

Ultra™ 4c

Bulletin SSLS003 Issue/Rev. 0.3 (11/15)

Smith Meter® Liquid Ultrasonic

The **Smith Meter® Ultra™ 4c Liquid Flowmeter** is a four path ultrasonic meter for custody transfer measurement of petroleum products. The meter provides highly accurate measurement over a range of light to medium crude oils and refined products using an exclusive four path design.

Unique Ultra™ 4c Features

- **Custody Transfer Accuracy** – +/-0.15% linearity over normal flow range. Meets OIML R117 and API requirements for custody transfer.
- **Efficient design** – Four measurement paths yield custody transfer accuracy in an efficient, cost effective design.
- **Light to medium crude oils and refined products** – Ideal solution for the accurate measurement of light to medium viscosity products.
- **Accuracy and Stability** – Transducer path arrangement optimized for flow measurement accuracy and stability.

Principle of Operation

The **Ultra 4c** 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 4c** 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
- Pipe line integrity
- Loading and unloading terminals
- Offshore FPSO and platforms
- Line integrity
- Inventory control
- Allocation
- Line balancing
- NGL and LPG

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.

Ultra™ Series Features (continued)

- **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 ³ /h	bph	m ³ /h	bph	m ³ /h	bph	m ³ /h
4	100	60	8.9	190	30	1,900	300	2,580	410
6	150	126	20	420	67	4,200	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

* For larger sizes consult factory.

Linearity

+/- 0.15% over the normal flow range¹

Uncertainty

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

Repeatability

+/-0.02%

Normal Viscosity Range

0.5 to 20 cSt. For extended ranges see chart.

Weights & Measures Approvals and Compliance

MID (MI-005 of the Directive 2014/32/EU)

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 4c has been tested and verified to, Welmec 7.2 software recommendations, and OIML R117-1 performance specifications.

Extended Viscosity Range (cSt²)

Meter Size (in)	Extended ³
4	430
6	310
8	880
10	670
12	3,400
16	2,510
20	1,910
24	1,500
30	1,075

¹ Consult Factory for operation at Reynolds No. below 10,000 or if application operates in the extended flow or viscosity ranges.

² 1 cSt = 1 mm²/s

³ Consult factory for extended viscosity applications.

Fluid Velocity Range

1 to 10 m/s. (3.3 to 33 ft/s). Extended 0.3 to 14 m/s (1.0 to 46 ft/s)

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
- Estimation of Reynolds number
- Correction for body temperature and pressure expansion

Fluid Properties 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.*

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.

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

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 μ m 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

120 Ω 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 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: > 66 μ s (50% duty cycle nominal)

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

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

12 VDC external power supply for pulse output circuitry: No Load: 11 \pm 0.3 Vp-p square wave.

270 Ω Load: 6 \pm 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

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

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)

Remote Mounted Display: Touch Screen 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)

Pressure Safety Information

ASME

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

CRN

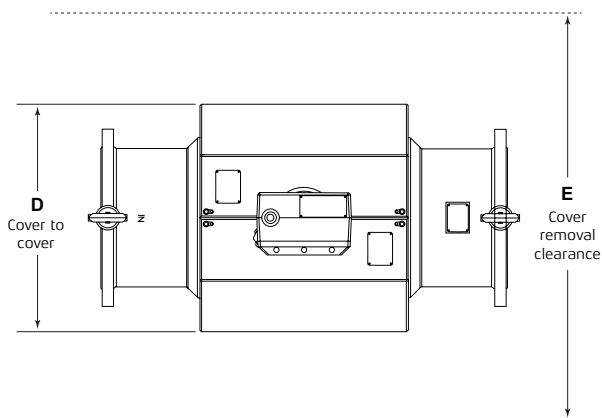
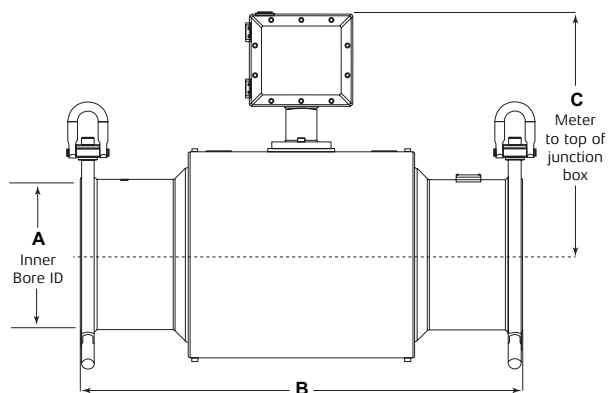
CRN certificates available, consult factory

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" (1,100)	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 (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.

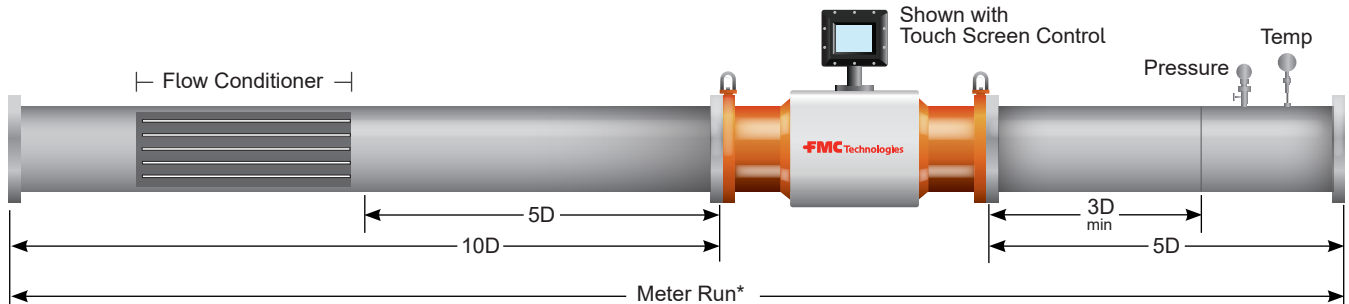
ASME Class 900 Flanges and RTJ Flanges

Consult factory for all sizes.

Recommended Installation

With the use of a flow conditioner, a 10D upstream spool is recommended with the flow conditioner outlet at least 5D from the meter inlet. Without the use of a flow conditioner, at least 20D of straight run is recommended from the nearest piping blend. Downstream straight run is 5D with or without flow conditioning. Consult factory for installations with a partially open valve, pump, or double elbows out of plane within 30D of the meter run inlet.

In addition, both upstream and downstream meter runs 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.



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

Position 1: Code

4 – Ultra 4c

Position 2: Hazardous Locations Certifications

S – Standard: UL/CUL; ATEX; IECEx

Positions 3 and 4: Diameter⁵

04" 24"
 08" 30"
 10"
 12"
 16"
 20"

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

⁵ For other sizes or custom ID, consult factory. Standard bored match ID is Sch. 40.

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

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 Ex e Junction Box (ATEX or IECEx only)

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

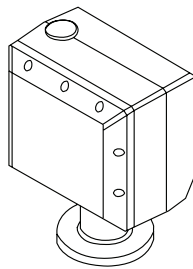
T – 5.7" Touch Screen (Position 3 option P or H only)*

Position 8: Additional Communication Options

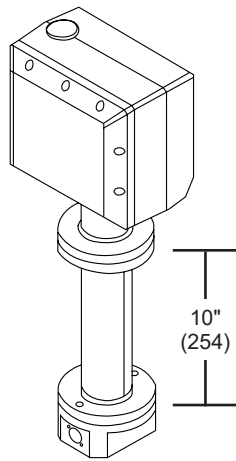
0 – None

1 – HART

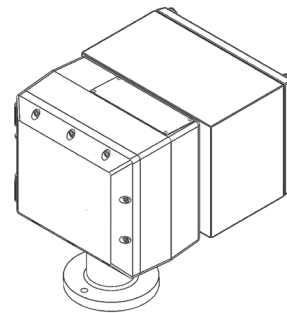
Model	Options and Option Combinations	Maximum Power (Based on Estimates)
UMC - E - (A or S) - (P, H, or E) - (M or N) - S - 0 - T - (0 or 1)	UMCB board assembly (with display)	14.2W
UMC - E - (A or S) - (P, H, or E) - (M or N) - S - 0 - B - (0 or 1)	UMCB board assembly (without display)	6W



Pedestal Mount



Pedestal Mount
With Height Extension



Pedestal Mount
with Exe Junction Box

* 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, IECEx 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

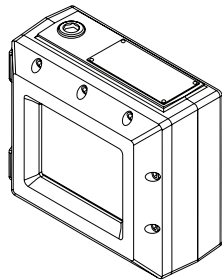
Position 4: Housing Entrances

M – M20 Thread
N – 1/2" NPT Thread

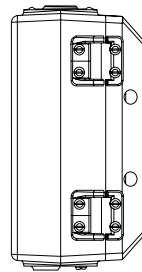
Position 5: Software

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

Revisions included in SSLS003 rev. 0.3 (11/15):
Total revision.
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.