

Ultra High Purity Immersible Thermal Gas Mass Flow Meter

FEATURES

- The ultra high purity meters are constructed of 316L electro-polished stainless-steel with a 7 to 10 Ra (0.18 to 0.25 Ra (µm)) interior finish
- Direct mass flow monitoring eliminates need for separate temperature and pressure inputs
- Built-in flow conditioner which eliminates velocity-profile distortions caused by upstream disturbances
- Field adjustment of critical flow meter settings via on-board switches or Smart Interface™ (RS-232)
- Field validation of flow meter calibration
- Outstanding rangeability
- One-second response to changes in flow rate
- FM, ATEX and CSA certified for hazardous areas
- CE approved
- Digital Communications: Modbus

780S Ultra High Purity



DESCRIPTION

Sierra Instruments' ultra high purity (UHP) 780S immersible thermal gas mass flow meters are the instruments of choice for gas distribution service in semiconductor fabs, pharmaceutical production and other ultra-clean processes. UHP meters are constructed of 316L electro-polished stainless-steel with a 7 to 10 Ra interior finish.

The versatile microprocessor-based transmitter integrates the functions of flow-range adjustment, meter validation and diagnostics in either a probe-mounted or remote housing. Mass flow rate and totalized flow, as well as other configuration variables, are displayed on the optional 2 x 12 LCD display. The programmable transmitter is easily configured via an RS-232 communication port and Sierra's Smart Interface™ software, or via the display and magnetic switches on the instruments display.

The 780S smart electronics allow you to easily configure the following performance parameters: flow range, reset totalizer, alarm settings, time response, low flow cut-off and a calibration correction factor. The Smart Interface™ also allows for field validation of flow meter performance and calibration.

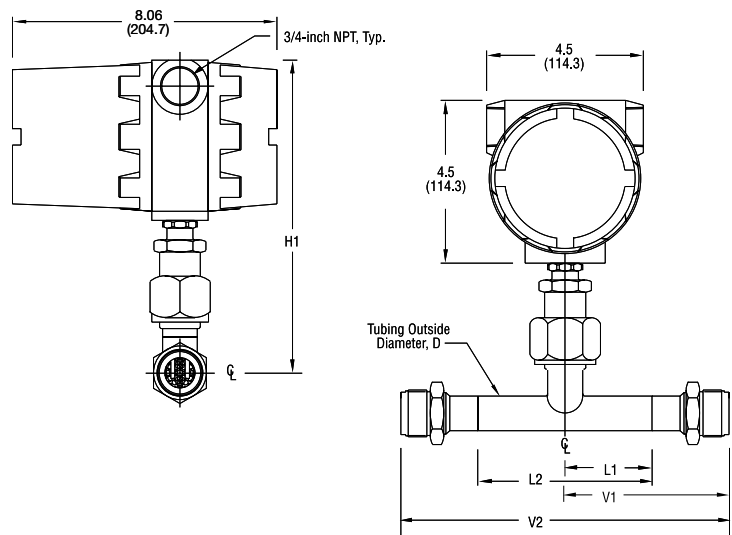
The 780S has a built-in flow conditioning which eliminates velocity-profile distortions caused by upstream disturbances.

The meter is FM, ATEX and CSA approved for operation in hazardous areas and is available with a variety of input power, output signal, mounting and packaging options.



DIMENSIONAL SPECIFICATIONS

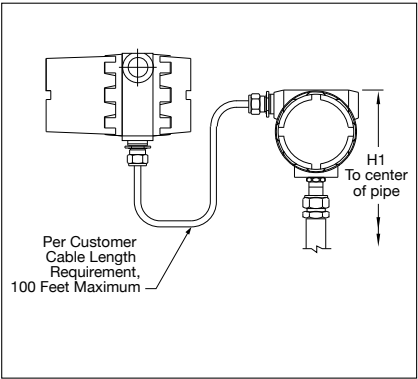
1 Through 6-inch 780S UHP (E2)



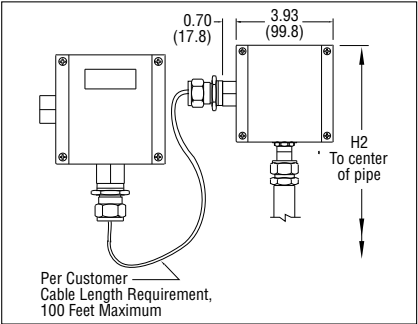
780S Uhp Dimensions							
TUBING SIZE	GENERAL		BUTT WELD		VCR		TUBE WALL
	H1	H2	L1	L2	V1	V2	
.375 (9.5)	10.30 (262)	10.20 (259)	2.98 (72.4)	5.70 (144.8)	3.48 (88.4)	6.96 (176.8)	.035 (0.9)
.500 (12.7)	10.40 (264)	10.20 (259)	2.90 (73.7)	5.80 (147.3)	4.00 (101.6)	8.00 (203.2)	.049 (1.2)
1.00 (25.4)	9.10 (231.1)	9.20 (234)	2.50 (63.5)	5.00 (127)	4.72 (119.9)	9.44 (239.8)	.065 (1.7)
1.50 (38.1)	9.10 (231.1)	9.30 (131.3)	2.00 (50.8)	5.50 (139.7)	—	—	.065 (1.7)
2.00 (50.8)	10.90 (276.9)	10.80 (183.1)	2.50 (63.5)	7.00 (177.8)	—	—	.065 (1.7)
3.00 (76.2)	10.70 (271.8)	10.90 (178.1)	3.00 (76.2)	10.50 (226.7)	—	—	.065 (1.7)
4.00 (101.6)	10.70 (271.8)	10.90 (277)	4.00 (101.6)	14.00 (355.6)	—	—	.083 (2.1)

REMOTE 780S UHP SPECIFICATIONS

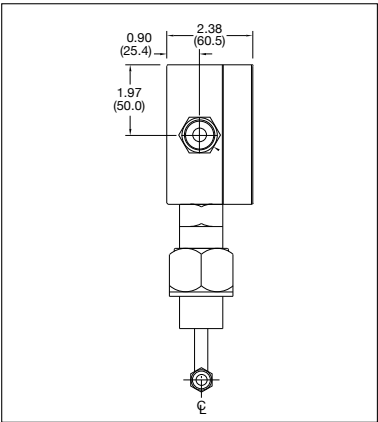
Remote Mounted with Junction Box (E4)



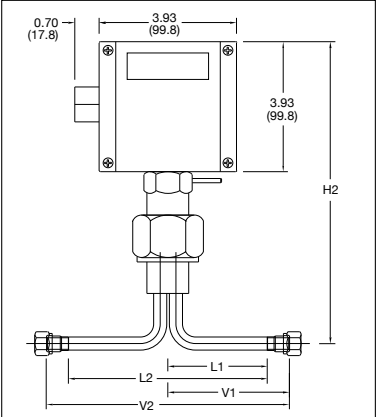
NEMA 4X Remote Mounted with Junction Box (N4)



3/8 & 1/2-inch 780S UHP—Side View (N2)



3/8 & 1/2-inch 780S UHP—Front View (N2)



Up Stream Straight Pipe Length Requirements(1) At 1 Atm		
PIPING CONDITION	3/8 AND 1/2-INCH 780SUHP ⁽²⁾	1 TO 4-INCH 780SUHP ⁽⁴⁾
Single 90° Elbow or T-Piece	1D	1D
Reduction (4:1)	1D	3D
Expansion (4:1)	3D	3D
After Control Valve	3D	3D
Two 90° Elbows (In Same Plane)	3D	3D
Two 90° Elbows (Different Planes)	5D	5D

- Notes: (1) Number of diameters (D) of straight pipe required between upstream disturbance and the flow meter.
(2) Requires 1D of straight pipe downstream of the flow meter.
(3) Requires 3D of straight pipe downstream of the flow meter.
(4) Requires 0D of straight pipe downstream of the flow meter.
(5) Consult factory for pressure effect.

PERFORMANCE SPECIFICATIONS

Accuracy

+/- 1% of reading + 0.5 % of full scale

Repeatability

+/- 0.2% of full scale

Temperature Coefficient

+/- 0.02% of reading per °F within +/- 50° F of customer specified conditions

+/- 0.03% of reading per °F within +/- 50° F to 100° F of customer specified conditions

+/- 0.04% of reading per °C within +/- 25° C of customer specified conditions

+/- 0.06% of reading per °C within +/- 25° C to 50° C of customer specified conditions

Pressure Coefficient

.02% per psi for air, consult factory for other gases

Response Time

One second to 63% of final velocity value

Gases

Argon, helium, hydrogen, nitrogen, oxygen (consult factory for other gases)

OPERATING SPECIFICATIONS

Gas Pressure

Mechanical design pressure:

500 psig (34.5 barg)

Gas & Ambient Temperature

Gas -40° F to 250° F (-40° C to 120° C)

Ambient -40° F to 120° F (-40° C to 50° C)

Note: ATEX units have a minimum Gas and Ambient Temperature rating of -4°F (-20°C). For gas temperatures >149°F (65°C) a remote E3 (RFQ) Electronics Enclosure must be used.

Leak Integrity

5 X 10⁻⁹ cc/sec of helium maximum

Power Requirements

18 to 30 VDC (regulated), 625 mA maximum (ATEX 18 to 24 VDC)

100 to 240 VAC, 50/60 Hz, 15 watts maximum

Output Signal

Linear 0–5 VDC or 0-10 VDC proportional to mass flow rate,

1000 ohms minimum load resistance or

Linear 4–20 mA proportional to mass flow rate,

700 ohms maximum resistance power supply dependent User-selectable.

Active non-galvanically separated or passive galvanically separated (loop powered)

See Digital Communications options below

Alarms

Hard contact user-adjustable high and low

Dead band adjustable with Smart Interface™ software

Relay ratings: Maximum 400 VDC or VAC (peak), 140 mA

Displays

Alphanumeric 2 x 12 digit backlit LCD

Adjustable variables via on-board switches (password protected) or with Smart Interface™ software

Adjustable variable; Full scale (50 to 100 %)

Time Response (1 to 7 seconds)

Correction factor setting (0.5 to 5)

Zero and span

Totalizer

Seven digits (9,999,999) in engineering units

Resettable by software, on-board switches or external magnet

SOFTWARE

Smart Interface™ Windows®-based software

Minimum 8 MB of RAM, preferred 16 MB of RAM

RS-232 communication

Additional features: Alarm dead band adjustment

Zero cut-off adjustment

Linearization adjustment

Save / Load configurations

Flow meter validation

DIGITAL COMMUNICATIONS

Pulse (not available with E2/E4-NR)

Modbus RTU (not available with P3 option)

PHYSICAL SPECIFICATIONS

Wetted Materials

316L stainless steel

UHP: 7 to 10 Ra internal finish

Enclosure

Hazardous-Area location enclosure (IP66) or NEMA 4X (IP65)

Both are powder-coated cast aluminum

Electrical Connection

Two 3/4 inch NPT . . . Hazardous-Area location enclosure (IP66)

One 1/2 inch NPT . . . NEMA 4X Enclosure (IP65)

Certifications

CE

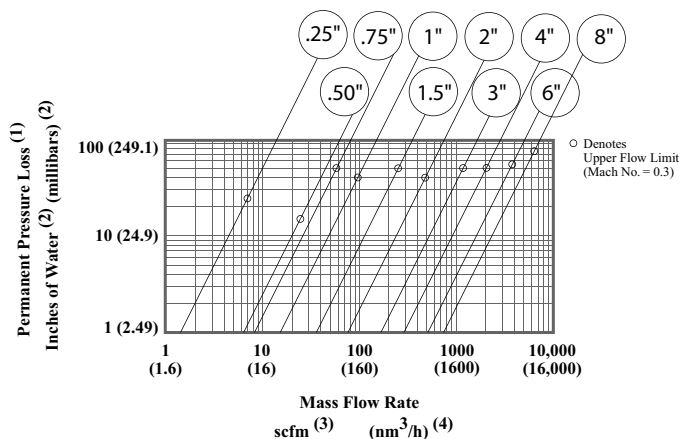
ATEX (II 2G Ex db IIB+H2 T6...T2 Gb / II 2D Ex tb IIIC T85 °C...T226°C Db)

CSA (Class I, Groups B, C and D T3; Class II, Groups E, F and G T3)

FM (Explosionproof for Class I, Division 1, Groups B, C and D; Dust-ignitionproof for Class II, Division 1, Groups E, F and G hazardous (classified) locations, indoors and outdoors (Type 4X). Ambient Temperature Ta = -40°C to +50°C)

IP65, NEMA 4X T6 -40° C to 50° C ambient

PRESSURE DROP



Notes:

(1) For air and nitrogen at 20 °C temperature and 1 atmosphere pressure.

(2) 1 inch of water at 60 °F = 0.0361 psi.

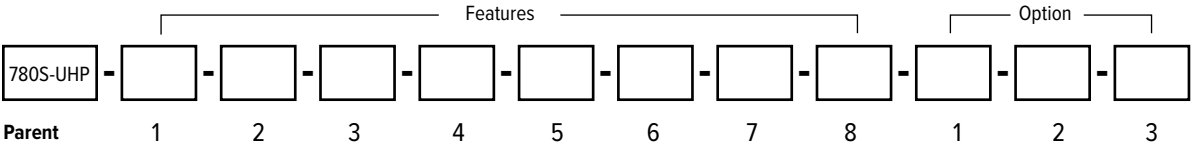
1 millibar = 0.001 bar = 100 pascal = 0.0145 psi.

(3) At base conditions of 21.1 °C temperature and 1 atmosphere pressure.

(4) At base conditions of 0 °C temperature and 1 atmosphere pressure.

(5) Built-in flow conditioner consists of two separate perforated plates in series.

ORDERING THE MODEL 780S UHP



Instructions: To order a 780S UHP please fill in each number block by selecting the codes from the corresponding features and options below and following pages.

Parent Model	
780S-UHP	Ultra High Purity In-Line Mass Flow Meter with built-in flow conditioner and all 316SS construction. Includes "Smart Electronics" with PC configuration software.

Note: The following lists standard product. Contact Sales to submit RFQs for specials.

Feature 1c: Body Size UHP			
UB038	UHP 0.375 inch tube O.D. butt weld prep	UB300	UHP 3 inch tube O.D. butt weld prep
UB050	UHP 0.50 inch tube O.D. butt weld prep	UB400	UHP 4 inch tube O.D. butt weld prep
UB100	UHP 1 inch tube O.D. butt weld prep	UV038	UHP 0.375 inch tube O.D. female VCR fittings
UB150	UHP 1.5 inch tube O.D. butt weld prep	UV050	UHP 0.50 inch tube O.D. female VCR fittings
UB200	UHP 2 inch tube O.D. butt weld prep	UV100	UHP 1 inch tube O.D. male VCR fittings

Feature 2: Electronics Enclosure	
E2	Hazardous-area location enclosure (IP66) mounted directly on probe
E4	Remote Hazardous-Area Location Enclosure (IP66) with Junction Box. Cable sold separately.
N2	NEMA 4X (IP65) enclosure. Mounted directly on probe
N4	Remote NEMA 4X (IP65) Enclosure with Junction Box. Cable sold separately.

Feature 3: Input Power	
P2	18-30 VDC (ATEX 18-24 VDC)
P3	100–240 VAC. Not available with EN enclosures.

Feature 4: Output	
V1	0–5 VDC, linear
V3	0-10 VDC, linear
V4	4-20 mA, linear (default)

Feature 5 : Display	
NR	No Readout
DD	Digital display, 2 lines x 12 digits, backlit LCD

Feature 6 : Digital Communications	
XX	None.
P1	Totalizer pulse output (available on N2/N4 enclosures or on E2/E4 enclosures with DD)
MB	Modbus RTU. DC power (P2) required. Not available with CSA approvals.

Feature 7: Approvals	
NA	Non-agency approved meter
AT	780S with ATEX Approval. Requires E2 or E3 (RFQ) enclosure. E3 (RFQ) required for gas temperatures >149°F (65°C).
FM	780S with FM approval. Requires E2 or E4 enclosure
CS	780S with CSA approval. Requires E2 or E4 enclosure

Note: ATEX units have circuit energy limitations that limit maximum flows to approx. 50% of non-ATEX units. Consult gas tables for actual values.

Feature 8: Calibration (Gas)	
00	Air
01	Argon
02	Carbon dioxide
03	Chlorine ¹
04	Digester gas
05	Digester gas ¹
06	Helium
07	Hydrogen
08	Methane
09	Methane ¹
10	Nitrogen
11	Oxygen ¹
12	Propane
13	Propane ¹
14	Ammonia ¹
99	Other--Consult Factory Gas Table

¹Correlation calibration - consult Gas Table for accuracy.
Note: Consult Product Data Sheet for flow rate, pressure, and temperature limits.

Option 1 : Non-Resettable Totalizer	
NRT	Totalizer cannot be reset in the field.

Option 3: O2 Cleaning	
O2C	Flow meter cleaned and bagged for oxygen (O2) service. Meters up to 4 inches. Includes inspection certificate.

Option 2: Remote Cable	
C010	Remote cable, 10-foot length, 20AWG
C025	Remote cable, 25-foot length, 20AWG
C050	Remote cable, 50-foot length, 16AWG
C100	Remote cable, 100-foot length, 16AWG



Measurably Different.®



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