**Product Data Sheet**
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# Rosemount™ 3418 8-Path Gas Ultrasonic Flow Meter

ROSEMOUNT™

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# Rosemount 3418 Gas Ultrasonic Flow Meter

## Highest accuracy for custody transfer

The Rosemount 3418 is an 8-path gas ultrasonic meter designed for natural gas custody transfer applications where high accuracy and long-term reliable performance is critical as it is in large volume transfers and in compact installations.

This 8-path chordal meter has eight paths in four locations placed in opposition to each other, allowing the meter to cancel out asymmetrical velocity effects. The meter provides higher resolution of the flow and can more accurately calculate swirl; therefore, it easily compensates for non-ideal flow distortions that result from pipe bends, shorter straight runs or smaller design footprints. Consequently, the need for flow conditioning elements and long upstream piping configurations is reduced, minimizing the footprint and the cost of the installation.

With sixteen (16) transducer modules forming eight (8) chordal paths, the Rosemount 3418 has one transmitter—and averages fluid velocity measurements from all eight chordal paths to calculate total flow. The transmitter performs all control and timing for the generation and measurement of acoustic pulses. Acoustic processing is performed by specialized proprietary 3410 electronics that are designed to achieve high sampling rates, provide stable ultrasonic signals and optimal low flow response.

Available in DN250 to DN1050 (10–42 in.), the Rosemount 3418 offers bidirectional flow capabilities, increased flow capacity and no incremental pressure drop, therefore reducing measurement risk and minimizing operating cost.

The Rosemount 3418 Gas Ultrasonic Flow Meter is designed to reduce uncertainty by reducing shift due to installation effects. It has OIML accuracy class 0.5 and requires only five diameters of straight run and no flow conditioner. To further improve measurement confidence, the meter is equipped to process speed of sound calculations in real time and compare theoretical values with actual values using AGA 10 or GERG 2008 methods. The meter will use real-time gas composition data and pressure and temperature data using direct inputs. Its performance, on-board intelligence and accuracy are unsurpassed.

**Figure 1: Based on a patented, interlocked British Gas path layout, eight direct paths are integrated into one measurement for swirl immunity and ultra-high accuracy measurement**

**Typical applications**

- Custody transfer for natural gas transmission lines

**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

- OIML Accuracy Class 0.5 with 5 diameters upstream pipe and no flow conditioner
- Best-in-class performance in compact installations
- Reduce size, weight and capital costs of metering system designs
- No flow conditioner reduces compression and pumping costs and eliminates maintenance due to blockages
- High rangeability of >100:1 ensures fewer meter runs, smaller line sizes and lower capital costs
- Equipped with robust titanium encapsulated T-200 Transducers for optimal performance in wet, sour and corrosive environments (standard for line sizes up to DN900 or 36 in. and optional for DN1050 or 42 in.)
- T-200 Transducers are safely extractable under pressure without special tools and its non-wetted design eliminates 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 which allows 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 LED display (optional) with up to ten user-selectable scrolling variables
- The Rosemount 3418 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 plant personnel to quickly detect and respond to abnormal situations to avoid process upsets and unscheduled downtime.

## 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

- 8-path (sixteen transducers) chordal design

### Meter performance

- Flow calibrated accuracy is ±0.1% of reading over entire flow calibration range
- OIML Accuracy Class 0.5 with 5 diameters upstream pipe and no flow conditioner
- Repeatability is ±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.) | 10 to 24 | 30 | 36 | 42 |
|---|---|---|---|---|
| $q_{min}$ (ft/s) | 1.7 | 1.7 | 1.7 | 1.7 |
| $q_t$ (ft/s) | 10 | 8.5 | 7.5 | CF |
| $q_{max}$ (ft/s) | 100 | 85 | 75 | CF |

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

| Meter size (DN) | 250 to 600 | 750 | 900 | 1050 |
|---|---|---|---|---|
| $q_{min}$ (m/s) | 0.5 | 0.5 | 0.5 | 0.5 |
| $q_t$ (m/s) | 3.048 | 2.591 | 2.29 | CF |
| $q_{max}$ (m/s) | 30.48 | 25.91 | 22.86 | CF |

## Electronics performance

### Power

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

## Mechanical ratings

### Line sizes

- 10–42 in. (DN250 to DN1050)[(1)]

- All meters use a patented interlocked Dual-British Gas (BG) layout.

**Operating gas temperature (transducers)**

- T-200[2]: –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[2]: 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 (3.45 bar) available with reduced Qmax[3]
- T-22: 0 to 3,750 psig (3.45 to 258.55 bar)[4]

**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[5]
- NORSOK available upon request
- PED available upon request

## Electronics ratings

**Operating temperature**

- With T-200 transducers: –40 °F to 257 °F (–40 °C to 125 °C)
- With T-21/T-22/T-41 transducers: –40 °F to 212 °F (–40 °C to 100 °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)

(1) Consult factory on meter sizes above 36 in. (DN900).
(2) Available for line sizes up to 42 in. (DN1050) Consult factory for minimum operating pressures below 100 psig (6.89 bar).
(3) Refer to US Customary units for additional information pertaining to operation limits.
(4) For low pressure applications below 100 psig (6.89 bar), the meter must be equipped with isolated transducer mounts.
(5) It is the equipment user's responsibility to select the materials suitable for the intended services.

# 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**

Forgings

- ASTM A350 Gr LF2 Carbon Steel[6]
  -50 °F to +302 °F (-46 °C to +150 °C)
- ASTM A350 Gr LF2 Carbon Steel[6]
  -58 °F to +302 °F (-50 °C to +150 °C)
- ASTM A182 Gr F316/F316L Stainless Steel (Dual Certified)
  -50 °F to +302 °F (-46 °C to +150 °C)
- ASTM A182 Gr F51 Duplex Stainless Steel[7]
  -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

**Electronics bracket**

Stainless Steel material

- 316 SS

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

(6) Impact tested per specified ASTM standard.
(7) A995 4A material is not yet approved in Canada.

# Paint specifications

**Body and flange exterior**

Carbon Steel body material

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

Stainless Steel or Duplex body material

- Paint (optional)

**Transducer shroud**

Aluminum material

- Powder coated

**Enclosure housing**

Aluminum material

- 100% conversion coated and exterior coated with a polyurethane enamel

Stainless Steel material

- Passivated (optional)

**Table 3: Body and flange maximum pressure ratings by construction materials [psi meter sizes 10–42 in.]. 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.**

| ANSI Class | Forged Carbon Steel | Forged 316/316L SS | Duplex SS |
|---|---|---|---|
| 300 | 740 | 720 | 750 |
| 600 | 1,480 | 1,440 | 1,500 |
| 900 | 2,220 | 2,160 | 2,250 |
| 1500 | 3,705 | 3,600 | 3,750 |

**Table 4: Body and flange maximum pressure ratings by construction materials [bar meter sizes DN250 to DN1050]. 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.**

| PN | Forged Carbon Steel | Forged 316/316L SS | Duplex SS |
|---|---|---|---|
| 50 | 51.1 | 49.6 | 51.7 |
| 100 | 102.1 | 99.3 | 103.4 |
| 150 | 153.2 | 148.9 | 155.1 |
| 200 | 255.3 | 248.2 | 258.6 |
| 250 | 425.5 | 413.7 | 430.9 |

# 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. Prior to order placement, confirm meter sizing with an Emerson Ultrasonics product specialist.

### 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.

The example below illustrates how to determine the hourly flow rate at 70 ft/s for an 10-inch meter operating at 800 psig:

$$\text{Flow rate} = 12{,}362 \text{ MSCFH} \quad \text{Velocity} = 70 \text{ ft/s} \quad \text{Answer} = \frac{12{,}362 \text{ MSCFH} \times 70 \text{ ft/s}}{100 \text{ ft/s}} = 8{,}653.4 \text{ MSCFH}$$

**Table 5: Flow rates (MSCFH) based upon max rated velocity [10–24 in. = 100 ft/s][30 in. = 85 ft/s][36 in. = 75 ft/s]**

| Meter size (in.) | | 10 | 12 | 16 | 18 | 20 | 24 | 30 | 36 | 42 |
|---|---|---|---|---|---|---|---|---|---|---|
| Operating pressure (psig) | 100 | 1,559 | 2,213 | 3,494 | 4,423 | 5,495 | 7,948 | 10,910 | 13,862 | CF |
| | 200 | 2,963 | 4,207 | 6,641 | 8,406 | 10,446 | 15,108 | 20,738 | 26,349 | CF |
| | 300 | 4,412 | 6,263 | 9,888 | 12,515 | 15,552 | 22,493 | 30,875 | 39,229 | CF |
| | 400 | 5,906 | 8,384 | 13,236 | 16,754 | 20,819 | 30,111 | 41,331 | 52,117 | CF |
| | 500 | 7,448 | 10,572 | 16,690 | 21,126 | 26,251 | 37,968 | 52,117 | 66,219 | CF |
| | 600 | 9,037 | 12,828 | 20,252 | 25,635 | 31,854 | 46,071 | 63,239 | 80,350 | CF |
| | 700 | 10,675 | 15,153 | 23,923 | 30,281 | 37,627 | 54,422 | 74,701 | 94,914 | CF |
| | 800 | 12,362 | 17,547 | 27,703 | 35,065 | 43,572 | 63,020 | 86,504 | 109,910 | CF |
| | 900 | 14,096 | 20,009 | 31,590 | 39,986 | 49,686 | 71,863 | 98,642 | 125,333 | CF |
| | 1000 | 15,877 | 22,537 | 35,581 | 45,038 | 55,964 | 80,943 | 111,105 | 141,169 | CF |
| | 1100 | 17,702 | 25,128 | 39,671 | 50,214 | 62,396 | 90,246 | 123,875 | 157,394 | CF |
| | 1200 | 19,567 | 27,774 | 43,850 | 55,504 | 68,969 | 99,752 | 136,923 | 173,973 | CF |
| | 1300 | 21,467 | 30,471 | 48,107 | 60,893 | 75,665 | 109,437 | 150,217 | 190,865 | CF |
| | 1400 | 23,395 | 33,208 | 52,428 | 66,362 | 82,462 | 119,267 | 163,711 | 208,009 | CF |
| | 1500 | 25,344 | 35,975 | 56,797 | 71,892 | 89,333 | 129,205 | 191,079 | 242,782 | CF |
| | 1600 | 27,306 | 38,760 | 61,193 | 77,456 | 96,247 | 139,205 | 191,079 | 242,782 | CF |
| | 1700 | 29,270 | 41,548 | 65,595 | 83,029 | 103,172 | 149,221 | 204,826 | 260,250 | CF |
| | 1800 | 31,227 | 44,326 | 69,981 | 88,580 | 110,069 | 159,197 | 218,520 | 277,649 | CF |
| | 1900 | 33,166 | 47,079 | 74,327 | 94,081 | 116,905 | 169,083 | 232,090 | 294,891 | CF |
| | 2000 | 35,079 | 49,793 | 78,612 | 99,505 | 123,645 | 178,832 | 245,472 | 311,894 | CF |

**Table 6: Flow rates (MMSCFD) based upon max rated velocity [10–24 in. = 100 ft/s][30 in. = 85 ft/s][36 in. = 75 ft/s]**

| Meter size (in.) | | 10 | 12 | 16 | 18 | 20 | 24 | 30 | 36 | 42 |
|---|---|---|---|---|---|---|---|---|---|---|
| Operating pressure (psig) | 100 | 37.4 | 53.1 | 83.9 | 106.1 | 131.9 | 190.8 | 261.8 | 332.7 | CF |
| | 200 | 71.1 | 101.0 | 159.4 | 201.8 | 250.7 | 362.6 | 497.7 | 632.4 | CF |
| | 300 | 105.9 | 150.3 | 237.3 | 300.4 | 373.2 | 539.8 | 741.0 | 941.5 | CF |
| | 400 | 141.8 | 201.2 | 317.7 | 402.1 | 499.6 | 722.7 | 991.9 | 1,260 | CF |
| | 500 | 178.7 | 253.7 | 400.6 | 507.0 | 630.0 | 911.2 | 1,250.8 | 1,589.3 | CF |
| | 600 | 216.9 | 307.9 | 486.1 | 615.2 | 764.5 | 1,105.7 | 1,517.7 | 1,928.4 | CF |
| | 700 | 256.2 | 363.7 | 574.2 | 726.7 | 903.1 | 1,306.1 | 1,792.8 | 2,277.9 | CF |
| | 800 | 296.7 | 421.1 | 664.9 | 841.6 | 1,045.7 | 1,512.5 | 2,076.1 | 2,637.8 | CF |
| | 900 | 338.3 | 480.2 | 758.2 | 959.7 | 1,192.5 | 1,724.7 | 2,367.4 | 3,008.0 | CF |
| | 1000 | 381.1 | 540.9 | 854.0 | 1,080.9 | 1,343.1 | 1,942.6 | 2,666.5 | 3,286.2 | CF |
| | 1100 | 424.8 | 603.1 | 952.1 | 1,205.1 | 1,497.5 | 2,165.9 | 2,973.0 | 3,777.5 | CF |
| | 1200 | 469.6 | 666.6 | 1,052.4 | 1,332.1 | 1,655.3 | 2,394.0 | 3,286.2 | 4,175.4 | CF |
| | 1300 | 515.2 | 731.3 | 1,154.6 | 1,461.4 | 1,816.0 | 2,626.5 | 3,605.2 | 4,580.7 | CF |
| | 1400 | 561.5 | 797.0 | 1,258.3 | 1,592.7 | 1,979.1 | 2,862.4 | 3,929.1 | 4,992.2 | CF |
| | 1500 | 608.3 | 863.4 | 1,363.1 | 1,725.4 | 2,144.0 | 3,100.9 | 4,585.9 | 5,826.8 | CF |
| | 1600 | 655.3 | 930.2 | 1,468.6 | 1,858.9 | 2,309.3 | 3,340.9 | 4,585.9 | 5,826.8 | CF |
| | 1700 | 702.5 | 997.2 | 1,574.3 | 1,992.7 | 2,476.1 | 3,581.3 | 4,915.8 | 6,246.0 | CF |
| | 1800 | 749.5 | 1,063.8 | 1,679.5 | 2,125.9 | 2,641.7 | 3,820.7 | 5,244.5 | 6,663.6 | CF |
| | 1900 | 796.0 | 1,129.9 | 1,783.8 | 2,257.9 | 2,805.7 | 4,058.0 | 5,570.2 | 7,077.4 | CF |
| | 2000 | 841.9 | 1,195.0 | 1,886.7 | 2,388.1 | 2,967.5 | 4,292.0 | 5,891.3 | 7,485.5 | CF |

# 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 and 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 DN250 meter operating at 4,500 kPag.

If Flow Rate = 280 MSCMH and Velocity = 21 m/s, the calculation is:

$$\frac{280 \text{ MSCMH} \times 21 \text{ m/s}}{30.5 \text{ m/s}} = 192.7 \text{ MSCMH}$$

**Table 7: Flow rates (MSCMH) based upon max rated velocity [DN250 to DN600 = 30.5 m/s] [DN750 = 25.9 m/s] [DN900 = 22.9 m/s]**

| Meter size (DN) | | 250 | 300 | 400 | 500 | 600 | 750 | 900 | 1050 |
|---|---|---|---|---|---|---|---|---|---|
| Operating pressure (kPag) | 1,000 | 62 | 88 | 139 | 218 | 315 | 432 | 550 | CF |
| | 1,500 | 91 | 129 | 204 | 320 | 463 | 635 | 809 | CF |
| | 2,000 | 121 | 171 | 270 | 425 | 615 | 843 | 1,074 | CF |
| | 2,500 | 151 | 214 | 339 | 533 | 770 | 1,056 | 1,345 | CF |
| | 3,000 | 182 | 259 | 408 | 642 | 929 | 1,274 | 1,622 | CF |
| | 3,500 | 214 | 304 | 480 | 754 | 1,091 | 1,496 | 1,905 | CF |
| | 4,000 | 247 | 350 | 553 | 869 | 1,257 | 1,724 | 2,195 | CF |
| | 4,500 | 280 | 397 | 627 | 987 | 1,427 | 1,957 | 2,491 | CF |
| | 5,000 | 314 | 446 | 704 | 1,107 | 1,600 | 2,195 | 2,794 | CF |
| | 5,500 | 349 | 495 | 781 | 1,229 | 1,778 | 2,438 | 3,104 | CF |
| | 6,000 | 384 | 545 | 861 | 1,354 | 1,959 | 2,686 | 3,420 | CF |
| | 6,500 | 420 | 597 | 942 | 1,482 | 2,143 | 2,939 | 3,742 | CF |
| | 7,000 | 457 | 649 | 1,025 | 1,612 | 2,331 | 3,460 | 4,405 | CF |
| | 7,500 | 495 | 702 | 1,109 | 1,744 | 2,523 | 3,460 | 4,405 | CF |
| | 8,000 | 533 | 757 | 1,195 | 1,879 | 2,718 | 3,727 | 4,745 | CF |
| | 8,500 | 572 | 812 | 1,281 | 2,015 | 2,915 | 3,997 | 5,090 | CF |
| | 9,000 | 611 | 867 | 1,369 | 2,154 | 3,115 | 4,272 | 5,439 | CF |
| | 9,500 | 651 | 924 | 1,458 | 2,294 | 3,318 | 4,550 | 5,793 | CF |
| | 10,000 | 691 | 981 | 1,548 | 2,435 | 3,522 | 4,830 | 6,149 | CF |

**Table 8: Flow rates (MMSCMD) based upon max rated velocity [DN250 to DN600 = 30.5 m/s] [DN750 = 25.9 m/s] [DN900 = 22.9 m/s]**

| Meter size (DN) | | 250 | 300 | 400 | 500 | 600 | 750 | 900 | 1050 |
|---|---|---|---|---|---|---|---|---|---|
| Operating pressure (kPag) | 1,000 | 1.484 | 2.106 | 3.325 | 5.229 | 7.563 | 10.372 | 13.205 | CF |
| | 1,500 | 2.182 | 3.097 | 4.889 | 7.690 | 11.122 | 15.251 | 19.418 | CF |
| | 2,000 | 2.895 | 4.110 | 6.489 | 10.206 | 14.761 | 20.242 | 25.773 | CF |
| | 2,500 | 3.626 | 5.147 | 8.126 | 12.780 | 18.485 | 25.348 | 32.273 | CF |
| | 3,000 | 4.373 | 6.207 | 9.800 | 15.414 | 22.293 | 30.571 | 38.923 | CF |
| | 3,500 | 5.137 | 7.292 | 11.512 | 18.107 | 26.189 | 35.914 | 45.725 | CF |
| | 4,000 | 5.919 | 8.401 | 13.264 | 20.862 | 30.174 | 41.378 | 52.682 | CF |
| | 4,500 | 6.718 | 9.536 | 15.055 | 23.679 | 34.248 | 46.964 | 59.795 | CF |
| | 5,000 | 7.535 | 10.695 | 16.885 | 26.558 | 38.412 | 52.674 | 67.065 | CF |
| | 5,500 | 8.369 | 11.880 | 18.755 | 29.499 | 42.665 | 58.508 | 74.492 | CF |
| | 6,000 | 9.221 | 13.089 | 20.664 | 32.502 | 47.009 | 64.463 | 82.075 | CF |
| | 6,500 | 10,090 | 14,322 | 22.612 | 35.565 | 51.439 | 70.538 | 89.810 | CF |
| | 7,000 | 10.975 | 15.579 | 24.596 | 38.686 | 55.953 | 76.729 | 97.692 | CF |
| | 7,500 | 11.877 | 16.859 | 26.616 | 41.863 | 60.549 | 83.031 | 105.716 | CF |
| | 8,000 | 12.793 | 18.160 | 28.670 | 45.094 | 65.221 | 89.438 | 113.873 | CF |
| | 8,500 | 13.723 | 19.480 | 30.754 | 48.372 | 69.962 | 95.940 | 122.151 | CF |
| | 9,000 | 14.666 | 20.818 | 32.866 | 51.694 | 74.766 | 102.528 | 130.539 | CF |
| | 9,500 | 15.619 | 22.170 | 35.002 | 55.053 | 79.625 | 109.190 | 139.021 | CF |
| | 10,000 | 16.580 | 23.535 | 37.157 | 58.442 | 84.527 | 115.913 | 147.581 | CF |

# 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 DN250 to DN900 (10–36 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 DN250 to DN1050 (10–42 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**

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)<br>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 | ■ Modbus® RTU/ASCII<br>■ 115 kbps baud rate<br>■ RS232/RS485 Full Duplex<br>■ RS485 Half Duplex |
| | Ethernet Port (TCP/IP) 100BaseT | 1 | ■ Modbus TCP |
| Digital input(1) | Contact Closure | 1 | ■ Status<br>■ Single polarity |
| Analog inputs(2) | 4-20 mA | 2 | ■ AI-1 Temperature(3)<br>■ AI-2 Pressure(3) |
| Frequency/Digital outputs | TTL/Open Collector | 6 | ■ User Configurable (can configure Digital Input as 6th Frequency/Digital Output) |
| Analog output(2)(4) | 4-20 mA | 1 | ■ Independently configurable analog output |

(1) *The analog-to-digital conversion accuracy is within ±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.*
(4) *The analog output zero scale offset error is within ±0.1% of full scale and gain error is within ±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 | ■ Modbus RTU/ASCII<br>■ 115 kbps baud rate<br>■ RS232/RS485 Half Duplex |
| | Ethernet switch | 3 | ■ 100BaseT<br>■ Three Ports |
| Analog Input | 4-20 mA | 1 | ■ Reserved for future use |

Optional I/O Expansion Slot(s) by Enclosure Type: Standard Enclosure: 1 RS232/RS485 Half Duplex, 2-Wire OR 1 I/O Expansion Module Extended (Retrofit) Enclosure: 2 RS232/RS485 Half Duplex, 2-Wire OR 1 I/O Expansion Module and 1 RS232/RS485 Half Duplex, 2-Wire

# 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**

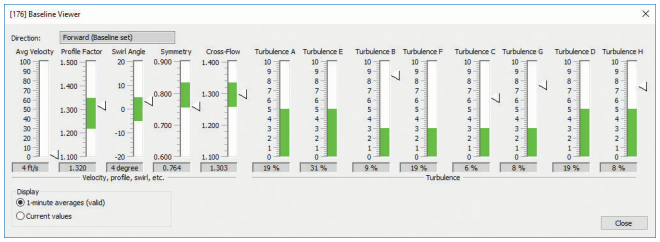
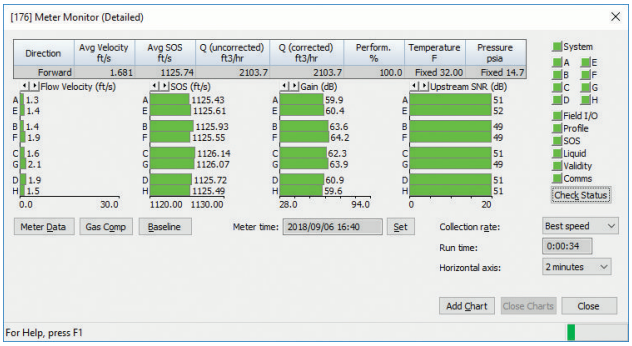



**Figure 6: MeterLink Monitor Screen**




- 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 | • | • | • |
| | Automatic Report Collection by Meter Group | | | • |
| | Last scheduled SMV result status multiple flow meter overview | | | • |
| | Bundle all scheduled flow meter reports | | • | • |

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

| | | Flow Meter | Accessible through MeterLink | Accessible through Net Monitor |
|---|---|---|---|---|
| | 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.*

(•) Feature is available.

# Safety and compliance

The Rosemount 3418 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 an 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)**

- Marking — Ex db ia IIB T4 Gb

**Canadian Registration Number**

- Certificate — 0F14855

**Figure 7: A single transducer shroud is standard on DN250 to DN300 (10–12 in.) Rosemount Model 3418 meters**

## Environmental ratings

**Aluminum**

- NEMA® 4
- IP66 to EN60529

**Stainless Steel**

- NEMA 4X
- IP66 to EN60529

## Metrology approval

**OIML**

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

**MID**

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

**ISO 17089-1 : 2010 (E)**

**Figure 8: Dual transducer shrouds are standard on DN400 (16 in.) and larger Rosemount 3418 flow meters**

# Operation limits

If requirements are outside of the operation limits shown below 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.) | Maximum velocity rating at 0 psig or greater (ft/s)(1) | Capacity at maximum rated velocity (ACFH)(1) | Schedule STD bore (in.) |
|---|---|---|---|
| 10 | 100 | 197,136 | 10.020 |
| 12 | 100 | 282,743 | 12.000 |

(1) *Isolated transducers mounts combined with T-22 transducers required for DN300 (12 in.) and smaller line size meters to achieve 0 to 689 kPag (0 to 100 psig). T-200 transducers minimum operating pressure varies by line size. Consult factory.*

**Table 14: Recommended maximum velocity for 16 in. and larger line size meters (US customary units)**

| Nominal Meter Size (in.) | Maximum velocity rating at 50 psig (ft/s) | Capacity between 50 to 100 psig (ACFH)(1) | Maximum velocity rating at 100 psig or greater (ft/s) at 100 psig (ft/s) | Capacity at max rated velocity (ACFH)(1) | Schedule STD bore (in.) |
|---|---|---|---|---|---|
| 16 | 50 | 228,318 | 100 | 456,635 | 15.250 |
| 18 | 50 | 292,131 | 100 | 584,263 | 17.250 |
| 20 | 50 | 363,799 | 100 | 727,598 | 19.250 |
| 24 | 50 | 530,696 | 100 | 1,061,392 | 23.250 |
| 30 | 45 | 755,952 | 85 | 1,427,909 | 29.250 |
| 36 | 37.5 | 914,912 | 75 | 1,829,824 | 35.250 |
| 42 | 37.5 | 1,252,879 | 75 | 2,505,758 | 41.250 |

(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) | Maximum velocity rating at 0 kPag or greater (m/s)(1) | Capacity at maximum rated velocity (ACMH)(1) | Schedule STD bore (mm) |
|---|---|---|---|
| 250 | 30.5 | 5,582 | 254.5 |
| 300 | 30.5 | 8,006 | 303.2 |

(1) *Isolated transducers mounts combined with T-22 transducers required for DN300 (12 in.) and smaller line size meters to achieve 0–689 kPag (0–100 psig). T-200 transducers minimum operating pressure varies by line size. Consult factory.*

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

| Nominal meter size (DN) | Maximum velocity rating at 345 kPag (m/s) | Capacity between 345 and 689 kPag (ACMH)(1) | Maximum velocity rating at 689 kPag or greater (m/s) | Capacity at maximum rated velocity (ACMH)(1) | Schedule STD bore (mm) |
|---|---|---|---|---|---|
| 400 | 15.2 | 6,465 | 30.5 | 12,930 | 387.4 |
| 450 | 15.2 | 7,917 | 30.5 | 20,603 | 438.2 |
| 500 | 15.2 | 10,301 | 30.5 | 30,055 | 489 |
| 600 | 15.2 | 15,027 | 26 | 40,433 | 590.6 |
| 750 | 11.4 | 25,907 | 23 | 51,814 | 743 |
| 900 | 11.4 | 34,479 | 23 | 70,955 | 895.4 |

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

# Weights and dimensions

**Figure 9: Dimension Key for DN200 to DN300 (8–12 in.) Meters with Single Transducer Shroud (See Table 17 and Table 18)**

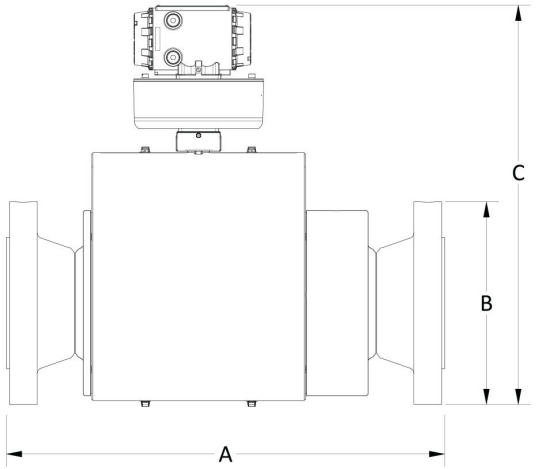
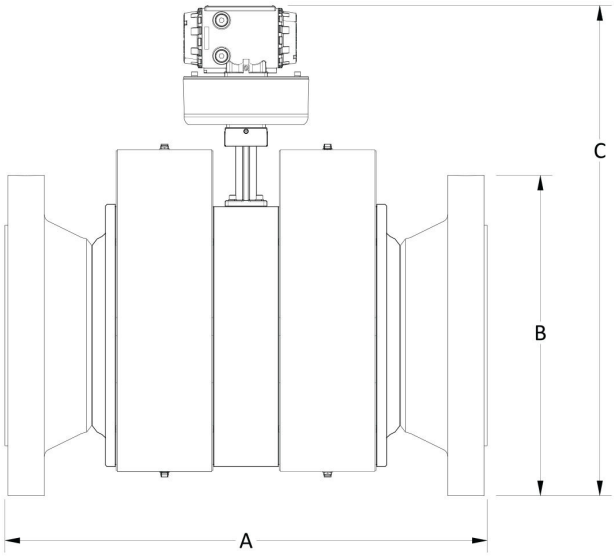



**Figure 10: Dimension Key for DN400 and larger (16 in. and larger) Meters with Dual Transducer Shrouds (See Table 17 and Table 18)**



# Tables

The Meter Dimension Key diagrams (Figure 9 and Figure 10) illustrate the meter component measurements that correspond to A, B and C in Table 17 and Table 18.

**Note**
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 10–28 in., Port Angle 60°] [line sizes 30 in. and larger, Port Angle 75°]**

| Nominal line size (in.) | | 10 | 12 | 16 | 20 | 24 | 30 | 36 | 42 |
|---|---|---|---|---|---|---|---|---|---|
| 300 ANSI | Weight (lb.) | 1250 | 1550 | 2000 | 3100 | 4550 | 4950 | 6200 | CF |
| | A (in.) | 33.75 | 36.50 | 37.50 | 42.75 | 47.50 | 44.50 | 46.50 | CF |
| | B (in.) | 17.50 | 20.50 | 25.50 | 30.50 | 36.00 | 43.00 | 50.00 | CF |
| | C (in.) | 34.50 | 36.50 | 40.50 | 45.50 | 50.50 | 57.00 | 63.50 | CF |
| 600 ANSI | Weight (lb.) | 1400 | 1750 | 2300 | 3450 | 5150 | 5650 | 7250 | CF |
| | A (in.) | 37.00 | 39.00 | 40.50 | 45.50 | 50.75 | 48.00 | 50.25 | CF |
| | B (in.) | 20.00 | 22.00 | 27.00 | 32.00 | 37.00 | 44.50 | 51.75 | CF |
| | C (in.) | 35.50 | 37.50 | 41.50 | 46.00 | 51.00 | 58.00 | 64.50 | CF |
| 900 ANSI | Weight (lb.) | 1800 | 2500 | 3450 | 5000 | 8000 | 10200 | 15150 | CF |
| | A (in.) | 44.00 | 48.75 | 51.00 | 53.12 | 62.13 | 61.50 | 67.00 | CF |
| | B (in.) | 21.50 | 24.00 | 27.75 | 33.75 | 41.00 | 48.50 | 57.50 | CF |
| | C (in.) | 36.50 | 39.00 | 42.50 | 47.50 | 53.50 | 61.50 | 69.50 | CF |
| 1500 ANSI | Weight (lb.) | 2250 | 3300 | 4950 | 7200 | 11200 | CF | CF | CF |
| | A (in.) | 49.75 | 55.75 | 59.00 | 62.00 | 71.50 | CF | CF | CF |
| | B (in.) | 23.00 | 26.50 | 32.50 | 38.75 | 46.00 | CF | CF | CF |
| | C (in.) | 37.00 | 40.00 | 45.00 | 50.00 | 56.00 | CF | CF | CF |

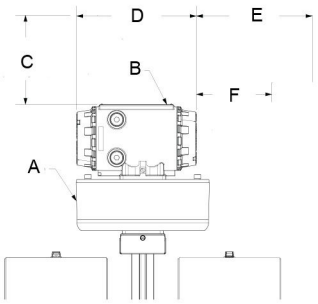
**Table 18: Weights and dimensional data (metric units) [line sizes DN250 to DN700, Port Angle 60°] [line sizes DN750 and larger, Port Angle 75°]**

| Nominal line size (DN) | | 250 | 300 | 400 | 500 | 600 | 750 | 900 | 1050 |
|---|---|---|---|---|---|---|---|---|---|
| PN 50 | Weight (kg) | 567 | 703 | 907 | 1406 | 2064 | 2245 | 2812 | CF |
| | A (mm) | 857 | 927 | 953 | 1086 | 1207 | 1130 | 1181 | CF |
| | B (mm) | 445 | 521 | 648 | 775 | 914 | 1092 | 1270 | CF |
| | C (mm) | 876 | 927 | 1029 | 1156 | 1283 | 1448 | 1613 | CF |
| PN 100 | Weight (kg) | 635 | 794 | 1043 | 1565 | 2336 | 2563 | 3289 | CF |
| | A (mm) | 940 | 991 | 1029 | 1156 | 1289 | 1219 | 1276 | CF |
| | B (mm) | 508 | 559 | 686 | 813 | 940 | 1130 | 1314 | CF |
| | C (mm) | 902 | 953 | 1054 | 1168 | 1295 | 1473 | 1638 | CF |
| PN 150 | Weight (kg) | 816 | 1134 | 1565 | 2268 | 3629 | 4627 | 6872 | CF |
| | A (mm) | 1118 | 1238 | 1295 | 1349 | 1578 | 1562 | 1702 | CF |
| | B (mm) | 546 | 610 | 705 | 857 | 1041 | 1232 | 1461 | CF |
| | C (mm) | 927 | 991 | 1080 | 1207 | 1359 | 1562 | 1765 | CF |

**Table 18: Weights and dimensional data (metric units) [line sizes DN250 to DN700, Port Angle 60°] [line sizes DN750 and larger, Port Angle 75°] *(continued)***

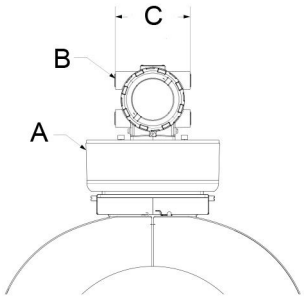
| Nominal line size (DN) | | 250 | 300 | 400 | 500 | 600 | 750 | 900 | 1050 |
|---|---|---|---|---|---|---|---|---|---|
| PN 250 | Weight (kg) | 1021 | 1497 | 2245 | 3266 | 5080 | CF | CF | CF |
| | A (mm) | 1264 | 1416 | 1499 | 1575 | 1816 | CF | CF | CF |
| | B (mm) | 584 | 673 | 826 | 984 | 1168 | CF | CF | CF |
| | C (mm) | 940 | 1016 | 1143 | 1270 | 1422 | CF | CF | CF |

**Figure 11: Dimensions of enclosure housing**




*A. Enclosure base*
*B. Enclosure housing[8]*
*C. Removal 2-in. (51 mm)*
*D. 9.5-in. (241 mm)*
*E. Board removal 4.75-in. (121 mm)*
*F. Endcap removal 1.75-in. (44 mm)*

**Figure 12: Additional dimensions of enclosure housing**



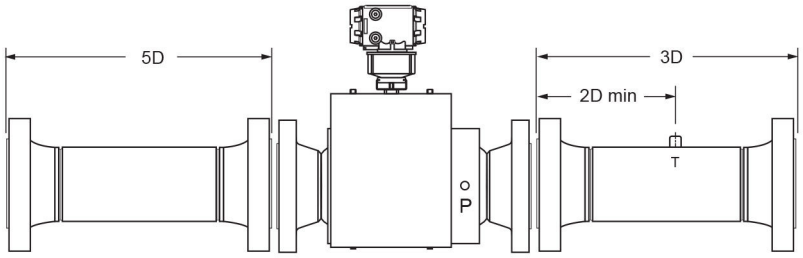

*A. Enclosure base*
*B. Enclosure housing*
*C. 5.9-in. (150 mm)*

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

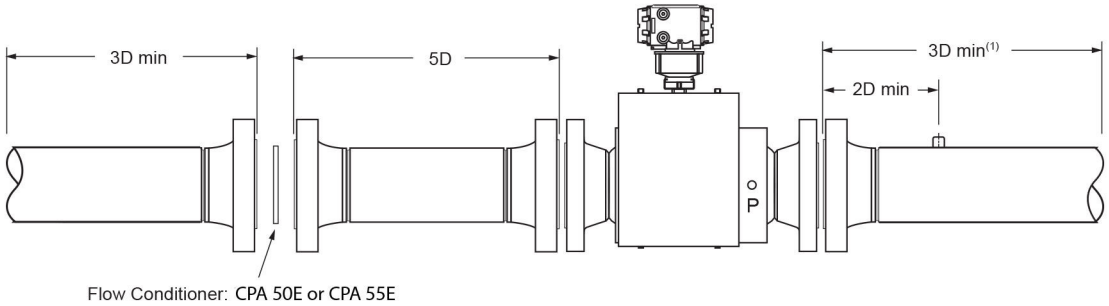
# Recommended installation

The drawings below represent recommended minimum pipe lengths for the installation of the Rosemount 3418 Gas Ultrasonic Flow Meter. For installation recommendations for the specific application, consult an Emerson Ultrasonics technical specialist. Other lengths or flow conditioners can be accommodated.

**Piping recommendation for Gas Ultrasonic meter (No flow conditioner)**



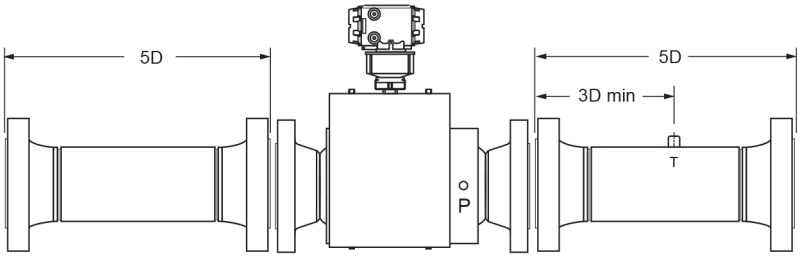

**Piping Recommendation for Gas Ultrasonic Meter with a Flow Conditioner (optional)**




**Note**

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

**Piping recommendation for Bi-directional Gas Ultrasonic Meter**



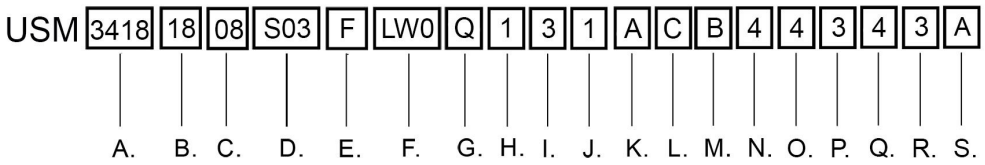

**Note**

- For best results, flow conditioning is recommended
- D = Nominal pipe size in inches (i.e., 10-in. pipe size, 5D = 50-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. Consult factory for assistance designing your optimal meter.




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/Display/Keys (see Table 30)

M. Expansion module (see Table 31)

N. Wireless (see Table 32)

O. Tagging format (Line size / Pressure rating / Flow parameters) (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 |
|---|---|
| 3418 | 3418 8-Path |

**Table 20: Line Size**

| Code | Description |
|---|---|
| 10 | DN250 (10 in.) |
| 12 | DN300 (12 in.) |
| 14 | DN350 (14 in.) |
| 16 | DN400 (16 in.) |
| 18 | DN450 (18 in.) |
| 20 | DN500 (20 in.) |
| 24 | DN600 (24 in.) |
| 26 | DN650 (26 in.) |
| 30 | DN750 (30 in.) |
| 36 | DN900 (36 in.)(1) |
| 42 | DN1050 (42 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 |
|---|---|
| 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 XS0 |

**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 [–40 °F to +257 °F (–40 °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 |
| I | T-22 [–58 °F to +212 °F (–50 °C to +100 °C)] - Isolated Standard Mounts / 316L Holders, NBR O-ring |

**Table 25: Transducer assembly *(continued)***

| Code | Description |
|---|---|
| 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 |

(1) *Available for line sizes up to 42 in. Consult factory for minimum operating pressures below 100 psig.*

**Table 26: Enclosure type**

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

(1) *Expansion module (Table 31) selections D, E and F only available with aluminum retrofit enclosure. Retrofit enclosure only available with electrical approval (Table 36) 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)] |

**Table 30: CPU/Display**

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

**Table 31: Expansion module**

| Code | Description |
|---|---|
| A | None |
| B | One Serial RS232 |
| C | One Serial RS485 |
| D | Two Serial RS232(1) |

**Table 31: Expansion module *(continued)***

| Code | Description |
|---|---|
| E | Two Serial RS485 (2-wire)(1) |
| F | Serial RS232 and Serial RS485(1) |

(1) *Expansion module selections D, E and F only available with aluminum retrofit enclosure. Retrofit enclosure only available with electrical approval (Table 36) selections 1 and 2.*

**Table 32: Wireless**

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

**Table 33: Tagging format (Line size / Pressure rating / Flow parameters)**

| 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 (Table 36) code 2) |
| 3 | CRN (Canadian Boiler Branch) |
| 4 | Russia (EAC) |

**Table 36: Electrical approvals**

| Code | Description |
|---|---|
| 1 | UL / c-UL |
| 2 | ATEX/IECEx |
| 3 | INMETRO |
| 4 | EAC - Russia |

**Table 37: Metrology approval**

| Code | Description |
|---|---|
| A | None |

**Table 37: Metrology approval *(continued)***

| Code | Description |
|---|---|
| B | European Union - MID Directive |
| C | China (CPA-2015-F101) |
| D | Brazil (INMETRO) |
| F | EAC - Russia |

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