497.5 | 2,165.9 | 2,973.0 | 3,777.5 |
| | 1,200 | 75.8 | 172.1 | 297.9 | 469.6 | 666.6 | 1,052.4 | 1,332.1 | 1,655.3 | 2,394.0 | 3,286.2 | 4,175.4 |
| | 1,300 | 83.2 | 188.8 | 326.9 | 515.2 | 731.3 | 1,154.6 | 1,461.4 | 1,816.0 | 2,626.5 | 3,605.2 | 4,580.7 |
| | 1,400 | 90.6 | 205.7 | 356.2 | 561.5 | 797.0 | 1,258.3 | 1,592.7 | 1,979.1 | 2,862.4 | 3,929.1 | 4,992.2 |
| | 1,500 | 98.2 | 222.9 | 385.9 | 608.3 | 863.4 | 1,363.1 | 1,725.4 | 2,144.0 | 3,100.9 | 4,256.4 | 5,408.2 |
| | 1,600 | 105.8 | 240.1 | 415.8 | 655.3 | 930.2 | 1,468.6 | 1,858.9 | 2,309.9 | 3,340.9 | 4,585.9 | 5,826.8 |
| | 1,700 | 113.4 | 257.4 | 445.7 | 702.5 | 997.2 | 1,574.3 | 1,992.7 | 2,476.1 | 3,581.3 | 4,915.8 | 6,246.0 |
| | 1,800 | 121.0 | 274.6 | 475.5 | 749.5 | 1,063.8 | 1,679.5 | 2,125.9 | 2,641.7 | 3,820.7 | 5,244.5 | 6,663.6 |
| 1,900 | 128.5 | 291.6 | 505.0 | 796.0 | 1,129.9 | 1,783.8 | 2,257.9 | 2,805.7 | 4,058.0 | 5,570.2 | 7,077.4 | |
| 2,000 | 135.9 | 308.4 | 534.1 | 841.9 | 1,195.0 | 1,886.7 | 2,388.1 | 2,967.5 | 4,292.0 | 5,891.3 | 7,485.5 | |

Metric units

Table 7 and Table 8 can be used to determine the flow range at reference conditions for all meter sizes. All calculations are based on Schedule 40 bore, 15 °C and typical gas composition (AGA 8 Amarillo). These values are intended to be a guide in sizing.

Calculating meter capacity

To calculate a volume rate for a given velocity, first find the capacity (flow rate) in Table 7 or Table 8 for the meter size and operating pressure. Next, multiply the capacity by the ratio of the desired velocity divided by 30.5 m/s to obtain the desired volume rate.

Example: Determine the hourly flow rate at 21 m/s for a DN200 meter operating at 4,500 kPag.

$$\text{Flow rate} = 178 \text{ MSCMH} \quad \text{Velocity} = 21 \text{ m/s} \quad \text{Answer} = \frac{178 \text{ MSCMH} \times 21 \text{ m/s}}{30.5 \text{ m/s}} = 122.6 \text{ MSCMH}$$

Table 7: Flow rates (MSCMH) based upon Max rated velocity [DN100 to DN600 = 30.5 m/s] [DN750 = 25.9 m/s] [DN900 = 22.9 m/s]

| Meter size (DN) | 100 | 150 | 200 | 250 | 300 | 400 | 450 | 500 | 600 | 750 | 900 | |
|---------------------------|-------|-----|-----|-----|-----|-------|-------|-------|-------|-------|-------|-------|
| Operating pressure (kPag) | 1,000 | 10 | 23 | 39 | 62 | 88 | 139 | 175 | 218 | 315 | 432 | 550 |
| | 1,500 | 15 | 33 | 58 | 91 | 129 | 204 | 258 | 320 | 463 | 635 | 809 |
| | 2,000 | 19 | 44 | 77 | 121 | 171 | 270 | 342 | 425 | 615 | 843 | 1,074 |
| | 2,500 | 24 | 55 | 96 | 151 | 214 | 339 | 429 | 533 | 770 | 1,056 | 1,345 |
| | 3,000 | 29 | 67 | 116 | 182 | 259 | 408 | 517 | 642 | 929 | 1,274 | 1,622 |
| | 3,500 | 35 | 78 | 136 | 214 | 304 | 480 | 607 | 754 | 1,091 | 1,496 | 1,905 |
| | 4,000 | 40 | 90 | 156 | 247 | 350 | 553 | 700 | 869 | 1,257 | 1,724 | 2,195 |
| | 4,500 | 45 | 103 | 178 | 280 | 397 | 627 | 794 | 987 | 1,427 | 1,957 | 2,491 |
| | 5,000 | 51 | 115 | 199 | 314 | 446 | 704 | 891 | 1,107 | 1,600 | 2,195 | 2,794 |
| | 5,500 | 56 | 128 | 221 | 349 | 495 | 781 | 989 | 1,229 | 1,778 | 2,438 | 3,104 |
| | 6,000 | 62 | 141 | 244 | 384 | 545 | 861 | 1,090 | 1,354 | 1,959 | 2,686 | 3,420 |
| | 6,500 | 68 | 154 | 267 | 420 | 597 | 942 | 1,193 | 1,482 | 2,143 | 2,939 | 3,742 |
| | 7,000 | 74 | 168 | 290 | 457 | 649 | 1,025 | 1,297 | 1,612 | 2,331 | 3,197 | 4,071 |
| | 7,500 | 80 | 181 | 314 | 495 | 702 | 1,109 | 1,404 | 1,744 | 2,523 | 3,460 | 4,405 |
| | 8,000 | 86 | 195 | 338 | 533 | 757 | 1,195 | 1,512 | 1,879 | 2,718 | 3,727 | 4,745 |
| | 8,500 | 92 | 209 | 363 | 572 | 812 | 1,281 | 1,622 | 2,015 | 2,915 | 3,997 | 5,090 |
| | 9,000 | 99 | 224 | 388 | 611 | 867 | 1,369 | 1,733 | 2,154 | 3,115 | 4,272 | 5,439 |
| 9,500 | 105 | 238 | 413 | 651 | 924 | 1,458 | 1,846 | 2,294 | 3,318 | 4,550 | 5,793 | |
| 10,000 | 112 | 253 | 438 | 691 | 981 | 1,548 | 1,960 | 2,435 | 3,522 | 4,830 | 6,149 | |

Table 8: Flow rates (MMSCMD) based upon Max rated velocity [DN100 to DN600 = 30.5 m/s] [DN750 = 25.9 m/s] [DN900 = 22.9 m/s]

| Meter size (DN) | 100 | 150 | 200 | 250 | 300 | 400 | 450 | 500 | 600 | 750 | 900 | |
|---------------------------|-------|-------|--------|--------|--------|--------|--------|--------|--------|---------|---------|---------|
| Operating pressure (kPag) | 1,000 | 0.240 | 0.544 | 0.941 | 1.484 | 2.106 | 3.325 | 4.208 | 5.229 | 7.563 | 10.372 | 13.205 |
| | 1,500 | 0.352 | 0.799 | 1.384 | 2.182 | 3.097 | 4.889 | 6.188 | 7.690 | 11.122 | 15.251 | 19.418 |
| | 2,000 | 0.467 | 1.061 | 1.837 | 2.895 | 4.110 | 6.489 | 8.213 | 10.206 | 14.761 | 20.242 | 25.773 |
| | 2,500 | 0.585 | 1.328 | 2.300 | 3.626 | 5.147 | 8.126 | 10.285 | 12.780 | 18.485 | 25.348 | 32.273 |
| | 3,000 | 0.706 | 1.602 | 2.774 | 4.373 | 6.207 | 9.800 | 12.404 | 15.414 | 22.293 | 30.571 | 38.923 |
| | 3,500 | 0.829 | 1.882 | 3.259 | 5.137 | 7.292 | 11.512 | 14.572 | 18.107 | 26.189 | 35.914 | 45.725 |
| | 4,000 | 0.956 | 2.168 | 3.755 | 5.919 | 8.401 | 13.264 | 16.789 | 20.862 | 30.174 | 41.378 | 52.682 |
| | 4,500 | 1.085 | 2.461 | 4.262 | 6.718 | 9.536 | 15.055 | 19.056 | 23.679 | 34.248 | 46.964 | 59.795 |
| | 5,000 | 1.216 | 2.760 | 4.780 | 7.535 | 10.695 | 16.885 | 21.373 | 26.558 | 38.412 | 52.674 | 67.065 |
| | 5,500 | 1.351 | 3.066 | 5.309 | 8.369 | 11.880 | 18.755 | 23.740 | 29.499 | 42.665 | 58.508 | 74.492 |
| | 6,000 | 1.489 | 3.378 | 5.850 | 9.221 | 13.089 | 20.664 | 26.156 | 32.502 | 47.009 | 64.463 | 82.075 |
| | 6,500 | 1.629 | 3.697 | 6.401 | 10.090 | 14.322 | 22.612 | 28.621 | 35.565 | 51.439 | 70.538 | 89.810 |
| | 7,000 | 1.772 | 4.021 | 6.963 | 10.975 | 15.579 | 24.596 | 31.133 | 38.686 | 55.953 | 76.729 | 97.692 |
| | 7,500 | 1.917 | 4.351 | 7.535 | 11.877 | 16.859 | 26.616 | 33.690 | 41.863 | 60.549 | 83.031 | 105.716 |
| | 8,000 | 2.065 | 4.687 | 8.116 | 12.793 | 18.160 | 28.670 | 36.290 | 45.094 | 65.221 | 89.438 | 113.873 |
| | 8,500 | 2.215 | 5.028 | 8.706 | 13.723 | 19.480 | 30.754 | 38.928 | 48.372 | 69.962 | 95.940 | 122.151 |
| | 9,000 | 2.368 | 5.373 | 9.304 | 14.666 | 20.818 | 32.866 | 41.601 | 51.694 | 74.766 | 102.528 | 130.539 |
| 9,500 | 2.521 | 5.722 | 9.909 | 15.619 | 22.170 | 35.002 | 44.304 | 55.053 | 79.625 | 109.190 | 139.021 | |
| 10,000 | 2.677 | 6.075 | 10.519 | 16.580 | 23.535 | 37.157 | 47.032 | 58.442 | 84.527 | 115.913 | 147.581 | |

T-200 Titanium encapsulated transducers

New non-wetted design

Designed for today's challenging application requirements, Ultrasonics T-200 Transducers are robustly designed for high performance in the harshest environments, such as process gases containing oil, wet gas, and corrosive chemicals.

The possibility of hydrocarbon corrosion is virtually eliminated due to the full metal, non-wetted design for increased longevity and stability. The T-200 design is also easy to use and maintain. The innovative transducer smart capsule, a single part, is retractable under pressure with no special tools, simplifying maintenance, minimizing downtime, and maximizing safety and convenience.

T-200 transducers are standard in flow meters sized DN100 to DN1050 (4–42 in.) but may also be available in additional sizes upon request.

Figure 2: T-200 Transducer Assembly



Features and benefits

- Patented MiniHorn array technology mechanically amplifies the transducer signal, overcoming any signal attenuation or effects from reverberation.
- Non-wetted: Full metal encapsulated transducer located outside the process is impervious to liquid-borne dirt and corrosive fluids.
- Retrofittable: Easily upgrade existing flow meters equipped with T-11/T-12 or T-21/T-22 transducers.
- Long-term reliability: Isolated transducer design provides a barrier from corrosive hydrocarbon fluids and extends the life of transducer components.
- Extractable under pressure: The simplified smart capsule design is easily retractable without depressurizing the line and does not require a high-pressure extraction tool.
- Non-wetted design eliminates possibility of greenhouse gas emissions during extraction operations.
- Higher temperature rating: Allows for higher operating temperature and cleaning while inline.
- Extended warranty: 3 years standard

Transducer specifications

Product compatibility

- Line sizes DN100 to DN1050 (4–42 in.)

Materials of construction

- Ti Gr12 Housing / 316/316L Stainless Steel Stalk Assembly (standard)
- Ti Gr12 Housing / Inconel Stalk Assembly (optional)

Fluid types

- Hydrocarbons, industrial gases

Fluid temperature

- -58 °F to +257 °F (-50 °C to 125 °C)

Operating pressure

- 15 to 3,750 psig (1.03 to 258.55 bar)

Operating frequency

- 125 kHz

Figure 3: Transducer Smart Capsule

Safety and compliance

Safety classifications

Underwriters Laboratories (UL/cUL)

- Hazardous Locations – Class 1, Division 1, Groups C and D

CE Marked Directives

- Explosive Atmospheres (ATEX)

International Electrotechnical Commission (IECEx)

Metrology approval

- Measurement Canada

NMI/MID

- OIML R137 Class 0.5
- MID Class 1.0

Local LCD Display

The 3410 Series Electronics offer an optional local LCD display that utilizes three lines to indicate the variable name, variable value, and engineering units. The local display configuration is supported via MeterLink™ software or Emerson's AMS Trex Device with HART® interface protocol.

The local display shows up to ten items which are user selectable from 26 variables. The display can be configured to scale volume units as actual or 000's, with an adjustable time base of seconds, hours or days. The scroll rate can be adjusted from 1 to 100 seconds (default 5 seconds).

Figure 4: Local LCD display



Table 9: User-selectable display variables

| Variables | Description |
|---------------------------------|--|
| Volumetric Flow Rate | Uncorrected (actual) Corrected (standard or normal) |
| Average Flow Velocity | (No description necessary) |
| Average Speed of Sound | (No description necessary) |
| Pressure | Flowing, if utilized |
| Temperature | Flowing, if utilized |
| Frequency Output | 1A, 1B, 2A, or 2B |
| Frequency Output K-factor | Channel 1 or 2 |
| Analog Output | 1 or 2 |
| Current Day's Volume Totals | Uncorrected or Corrected (forward or reverse) |
| Previous Day's Volume Totals | Uncorrected or Corrected (forward or reverse) |
| Total Volume Totals (non-reset) | Uncorrected or Corrected (forward or reverse) |

Input/Output

Table 10: CPU Module I/O Connections (maximum wire gauge is 18 AWG)

| | I/O Connection Type | Qty | Description |
|---------------------------------|---------------------------------|-----|---|
| Serial Communications | Serial RS232/RS485 Port | 1 | <ul style="list-style-type: none"> ▪ Modbus® RTU/ASCII ▪ 115 kbps baud rate ▪ RS232/RS485 Full Duplex ▪ RS485 Half Duplex |
| | Ethernet Port (TCP/IP) 100BaseT | 1 | <ul style="list-style-type: none"> ▪ Modbus TCP |
| Digital Input ⁽¹⁾ | Contact Closure | 1 | <ul style="list-style-type: none"> ▪ Status ▪ Single polarity |
| Analog Inputs ⁽²⁾ | 4-20 mA | 2 | <ul style="list-style-type: none"> ▪ AI-1 Temperature⁽³⁾ ▪ AI-2 Pressure⁽³⁾ |
| Frequency/Digital Outputs | TTL/Open Collector | 6 | <ul style="list-style-type: none"> ▪ User Configurable (can configure Digital Input as 6th Frequency/Digital Output) |
| Analog Output ⁽²⁾⁽⁴⁾ | 4-20 mA | 1 | <ul style="list-style-type: none"> ▪ Independently configurable analog output ▪ HART® 7 Compliant, consult factory for HART 5 |

(1) The analog-to-digital conversion accuracy is within $\pm 0.05\%$ of full scale over the operating temperature range.

(2) A 24 volt DC power supply is available to provide power to the sensors.

(3) AI-1 and AI-2 are electronically isolated and operate in sink mode. The input contains a series resistance for HART® Communicators to be connected for sensor configuration.

(4) The analog output zero scale offset error is within $\pm 0.1\%$ of full scale and gain error is within $\pm 0.2\%$ of full scale. The total output drift is within ± 50 ppm of full scale per °C.

Table 11: Optional I/O Expansion Module

| | I/O Connection Type | Qty | Description |
|-----------------------|-------------------------|-----|---|
| Serial Communications | Serial RS232/RS485 Port | 1 | <ul style="list-style-type: none"> ▪ Modbus RTU/ASCII ▪ 115 kbps baud rate ▪ RS232/RS485 Half Duplex |
| | Ethernet switch | 3 | <ul style="list-style-type: none"> ▪ 100BaseT ▪ Three Ports |
| Analog Input | 4-20 mA | 1 | <ul style="list-style-type: none"> ▪ Reserved for future use |

Optional I/O Expansion Slot: RS232/RS485 Half Duplex, 2-Wire OR 1 I/O Expansion Module

Diagnostics and software

Significantly reduce time previously spent on data analysis and troubleshooting with the new Smart Meter Verification (SMV) feature now included in the latest meter firmware update. Walk away with more confidence in your measurement with a clear measurement verification result as well as flow meter and process status results.

Every Ultrasonic flow meter works with advanced MeterLink™ Software to simplify monitoring and troubleshooting. This advanced software displays a number of performance-based diagnostics that indicate flow meter health. In addition, dynamic flow-based diagnostics help operators identify flow disturbances that may affect measurement uncertainty. The latest version of MeterLink has been optimized to work with Smart Meter Verification, allowing for easy collection of monthly scheduled or on-demand SMV reports.

Figure 5: MeterLink Baseline Viewer

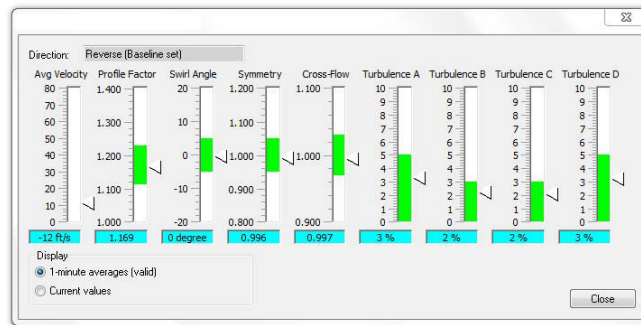
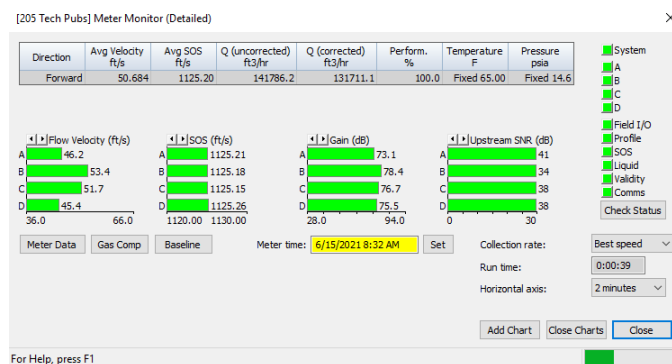


Figure 6: MeterLink Monitor Screen



- MeterLink software is downloadable at no charge
- MeterLink is required for transmitter configuration
 - Flow meter also configurable with AMS Device Manager or TREX Device, if HART® is used
- MeterLink connects to flow meters using Ethernet (recommended), RS232, or RS485 full duplex
- Supports Microsoft® Windows 7, 8.1, and 10
- Microsoft Office 2010-2019

Table 12: Features of Flow Meter, MeterLink and Net Monitor⁽¹⁾

| | | Flow Meter | Accessible through MeterLink | Accessible through Net Monitor |
|-----|---|------------|------------------------------|--------------------------------|
| SMV | Scheduled or On-Demand Reports (PDF or XML) | • | • | • |
| | Clear Measurement Verification Results | • | • | • |

Table 12: Features of Flow Meter, MeterLink and Net Monitor⁽¹⁾ (continued)

| | | Flow Meter | Accessible through MeterLink | Accessible through Net Monitor |
|----------------------|---|------------|------------------------------|--------------------------------|
| | Automatic Report Collection by Meter Group | | | • |
| | Last scheduled SMV result status multiple flow meter overview | | | • |
| | Bundle all scheduled flow meter reports | | • | • |
| | Alarm prioritization | • | • | • |
| Operation | Configurable Modbus GC component data table | • | | |
| | Speed of sound comparison ⁽²⁾ | • | • | |
| | Transducer health monitoring | • | • | |
| | Baseline Viewer | | • | |
| | Monitor screen | | • | |
| | Multiple charts with green limit bands | | • | |
| | View waveforms | | • | |
| | Speed of sound calculator ⁽²⁾ | | • | |
| | Help topics/troubleshooting guidance | | • | |
| | Maintenance logs | | • | |
| History | Hourly logs (180 days) and daily logs (5 years) | • | • | |
| | Trend maintenance logs | | • | |
| | Hourly/Daily log graphing | | • | |
| Configuration | Field Setup Wizard and Baseline Configuration Wizard | | • | |
| | User name identified on audit log | • | • | |
| | Write protect switch | • | | |
| | Compare configuration from logs | | • | |
| | GC Master - Modbus serial/TCP | • | | |
| | Modbus TCP slave | • | | |
| Alarms | Alarm/audit/system logs | • | • | |
| | Bore buildup alarm | • | • | |
| | Blockage alarm | • | • | |
| | Abnormal profile alarm | • | • | |
| | Liquid detection alarm | • | • | |
| | Latched alarms | • | • | |
| | Severity alarm display | | • | |
| | Reverse flow alarm | • | • | |

(1) Net Monitor is an application automatically available with MeterLink that allows the user to access and monitor all Ultrasonic Flow Meters that are part of a network.

(2) AGA 10 2003 and GERG-2008 (AGA 8 Part 2, 2017) supported.

Safety and compliance


The Rosemount SeniorSonic 3414 gas ultrasonic flow meter meets worldwide industry standards for electrical and intrinsic safety certifications and approvals. For a complete list of agencies and certifications, consult a Emerson Ultrasonics technical specialist.

Safety classifications

Underwriters laboratories (UL / cUL)

- Hazardous Locations — Class I, Division 1, Groups C and D

CE Marked to Directives

- Explosive Atmospheres (ATEX)
- Certificate — Demko II ATEX 1006133X
- Marking —  II 2G Ex db ia IIB T4 Gb (-40 °C ≤ T ≤ +60 °C)
- Pressure Equipment Directive (PED)
- Electromagnetic Compatibility (EMC)

INMETRO

- Certificate — UL-BR 16.0144X
- Marking — Ex db ia IIB T4 Gb

International Electrotechnical Commission (IECEX)

- Certificate — 11.0004X
- Marking — Ex db ia IIB T4 Gb

Canadian Registration Number

- Certificate — 0F14855

Figure 7: Standard aluminum electronics enclosure with optional display on Rosemount SeniorSonic 3414 meter



Environmental ratings

Aluminum

- NEMA 4
- IP66 to EN60529

Stainless steel

- NEMA 4X
- IP66 to EN60529

Metrology approval

ISO 17089-1 : 2010 (E)

OIML

- OIML R137-1 & 2 Edition 2012(E)
- Class 0.5

MID

- Directive 2014/32/EU (MID MI-002)
- Class 1.0

China Pattern Approval (CPA)

Measurement Canada

- Approval — AG-0623

Figure 8: Optional larger, retrofit electronics enclosure on Rosemount SeniorSonic 3414 meter (no optional display available)



Operation limits

If requirements are outside of the operation limits shown in the following tables for T-21/T-41/T-22/T-200 transducers, consult an Emerson Ultrasonics product specialist.

Table 13: Recommended maximum velocity for 12 in. and smaller line size meters (US Customary units)

| Nominal meter size (in.) | Max velocity rating at 0 psig or greater (ft/s) ⁽¹⁾ | Capacity at max rated velocity (ACFH) ⁽¹⁾ |
|--------------------------|--|--|
| 4 | 100 | 31,826 |
| 6 | 100 | 72,226 |
| 8 | 100 | 125,068 |
| 10 | 100 | 197,136 |
| 12 | 100 | 282,743 |

(1) T-22 transducers and isolated transducer mounts required for DN300 (12 in.) and smaller line size meters to achieve 0-100 psig (0-345 kPag).

Table 14: Recommended maximum velocity for 16-in and larger line size meters (US Customary units)

| Nominal meter size (in.) | Max velocity rating at 50 psig (ft/s) | Capacity between 50 to 100 psig (ACFH) ⁽¹⁾ | Max velocity rating at 100 psig (ft/s) | Capacity at max rated velocity (ACFH) ⁽¹⁾ |
|--------------------------|---------------------------------------|---|--|--|
| 16 | 80 | 228,318 | 100 | 456,635 |
| 18 | 80 | 292,131 | 100 | 584,263 |
| 20 | 80 | 363,799 | 100 | 727,598 |
| 24 | 80 | 530,696 | 100 | 1,061,392 |
| 30 | 45 | 755,952 | 85 | 1,427,909 |
| 36 | 37.5 | 914,912 | 75 | 1,829,824 |

(1) Capacities are for meter ID equivalent to Schedule 40 (or STD).

Table 15: Recommended maximum velocity for DN300 and smaller line size meters (Metric units)

| Nominal meter size (DN) | Max velocity rating at 0 kPag or greater (m/s) ⁽¹⁾ | Capacity at max rated velocity (ACMH) ⁽¹⁾ |
|-------------------------|---|--|
| 100 | 30.5 | 901 |
| 150 | 30.5 | 2,045 |
| 200 | 30.5 | 3,541 |
| 250 | 30.5 | 5,582 |
| 300 | 30.5 | 8,006 |

(1) Isolated transducer mounts required for DN300 (12 in.) and smaller line size meters to achieve 0-100 psig (0-345 kPag).

Table 16: Recommended maximum velocity for DN400 and larger line size meters (Metric units)

| Nominal meter size (DN) | Max velocity rating at 345 kPag (m/s) | Capacity between 345 and 689 kPag (ACMH) ⁽¹⁾ | Max velocity rating at 689 kPag or greater (m/s) | Capacity at max rated velocity (ACMH) ⁽¹⁾ |
|-------------------------|---------------------------------------|---|--|--|
| 400 | 15.2 | 6,465 | 30.5 | 12,930 |
| 450 | 15.2 | 7,917 | 30.5 | 15,835 |
| 500 | 15.2 | 10,301 | 30.5 | 20,603 |
| 600 | 15.2 | 15,027 | 30.5 | 30,055 |
| 750 | 13.7 | 21,406 | 26 | 40,433 |

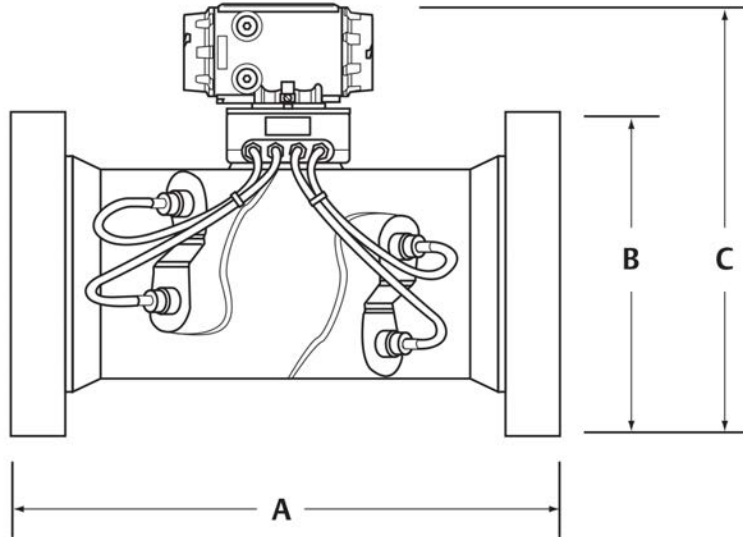
Table 16: Recommended maximum velocity for DN400 and larger line size meters (Metric units) (continued)

| Nominal meter size (DN) | Max velocity rating at 345 kPag (m/s) | Capacity between 345 and 689 kPag (ACMH) ⁽¹⁾ | Max velocity rating at 689 kPag or greater (m/s) | Capacity at max rated velocity (ACMH) ⁽¹⁾ |
|-------------------------|---------------------------------------|---|--|--|
| 900 | 11.4 | 25,907 | 23 | 51,814 |

(1) Capacities are for meter ID equivalent to Schedule 40 (or STD).

Weights and dimensions

Figure 9: Meter Dimension Key



To determine the values of A, B and C, see [Table 17](#) and [Table 18](#).

Tables

The Meter Dimension Key diagram ([Figure 9](#)) illustrates the meter component measurements that correspond to A, B and C in the chart below. All weights and dimensions based on standard electronics enclosure. The certified approval drawing will include the actual weights and dimensions.

Table 17: Weights and Dimensional Data (US Customary Units) [Line Sizes 4–6 in. Port Angle = 45°] [Line Sizes 8–26 in. Port Angle = 60°] [Line Sizes 30–36 in. Port Angle = 75°]

| Nominal line size (in.) | | 4 | 6 | 8 | 10 | 12 | 14 | 16 | 18 | 20 | 24 | 26 | 30 | 36 |
|-------------------------|--------------|------|------|------|------|------|----|------|------|------|------|------|------|-------|
| 300 ANSI | Weight (lb.) | 365 | 445 | 445 | 605 | 765 | CF | 1255 | CF | 1875 | 2415 | CF | CF | CF |
| | A (in.) | 29 | 29.5 | 21.5 | 24.5 | 26 | CF | 30 | 31.5 | 35.5 | 39 | 40.5 | CF | CF |
| | B (in.) | 10 | 12.5 | 15 | 17.5 | 20.5 | CF | 25.5 | 28 | 30.5 | 36 | 38.3 | CF | CF |
| | C (in.) | 18.6 | 20.7 | 22.9 | 25.4 | 27.9 | CF | 32.1 | 34.2 | 36.6 | 41.6 | 44.9 | CF | CF |
| 600 ANSI | Weight (lb.) | 395 | 515 | 665 | 785 | 915 | CF | 1475 | 1655 | 2205 | 3235 | CF | 5135 | CF |
| | A (in.) | 29 | 29.5 | 21.5 | 24.5 | 26 | CF | 30 | 31.5 | 35.5 | 39 | 47 | 38.8 | 43.75 |
| | B (in.) | 10.8 | 14 | 16.5 | 20 | 22 | CF | 27 | 29.3 | 32 | 37 | 40 | 44.5 | 51.8 |
| | C (in.) | 19 | 21.4 | 23.7 | 26.7 | 28.6 | CF | 32.8 | 34.8 | 37.3 | 42.1 | 45.6 | 50.2 | 56.2 |
| 900 ANSI | Weight (lb.) | 394 | 754 | 814 | 1194 | 1644 | CF | 2644 | 2414 | 3484 | 5824 | CF | 6740 | CF |
| | A (in.) | 31 | 37 | 27.5 | 30.5 | 34.5 | CF | 41.5 | 36 | 37 | 52 | CF | 45.5 | CF |
| | B (in.) | 11.5 | 15 | 18.5 | 21.5 | 24 | CF | 27.8 | 31 | 33.8 | 41 | CF | 48.5 | CF |

Table 17: Weights and Dimensional Data (US Customary Units) [Line Sizes 4–6 in. Port Angle = 45°] [Line Sizes 8–26 in. Port Angle = 60°] [Line Sizes 30–36 in. Port Angle = 75°] (continued)

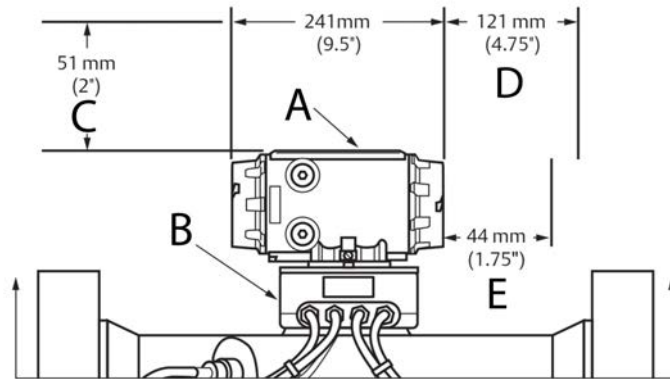
| Nominal line size (in.) | | 4 | 6 | 8 | 10 | 12 | 14 | 16 | 18 | 20 | 24 | 26 | 30 | 36 |
|-------------------------|--------------|------|------|------|------|------|----|------|------|------|------|----|------|----|
| 1500 ANSI | C (in.) | 19.3 | 22.3 | 25.2 | 27.7 | 30.4 | CF | 34.1 | 36.3 | 39.5 | 45.3 | CF | 52.4 | CF |
| | Weight (lb.) | 434 | 854 | 914 | 1464 | 2204 | CF | 3584 | CF | CF | CF | CF | CF | CF |
| | A (in.) | 31 | 37 | 27.5 | 30.5 | 34.5 | CF | 41.5 | CF | 60 | 68 | CF | CF | CF |
| | B (in.) | 12.3 | 15.5 | 19 | 23 | 26.5 | CF | 32.5 | CF | 38.8 | 46 | CF | CF | CF |
| | C (in.) | 19.7 | 22.4 | 25.4 | 28.4 | 31.7 | CF | 36.4 | CF | 42 | 47.8 | CF | CF | CF |

Table 18: Weights and Dimensional Data (Metric Units) [Line Sizes DN100 to DN150 Port Angle = 45°] [Line Sizes DN200 to DN650 Port Angle = 60°] [Line Sizes DN750 to DN900 Port Angle = 75°]

| Nominal line size (DN) | | 100 | 150 | 200 | 250 | 300 | 350 | 400 | 450 | 500 | 600 | 650 | 750 | 900 |
|------------------------|-------------|-------|-------|-------|-------|-------|-----|-------|-------|-------|--------|--------|--------|--------|
| DN 50 | Weight (kg) | 166 | 202 | 202 | 274 | 347 | CF | 569 | CF | 850 | 1095 | CF | CF | CF |
| | A (mm) | 736.6 | 749.3 | 546.1 | 622.3 | 660.4 | CF | 762 | 800.1 | 901.7 | 990.6 | 1029 | CF | CF |
| | B (mm) | 254 | 318 | 381 | 444.5 | 520.7 | CF | 647.7 | 711.2 | 774.7 | 914.4 | 973 | CF | CF |
| | C (mm) | 472 | 526 | 582.7 | 645 | 709 | CF | 814.3 | 869 | 930 | 1057 | 1141 | CF | CF |
| DN 100 | Weight (kg) | 179 | 234 | 302 | 356 | 415 | CF | 669 | 751 | 1000 | 1467 | CF | 2329 | CF |
| | A (mm) | 737 | 749 | 546 | 622 | 660 | CF | 762 | 800 | 902 | 991 | 1194 | 985 | 1111.2 |
| | B (mm) | 273 | 356 | 419 | 508 | 559 | CF | 686 | 743 | 812.8 | 939.8 | 1016 | 1130 | 1314.5 |
| | C (mm) | 481.3 | 544.6 | 601.7 | 677.9 | 727.2 | CF | 833.4 | 884.5 | 947.7 | 1068.6 | 1157.5 | 1275 | 1428 |
| DN 150 | Weight (kg) | 179 | 342 | 370 | 542 | 746 | CF | 1199 | 1095 | 1580 | 2642 | CF | 3057 | CF |
| | A (mm) | 787.4 | 940 | 698.5 | 774.7 | 876.3 | CF | 1054 | 914.4 | 939.8 | 1321 | CF | 1156 | CF |
| | B (mm) | 292.1 | 381 | 469.9 | 546.1 | 609.6 | CF | 705 | 787.4 | 857.3 | 1041.4 | CF | 1231.9 | CF |
| | C (mm) | 490 | 566 | 640 | 703.3 | 773.2 | CF | 866 | 922.3 | 1002 | 1150.9 | CF | 1332 | CF |
| DN 250 | Weight (kg) | 197 | 387 | 415 | 664 | 1000 | CF | 1626 | CF | CF | CF | CF | CF | CF |
| | A (mm) | 787 | 940 | 699 | 775 | 876 | CF | 1054 | CF | 1524 | 1727 | CF | CF | CF |
| | B (mm) | 292 | 381 | 470 | 546 | 610 | CF | 706 | CF | 984.3 | 1168 | CF | CF | CF |
| | C (mm) | 500 | 569 | 645 | 721 | 805 | CF | 925 | CF | 1066 | 1213 | CF | CF | CF |

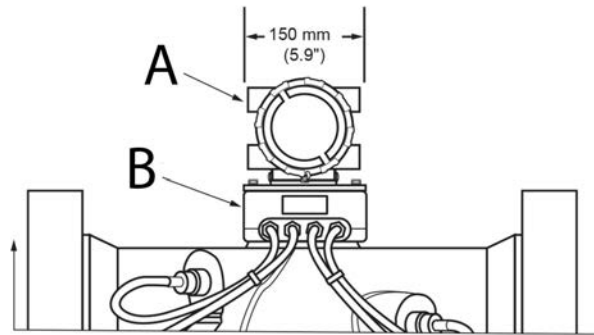
CF: Consult factory

Figure 10: Position of Enclosure Housing



- A. Enclosure housing
- B. Enclosure base
- C. Removal
- D. Board removal
- E. Endcap removal

Figure 11: Optional Position of Enclosure Housing⁽⁹⁾



- A. Enclosure housing
- B. Enclosure base

Dimensions are in mm (inches).

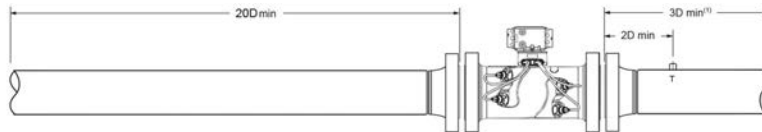
(9) Enclosure housing may be rotated 360 degrees in 90 degree increments

Recommended installation

Recommended pipe lengths

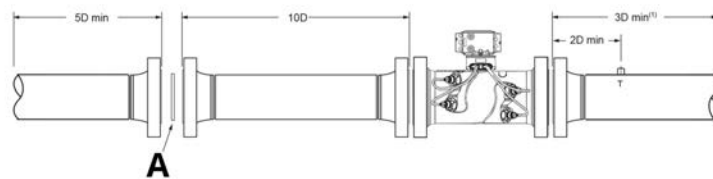
The drawings below represent recommended minimum pipe lengths for the installation of the Rosemount SeniorSonic 3414 Gas Ultrasonic Flow Meter. Consult an Emerson Ultrasonics technical specialist for installation recommendations for the specific application. Other lengths or flow conditioners can be accommodated.

Figure 12: Piping Recommendation for Gas Ultrasonic Meter (No Flow Conditioner)



3D min⁽¹⁾ = Additional pipe length may be required for additional taps (i.e. sample probe, test well, etc.).

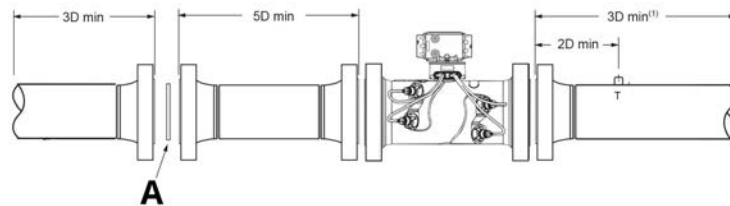
Figure 13: Piping Recommendation for Gas Ultrasonic Meter with a Flow Conditioner



A. Flow conditioner: Daniel Profiler, CPA 50E or CPA 55E

3D min⁽¹⁾ = Additional pipe length may be required for additional taps (i.e. sample probe, test well, etc.).

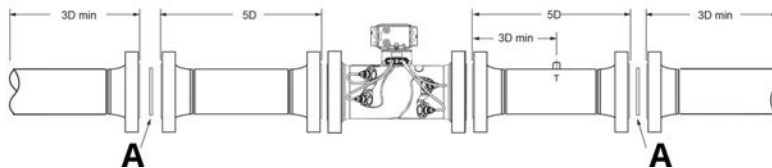
Figure 14: Piping Recommendation for Gas Ultrasonic Meter with a Flow Conditioner (Compact Installation)⁽¹⁰⁾



A. Flow conditioner: CPA 55E

3D min⁽¹⁾ = Additional pipe length may be required for additional taps (i.e. sample probe, test well, etc.).

Figure 15: Piping Recommendation for Bi-directional Gas Ultrasonic Meter with Flow Conditioners (Compact Installation)⁽¹⁰⁾



A. Flow conditioner: CPA 55E

Note

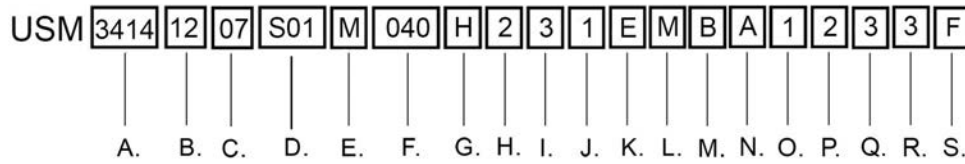
- For best results, flow conditioning is recommended.

⁽¹⁰⁾ Longer upstream lengths can increase long term baseline diagnostics stability. This configuration not applicable to OIML installations.

- D = Nominal pipe size in inches (i.e., 6-in. pipe size; 10D = 60-in.)
 - T = Temperature measurement location
 - Pressure measurement location provided on meter body.
-

Configurator code

This is an example of a configurator code. This is for informational purposes only. Not every option is listed and some options are contingent on others. For assistance designing your optimal meter, consult factory.



- A. Device (see [Table 19](#))
- B. Line size (see [Table 20](#))
- C. Pressure rating (see [Table 21](#))
- D. Flange type (see [Table 22](#))
- E. Body and flange material (see [Table 23](#))
- F. Schedule (pipe bore) (see [Table 24](#))
- G. Transducer assembly (see [Table 25](#))
- H. Enclosure type (see [Table 26](#))
- I. Pressure taps (see [Table 27](#))
- J. Conduit type (see [Table 28](#))
- K. Electronics mounting (see [Table 29](#))
- L. CPU/Displays/Keys (see [Table 30](#))
- M. Expansion module (see [Table 31](#))
- N. Wireless (see [Table 32](#))
- O. Tagging format (see [Table 33](#))
- P. Tagging language (see [Table 34](#))
- Q. Pressure Directive Certification (see [Table 35](#))
- R. Electrical approvals (see [Table 36](#))
- S. Metrology approval (see [Table 37](#))

Table 19: Device

| Code | Description |
|------|-------------|
| 3414 | 3414 4-Path |

Table 20: Line size

| Code | Description |
|------|-------------------------------|
| 04 | DN100 (4-in.) |
| 06 | DN150 (6-in.) |
| 08 | DN200 (8-in.) |
| 10 | DN250 (10-in.) |
| 12 | DN300 (12-in.) |
| 14 | DN350 (14-in.) |
| 16 | DN400 (16-in.) |
| 18 | DN400 (18-in.) |
| 20 | DN500 (20-in.) |
| 24 | DN600 (24-in.) |
| 26 | DN650 (26-in.) |
| 30 | DN750 (30-in.) |
| 36 | DN900 (36-in.) ⁽¹⁾ |

⁽¹⁾ Consult factory on meter sizes above DN900 (36-in.).

Table 21: Pressure rating

| Code | Description |
|------|--------------------|
| 03 | PN 50 / ANSI 300 |
| 05 | PN 100 / ANSI 600 |
| 06 | PN 150 / ANSI 900 |
| 07 | PN 250 / ANSI 1500 |
| 08 | PN 420 / ANSI 2500 |

Table 22: Flange type

| Code | Description |
|------|--------------------------|
| S01 | RF / RF |
| S02 | RTJ / RTJ |
| S03 | FEFA / FEFA |
| S04 | Compact flange (special) |

Table 23: Body and flange material

| Code | Description |
|------------------|---|
| M ⁽¹⁾ | Cast: LCC / Carbon Steel / SS / Duplex |
| F ⁽¹⁾ | Forged: Carbon Steel / 316 SS / Duplex SS |

(1) Consult factory for specific model code for desired material.

Table 24: Schedule (pipe bore)

| Code | Description |
|------|--------------|
| LW0 | Schedule LW |
| 020 | Schedule 20 |
| 030 | Schedule 30 |
| 040 | Schedule 40 |
| 060 | Schedule 60 |
| 080 | Schedule 80 |
| 100 | Schedule 100 |
| 120 | Schedule 120 |
| 140 | Schedule 140 |
| 160 | Schedule 160 |
| STD | Schedule STD |
| XS0 | Schedule XS |

Table 25: Transducer assembly

| Code | Description |
|------|--|
| 4 | T200 [-40 °F to +257 °F (-40 °C to +125 °C)] - Inconel Stalk, FKM O-ring ⁽¹⁾ |
| 5 | T200 [-58 °F to +257 °F (-50 °C to +125 °C)] - 316/316L SS Standard Stalk, NBR O-ring ⁽¹⁾ |
| 6 | T200 [-40 °F to +257 °F (-40 °C to +125 °C)] - 316/316L SS Standard Stalk, FKM O-ring ⁽¹⁾ |
| G | T-21 [-4 °F to +212 °F (-20 °C to +100 °C)] - Standard Mounts / Holders, NBR O-ring |

Table 25: Transducer assembly (continued)

| Code | Description |
|------|--|
| I | T-22 [-58 °F to +212 °F (-50 °C to +100 °C)] - Isolated Standard Mounts / 316L Holders, NBR O-ring |
| J | T-21 [-4 °F to +212 °F (-20 °C to +100 °C)] - Inconel Mounts / 316L Holders, NBR O-ring |
| L | T-21 [-4 °F to +212 °F (-20 °C to +100 °C)] - Inconel Mounts / Inconel Holders, FKM O-ring |
| N | T-41 [-58 °F to +212 °F (-50 °C to +100 °C)] - Standard Mounts / Holders, NBR O-ring |
| O | T-21 [-4 °F to +212 °F (-20 °C to +100 °C)] - Inconel Mounts/316L Holders, FKM O-ring |
| Z | T-22 [-40 °F to +212 °F (-40 °C to +100 °C)] - Isolated Inconel Mounts / Inconel Holders, FKM O-ring |

Table 26: Enclosure type

| Code | Description |
|------|---|
| 1 | Standard Aluminum |
| 2 | Optional Stainless Steel |
| 3 | Optional (Retrofit) Aluminum ⁽¹⁾ |

(1) Expansion module selections D, E and F only available with aluminum retrofit enclosure. Retrofit enclosure only available with electrical approval selections 1 and 2.

Table 27: Pressure taps

| Code | Description |
|------|-------------|
| 1 | ½-in. NPT |
| 3 | Pipette |

Table 28: Conduit type

| Code | Description |
|------|-------------------------|
| 1 | ¾-in. NPT |
| 2 | M20 (reducers required) |

Table 29: Electronics mounting

| Code | Description |
|------|---|
| A | Integral mount [up to +140 °F (+60 °C)] |
| B | Remote mount with 15-foot cables |
| E | Integral mount [up to +140 °F (+60 °C)] with armored cables |
| F | Remote mount with 5-foot armored, covered cable |

Table 30: CPU/Display

| Code | Description |
|------|--|
| J | I/O Type 4 (6 Frequency/Digital Outputs, 1 Analog Output) |
| K | I/O Type 4 (6 Frequency/Digital Outputs, 1 Analog Output)/ |

Table 31: Expansion module

| Code | Description |
|------|------------------|
| A | None |
| B | One Serial RS232 |

Table 31: Expansion module (continued)

| Code | Description |
|------|--|
| C | One Serial RS485 |
| D | Two Serial RS232 ⁽¹⁾ |
| E | Two Serial RS485 (2-wire) ⁽¹⁾ |
| F | Serial RS232 and Serial RS485 ⁽¹⁾ |
| G | Expansion I/O Module |
| H | Serial RS-232 and Expansion I/O Module ⁽¹⁾ |
| J | Serial RS-485 (2-wire) and Expansion I/O Module ⁽¹⁾ |

(1) Expansion module selections D, E, and F only available with aluminum retrofit enclosure. Retrofit enclosure only available with electrical approval selections 1 and 2.

Table 32: Wireless

| Code | Description |
|------|-------------|
| A | None |
| B | THUM |

Table 33: Tagging format

| Code | Description |
|------|----------------------------|
| 1 | Inch / ANSI / US Customary |
| 2 | Inch / ANSI / Metric |
| 3 | DN / PN / US Customary |
| 4 | DN / PN Metric |

Table 34: Tagging language

| Code | Description |
|------|-------------|
| 1 | English |
| 2 | French |
| 3 | Russian |
| 4 | Chinese |

Table 35: Pressure Directive Certification

| Code | Description |
|------|---|
| 1 | None |
| 2 | PED (must select electrical approval 2) |
| 3 | CRN (Canadian Boiler Branch) |
| 4 | Russia (EAC) |

Table 36: Electrical approvals

| Code | Description |
|------|-------------|
| 1 | UL / c-UL |
| 2 | ATEX/IECEX |

Table 36: Electrical approvals (continued)

| Code | Description |
|------|--------------|
| 3 | INMETRO |
| 4 | Russia (EAC) |

Table 37: Metrology approval

| Code | Description |
|------|--------------------------------|
| A | None |
| B | European Union - MID Directive |
| C | China (CPA-2005-F101) |
| D | Brazil (INMETRO) |
| F | Russia (EAC) |

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