

Ultra™ 8c

Bulletin SSLS006 Issue/Rev. 0.2 (8/16)

Smith Meter® Liquid Ultrasonic Flowmeter

The **Smith Meter® Ultra™ 8c Liquid Flowmeter** is an eight path ultrasonic meter for custody transfer measurement of petroleum products. The multiple measurement paths accurately resolve difficult flow profiles, maintaining linearity and repeatability over the widest range of conditions. Crossing measurement paths cancel the velocity effects of fluid swirl providing the capability to handle compact installations with only 5D of upstream straight run. As a result, the Ultra 8c exceeds the most demanding performance specifications on light to heavy petroleum products without the need for flow conditioning.

Unique Ultra™ 8c Features

- **Custody Transfer Accuracy** – +/-0.12% linearity over 15:1 normal flow range. Meets OIML R117 and API requirements for custody transfer.
- **Cancellation of swirl** – Eight transducer paths precisely measure swirl and cancel any resulting transverse velocities for highly accurate performance in installations without flow conditioning.
- **Heavy, high viscosity fluids at low Reynolds number** – Eight measurement paths and dynamic profile compensation allow extremely linear performance from laminar to turbulent flow regimes.
- **5D Upstream Straight Run** – Cancellation of swirl permits installations with 5D upstream straight run without flow conditioning.
- **Low Frequency Transducer Option** – Powerful signals penetrate the heaviest fluids maintaining measurement integrity and preventing signal loss on high viscosity/contaminated fluids or during cold flow startup conditions.
- **Proving Performance** – High speed signal processing allow the Ultra 8c to exceed API requirements, proving in fewer runs and/or smaller prove volumes.



Principle Of Operation

The **Ultra 8c** calculates flow rate by measuring the transit time of ultrasonic sound signals travelling back and forth across the flowing fluid. The signal transmission and detection is achieved using piezoelectric transducers located on either side of the measurement path. Flow velocity is calculated from the transit times and these velocities integrated to the total volumetric flow rate through the meter.

The **Ultra 8c** transducers are non-intrusive and flush mounted ensuring low maintenance requirements and no obstructions to full bore passage through the pipe. The transducer element is fully encapsulated in a removable well, allowing it to be serviced with the meter under pressure.

Applications

Measurement of refined petroleum products and crude oils for:

- Custody transfer
- Pipeline line integrity
- Loading and unloading terminals
- Offshore FPSO and platforms
- Advanced diagnostic line integrity
- Inventory control
- Allocation
- Line balancing
- LPG

Smith Meter® Ultra™ Series Features

- **Integrated or Remote Color Touch Screen Display** – A color touch screen display provides the capabilities of the PC interface right at the meter. The display can be attached to the front of the meter electronics or remotely as a separate display unit.
- **Reciprocity** – Transducer and electronics are designed with symmetrical pathways for long term measurement stability independent of pressure, temperature and aging and to provide an inherent zero flow calibration without offset or drift.
- **Density and Viscosity Reference** – Outputs can be configured for the particular application to be used for interface detection between product batches and product identification.
- **In-line Transducer Replacement** – Designed so there is no need for special tooling or process shut-down to replace a transducer.
- **Advanced Noise Immunity** – The signal filtering and processing increases noise immunity allowing for accurate measurement of hard to handle high viscosity crude oils with sediment and water.

Ultrasonic Benefits

- **Low Pressure Drop** – The same as an equal length of straight pipe.
- **Low Maintenance** – No moving parts requiring replacement due to wear, providing stable measurement over the life of the meter. Non-intrusive design helps avoid product build up on equipment.
- **Operational Flexibility** – Bidirectional flow reduces additional piping and equipment required to redirect product flow.
- **Ideal for Leak Detection** – The combination of wide flow range capability, low pressure drop, low maintenance and non-intrusive internals is ideal for pipeline installations and leak detection applications.

Operating Specifications

| Flow Range* | | | | | | | | | |
|-------------|-----|----------------------------|------|------------------|-------|---------|--------|----------------------------|--------|
| Size | | Extended Minimum Flow Rate | | Normal Flow Rate | | | | Extended Maximum Flow Rate | |
| | | | | Minimum | | Maximum | | | |
| Inches | mm | bph | m³/h | bph | m³/h | bph | m³/h | bph | m³/h |
| 4 | 100 | 60 | 8.9 | 150 | 24 | 2,200 | 350 | 2,580 | 410 |
| 6 | 150 | 126 | 20 | 340 | 54 | 5,090 | 810 | 5,910 | 940 |
| 8 | 200 | 220 | 35 | 570 | 90 | 8,700 | 1,390 | 10,300 | 1,630 |
| 10 | 250 | 350 | 55 | 940 | 150 | 13,800 | 2,200 | 16,100 | 2,560 |
| 12 | 300 | 500 | 80 | 1,320 | 210 | 19,800 | 3,150 | 23,100 | 3,680 |
| 16 | 400 | 820 | 130 | 2,140 | 340 | 32,000 | 5,090 | 37,400 | 5,940 |
| 20 | 500 | 1,260 | 200 | 3,400 | 540 | 51,000 | 8,110 | 59,500 | 9,460 |
| 24 | 600 | 1,890 | 300 | 4,970 | 790 | 74,200 | 11,800 | 86,800 | 13,800 |
| 30 | 750 | 2,960 | 470 | 7,860 | 1,250 | 118,000 | 18,700 | 137,100 | 21,800 |

* Standard sizes shown. For additional meter sizes consult factory.

Linearity

+/- 0.12% over the normal flow range with recommended installation.¹

Uncertainty

Compliant with API MPMS Chapter 4.8 Table A-1 for +/-0.027% average meter factor uncertainty.

Repeatability

+/-0.02%

Weights & Measures Approvals and Compliance

MID (Annex B and MI-005 of the Directive 2004/22/EC)

WELMEC 7.2 (Issue 5, March 2012)

OIML R117-1 (Edition 2007) Accuracy Class 0.3

Compliant with API Chapter 5.8

Compliance to International Standards

The Ultra 8c has been tested and verified to, Welmec 7.2 recommendations, and OIML R117-1 performance specifications.

¹ Performance shown for a Dynamic Turndown (TD) under 100:1. Consult factory for an application review over the complete capability range.

Where: • **Dynamic TD** = (max flow / min flow) x (max viscosity / min viscosity) : 1

• **Re No** = (2,214 x bph) / (meter size in inches x viscosity in cSt) or (13,925 x m³/h) / (meter size in inches x viscosity in cSt)

Viscosity Range (cSt²)

Minimum Viscosity:

Standard: 0.5; Extended Consult Factory

| Maximum Viscosity | | |
|-------------------|----------|-----------------------|
| Meter Size (in) | Standard | Extended ³ |
| 4 | 310 | Consult Factory |
| 6 | 1225 | Consult Factory |
| 8 | 880 | Consult Factory |
| 10 | 670 | Consult Factory |
| 12 | 540 | 3,400 |
| 16 | 400 | 2,510 |
| 20 | 305 | 1,910 |
| 24 | 240 | 1,500 |
| 30 | 175 | 1,075 |

Service

Refined products, LPG's and crude oils.

Flow Measurement

- Gross volumetric flow rate, single or bi-directional (please specify when ordering)
- Totalized volumetric flow, forward and reverse
- Totalized error flow during meter alarm condition
- Indication of flow velocity profile and swirl
- Estimation of Reynolds number
- Correction for body temperature and pressure expansion

Physical Property Measurement

- Velocity of sound
- Estimation of density and viscosity

| Maximum Working Pressure – PSI (bar) | | |
|--------------------------------------|--------------|-----------------|
| ASME | Carbon Steel | Stainless Steel |
| 150 | 285 (20) | 275 (19) |
| 300 | 740 (51) | 720 (50) |
| 600 | 1,480 (102) | 1,440 (99) |
| 900 | 2,220 (153) | 2,160 (149) |

Temperature Range

Process fluid temperature⁴:

Carbon Steel Housing: -50°F to 250°F (-45°C to 120°C)

Stainless Steel Housing: -58°F to 250°F (-50°C to 120°C)

Ambient Temperature: -40°F to 140°F (-40°C to 60°C)

NACE Compliant

Designed for NACE MR0175 compliance.

Standard Flange Connections

ASME B16.5 RF or RTJ flanges Class 150, 300, 600 and 900. Consult the factory for other flange type connections.

Meter Body and Flanges

Carbon Steel: A350 LF2

Stainless Steel: A182 F316

For other options consult factory.

Transducer

Piezoelectric element, fully encapsulated in metal housing.

Instrument Power

DC Instrument Input Power to Field Mounted

Electronics

24 Vdc, +20% / -15%, 0.5A without integrated display 0.7A with integrated display

Power inrush: 10 Amps for < 20mS at 24 Vdc.

The DC power input circuitry is reverse current protected and fused.

Tested to 20 milliseconds power dropout, 100 milliseconds power brownout without shut down.

Meter will always restart orderly after power loss.

Electrical Inputs

Digital Inputs

Quantity: 2

Function: Input 1 – Consult Factory.

Input 2 – Dedicated to external Weights & Measures switch input

Type: Optically isolated, internally current limited digital input

Input voltage range (V-high): 5 to 28 VDC

Maximum input frequency: 10KHz

V (high): 5.5 VDC minimum to 28 VDC maximum.*

V (low): 1 VDC maximum.*

Current at maximum voltage: 20mA maximum

Input impedance: 1.67 kΩ.

***Note:** The input pulse must rise above V (high-minimum) for a period of time then fall below V (low) to be recognized as a pulse.

² 1 cSt = 1 mm²/s

³ Consult Factory for higher viscosity applications.

⁴ For applications with process fluid temperatures over 158°F (70°C) the pedestal mount height extension is required. See page 9.

Analog Input (4-20mA)

Quantity: 2

Type: Two-wire, 4-20mA current loop receiver, common neutral isolated from system ground, programmable as to function.

Span Adjustment: 3.8mA to 22mA span, User-programmable inside these limits.

Input burden: 50Ω

Resolution: 24-bit

Voltage drop: 2 Volts maximum.

Recommended cable: Belden 8729, 9940 or equivalent

Analog Input (Temperature Probe – RTD)

Quantity: 1

Type: Four-wire, 100Ω Platinum Resistance Temperature Detector (PRTD).

Temperature coefficient: @ 0°C: 0.00385Ω/Ω/°C

Temperature range: -60°C to 180°C

Offset: Temperature probe offset is user-programmable.

Self calibrating: Lead length compensation that requires no resistance balancing of leads.

Electrical Outputs

Communications

Ethernet

IEEE 802.3 Ethernet operating at 10/100 Mbps.

Modbus TCP/IP at port 502

10/100Base-TX (Ethernet over twisted pair)

Maximum of 2 ports (1 if fiber optic option is enabled via jumpers. 0 if integrated display is fitted and fiber optic is enabled)

Auto-MDIX – Will work with straight or crossover cable automatically

RJ-45 connector per port

Maximum distance between Ethernet devices: 100m (328ft)

Recommended cable: Category 5 or better

100Base-FX (Ethernet over fiber optic)

1300nm wavelength MT-RJ connector

Maximum Distance between Ethernet devices: 2km

(6,561ft)*

Recommended cable: 1-pair 62.5/125 μm multimode glass

Recommended cable: 1-pair 62.5/125 μm multimode glass

Transmitter output minimum optical power: -20dBv avg

Receiver input minimum optical power: -31dBm avg.

Optical Power Budget (OPB) at 0.5km with recommended cable: 9dB

Optical Power Budget (OPB) at 2km with recommended cable: 6dB

**Note: Optical losses in cables, connectors, and couplers can reduce this maximum limit.*

Serial

EIA-485 Port: 2 wire

120Ω endpoint termination resistor included in circuit, user selectable via jumper

Configuration: Multi-drop network

Line Protocol: Half duplex

Data Rate: Selectable asynchronous data (Baud) rates of 1200, 2400, 4800, 9600, 19200, 38400, 57600 or 115200 bps.

Word Length: 7 or 8 bits

Parity: None, odd, or even

Protocol: MODBUS (RTU) or Modbus ASCII

Recommended cable: Belden 3106A, 9841, or equivalent low capacitance cable

HART

The optional HART interface operates over the 4-20 mA analog output and supports the following command:

All Universal Commands:

- Read up to four dynamic variables
- Read and write TAG name
- Read range values and sensor limits
- Read and write user messages and date

Common Practice Commands required for:

- Selection of engineering units
- Burst mode control

Digital/Pulse Outputs

Quantity: 2

Volume output with programmable K-factor.

Configuration Selections:

- 1). Quadrature (I, Q)
- 2). Pulse (forward, reverse)
- 3). Pulse (pulse, direction)
- 4). Pulse (pulse, direction inverted)

Type: Current limited active output or open collector – jumper selectable.

Switch blocking voltage (switch off): 30Vdc maximum.

Frequency Range: 0 to 10kHz nominal, overrange up to 15kHz.

Minimum Pulse Width: > 66μs (50% duty cycle nominal)

24 VDC Input Power Supply: No Load: 23 ±0.3 Vp-p square wave.

270Ω Load: 12 ±0.3 Vp-p square wave (minimum).

12 VDC external power supply for pulse output

circuitry: No Load: 11 ±0.3 Vp-p square wave.

270Ω Load: 6 ±0.3 Vp-p square wave (minimum).

Current: Maximum Sink Current: 300mA @ 29 Vdc.

Maximum Source Current: 80mA @ 29 Vdc.

Recommended cable: Belden 9402. Up to 2000 ft use 20AWG, up to 3000 ft use 18AWG. Shielded cable is recommended with the shield connected only at the receiving instrument. If using dual (quadrature) pulse output, the two conductors carrying the outputs must not be in the same pair and ideally individually shielded.

Analog Output (4-20mA)

Quantity: 1

Type: Two-wire, loop powered, isolated from ground, user programmable as to function.

Span adjustment: 3.8mA to 21mA User adjustable

Alarm output: 22.5mA

Resolution: 16-bit.

Compliance voltage range: 6 VDC to 28VDC.

Maximum load resistance @ 10VDC: 250

Recommended cable: Belden 8729, 9940 or equivalent

Alarm Output

Quantity: 1

Type: Optically-isolated solid state output.

Polarity: Open during alarm and power off.

Switch blocking voltage: 30 VDC maximum.

Load current: 125mA maximum with 0.6 volt drop.

Safety Classifications**Model (Ultrasonic Transducer)****ATEX (European Community)**

DEMKO 05 ATEX 05.11224X

Ex d IIB T6 Tamb = -40°C to 70°C IP 66

IEC Ex (Global Approach)

IEC Ex UL 05.0014

Ex d IIB T6 Tamb = -40°C to 70°C IP 66

Model UTS (Ultrasonic Transducer System)**ATEX (European Community)**

DEMKO 09 ATEX 0907098X

Ex d IIB T4-T6 Gb Tamb = -40°C to 70°C IP 66

IEC Ex (Global Approach)

IEC Ex UL 09.0023X

Ex d IIB T4-T6 Gb Tamb = -40°C to 70°C IP 66

UL/CUL (North American)

UL File E23545

Class I, Division 1, Groups C & D

Class I, Zone 1, Groups IIB

Electronics Enclosure: Ultrasonic Meter Control (UMC)

Explosion Proof Certification UL, C-UL, ATEX, IEC-Ex

ATEX (European Community)

DEMKO 13 ATEX 1204991X

Ex d ia op is IIB T5 Gb (Um=250v) IP66 Tamb = -40°C to 60°C (Display Version)

Ex d op is IIB T5 Gb IP66 Tamb = -40°C to 60°C (Non Display Version)

IEC Ex (Global Approach)

IEC Ex UL 13.0019X

Ex d ia op is IIB T5 Gb (Um=250v) IP66 Tamb = -40°C to 60°C (Display Version)

Ex d op is IIB T5 Gb IP66 Tamb = -40°C to 60°C (Non Display Version)

UL/CUL (North American)

UL File E23545

Class I, Division 1, Groups C & D Class I, Zone 1, Groups IIB T5, IP66 Enclosure

Tamb = -40°C to 55°C (Display Version)

Tamb = -40°C to 60°C (Non Display Version)

Remote Mounted Display: Touch Screen Control Interface (TCI)

Explosion Proof Certification UL, C-UL, ATEX, IEC Ex

ATEX (European Community)

DEMKO 13 ATEX 1204991X

Ex d ia op is IIB T5 Gb (Um=250v) IP66 Tamb = -40°C to 60°C (Display Version)

IEC Ex (Global Approach)

IEC Ex UL 13.0019X

Ex d ia op is IIB T5 Gb (Um=250v) IP66 Tamb = -40°C to 60°C (Display Version)

UL/CUL (North American)

UL File E23545

Class I, Division 1, Groups C & D Class I, Zone 1, Groups IIB T5, IP66 Enclosure

Tamb = -40°C to 55°C (Display Version)

Pressure Safety Information**ASME**

Designed to B31.3 / ASME Section VIII Div. 1

CRN

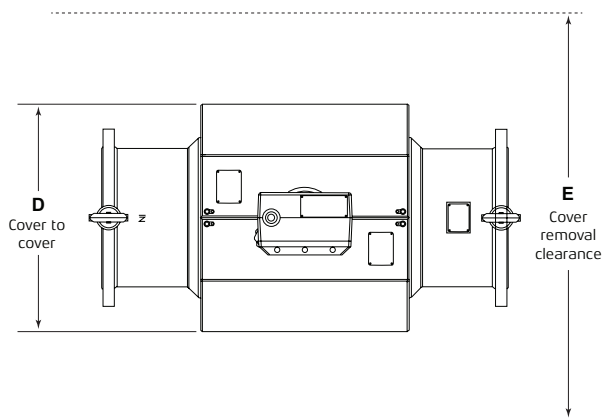
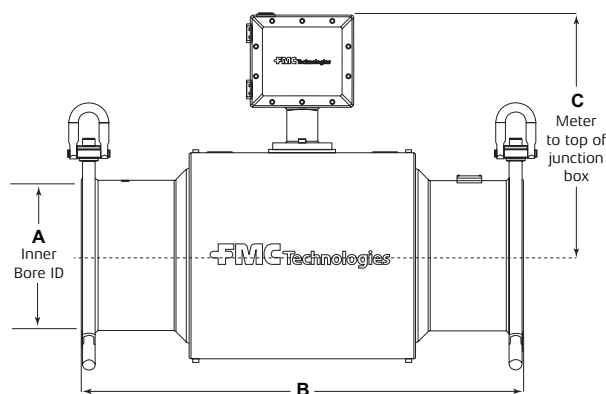
CRN certificates available, consult factory

PED

EC Conformity Certificate available, consult factory

Dimensions and Weight

Inches (mm) and Pounds (kg)



ASME Class 150 Flange*

| Size | A | B | C | D | E | Weight - lb (kg) |
|------|-----------------|----------------|-------------|---------------|-------------|------------------|
| 4" | 3.826" (97.2) | 24.4" (620) | 16.8" (425) | 16.2" (410) | 26" (661) | 214 (97) |
| 6" | 5.761" (146.3) | 29.0" (737) | 18.5" (470) | 15.7" (398) | 32" (813) | 466 (202) |
| 8" | 7.625" (193.7) | 33.5" (850) | 19.4" (493) | 19.7" (499) | 40" (1,016) | 674 (305) |
| 10" | 9.562" (242.9) | 37.0" (940) | 20.3" (516) | 20.6" (524) | 42" (1,067) | 859 (390) |
| 12" | 11.374" (288.9) | 39.0" (990) | 21.3" (541) | 22.6" (575) | 46" (1,168) | 1,090 (494) |
| 16" | 14.312" (363.5) | 43.3" (1,100) | 22.8" (579) | 26.0" (661) | 53" (1,346) | 1,360 (616) |
| 20" | 17.938" (455.6) | 45.5" (1,156) | 24.6" (624) | 30.5" (775) | 62" (1,575) | 2,325 (1,054) |
| 24" | 21.562" (547.7) | 52.6" (1,337) | 26.6" (675) | 35.2" (893) | 71" (1,803) | 3,380 (1,533) |
| 30" | 27.500" (698.5) | 66.25" (1,682) | 29.8" (757) | 44.5" (1,130) | 55" (1,397) | 5,516 (2,502) |

ASME Class 300 Flange*

| Size | A | B | C | D | E | Weight - lb (kg) |
|------|-----------------|----------------|-------------|---------------|-------------|------------------|
| 4" | 3.826" (97.2) | 24.4" (620) | 16.8" (425) | 16.2" (410) | 26" (661) | 230 (105) |
| 6" | 5.761" (146.3) | 29.0" (737) | 18.5" (470) | 15.7" (398) | 32" (813) | 500 (226) |
| 8" | 7.625" (193.7) | 33.5" (850) | 19.4" (493) | 19.7" (499) | 40" (1,016) | 715 (324) |
| 10" | 9.562" (242.9) | 37.0" (940) | 20.3" (516) | 20.6" (524) | 42" (1,067) | 930 (421) |
| 12" | 11.374" (288.9) | 39.0" (990) | 21.3" (541) | 22.6" (575) | 46" (1,168) | 1,200 (544) |
| 16" | 14.312" (363.5) | 43.3" (1,100) | 22.8" (579) | 26.0" (661) | 53" (1,346) | 1,485 (673) |
| 20" | 17.938" (455.6) | 45.5" (1,156) | 24.6" (624) | 30.5" (775) | 62" (1,575) | 2,485 (1,127) |
| 24" | 21.562" (547.7) | 52.6" (1,337) | 26.6" (675) | 35.2" (893) | 71" (1,803) | 3,510 (1,592) |
| 30" | 27.500" (698.5) | 66.25" (1,682) | 29.8" (757) | 44.5" (1,130) | 55" (1,397) | 6,100 (2,767) |

C/F – Consult Factory

*For other sizes or custom ID consult factory

Note: Dimensions – inches to the nearest tenth (millimetres to the nearest whole mm), each independently dimensioned from respective engineering drawings.

| ASME Class 600 Flange* | | | | | | |
|------------------------|-----------------|----------------|-------------|---------------|-------------|------------------|
| Size | A | B | C | D | E | Weight - lb (kg) |
| 4" | 3.826" (97.2) | 24.4" (620) | 16.8" (425) | 16.2" (410) | 26" (661) | 250 (114) |
| 6" | 5.761" (146.3) | 29.0" (737) | 18.5" (470) | 15.7" (398) | 32" (813) | 546 (248) |
| 8" | 7.625" (193.7) | 33.5" (850) | 19.4" (493) | 19.7" (499) | 40" (1,016) | 791 (359) |
| 10" | 9.562" (242.9) | 37.0" (940) | 20.3" (516) | 20.6" (524) | 42" (1,067) | 1,058 (480) |
| 12" | 11.374" (288.9) | 39.0" (990) | 21.3" (541) | 22.6" (575) | 46" (1,168) | 1,306 (592) |
| 16" | 14.312" (363.5) | 43.3" (1,156) | 22.8" (579) | 26.0" (661) | 53" (1,346) | 1,947 (883) |
| 20" | 17.938" (455.6) | 45.5" (1,100) | 24.6" (624) | 30.5" (775) | 62" (1,575) | 2,632 (1,194) |
| 24" | 21.562" (547.7) | 52.6" (1,337) | 26.6" (675) | 35.2" (893) | 71" (1,803) | 3,776 (1,713) |
| 30" | 27.500" (698.5) | 66.25" (1,682) | 29.8" (757) | 44.5" (1,130) | 55" (1,397) | 6,600 (2,994) |

C/F – Consult Factory

*For other sizes or custom ID consult factory

Note: Dimensions – inches to the nearest tenth (millimetres to the nearest whole mm), each independently dimensioned from respective engineering drawings.

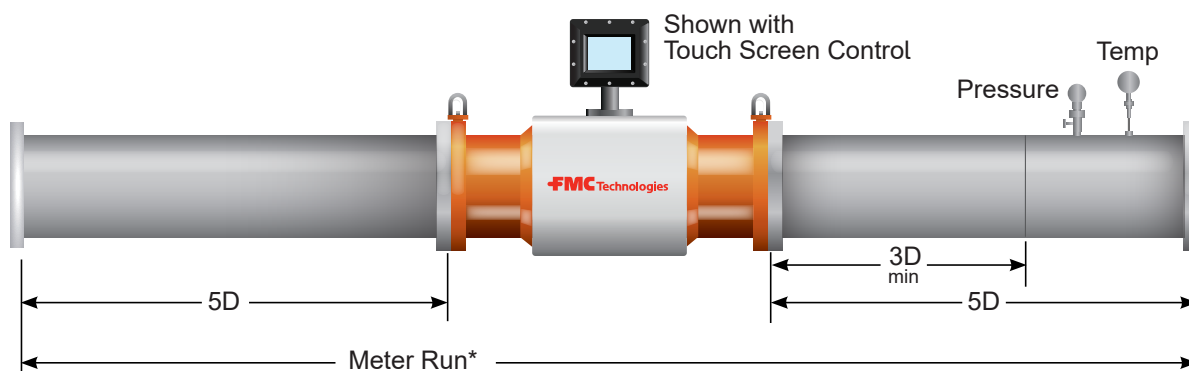
ASME Class 900 Flanges and RTJ Flanges

Consult factory for all sizes.

Recommended Installation

The Ultra 8c is designed for resistance to the effects of flow profile variation and swirl. In order to optimize the stability and repeatability of the measurement these installation effects should minimize where possible. The meter run must be the same pipe diameter as the meter inlet and concentrically centered so that neither the pipe edge nor gasket protrude into the fluid flow. For correct centering it is recommended to use the centering dowel pin provided on the meter flange.

The Ultra 8c can be installed with 5D of upstream straight run after an elbow or concentric reducer. For optimum performance it is recommended to keep restrictions such as control valves or installations with a similar effect away from the upstream area or to use 10D straight run. Consult factory for an evaluation in the case of a complex upstream piping geometry. When using flow conditioning maintain a minimum of 5D from the flow conditioner outlet.



* Diagram not drawn to scale.

Catalog Code

The following guide defines the correct ultrasonic flowmeter for a given application and the respective catalog code. This code is part of the ordering information and should be included on the purchase order.

Standard Configuration

Instrument Power: 24 Vdc
2 Analog Inputs: 4-20mA
1 Analog Input: 4-wire RTD
1 Analog Output: 4-20mA
1 Digital Output: Dedicated to alarm – Optically isolated solid-state output
2 Digital Inputs: 1 dedicated to Weights & Measures switch
2 Pulse Outputs: Solid-state output (0 - 10 kHz) user-programmable K-factor, Quadrature
2 Ethernet: 2 Twisted pair (10Base-T/100Base-T)
1 Serial: 2 Wire EIA-485

| Ultrasonic Meter Body | | | | | | | | | | | | |
|-----------------------|---|---|---|---|---|---|---|---|----|---|----|----|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | - | 11 | 12 |
| 8 | S | 0 | 6 | 1 | 1 | S | S | B | C | - | 4 | 0 |

Position 1: Code

8 – Ultra 8c

Position 2: Certification

S – Standard: UL/CUL; ATEX; IEC Ex

Positions 3 and 4: Diameter⁵

06" 18"
08" 20"
10" 24"
12" 26"
14" 30"
16"

Position 5: End Connections

1 - Class 150 ASME Flange
2 - Class 300 ASME Flange
3 - Class 600 ASME Flange
4 - Class 900 ASME Flange
5 - Class 150 RTJ Flange
6 - Class 300 RTJ Flange
7 - Class 600 RTJ Flange
8 - Class 900 RTJ Flange

Position 6: Body Housing Materials

1 - Carbon Steel
2 - 300 Series Stainless Steel
X - Special

Position 7: Transducer⁶

S - Standard Titanium
X - Special

Position 8: Transducer Type

S - Standard Transducer
L - Low Frequency (High Viscosity Applications)

Position 9: Mechanical Certification

B - ASME B31.3
P - PED
C - CRN
X - Special

Position 10: Ethernet Connection

C - 2 Twisted Pair
F - 1 Twisted Pair and 1 Optical

Position 11 and 12: Inlet ID (Meter Run)

10 - Schedule 10
20 - Schedule 20
30 - Schedule 30
40 - Schedule 40
60 - Schedule 60
80 - Schedule 80
ST - Schedule STD
XS - Schedule XS
CD - Custom ID (consult factory)

⁵ For other sizes or custom ID, consult factory.

⁶ "Special" transducer requirement for any application not compatible with Buna-N Elastomers or where other transducer materials are required.

Meter Mounted Electronics Enclosure: Ultrasonic Meter Control (UMC)

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|-----|---|---|---|---|---|---|---|---|
| UMC | E | A | P | N | S | 0 | B | 0 |

Position 1: Hazardous Location Certification

E – Explosion Proof Certification UL, C-UL, ATEX, IEC-Ex Class I, Div 1, Gr C&D; Exd IIB Zone 1

Position 2: Housing Material

A – Aluminum
S – 300 Series Stainless Steel

Position 3: Housing Style

P – Pedestal Mount
H – Pedestal Mount w/Height Extension
(High Temperature Product Applications)
E – Pedestal Mount with Exe Junction Box

Position 4: Housing Electrical Entrances

M – M20 Thread
N – ½" NPT Thread

Position 5: Software

S – Standard UMC Software
X – Special

Position 6:

0 – Reserved

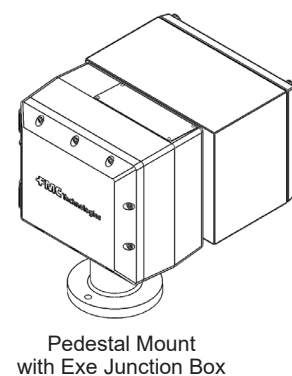
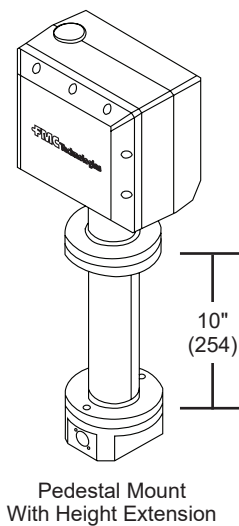
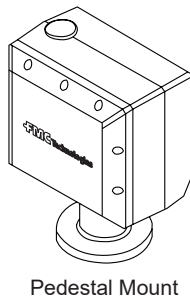
Position 7: Housing Cover

B – Blind Cover
T – 5.7" Touch Screen (Position 3 option P or H only)*

Position 8: Additional Communication Options

0 – None
1 – HART

| Model | Options and Option Combinations | Maximum Power (Based on Estimates) |
|-----------------------------------------------------------------|---------------------------------------|---------------------------------------|
| UMC - E - (A or S) - (P or H) - (M or N) - S - 0 - T - (0 or 1) | UMCB board assembly (with display) | 14.2W |
| UMC - E - (A or S) - (P or H) - (M or N) - S - 0 - B - (0 or 1) | UMCB board assembly (without display) | 6W |



*Touch screen display only available with Pedestal Mount or Pedestal Mount with Height Extension.

Remote Mounted Display: 5.7" Touch Screen Control Interface (TCI)

| | 1 | 2 | 3 | 4 | 5 |
|-----|---|---|---|---|---|
| TCI | E | A | S | N | S |

Position 1: Hazardous Location Certification

E – Explosion Proof Certification UL, C-UL, ATEX, IEC-Ex Class I, Div 1, Gr C&D; Exd IIB Zone 1

Position 2: Housing Material

A – Aluminum
S – 300 Series Stainless Steel

Position 3: Housing Style

S – Surface Mount

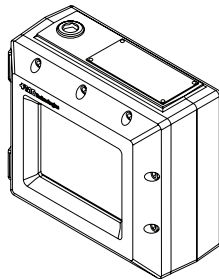
Position 4: Housing Entrances

M – M20 Thread
N – ½" NPT Thread

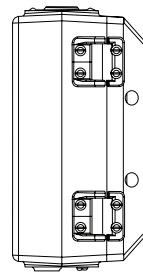
Position 5: Software

S – Standard
X – Special

| Model | Options and Option Combinations | Maximum Power (based on estimates) |
|---------------------------------------|---------------------------------|------------------------------------|
| TCI - E - (A or S) - S - (M or N) - S | Display board assembly | 8W |



Housing With Display
Surface Mount



Housing With Display
Side View

Calibration Testing

FMC Technologies Flow Research and Test Center

In order to verify meter performance it is important to dynamically test over a broad operating range with hydrocarbon fluids. FMC Technologies' comprehensive Flow Research and Test Center (FRTC) located in Erie, Pennsylvania is capable of testing meters over the widest dynamic measurement range of any test facility in the world with hydrocarbon fluids.

- NVLAP accredited to ISO/IEC 17025:2005 (NVLAP Laboratory Code 200939-01)
- ISO 9001:2008 Certified – Quality Management System
- Flow up to 42,000 bph (6,675 m³/h)
- Viscosity capability up to 500 cSt (mm²/s)
- Traceable to international standards
- Reynolds number ranges between 100 to 1,000,000+ (depending on meter size)

Standard factory Calibration

Every Ultra™ Series ultrasonic flowmeter includes a dynamic test on FMC Technologies' FRTC to validate performance on a hydrocarbon fluid up to 42,000 bph (6,675 m³/h), and on meter sizes from 6 to 30 inches.

Type: Dynamic hydrocarbon test over flow range

Repeatability: Run to 0.027% uncertainty (per API 4.8 Table A1) at the highest flow rate.

Linearity: Measured at 6 flow rate intervals (standard) at 3 runs per flow rate.

Flow Range: 200 to 42,000 bph (30 to 6,675 m³/h)

Optional Dynamic Calibration on the Multi-Viscosity Flow Loop

Demonstrating a meter's accuracy over the combined flow and viscosity range provides the best performance validation for custody transfer and leak detection meters in demanding applications. To accomplish this, the fluid dynamic parameter of Reynolds Number (Re No.) is used to simulate field operating conditions across varying viscosities in the test laboratory.

A Dynamic Calibration uses multiple fluid tests to cover the application Reynolds Number range. Testing is performed on FMC Technologies' Multi-Viscosity (MV) Test System, which is a high accuracy test loop that can operate multiple hydrocarbon fluid types for a wide range of viscosities.

Type: Dynamic hydrocarbon test over Reynolds Number range.

Repeatability: Run to 0.027% uncertainty (per API 4.8 Table A1) on each fluid at the highest flow rate.

Linearity: Measured at 3 flow rate intervals at 3 runs per flow rate for each additional test fluid.

Reynolds No. Range: Between 100 to 1,000,000+ (depending on meter size.)

Number of fluids tested: Multiple

Optional ISO 17025 Accredited Calibration

The FMC Technologies' Flow Research and Test Center is accredited by the National Voluntary Laboratory Accreditation Program (NVLAP) to comply with international laboratory standard ISO/IEC 17025. All measurements are ultimately traceable through a National Metrology Institute (NIST) that is member of the International Organization of Legal Metrology (OIML). This option includes documentation certifying test result compliance with ISO 17025 and verification of metrological traceability.

Certification: Test documentation includes ISO 17025 certified expanded uncertainty certificate.

Repeatability: Run to 0.027% uncertainty (per API 4.8 Table A1) at all flow rates.



Revisions included in SSLS006 Issue/Rev. 0.2 (8/16):

Footnote 1 updated. Updated maximum viscosity, standard, on meter sizes 4, 6, and 8 inches.
March 2019 - Updated branding and contact information.

The specifications contained herein are subject to change without notice and any user of said specifications should verify from the manufacturer that the specifications are currently in effect. Otherwise, the manufacturer assumes no responsibility for the use of specifications which may have been changed and are no longer in effect.