Smart Ultra High Purity Thermal Gas Mass Flow Meter

Features

- Measures mass flow directly, no separate temperature or pressure inputs required
- Built-in flow conditioner which eliminates velocity-profile distortions caused by upstream disturbances
- The Ultra High Purity meters are constructed of 316L electro-polished, stainless-steel with a 7-10 Ra interior finish
- 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 ATEX certified for hazardous areas
- CE approved
- PED available





For information online...
www.sierrainstruments.com



Description

ierra Instruments' ultra high purity (UHP) model 780S 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 7-10 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 display 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.

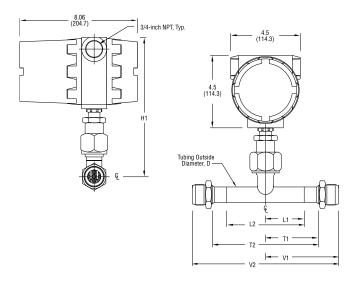
Model 780S smart electronics allow you to easily configure the following performance parameters: flow range, reset totalizer, alarm settings, time response, low flow cut-off and a calibration correction factor. The smart interface also allows for field validation of flow meter perfomance and calibration.

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

The meter is FM, CSA, ATEX and PED 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	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)	

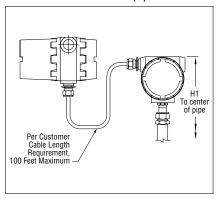
UPSTREAM STRAIGHT PIPE LENGTH REQUIREMENTS ⁽¹⁾ at 1 atm								
Piping Condition	3/8 and 1/2-inch 780SUHP ⁽²⁾	1 to 6-inch 780SUHP ⁽⁴⁾						
Single 90° Elbow or T-Piece	1D	1D						
Reduction (4:1)	1D	3D						
Expansion (4:1)	3D	3D						
After Control Valve	3D	3D						
Two 90° Elbows (In Same Plane)	3D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

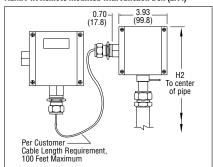
- (2) Requires 1D of straight pipe downstream of the flow meter.
- (3) Requires 3D of straight pipe downstream of the flow meter.
- (4) Requires 0D of straight pipe downstream of the flow meter.
- (5) Consult factory for pressure effect.

Remote 780S UHP Specifications

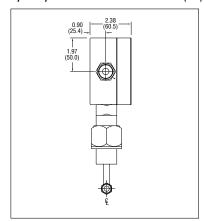
Remote Mounted with Junction Box (E4)



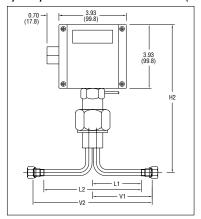
NEMA 4X Remote Mounted with Junction Box (EN4)



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



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



Performance Specifications

+/- 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

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

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 (All enclosures)

CSA (Explosion proof for Class I, Division 1, Groups B, C, D)

ATEX (II 2 GD Ex d IIC T6 ... T2

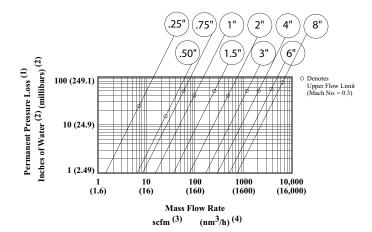
IP 66 T70 °C ... T280 °C)

FM (Explosion proof for Class I, Division 1, Groups B, C, D; dust-ignition proof for

Class II, III, Division 1, Groups E, F, G) IP66, NEMA 4X T6 -40° C to 70° C ambient

PED optional

Pressure Drop for 780S UHP





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.

| 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 $\,0\,^{\rm O}{\rm C}$ temperature and 1 atmosphere

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

Ordering the Model 780S UHP PARENT MODEL NUMBER Ultra High Purity In-Line Mass Flow Meter with built-in flow conditioner AGENCY APPROVALS NAA Non-Agency Approved Meter Explosion Proof for Class I, Division 1, Groups B, C, D CSA **ATEX** II 2 GD Ex d IIC T6 ... T2 IP 66 T70 °C ... T280 °C Explosion Proof for Class I, Division 1, Groups B, C, D FM **RA FINISH** 7-10 Ra Internal Finish UHP 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 1-inch Tube O.D. Butt Weld Prep VCR4 1-inch Tube O.D. Male VCR Fitting 1-inch Tube O.D. Tri-Clamp Connection BW5 1.5-inch Tube O.D. Butt Weld Prep 1.5-inch Tube O.D. Tri-Clamp Connection TR5 BW6 2-inch Tube O.D. Butt Weld Prep 2-inch Tube O.D. Tri-Clamp Connection TR6 BW7 3-inch Tube O.D. Butt Weld Prep 3-inch Tube O.D. Tri-Clamp Connection TR7 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 Remote Hazardous-Area Location Enclosure (Required with EEx Meters) E3(ft) E4(ft) Remote Hazardous-Area Location Enclosure with Junction Box EN₂ 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 P3 19-30 VDC 100-240 VAC (Not Available on EN Enclosures) **OUTPUT SIGNAL** 0-5 VDC, Linear 0-10 VDC, Linear V4 4-20 mA, Linear DISPLAY No Readout Digital Display GAS CODE Air 1 Argon CO_2 2 Helium 6 7 Hydrogen 10 Nitrogen 11 Oxygen (Correlation) Other 99 **OPTION 3 (CERTIFICATES) OPTION 1 (DIGITAL COMMUNICATIONS) OPTION 2 (PURGE)** Pressure Test Certificate **PULSE** Pulse (not avail. w/ E2-NR) **PURGE** Includes valve, tube and CC Certificate of Conformance MB MODBUS (not avail. w/ P3) purge nozzle. NC NACE Certificate Foundation Fieldbus (E2/P2 only) FF MC Materials Certificate PB Profibus (E2/P2 only) NC NACE Certificate