

## Ultra™ 6c

Bulletin SSLS004 Issue/Rev. 0.3 (11/15)

**We put you first.  
And keep you ahead.**

### SMITH METER® LIQUID ULTRASONIC FLOWMETER

The **Smith Meter Ultra™ 6c Liquid Flowmeter** is a six path ultrasonic meter for custody transfer measurement of petroleum products. The six paths combine fluid diagnostic capabilities with highly accurate measurement for excellent metering performance. The Ultra 6c is an ideal solution for many light, medium and heavy petroleum fluid measurement applications.

#### UNIQUE SMITH METER ULTRA 6C FEATURES

- » **Custody Transfer Accuracy** – +/-0.15 % linearity over normal flow range. Meets OIML R117 and API requirements for custody transfer.
- » **Diagnostic Compensation** – Six path configuration provides diagnostic compensation to measure and correct for the presence of crossflow and swirl in the flowing fluid.
- » **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.



#### APPLICATIONS

Measurement of refined petroleum products and crude oils for:

- » Custody transfer
- » Line integrity
- » Loading and unloading terminals
- » Offshore FPSO and platforms
- » Inventory control
- » Allocation
- » Line balancing

#### PRINCIPLE OF OPERATION

The **Ultra 6c** 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 6c** transducers are non-intrusive and flush-mounted ensuring low maintenance requirements and no obstructions to full bore transit through the pipe. The transducer element is fully encapsulated in a removable well, allowing it to be serviced with the meter under pressure.

#### 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	m <sup>3</sup> /h	bph	m <sup>3</sup> /h	bph	m <sup>3</sup> /h	bph	m <sup>3</sup> /h
4	100	60	8.9	190	30	1,900	300	2,580	410
6	150	126	20	420	67	4,210	670	5,910	940
8	200	220	35	730	116	7,300	1,160	10,300	1,630
10	250	350	55	1,150	183	11,500	1,830	16,100	2,560
12	300	500	80	1,650	263	16,500	2,630	23,100	3,680
16	400	820	130	2,670	424	26,700	4,240	37,400	5,940
20	500	1,260	200	4,250	676	42,500	6,760	59,500	9,460
24	600	1,890	300	6,200	986	62,000	9,860	86,800	13,800
30	750	2,960	470	9,810	1,560	98,100	15,600	137,100	21,800

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

### Linearity

+/- 0.15% over the normal flow range with recommended installation.<sup>1</sup>

### 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 6c has been tested and verified to, Welmec 7.2 recommendations, and OIML R117-1 performance specifications.

<sup>1</sup> **Performance** shown for a Dynamic Turndown (TD) under 100:1 and/or Reynolds Number (Re No) is above 8,000. 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 m<sup>3</sup>/h) / (meter size in inches x viscosity in cSt)

## Viscosity Range (cSt<sup>2</sup>)

### Minimum Viscosity:

Standard: 0.5; Extended Consult Factory

MAXIMUM VISCOSITY		
Meter Size (in)	Standard	Extended <sup>3</sup>
4	430	Consult Factory
6	1,225	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 temperature<sup>4</sup>:

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 mm<sup>2</sup>/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

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 commands:

### 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 data

### 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**

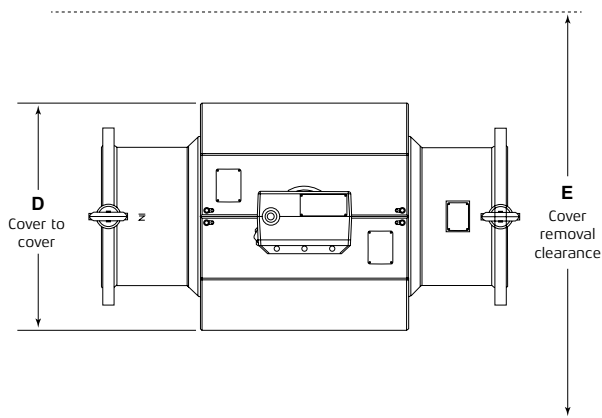
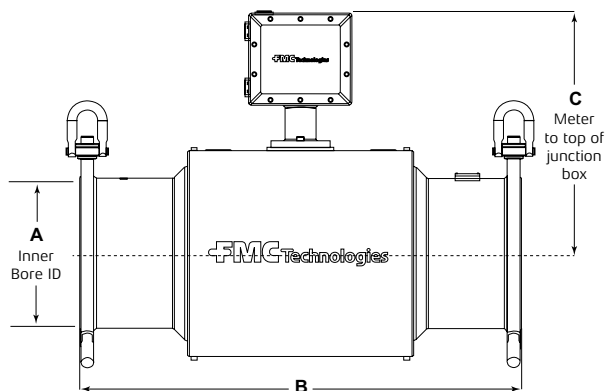
CRN certificates available, consult factory

#### **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"	27.5" (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"	27.5" (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.

1 - Measurement bore ID

## 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 (1194)
24"	21.562" (547.7)	52.6" (1,337)	26.6" (675)	35.2" (893)	71" (1,803)	3,776 (1713)
30"	27.5" (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.

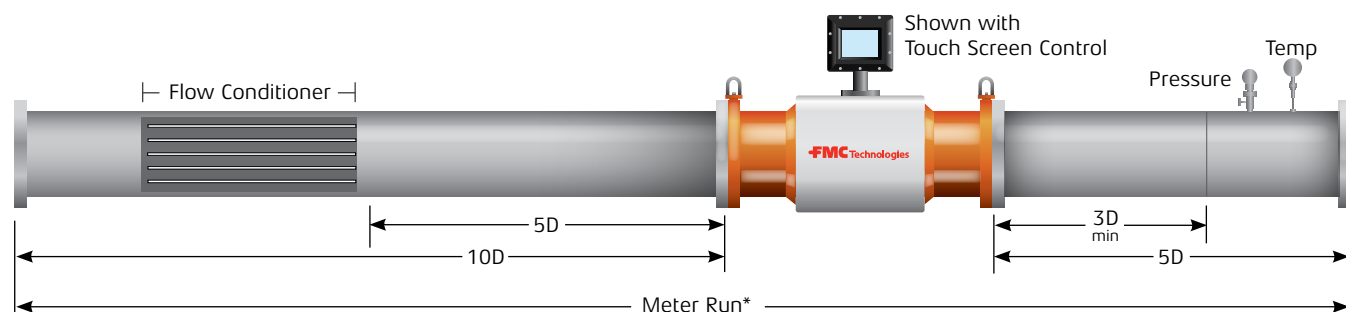
### ASME Class 900 Flanges and RTJ Flanges

Consult factory for all sizes.

## RECOMMENDED INSTALLATION

For optimum performance, the flow meter installation should be designed to minimize excessive flow profile variation and swirl from entering the meter. 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.

With the use of a flow conditioner, the upstream meter run recommendation is 10D, with 5D minimum distance from the flow conditioner outlet to the meter inlet. Without the use of a flow conditioner, recommended upstream meter run is 15D straight length from a concentric reducer or 20D straight length from a single elbow. Downstream meter run should be 5D of straight run with or without a flow conditioner. Consult factory for installations with a partially open valve, a pump, or double elbows out of plane within 30D of the upstream meter run entrance.



\* 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
6	S	0	6	1	1	S	S	B	C	-	4	0

**Position 1:** Code

6 – Ultra 6c

**Position 2:** Certification

S – Standard: UL/CUL; ATEX; IEC Ex

**Positions 3 and 4:** Diameter<sup>1</sup>

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:** Transducer<sup>2</sup>

- 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)

1 - For other sizes or custom ID, consult factory.

2 - "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 1, 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

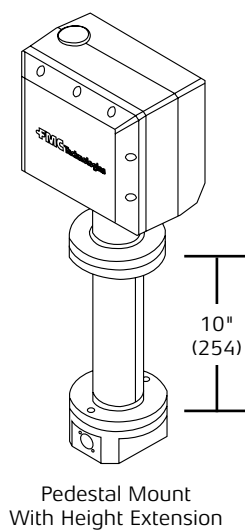
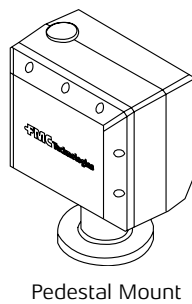
**Position 7:** Housing Cover

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)

	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
TCI	E	A	S	N	S

**Position 1:** Hazardous Location Certification

E – Explosion Proof Certification UL, C-UL, ATEX, IEC-Ex Class 1, 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

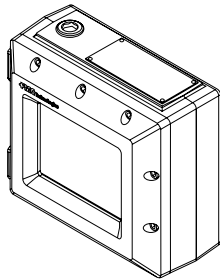
**Position 4:** Housing Entrances

M – M20 Thread  
N – ½" NPT Thread

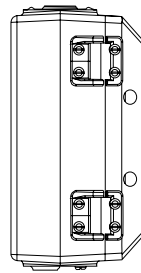
**Position 5:** Software

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 m<sup>3</sup>/h)
- » Viscosity capability up to 500 cSt (mm<sup>2</sup>/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 m<sup>3</sup>/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 m<sup>3</sup>/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 no. 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.





**We put you first.  
And keep you ahead.**

**Revisions included in SSSL004 rev. 0.3 (11/15):**

Total Revision.

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.

Contact information is subject to change. For the most current contact information, visit our website at [www.fmctechnologies.com/measurementsolutions](http://www.fmctechnologies.com/measurementsolutions) and click on the "Contact Us" link in the left-hand column.