

Ultra™ 8c Liquid Ultrasonic Flowmeter

Bulletin SSLS006 Issue/Rev. 0.3 (12/22)



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 while 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.

Principle of Operation

The Ultra 8c calculates flow rate by measuring the transit time of ultrasonic sound signals traveling 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.

Ultra 8c Features

- Custody transfer accuracy— ± 0.12 percent (%) linearity over 15:1 normal flow range and meets International Organization of Legal Metrology (OIML) R117 and American Petroleum Institute (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 systems.
- 5D upstream straight run—Cancellation of swirl allows installations with 5D upstream straight run with no flow conditioning.
- Low frequency transducer option—Powerful signals penetrate the heaviest fluids maintaining measurement integrity and preventing signal loss on high viscosity and contaminated fluids or during cold flow startup conditions.
- Proving performance—High speed signal processing allows the Ultra 8c to exceed API requirements, proving in fewer runs and smaller prove volumes.

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
- 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.

Ultra Series Features

- Integrated or remote color touchscreen display—The color touchscreen display provides the capabilities of the personal computer (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 shutdown 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.

Operating Specifications

Flow Range									
Size		Extended Minimum Flow Rate		Normal Flow Rate				Extended Maximum Flow Rate	
				Minimum		Maximum			
Inches	mm	bph	m ³ /h	bph	m ³ /h	bph	m ³ /h	bph	m ³ /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

Note: Standard sizes shown. For additional meter sizes consult factory.

Linearity

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

Performance shown for a dynamic turndown (TD) under 100:1. Consult factory for an application review over the complete capability range, where

- Dynamic TD = (maximum flow/minimum flow) x (maximum viscosity/minimum viscosity) : 1.
- Reynolds number (Re) = (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).

Uncertainty

Compliant with API Manual of Petroleum Measurement Standards (MPMS) Chapter 4.8, Table A-1 for +/-0.027% average meter factor uncertainty.

Repeatability

Repeatability is +/-0.02%.

Weights and 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
 Brazil—INMETRO

Compliance to International Standards

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

Viscosity Range (cSt)

1 cSt = 1 mm²/s

Minimum viscosity

Standard is 0.5. For extended viscosity consult the factory.

Maximum Viscosity

Meter Size (in)	Standard	Extended
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Maximum Viscosity

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

Consult the factory for higher viscosity applications.

Service

- Refined products
- Liquefied petroleum gases (LPGs)
- Crude oils

Flow Measurement

- Gross volumetric flow rate is single or bi-directional (specify when ordering)
- Totalized volumetric flow is forward and reverse
- Totalized error flow during meter alarm condition
- Indication of flow velocity profile and swirl
- Estimation of Reynolds number (Re)
- 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 temperature

Note: For applications with process fluid temperatures over 158 degrees Fahrenheit (°F) (70 degrees Celcius (°C)) the pedestal mount height extension is required.

- Carbon steel housing is -50 to 250 °F (-45 to 120 °C).
- Stainless steel housing is -58 to 250 °F (-50 to 120 °C).
- Ambient temperature is -40 to 140 °F (-40 to 60 °C).

NACE Compliant

Designed for NACE MR0175 compliance.

Standard Flange Connections

ASME B16.5 raised-face (RF) or ring-type-joint (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 the factory.

Transducer

Piezoelectric element is fully encapsulated in metal housing.

Instrument Power

DC Instrument Input Power to Field-Mounted Electronics

24 volts direct current (VDC), +20% / -15%, 0.5 ampere (amp) without integrated display 0.7 amp with integrated display

Power inrush: 10 amp for < 20 milliseconds (ms) at 24 VDC. The direct current (DC) power input circuitry is reverse current protected and fused.

Tested to 20 ms power dropout, 100 ms power brownout without shut down. Meter restarts orderly after power loss.

Electrical Inputs

Digital Inputs

Quantity: Two

Function:

- Input 1—Consult factory
- Input 2—Dedicated to external Weights and Measures switch input

Type: Optically isolated, internally current limited digital input

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

Maximum input frequency: 10 kilohertz (KHz)

Volt (V) (high): 5.5 VDC minimum to 28 VDC maximum

V (low): 1 VDC maximum

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

Current at maximum voltage: 20 milliamper (mA) maximum

Input impedance: 1.67 kilohms.

Analog Input (4-20 mA)

Quantity: Two

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

Span adjustment: 3.8 mA to 22 mA span, user-programmable inside these limits

Input burden: 50 ohms

Resolution: 24-bit

Voltage drop: 2 V maximum

Recommended cable: Belden 8729, 9940 or equivalent

Analog Input (Temperature Probe—Resistance Temperature Detector (RTD))

Quantity: 1

Type: Four-wire, 100 ohms platinum resistance temperature detector (PRTD)

Temperature coefficient: at 0 °C: 0.00385 ohms/ohms/°C

Temperature range: -60 to 180 °C

Offset: Temperature probe offset is user-programmable.

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

Electrical Outputs

Communications

Ethernet

IEEE 802.3 Ethernet operating at 10/100 millions of bits per second (Mbps)

Modbus transmission control protocol/internet protocol (TCP/IP) at port 502

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

Maximum of two ports (one if fiber optic option is enabled via jumpers. No ports if integrated display is fitted and fiber optic is enabled)

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

Registered jack (RJ) 45 connector per port

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

Recommended cable: Category 5 or better

100Base-FX (Ethernet over fiber optic)

1300 nanometer (nm) wavelength MT-RJ connector

Maximum distance between Ethernet devices: 2 kilometers (km) (6,561 ft)

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

Recommended cable: One pair 62.5/125 micrometer (μm) multimode glass

Transmitter output minimum optical power: -20 decibel volt (dBv) avg

Receiver input minimum optical power: -31 decibel milliwatts (dBm) avg

Optical power budget (OPB) at 0.5km with recommended cable: 9 decibel (dB)

OPB at 2 km with recommended cable: 6dB

Serial

EIA-485 port: Two wire

120 ohms 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: Seven or eight bits

Parity: None, odd, or even

Protocol: Modbus (RTU) or Modbus ASCII

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

Highway Addressable Remote Transducer (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: Two

Volume output with programmable K-factor

Configuration selections:

- Quadrature (I, Q)
- Pulse (forward, reverse)
- Pulse (pulse, direction)
- Pulse (pulse, direction inverted)

Type: Current limited active output or open collector—jumper selectable

Switch blocking voltage (switch off): 30 VDC maximum

Frequency range: Zero to 10 kHz nominal, overrange up to 15 kHz

Minimum pulse width: > 66 microsecond (μ s) (50% duty cycle nominal)

24 VDC input power supply: No load: 23 \pm 0.3 volts peak-to-peak (Vpp) square wave

270 ohms load: 12 \pm 0.3 Vpp square wave (minimum)

12 VDC external power supply for pulse output circuitry:

No load: 11 \pm 0.3 Vpp square wave

270 ohms load: 6 \pm 0.3 Vpp square wave (minimum)

Current: Maximum sink current: 300 mA @ 29 VDC

Maximum source current: 80 mA @ 29 VDC

Recommended cable: Belden 9402

Up to 2000 ft use 20 American wire gauge (AWG), up to 3000 ft use 18 AWG.

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: One

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

Span adjustment: 3.8 mA to 21 mA

User adjustable alarm output: 22.5 mA

Resolution: 16 bit

Compliance voltage range: 6 to 28 VDC

Maximum load resistance: 10 VDC: 250

Recommended cable: Belden 8729, 9940 or equivalent

Alarm Output

Quantity: One

Type: Optically-isolated solid state output

Polarity: Open during alarm and power off

Switch blocking voltage: 30 VDC maximum

Load current: 125 mA 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

IECEX (Global Approach)

IECEX 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

IECEX (Global approach)

IECEX 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

INMETRO UL Brazil (Brazil)

UL-BR 19.0079X

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

Electronics Enclosure: Ultrasonic Meter Control (UMC)

Explosion-proof certification UL, C-UL, ATEX, IECEX

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)

IECEX (Global Approach)

IECEX 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)

UL Brazil (Brazil)

UL-BR 19.0087X

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)

Remote Mounted Display: Touchscreen Control Interface (TCI)

Explosion-proof Certification UL, C-UL, ATEX, IECEX

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)

IECEX (Global Approach)

IECEX 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)

UL Brazil (Brazil)

UL-BR 19.0087X

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

Pressure Safety Information

ASME

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

CRN

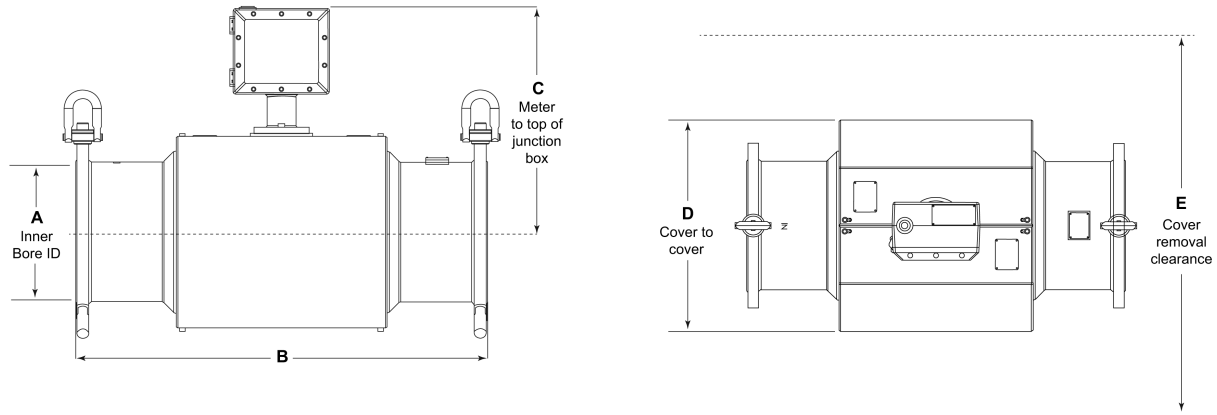
CRN certificates available, consult factory

PED

EC Conformity certificate available, consult factory

Dimensions and Weight

Dimensions are in inches to the nearest tenth (millimeters to the nearest whole mm), each independently dimensioned from respective engineering drawings. Weight is measured in pounds (kilograms (kg)). For larger sizes, other flange types, classes, or custom inside diameter (ID), consult the factory.



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)

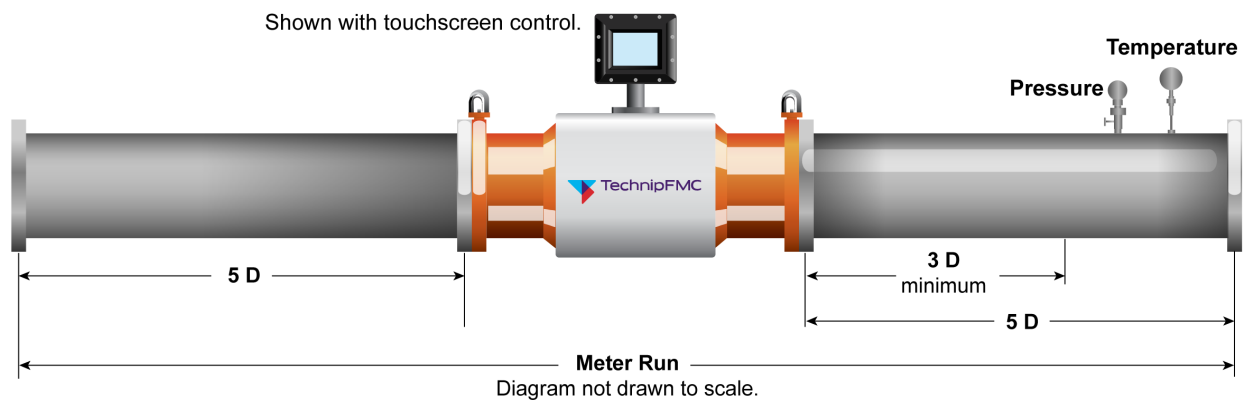
ASME Class 600 Flange						
Size	A	B	C	D	E	Weight - lb (kg)
4"	3.826" (97.2)	24.4" (620)	16.8" (425)	16.2" (410)	26" (661)	250 (114)
6"	5.761" (146.3)	29.0" (737)	18.5" (470)	15.7" (398)	32" (813)	546 (248)
8"	7.625" (193.7)	33.5" (850)	19.4" (493)	19.7" (499)	40" (1,016)	791 (359)
10"	9.562" (242.9)	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" (1,100)	22.8" (579)	26.0" (661)	53" (1,346)	1,947 (883)
20"	17.938" (455.6)	45.5" (1,156)	24.6" (624)	30.5" (775)	62" (1,575)	2,632 (1194)
24"	21.562" (547.7)	52.6" (1,337)	26.6" (675)	35.2" (893)	71" (1,803)	3,776 (1713)
30"	27.500" (698.5)	66.25" (1,682)	29.8" (757)	44.5" (1,130)	55" (1,397)	6,600 (2,994)

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 (D) 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 5 D 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 10 D straight run. Consult factory for an evaluation in the case of a complex upstream piping geometry. When using flow conditioning maintain a minimum of 5 D from the flow conditioner outlet.



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

Two analog inputs: 4-20mA

One analog input: Four-wire RTD

One analog output: 4-20mA

One digital output: Dedicated to alarm, optically isolated solid-state output

Two digital inputs: One dedicated to Weights and Measures switch

Two pulse outputs: Solid-state output (0 - 10 kHz) user-programmable K-factor, quadrature

Two Ethernet: Two twisted pair (10Base-T/100Base-T)

One serial: Two-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: Hazardous Location Certifications

S—Standard: UL/CUL; ATEX; IECEx

B—INMETRO UL Brazil

Positions 3 and 4: Diameter

Note: For other sizes or custom ID, consult the factory.

06"

08"

10"

12"

14"

16"

18"

20"

24"

26"

30"

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: Transducer

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

S—Standard titanium

X—Special

Position 8: Transducer Type

S—Standard transducer

L—Low frequency (high viscosity applications)

H—High frequency

Position 9: Mechanical Certification

B—ASME B31.3

P—PED

C—CRN

X—Special

Position 10: Ethernet Connection

C—Two twisted pair

F—One twisted pair and one 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)

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, IECEx
- B—INMETRO UL Brazil

Position 2: Housing Material

- A—Aluminum
- S—300 series stainless steel

Position 3: Housing Style

- P—Pedestal mount
- H—Pedestal mount with height extension (high temperature product applications)

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

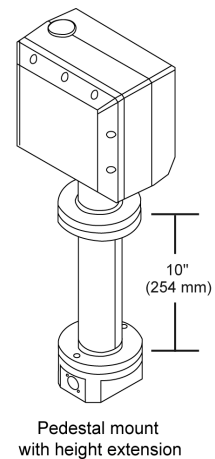
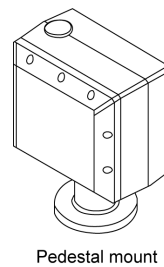
T—5.7" touchscreen (Position 3 option P or H only)

Touchscreen display only available with pedestal mount or pedestal mount with height extension.

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, H, E) - (M or N) - S - 0 - B - (0 or 1)	UMCB board assembly (without display)	6W



**Remote Mounted Display:
5.7" Touchscreen 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, IECEx

B—INMETRO UL Brazil

Position 2: Housing Material

A—Aluminum

S—300 series stainless steel

Position 3: Housing Style

S—Surface mount

Position 4: Housing Entrances

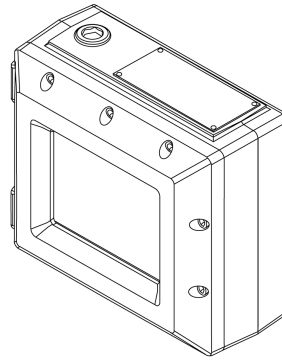
M—M20 thread

N—½" NPT thread

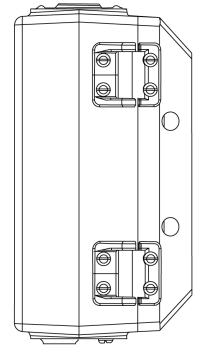
Position 5: Software

S—Standard

X—Special



Housing with display surface mount



Housing with display side view

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

Calibration Testing

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. TechnipFMCs' comprehensive Flow Research and Test Center (FRTC) located in Erie, Pennsylvania, USA 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 TechnipFMCs' 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 six 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 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 TechnipFMCs' 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 three flow rate intervals at three runs per flow rate for each additional test fluid.

Reynolds number range: Between 100 to 1,000,000+ (depending on meter size.)

Number of fluids tested: Multiple

Optional ISO 17025 Accredited Calibration

The TechnipFMCs' 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.

The specifications contained herein are subject to change without notice and any user of said specifications should verify from the manufacture 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.

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