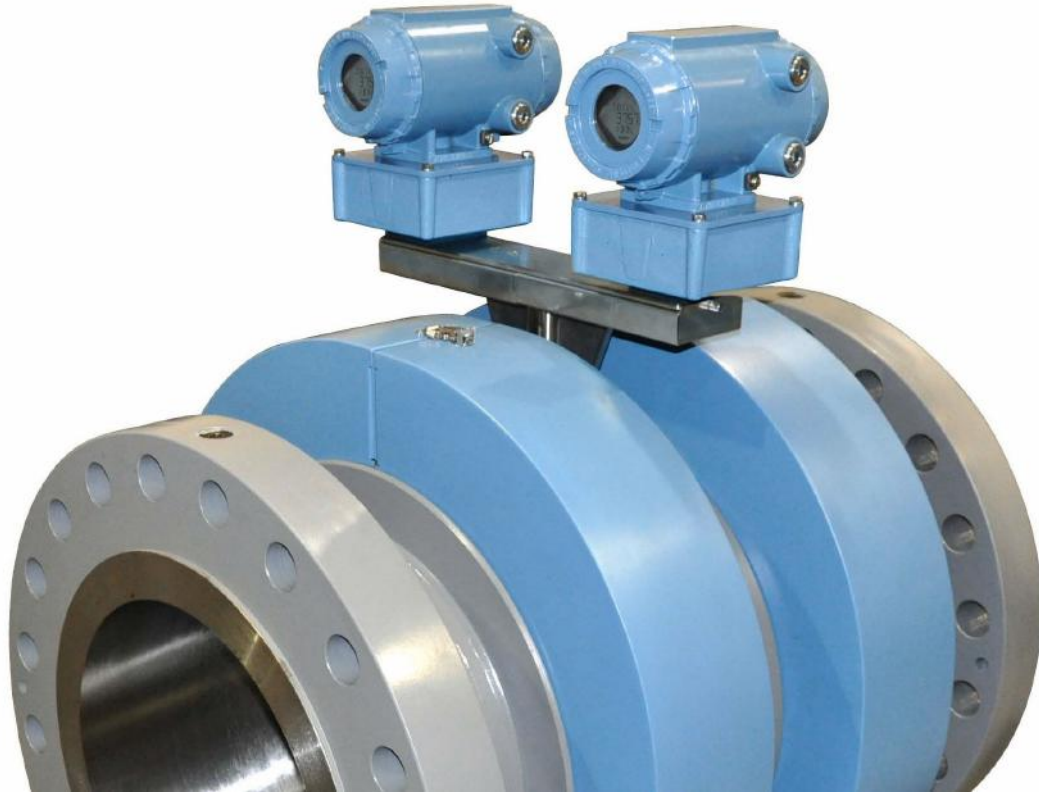


# Rosemount™ 3417

## Redundant 4+4 Four-Path Gas Ultrasonic Flow Meter



# 3417 4+4 Gas Ultrasonic Flow meter

## Redundancy for superior reliability

Engineered to maximize uptime while offering superior custody transfer accuracy, the new, fully-redundant 3417 Gas Ultrasonic Flow Meter delivers the ultimate in measurement verification and validation. The advanced, dual-configuration meter combines the power of two field-proven four-path British Gas-design meters in a single body, enabling two independent measurements in one meter run.

Available in DN200 to DN1050 (8-in to 42-in)<sup>(1)</sup> line sizes, each standard 3417 meter is equipped with powerful 3410 Series Electronics and robust transducers that are engineered for wet, rich and/or dirty gas applications. A new patented transducer synchronization method ensures the meter's electronics provide the highest sampling rates possible, resulting in more stable ultrasonic signals for better flow resolution.

To further reduce measurement uncertainty, the electronics' firmware processes AGA 8 Part 2 speed of sound calculations in real time for comparison with the meter's SOS measurement.

An updated version of MeterLink software gives operators advanced insight and allows real-time monitoring of the meter from a PC or laptop, enabling immediate diagnosis of potential flow disturbances to help eliminate unplanned shutdowns. In addition, the meter's extensive hourly and daily logging enables operators to trend the two independent meters over time, helping extend calibration cycles for significant cost reduction.

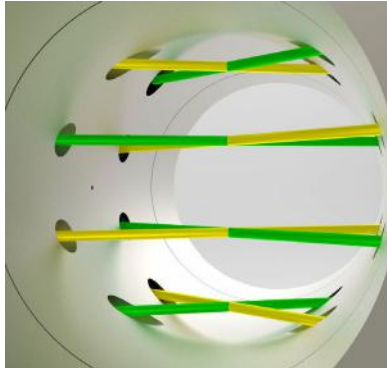
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(1) Consult factory on meter sizes above DN900 (36-in).

**Figure 1: Based on the field-proven British Gas design, the fully-redundant 3417 meter combines two sets of four direct paths for ultra-reliable custody transfer measurement**



### Typical applications

Custody transfer for natural gas

### Application sites

- Pipeline interconnects
- Pipelines (no bypass)
- Border stations
- Offshore production
- Industry/city gates
- Power plants
- LNG regasification terminals

## Features and benefits

- Fully-redundant model with two field-proven 4-path chordal, British Gas-design meters (OIML Accuracy Class 0.5) in one body offering:
  - Direct inputs for pressure, temperature and gas composition that allow speed of sound calculations using AGA 10 2003 and GERG-2008 (AGA 8 Part 2, 2017)
  - Automatic calculations and totalization of corrected volume rates, mass rates and energy rates
  - Ethernet connectivity for expedited data transfer
  - Operating pressures down to 0 psig
- Ultra-reliable dual configuration with two independent measurements for multiple applications, including:
  - Verification of measurement performance and/or as a complete backup in remote locations
  - Pay-check configuration between two contracting parties for significant savings
  - Bi-directional measurement with one transmitter dedicated to forward flow and one to reverse flow
- Patented transducer synchronization method increases sampling speed, resulting in faster detection of flow disturbances to expedite alerts and troubleshooting
- 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 an expandable platform and an expansive archive data log to simplify accounting and dispute resolution

- Trending data captured by two independent transmitters can also help extend calibration cycles
- New Type 4 CPU Module offers additional I/O with five frequency or digital outputs and one digital input that can be configured as the sixth output if needed
- Local LED displays (optional) on each transmitter offer up to ten user-selectable scrolling variables
- High rangeability (>100:1) that eliminates an additional meter run
- 5D upstream piping requirement (with flow conditioner) for offshore rigs and other sites with limited straight run
- The Rosemount 3417 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.

## Standard specifications

Please consult an Emerson Ultrasonics product specialist if requirements are outside of the listed specifications. Other product and material offerings may be available depending on the application.

### Meter specifications

#### Characteristics

- Two redundant 4-path (eight transducers per transmitter) 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 metrics)**

Meter size (in)	8 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)	200 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 per transmitter

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

#### Total meter consumption

- 16 watts typical; 30 watts maximum

## Mechanical ratings

### Line sizes

- 8-in to 42-in (DN200 to DN1050)<sup>(2)</sup> with British Gas (BG) orientation

### Operating gas temperature (transducers)

- T-200<sup>(3)</sup>: -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<sup>(3)</sup>: 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: 50 psig (3.45 bar) minimum operating pressure available with reduced  $Q_{max}$ <sup>(4)</sup>
- T-22: 0 to 3,750 psig (3.44 to 258.55 bar)<sup>(5)</sup>

### Flanges

- Raised Face (RF) and Ring Type Joint (RTJ) for ANSI Classes 300 to 1,500 (PN 50 to 250)
- Compact flanges/hub end connectors (optional)

### NACE, NORSOK and PED compliance

- Designed for NACE compliance<sup>(6)</sup>
- 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

- Integral mount

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

(3) Available for line sizes up to 36-in. Minimum operating pressure varies by line size. Consult factory for minimum operating pressures below 100 psig.

(4) Refer to page 9 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.

# 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<sup>(7)</sup>  
-50 °F to +302 °F (-46 °C to +150 °C)
- ASTM A350 Gr LF2 Carbon Steel<sup>(7)</sup>  
-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<sup>(8)</sup>  
-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

- 316SS

#### 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<sup>®</sup> ASTM B446 (UNS N06625) Gr 1 Mount (optional)
- INCONEL ASTM B446 (UNS N06625) Gr 1 Holder (optional)

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(7) Impact tested per specified ASTM standard.

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

## Paint specifications

### Body and flange exterior

#### Carbon Steel body material

- 2 coat paint; inorganic 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 [bar Meter Sizes DN200 to DN1050]<sup>(1)</sup>**

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

(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 [psi Meter Sizes 8-in to 42-in]<sup>(1)</sup>**

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
1,500	3,705	3,600	3,750

(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.



# 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 and typical gas composition (AGA 8 Amarillo). These values are intended to be a guide in sizing. Please confirm meter sizing with an Emerson Ultrasonics product specialist prior to order placement.

### Calculating meter capacity

To calculate a volume rate for a given velocity, first find the capacity (flow rate) in table 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 8-inch meter operating at 800 psig:

If Flow Rate = 7,842 MSCFH and Velocity = 70 ft/s, the calculation is:

$$\frac{7,842 \text{ MSCFH} \times 70 \text{ ft/s}}{100 \text{ ft/s}} = 5,489.4 \text{ MSCFH}$$

**Table 5: Flow Rates (MSCFH) Based Upon Max Rated Velocity [8-in to 24-in = 100 ft/s] [30-in = 85 ft/s] [36-in = 75 ft/s]**

Meter size (in)		8	10	12	16	20	24	30	36	42
Operating pressure (psig)	100	989	1,559	2,213	3,494	5,495	7,948	10,910	13,862	CF
	200	1,880	2,963	4,207	6,641	10,446	15,108	20,738	26,349	CF
	300	2,799	4,412	6,263	9,888	15,552	22,493	30,875	39,229	CF
	400	3,747	5,906	8,384	13,236	20,819	30,111	41,331	52,515	CF
	500	4,725	7,448	10,572	16,690	26,251	37,968	52,117	66,219	CF
	600	5,733	9,037	12,828	20,252	31,854	46,071	63,239	80,350	CF
	700	6,772	10,675	15,153	23,923	37,627	54,422	74,701	94,914	CF
	800	7,842	12,362	17,547	27,703	43,572	63,020	86,504	109,910	CF
	900	8,943	14,096	20,009	31,590	49,686	71,863	98,642	125,333	CF
	1,000	10,073	15,877	22,537	35,581	55,964	80,943	111,105	141,169	CF
	1,100	11,231	17,702	25,128	39,671	62,396	90,246	123,875	157,394	CF
	1,200	12,414	19,567	27,774	43,850	68,969	99,752	136,923	173,973	CF
	1,300	13,619	21,467	30,471	48,107	75,665	109,437	150,217	190,865	CF
	1,400	14,842	23,395	33,208	52,428	82,462	119,267	163,711	208,009	CF
	1,500	16,079	25,344	35,975	56,797	89,333	129,205	177,352	225,341	CF
	1,600	17,323	27,306	38,760	61,193	96,247	139,205	191,079	242,782	CF
	1,700	18,570	29,270	41,548	65,595	103,172	149,221	204,826	260,250	CF
1,800	19,811	31,227	44,326	69,981	110,069	159,197	218,520	277,649	CF	
1,900	21,041	33,166	47,079	74,327	116,905	169,083	232,090	294,891	CF	
2,000	22,255	35,079	49,793	78,612	123,645	178,832	245,472	311,894	CF	

**Table 6: Flow Rates (MMSCFD) Based Upon Max Rated Velocity [8-in to 24-in = 100 ft/s] [30-in = 85 ft/s] [36-in = 75 ft/s]**

Meter size (in)		8	10	12	16	20	24	30	36	42
Operating pressure (psig)	100	23.7	37.4	53.1	83.9	131.9	190.8	261.8	332.7	CF
	200	45.1	71.1	101.0	159.4	250.7	362.6	497.7	632.4	CF
	300	67.2	105.9	150.3	237.3	373.2	539.8	741.0	941.5	CF
	400	89.9	141.8	201.2	317.7	499.6	722.7	991.9	1,260.4	CF
	500	113.4	178.7	253.7	400.6	630.0	911.2	1,250.8	1,589.3	CF
	600	137.6	216.9	307.9	486.1	764.5	1,205.7	1,517.7	1,928.4	CF
	700	162.5	256.2	363.7	574.2	903.1	1,306.1	1,792.8	2,277.9	CF
	800	188.2	296.7	421.1	664.9	1,045.7	1,512.5	2,076.1	2,637.8	CF
	900	214.6	338.3	480.2	758.2	1,192.5	1,724.7	2,367.4	3,008.0	CF
	1,000	241.7	381.1	540.9	854.0	1,343.1	1,942.6	2,666.5	3,388.1	CF
	1,100	269.5	424.8	603.1	952.1	1,497.5	2,165.9	2,973.0	3,777.5	CF
	1,200	297.9	469.6	666.6	1,052.4	1,655.3	2,394.0	3,286.2	4,175.4	CF
	1,300	326.9	515.2	731.3	1,154.6	1,816.0	2,626.5	3,605.2	4,580.7	CF
	1,400	356.2	561.5	797.0	1,258.3	1,979.1	2,862.4	3,929.1	4,992.2	CF
	1,500	385.9	608.3	863.4	1,363.1	2,144.0	3,100.9	4,256.4	5,408.2	CF
	1,600	415.8	655.3	930.2	1,468.6	2,309.9	3,340.9	4,585.9	5,826.8	CF
	1,700	445.7	702.5	997.2	1,574.3	2,476.1	3,581.3	4,915.8	6,264.0	CF
1,800	475.5	749.5	1,063.8	1,679.5	2,641.7	3,820.7	5,244.5	6,663.6	CF	
1,900	505.0	796.0	1,129.9	1,783.8	2,805.7	4,058.0	5,570.2	7,077.4	CF	
2,000	534.1	841.9	1,195.0	1,886.7	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. Please confirm meter sizing with an Emerson Ultrasonics product specialist prior to order placement.

### Calculating meter capacity

To calculate a volume rate for a given velocity, first find the capacity (flow rate) in table 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.

The example below illustrates how to determine the hourly flow rate at 21 m/s for a DN200 meter operating at 4,500 kPag:

If Flow Rate = 178 MSCMH and Velocity = 21 m/s, the calculation is:

$$\frac{178 \text{ MSCMH} \times 21 \text{ m/s}}{30.5 \text{ m/s}} = 122.6 \text{ MSCMH}$$

**Table 7: Flow Rates (MSCMH) Based Upon Max Rated Velocity [DN200 to DN600 = 30.5 m/s] [DN750 = 25.9 m/s] [DN900 = 22.9 m/s]**

Meter size (DN)		200	250	300	400	500	600	750	900	1050
Operating pressure (kPag)	1,000	39	62	88	139	218	315	432	550	CF
	1,500	58	91	129	204	320	463	635	809	CF
	2,000	77	121	171	270	425	615	843	1,074	CF
	2,500	96	151	214	339	533	770	1,056	1,345	CF
	3,000	116	182	259	408	642	929	1,274	1,622	CF
	3,500	136	214	304	480	754	1,091	1,496	1,905	CF
	4,000	156	247	350	553	869	1,257	1,724	2,195	CF
	4,500	178	280	397	627	987	1,427	1,957	2,491	CF
	5,000	199	314	446	704	1,107	1,600	2,195	2,794	CF
	5,500	221	349	495	781	1,229	1,778	2,438	3,104	CF
	6,000	244	384	545	861	1,354	1,959	2,686	3,420	CF
	6,500	267	420	597	942	1,482	2,143	2,939	3,742	CF
	7,000	290	457	649	1,025	1,612	2,331	3,197	4,071	CF
	7,500	314	495	702	1,109	1,744	2,523	3,460	4,405	CF
	8,000	338	533	757	1,195	1,879	2,718	3,727	4,745	CF
	8,500	363	572	812	1,281	2,015	2,915	3,997	5,090	CF
9,000	388	611	867	1,369	2,154	3,115	4,272	5,439	CF	
9,500	413	651	924	1,458	2,294	3,318	4,550	5,793	CF	
10,000	438	691	981	1,548	2,435	3,522	4,830	6,149	CF	

**Table 8: Flow Rates (MMSCMD) Based Upon Max Rated Velocity [DN200 to DN600 = 30.5 m/s] [DN750 = 25.9 m/s] [DN900 = 22.9 m/s]**

Meter size (DN)	200	250	300	400	500	600	750	900	1050	
Operating pressure (kPag)	1,000	0.941	1.484	2.106	3.325	5.229	7.563	10.372	13.205	CF
	1,500	1.384	2.182	3.097	4.889	7.690	11.122	15.251	19.418	CF
	2,000	1.837	2.895	4.110	6.489	10.206	14.761	20.242	25.773	CF
	2,500	2.300	3.626	5.147	8.126	127.80	18.485	25.348	32.273	CF
	3,000	2.774	4.373	6.207	9.800	15.414	22.293	30.571	38.923	CF
	3,500	3.259	5.137	7.292	11.512	18.107	26.189	35.914	45.725	CF
	4,000	3.755	5.919	8.401	13.264	20.862	30.174	41.378	52.682	CF
	4,500	4.262	6.718	9.536	15.055	23.679	34.248	46.964	59.795	CF
	5,000	4.780	7.535	10.695	16.885	26.558	38.412	52.674	67.065	CF
	5,500	5.309	8.369	11.880	18.755	29.499	42.665	58.508	74.492	CF
	6,000	5.850	9.221	13.089	20.664	32.502	47.009	64.463	82.075	CF
	6,500	6.401	10.090	14.322	22.612	35.565	51.439	70.538	89.810	CF
	7,000	6.963	10.975	15.579	24.596	38.686	55.953	76.729	97.692	CF
	7,500	7.535	11.877	16.859	26.616	41.863	60.549	83.031	105.716	CF
	8,000	8.116	12.793	18.160	28.670	45.094	65.221	89.438	113.873	CF
	8,500	8.706	13.723	19.480	30.754	48.372	69.962	95.940	122.151	CF
	9,000	9.304	14.666	20.818	32.866	51.694	74.766	102.528	130.539	CF
	9,500	9.909	15.619	22.170	35.002	55.053	79.625	109.190	139.021	CF
10,000	10.519	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 meters sized DN200 to DN900 (8-in to 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 such as H<sub>2</sub>S
- Retrofittable: Easily upgrade existing meters that have 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 DN200 to DN1050 (8-in to 42-in)
- Consult Factory for larger sizes.

**Materials of construction**

- Ti Gr12 Housing / 17-4PH Stalk Assembly (standard)
- Ti Gr12 Housing / 316/316L Stainless Steel Stalk Assembly (optional)
- Ti Gr12 Housing / Inconel Stalk Assembly (optional)

**Fluid types**

- Hydrocarbons, industrial gases, H<sub>2</sub>S (100%)

**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 10 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: I/O Connections per transmitter**

	I/O connection type	Qty	Description
<b>Communication</b>			
Serial communications	Serial RS232/RS485 Port	1	<ul style="list-style-type: none"> <li>■ Modbus RTU/ASCII</li> <li>■ 115 kbps baud rate</li> <li>■ RS232/RS485 Full Duplex</li> <li>■ RS485 Half Duplex</li> </ul>
	Ethernet Port (TCP/IP) 100BaseT	1	<ul style="list-style-type: none"> <li>■ Modbus TCP</li> </ul>
<b>Digital and analog inputs</b>			
Digital input <sup>(1)</sup>	Contact closure	1	<ul style="list-style-type: none"> <li>■ Status</li> <li>■ Single polarity</li> </ul>
Analog inputs <sup>(2)</sup>	4-20 mA	2	<ul style="list-style-type: none"> <li>■ AI-1 Temperature<sup>(3)</sup></li> <li>■ AI-2 Pressure<sup>(3)</sup></li> </ul>
<b>Digital, analog and frequency outputs</b>			
Frequency/Digital outputs	TTL/Open collector	6	<ul style="list-style-type: none"> <li>■ User Configurable (can configure Digital Input as 6th Frequency/Digital Output)</li> </ul>
Analog output <sup>(2)(4)</sup>	4-20 mA	1	<ul style="list-style-type: none"> <li>■ Independently configurable analog output</li> <li>■ HART® 7 Compliant</li> </ul>

- (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. The input contains a series resistor for HART Communicators to be connected for sensor configuration.
- (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.

**Optional I/O Expansion Slot:** 1 RS232 or 1 RS485 Half Duplex, 2-Wire available per transmitter.

**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"> <li>■ Modbus RTU/ASCII</li> <li>■ 115 kbps baud rate</li> <li>■ RS232/RS485 Half Duplex</li> </ul>
	Ethernet switch	3	<ul style="list-style-type: none"> <li>■ 100BaseT</li> <li>■ Three Ports</li> </ul>
Analog Input	4-20mA	1	<ul style="list-style-type: none"> <li>■ Reserved for future use</li> </ul>



# Diagnostics and software

Significantly reduce time previously spent on data analysis and troubleshooting with the new Smart Meter Verification 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 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 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

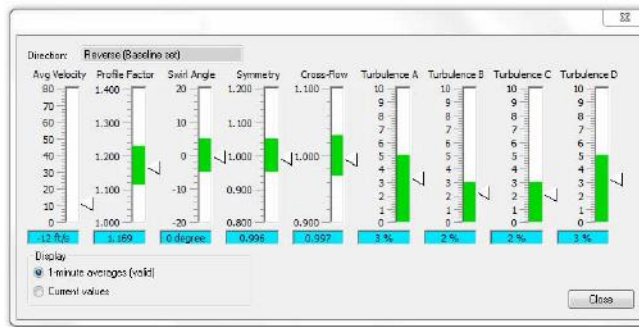
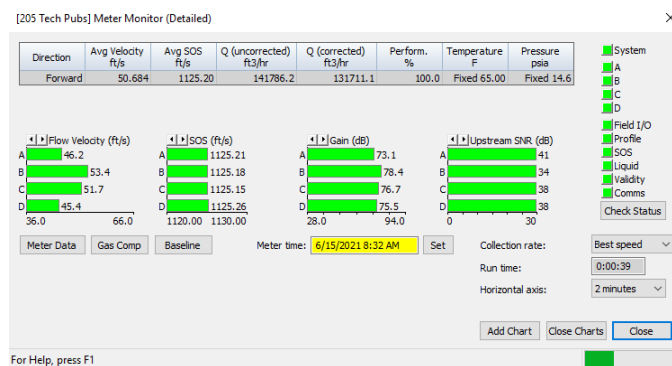


Figure 6: MeterLink Monitor Screen



- MeterLink software is downloadable at no charge
- MeterLink is required for transmitter configuration
  - Meter also configurable with AMS Device Manager or TREN Device, if HART® is used
- MeterLink connects to 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 Meter, MeterLink and Net Monitor<sup>(1)</sup>

		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 Meter, MeterLink and Net Monitor<sup>(1)</sup> (continued)**

		Meter	Accessible through MeterLink	Accessible through Net Monitor
	Automatic Report Collection by Meter Group			•
	Last scheduled SMV result status multiple meter overview			•
	Bundle all scheduled meter reports		•	•
	Alarm prioritization	•	•	•
<b>Operation</b>	Configurable Modbus GC component data table	•		
	Speed of sound comparison <sup>(2)</sup>	•	•	
	Transducer health monitoring	•	•	
	Baseline Viewer		•	
	Monitor screen		•	
	Multiple charts with green limit bands		•	
	View waveforms		•	
	Speed of sound calculator <sup>(2)</sup>		•	
	Help topics/troubleshooting guidance		•	
	Maintenance logs		•	
<b>History</b>	Hourly logs (180 days) and daily logs (5 years)	•	•	
	Trend maintenance logs		•	
	Hourly/Daily log graphing		•	
<b>Configuration</b>	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	•		
<b>Alarms</b>	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 3417 Gas Ultrasonic Flow Meter meets worldwide industry standards for electrical and intrinsic safety certifications and approvals. Consult an Emerson Ultrasonics technical specialist for a complete list of agencies and certifications.

### 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: Dual transducer shrouds are standard on DN400 (16-in) and larger Model 3417 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

### Measurement Canada

- Approval — AG-0623

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

**Figure 8: A single transducer shroud is standard on DN200 to DN300 (8-in to 12-in) Model 3417 meters**



## Operation limits

Consult an Emerson Ultrasonics product specialist if requirements are outside of the operation limits shown below for T-21/T-41/T-22/T-200 transducers.

**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) <sup>(1)</sup>	Capacity at max rated velocity (ACFH) <sup>(1)</sup>	Schedule STD bore (in)
8	100	125,068	7.981
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 transducer 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) <sup>(1)</sup>	Maximum velocity rating at 100 psig or greater (ft/s)	Capacity at max rated velocity (ACFH) <sup>(1)</sup>	Schedule STD bore
16	80	228,318	100	456,635	15.250
20	80	363,799	100	727,598	19.250
24	80	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) <sup>(1)</sup>	Capacity at maximum rated velocity (ACMH) <sup>(1)</sup>	Schedule STD bore (mm)
200	30.5	3,541	202.7
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 to 689 kPag (0 to 100 psig). T-200 transducer 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) <sup>(1)</sup>	Maximum velocity rating at 689 kPag or greater (m/s)	Capacity at maximum rated velocity (ACMH) <sup>(1)</sup>	Schedule STD bore (mm)
400	15.2	6,465	30.5	12,930	381
500	15.2	10,301	30.5	20,603	477.9
600	15.2	15,027	30.5	30,055	574.7
750	13.7	21,406	26	40,433	743
900	11.4	25,907	23	51,814	895.4

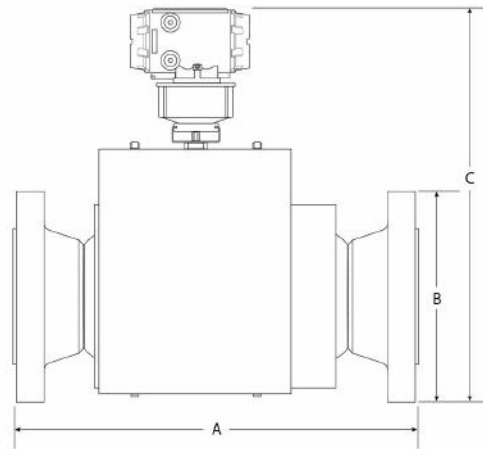
**Table 16: Recommended maximum velocity for DN400 and larger line size meters (metric units) (continued)**

Nominal meter size (DN)	Maximum velocity rating at 345 kPag (m/s)	Capacity between 345 and 689 kPag (ACMH) <sup>(1)</sup>	Maximum velocity rating at 689 kPag or greater(m/s)	Capacity at maximum rated velocity (ACMH) <sup>(1)</sup>	Schedule STD bore (mm)
1050	11.4	34,479	23	70,955	1047.8

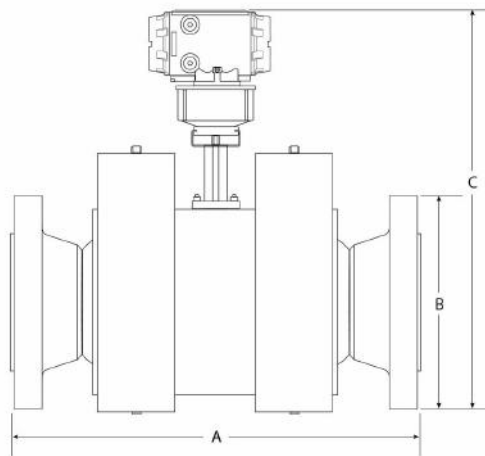
(1) Capacities are for meter ID equivalent to Schedule 40 (or STD).

# Weights and dimensions

**Figure 9: Dimension Key for DN200 to DN300 (8-in to 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 the chart below. All weights and dimensions are based on the standard electronics enclosure. The certified approval drawing will include the actual weights and dimensions.

**Table 17: Weights and dimensional data (US customary units)**

Normal line size (in)		8	10	12	16	20	24	30	36	42
300 ANSI	Weight (lb)	1180	1400	1700	2200	3200	4800	5050	6300	CF
	A (in)	33.3	33.8	36.5	37.5	42.8	47.5	44.5	46.5	CF
	B (in)	15	17.5	20.5	25.5	30.5	36	43	50	CF

**Table 17: Weights and dimensional data (US customary units) (continued)**

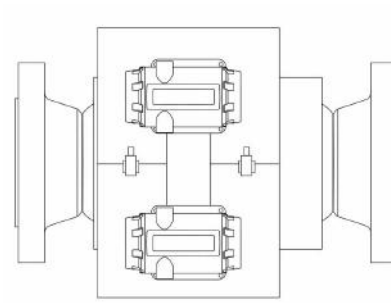
Normal line size (in)		8	10	12	16	20	24	30	36	42
600 ANSI	C (in)	31.1	33.2	35.5	39.5	44.3	49.3	55.9	62.5	CF
	Weight (lb)	1260	1600	1900	2400	3700	5300	5800	7350	CF
	A (in)	35.5	37	39	40.5	45.5	50.8	48	50.3	CF
	B (in)	18.5	21.5	24	27.8	33.8	41	48.5	57.5	CF
900 ANSI	C (in)	32.3	35	37.4	41.1	46.2	51.9	60	68.5	CF
	Weight (lb)	1435	1900	2560	3580	5110	7930	10300	15230	CF
	A (in)	39	44	48.8	51	53.1	62.1	61.5	67	CF
	B (in)	18.5	21.5	24	27.8	33.8	41.	48.5	57.5	CF
1500 ANSI	C (in)	32.3	35	37.4	41.1	46.2	51.9	60	68.5	CF
	Weight (lb)	1680	2370	3380	5130	7410	11430	CF	CF	CF
	A (in)	43.3	49.8	55.8	59	62	71.5	CF	CF	CF
	B (in)	19	23	26.5	32.5	38.8	46	CF	CF	CF
	C (in)	32.5	35.7	38.7	43.4	48.7	54.4	CF	CF	CF

**Table 18: Weights and dimensional data (metric units)**

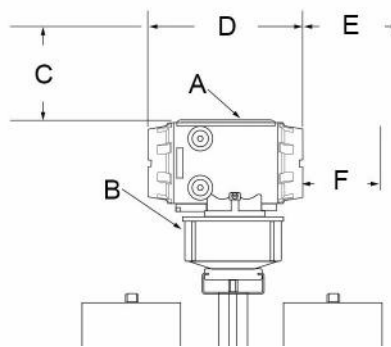
Nominal line size (DN)		200	250	300	400	500	600	750	900	1050
PN 50	Weight (kg)	535	635	771	998	1452	2177	2291	2858	CF
	A (mm)	381	445	521	648	775	914	1092	1270	CF
	B (mm)	790	843	902	1003	1125	1252	1420	1588	CF
	C (mm)	790	843	902	1003	1125	1252	1420	1588	CF
PN 100	Weight (kg)	572	726	862	1089	1678	2404	2631	3334	CF
	A (mm)	902	940	991	1029	1156	1290	1219	1278	CF
	B (mm)	419	508	559	686	813	940	1130	1316	CF
	C (mm)	800	871	922	1024	1143	1265	1438	1610	CF
PN 150	Weight (kg)	651	862	1162	1624	2318	3597	4672	6908	CF
	A (mm)	991	1092	1201	1295	1349	1577	1562	1072	CF
	B (mm)	470	546	610	706	859	1041	1232	1461	CF
	C (mm)	820	889	950	1044	1174	1318	1524	1740	CF
PN250	Weight (kg)	762	1075	1533	2327	3361	5185	CF	CF	CF
	A (mm)	1100	1265	1379	1499	1575	1816	CF	CF	CF
	B (mm)	483	584	673	826	986	1168	CF	CF	CF
	C (mm)	826	907	983	1102	1237	1382	CF	CF	CF



**Figure 11: Overhead view of meter**

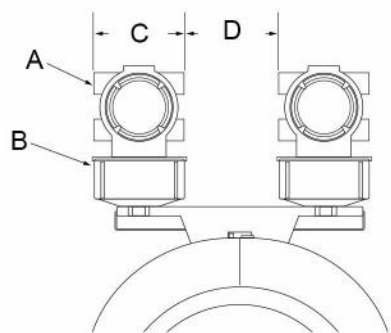


**Figure 12: Dimensions of enclosure housing**



- A. Enclosure housing
- B. Enclosure base
- 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 13: Additional dimensions of enclosure housing**



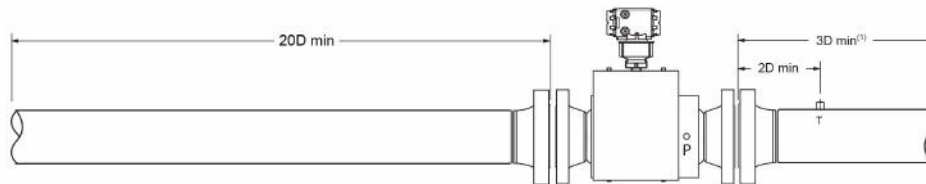
- A. Enclosure housing
- B. Enclosure base
- C. 5.9-in. (150 mm)
- D. 7.16-in. (181.9 mm)

# Recommended installation

## Recommended pipe lengths

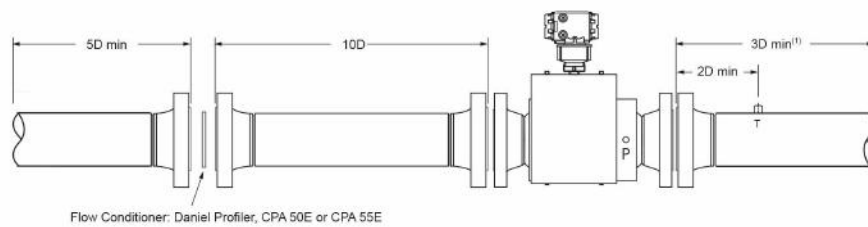
The drawings below represent the manufacturer's recommended minimum pipe lengths for the installation of the 3417 Meter. The final recommendations are dependent upon application requirements that must be specified by the customer. Other lengths and flow conditioners can be accommodated. An Emerson Ultrasonics product specialist can provide guidance as needed.

**Figure 14: Piping recommendation for Gas Ultrasonic Meter (No flow conditioner)**



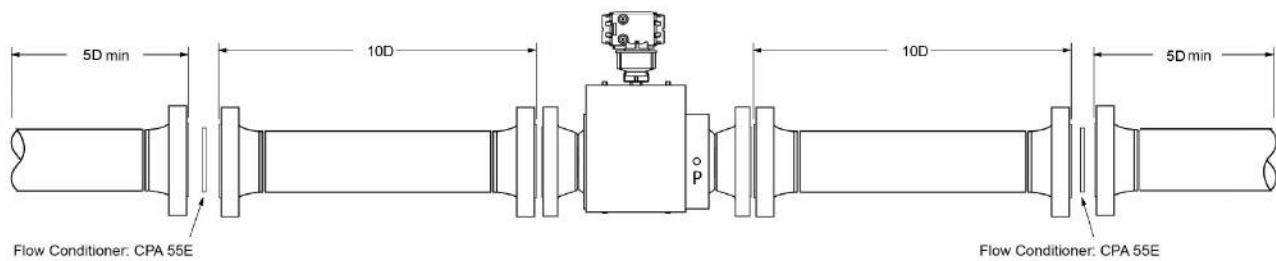
3D min<sup>(1)</sup> = Additional pipe length may be required for additional taps (i.e. sample probe, test well, etc.).

**Figure 15: Piping recommendation for Gas Ultrasonic Meter with a flow conditioner**



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

**Figure 16: Piping recommendation for bi-directional Gas Ultrasonic Meter with flow conditioners**



**Note**

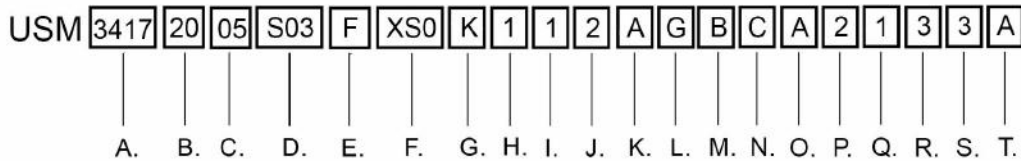
- For best results, flow conditioning is recommended
- D = Nominal pipe size in inches (i.e., 8-in pipe size; 10D = 80-in)
- T = Temperature measurement location
- Pressure measurement location provided on meter body

**Important**

Compact installations options available.

## 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. Please consult factory for assistance designing your optimal meter.



A. Device	K. Electronics mounting
B. Line size	L. CPU/Displays/Keys
C. Pressure rating	M. Transmitter Head 1 expansion module
D. Flange type	N. Transmitter Head 2 expansion module
E. Body and flange material	O. Wireless
F. Schedule (pipe bore)	P. Tagging format (Line size/Pressure rating/Flow parameters)
G. Transducer assembly	Q. Tagging language
H. Enclosure type	R. Pressure Directive Certification
I. Pressure taps	S. Electrical approval
J. Conduit type	T. Metrology approval

Category	Code	Description
Device	17	3417 Redundant 4-Path
Line size	08	DN200 (8-in)
	10	DN250 (10-in)
	12	DN300 (12-in)
	16	DN400 (16-in)
	20	DN500 (20-in)
	24	DN600 (24-in)
	30	DN750 (30-in)
	36	DN900 (36-in) <sup>(1)</sup>
	42	DN1050 (42-in) <sup>(1)</sup>

(1) Consult factory on meter sizes above 900 mm (36-in).

Pressure rating	03	PN 50/ANSI 300
	05	PN 100/ANSI 600
	06	PN 150/ANSI 900
	07	PN 250/ANSI 1500

Category	Code	Description
Flange type	S01	RF/RF
	S02	RTJ/RTJ
	S03	FEFA/FEFA
Body and flange material	F <sup>(1)</sup>	Forged: Carbon Steel/316 SS/Duplex SS

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

Schedule (pipe bore)	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
	XSO	Schedule XS
	XXS	Schedule XXS

Transducer assembly	1	T200 (-50 °C to +12 °C) - 17-4PH Standard Stalk, NBR O-ring
	2	T200 (-50 °C to +12 °C) - 17-4PH Standard Stalk, FKM O-ring
	4	T200 (-40 °C to +125 °C) Inconel Stalk, FMK O-ring <sup>(1)</sup>
	5	T200 (-40 °C to +125 °C) – Optional Stalk (316/316L), NBR <sup>(1)</sup>
	6	T200 (-40 °C to +125 °C) - Optional Stalk (316/316L), FKM <sup>(1)</sup>
	G	T-21 (-20 °C to +100 °C) - Standard Mounts/holders, NBR O-ring
	I	T-22 (-50 °C to +100 °C) - Isolated Standard Mounts/316L Holders, NBR O-ring
	L	T-21 (-20 °C to +100 °C) - Inconel Mounts/Inconel Holders, FKM O-ring
	N	T-41 (-50 °C to +100 °C) - Standard Mounts/holders, NBR O-ring
	O	T-21 (-20 °C to + 100 °C) - Inconel Mounts/316L Holders, FKM O-ring

	Z	T-22 (-40 °C to +100 °C) - Isolated Inconel Mounts/Inconel Holders, FKM O-ring
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(1) Available for line sizes up to 42-in. Consult factory for minimum operating pressures below 100 psig.

Enclosure type	1	Aluminum (standard)
	2	Stainless steel (optional)

Pressure taps	1	3½-in NPT
	3	Pipette

Category	Code	Description
Conduit type	1	¾-in NPT
	2	M20 (reducers required)

Electronics mounting	A	Integral mount
----------------------	---	----------------

CPU/Displays	J	I/O Type 4 (6 Frequency/Digital Outputs, 1 Analog Output)
	K	I/O Type 4 (6 Frequency/Digital Outputs, 1 Analog Output)/Displays

Transmitter Head 1 expansion module	A	None
	B	Serial RS232
	C	Serial RS485
	G	Expansion I/O Module

Transmitter Head 2 expansion module	A	None
	B	Serial RS232
	C	Serial RS485

Wireless	A	None
	B	THUM

Tagging format (Line size/ Pressure rating/Flow parameters)	1	Inch/ANSI/US Customary
	2	Inch/ANSI/Metric
	3	DN/PN/US Customary
	4	DN/PN Metric

Tagging language	1	English
	2	French
	3	Russian
	4	Chinese

Pressure Directive Certification	1	None
	2	PED (must select electrical approval 2)

	3	Canadian Boiler Branch (CRN)
	4	EAC-Russia
Category	Code	Description
Electrical approvals	1	UL/c-UL
	2	ATEX/IECEX
	3	INMETRO
	4	Russia
Metrology approval	A	None
	B	European Union - MID Directive
	C	China (CPA-2015-F101)
	D	Brazil (INMETRO)
	F	EAC - Russia



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