Smart Ultra High Purity Thermal Gas Mass Flow Meter

780S Ultra High Purity Series

Features

- **Measures mass flow directly, no separate temperature or pressure inputs required**
- **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, CSA and EEx certified for hazardous areas**
- **CE approved**

Description

Sierra Instruments' Series 780S UHP gas mass flow meters are the instruments of choice for gas distribution service in semiconductor fabs, pharmaceutical production and other ultra-clean processes. The Ultra High Purity meters are constructed of 316L electro-polished, stainless-steel with a 7-10 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 meter's optional 2 x 12 LCD panel. The programmable transmitter is easily configured via RS-232 communication port and Sierra's Smart Interface™ software, or via the display and magnetic switches on the instrument panel.

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

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

SIERRA® INSTRUMENTS
THE MASS FLOW COMPANY

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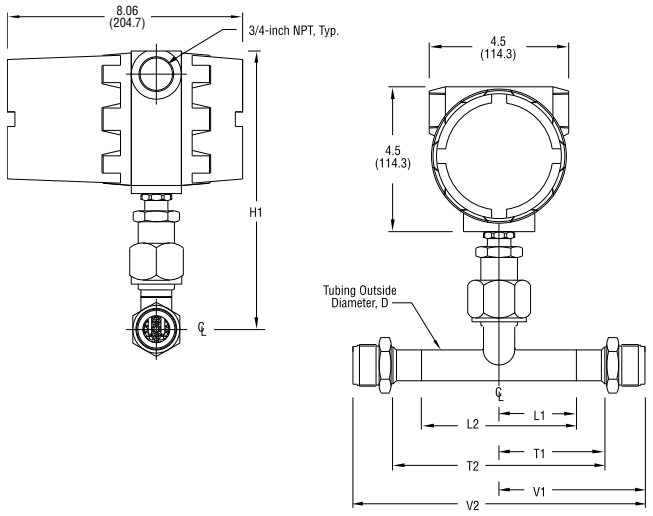
ISO REGISTERED 9001

Dimensional Specifications

1 Through 6-inch 780S UHP (E2)



780S UHP DIMENSIONS									
TUBING	GENERAL			BUTT WELD		TRI-CLAMP		VCR	TUBE
SIZE	H1	H2	L1	L2	T1	T2	V1	V2	WALL
.375 (9.5)	10.30 (262)	10.20 (259)	2.85 (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)	3.00 (76.2)	6.00 (152.4)	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)	2.50 (63.5)	6.50 (165.1)	—	—	.065 (1.7)
2.00 (50.8)	10.90 (276.9)	10.80 (183.1)	2.50 (63.5)	7.00 (177.8)	3.00 (76.2)	8.00 (203.2)	—	—	.065 (1.7)
3.00 (76.2)	10.70 (271.8)	10.90 (178.1)	3.00 (76.2)	10.50 (266.7)	3.50 (88.9)	11.50 (292.1)	—	—	.065 (1.7)
4.00 (101.6)	10.70 (271.8)	10.90 (277)	4.00 (101.6)	14.00 (355.6)	4.62 (116.8)	15.25 (387.4)	—	—	.083 (2.1)
6.00 (152.4)	12.70 (322.6)	11.90 (302)	6.00 (152.4)	21.00 (533.4)	—	—	—	—	.109 (2.8)

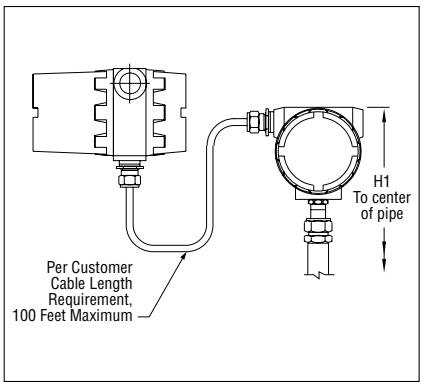
UPSTREAM STRAIGHT PIPE LENGTH REQUIREMENTS(1) AT 1 ATM		
Piping Condition	3/8 and 1/2-inch 780SUHP(2)	1 to 6-inch 780SUHP(4)
Single 90° Elbow or T-Piece	1D	1D
Reduction (4:1)	1D	3D
Expansion (4:1)	3D	3D
After Control Valve	3D	3D
Two 90° Elbows (In Same Plane)	3D	3D
Two 90° Elbows (Different Planes)	5D	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.

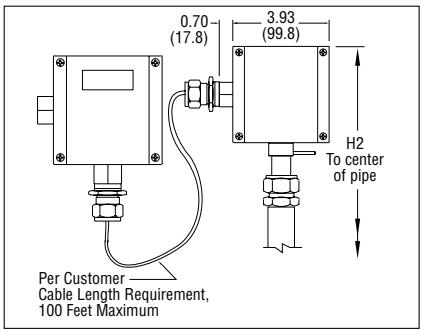
All dimensions are inches. Millimeters are in parentheses. Certified drawings are available on request.

Remote 780S UHP Specifications

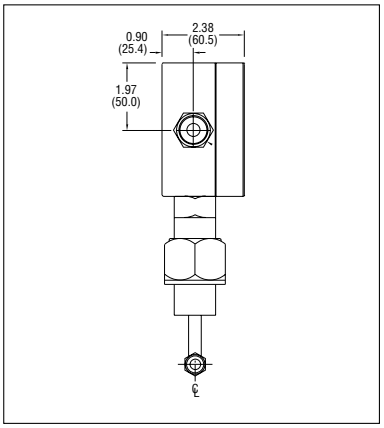
Remote Mounted with Junction Box (E4)



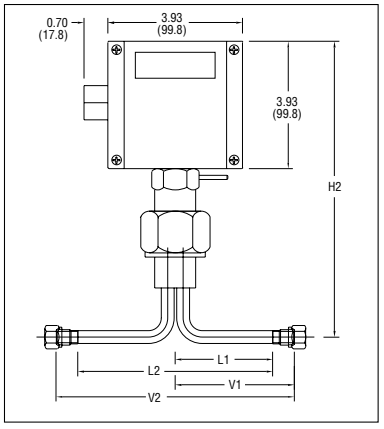
NEMA 4X Remote Mounted with Junction Box (EN4)



3/8 & 1/2-inch 780S UHP–Side View (EN2)



3/8 & 1/2-inch 780S UHP – Front View (EN2)



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

Operating Specifications

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

Gas Pressure
Mechanical design pressure:
Compression fittings: 500 psig (34.5 barg)

Gas & Ambient Temperature
Gas . . . . . 40° F to 450° F (-40° C to 120° C)
Ambient . . . . . -5° F to 120° F (-20° C to 50° C)

Leak Integrity
5 X 10^{-9} cc/sec of helium maximum

Power Requirements
18 to 30 VDC (regulated), 625 mA maximum
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 power rired)

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 variables. . 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

Physical Specifications

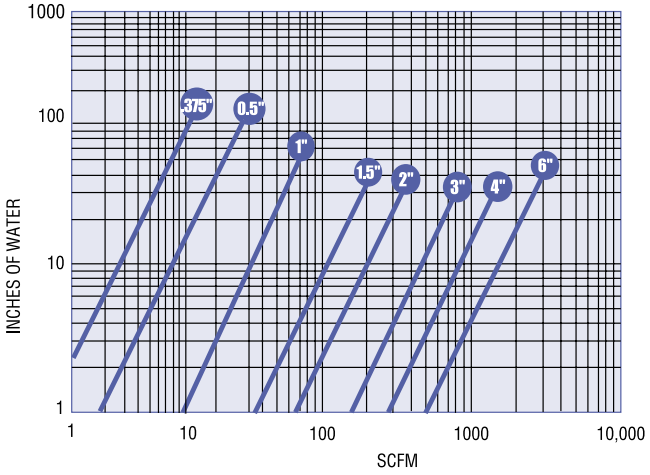
Wetted Materials
316L stainless steel
UHP . . . . . 7 to 10 Ra internal finish

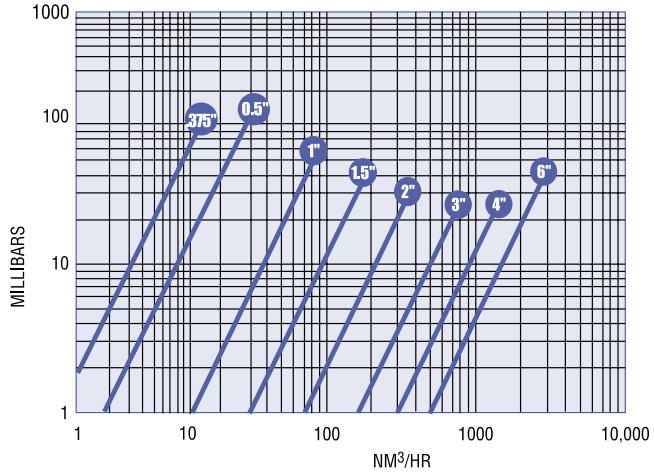
Enclosure
Hazardous-Area Location Enclosure (IP67) or NEMA 4X (IP65)
Both are powder-coated cast aluminum

Electrical Connection
Two 3/4 inch NPT. . . Hazardous-Area Location Enclosure (IP67)
One 1/2 inch NPT. . . NEMA 4X Enclosure (IP65)

Certifications
CE (All enclosures)
CSA (Explosion proof for Class I, Division 1, Groups B, C, D)
EEx (EEx d IIC T6…T2) Cenelec
FM (Explosion proof for Class I, Division 1, Groups B, C, D)
Hazardous-Area Location Enclosures must be specified for CSA, EEx or FM approved products.

Pressure Drop for 780S UHP





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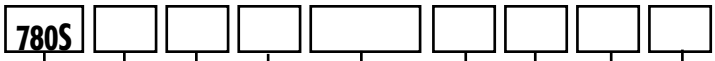
Ordering the Model 780S UHP



PARENT MODEL NUMBER

780S	Ultra High Purity In-Line Mass Flow Meter with built-in flow conditioner

AGENCY APPROVALS

NAA	Non-Agency Approved Meter
CSA	Explosion Proof for Class I, Division 1, Groups B, C, D
EEx	EEx d IIC T6…T2 Cenelec (Requires E3 encosure)
FM	Explosion Proof for Class I, Division 1, Groups B, C, D

RA FINISH

UHP	7–10 Ra Internal Finish

MOUNTING

BW1	3/8-inch Tube O.D. Butt Weld Prep
VCR1	3/8-inch Tube O.D. Female VCR Fitting
BW2	1/2-inch Tube O.D. Butt Weld Prep
VCR2	1/2-inch Tube O.D. Female VCR Fitting
BW4	1-inch Tube O.D. Butt Weld Prep
VCR4	1-inch Tube O.D. Male VCR Fitting
TR4	1-inch Tube O.D. Tri-Clamp Connection
BW5	1.5-inch Tube O.D. Butt Weld Prep
TR5	1.5-inch Tube O.D. Tri-Clamp Connection
BW6	2-inch Tube O.D. Butt Weld Prep
TR6	2-inch Tube O.D. Tri-Clamp Connection
BW7	3-inch Tube O.D. Butt Weld Prep
TR7	3-inch Tube O.D. Tri-Clamp Connection
BW8	4-inch Tube O.D. Butt Weld Prep
TR8	4-inch Tube O.D. Tri-Clamp Connection
BW9	6-inch Tube O.D. Butt Weld Prep (Available in HP Finish Only)

ENCLOSURES

E2	Hazardous-Area Location Enclosure
E3(ft)	Remote Hazardous-Area Location Enclosure (Required with EEx Meters)
E4(ft)	Remote Hazardous-Area Location Enclosure with Junction Box
EN2	NEMA 4X
EN4(ft)	Remote NEMA 4X with Junction Box
	Specify Cable Length in Parentheses, Maximum 200 feet (60 m), Length in Feet using 5 ft. increments to 20 ft., 10 ft. increments to 200 ft.

INPUT POWER

P2	19–30 VDC
P3	100–240 VAC (Not Available on EN Enclosures)

OUTPUT SIGNAL

V1	0–5 VDC, Linear
V3	0–10 VDC, Linear
V4	4–20 mA, Linear

DISPLAY

NR	No Readout
DD	Digital Display

GAS CODE

0	Air
1	Argon
2	CO_2
6	Helium
7	Hydrogen
10	Nitrogen
11	Oxygen (Correlation)
99	Other

ACCESSORIES (CONSULT FACTORY)

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