



ATMF-IL

Thermal Mass Flowmeter

ATMF Inline Series

GENERAL

Inline mass flowmeters from SmartMeasurement are thermal dispersion type, utilizing the constant temperature difference method of measuring gas mass flow rate. They contain two reference grade platinum RTD sensors clad in a protective SS #316 sheath. Features include direct mass flow measurement for gases, wide rangeability, low pressure drop, excellent low end sensitivity, and no moving parts. The SMC ATMF series is microprocessor-based and does not have any potentiometers. Electronics may be integral style, or remote type with both making use of a rugged windowed dual compartment enclosure. Four models are available ranging from the low cost blind meters to the more advanced SP models.


Calibration Self Check: Each meter has built in diagnostics - a display of the calibration milliwatts (mw) can be used to check the sensor's operation by being compared to the original reported "zero flow" value noted on meter's Certificate of Conformance (last few lines) and metallic tag. This convenient field diagnostic procedure verifies that the original factory calibration hasn't drifted, shifted, or changed. This "Sensor Functionality and Zero Self Check" also verifies that the sensor is free from contamination, even without inspection.



FEATURES

- Direct mass flow measurement of any gas with actual gas calibration
- Opto-isolated outputs, with graphic display
- Tracking of overall gas consumption over a turn down ratio of at least 100:1
- Available in SP (CSA, UL) and NH (Non-Hazardous) configuration
- High contrast photo-emissive OLED display with rate, total, temperature and graphic display
- User-selectable engineering units, dynamically converts the flow rate and total flow
- Can measure higher velocity than any other thermal mass meter - up to 203 m/s
- Display calibration milliwatt (mw) for ongoing diagnostics
- Standard software available with multi-curve fit programs
- Low power dissipation; under 2W
- Flow conditioners included with all meters

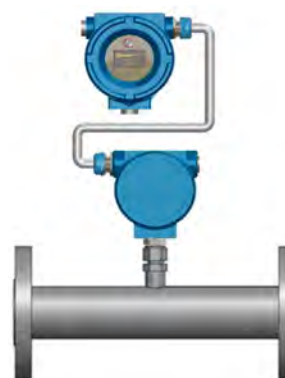
SPECIFICATIONS

• Process Connection:	Threaded, Flanged	• Housing protection:	NEMA 4, Class 1, Div 1, Groups B, C, & D
• Process temperature:	300°F (149°C)	• Ex-protection:	II 2 GD EEx d IIC T2 or T3
• Operating pressure:	1000 PSIG (69 Barg)		
• Mass Flow rate:	See model selection guide section	• Cable Length (remote version):	up to 300 meters
• Flow units:	Kg/hr, Kg/mn, Kg/s Lb/hr, Lb/m Lb/s NCMH, SCFM, NLPM, SLPM Mt/s, F/mn, BTU/Hr, BTU/min	• Wetted materials:	SS# 316 (Hastelloy, others optional)
• Gas temperature effect:	0.01% /°C	• Weight (approximate):	
• Accuracy (and linearity):	±[1% of Reading + (0.5% FS)]	Integral Type:	
• Repeatability:	± 0.25% of Full Scale	¼" to 1"	2.2 - 8.8 Lb (1 - 4 Kg)
• Turn down ratio:	Over 100:1	1¼" to 2½"	8.81 - 22 Lb (4 - 5 Kg)
• Response time:	Less than one second	3" to 4"	13.2 - 17.6 Lb (6 - 8 Kg)
• Material:	316SS as per DIN 1.4571 (AISI 316 Ti)	Remote Type:	
• Linear signal output:	0-5 V _{DC} & 4-20 mA	¼" to 1"	6.6 - 13.2 Lb (3 - 6 Kg)
• Pulse output:	scalable	1¼" to 2½"	13.2 - 17.6 Lb (6 - 8 Kg)
• Relays:	Two 1-amp, SPDT User-selectable alarm functions	3" to 4"	17.6 - 22 Lb (8-10 Kg)
• Display units:	Flow, Total flow, Switch settings Temperature, Elapsed time	Notes: -weight +0.5 kg (1 Lb) for 150# flanges + 1kg (2.2Lb) for 300#	
• RAM Back-up:	Lithium Battery	• Power requirements:	115V _{AC} @ ½ A 230V _{AC} @ ¼ A 24 V _{DC} @ ¼ A
		• Power Consumption:	2 Watts or less
		• NIST traceable	Standard for all calibration
		• Signal Interface	RS232 & RS485, MODBUS
		• Data storage	EPROM storage up to 10 years



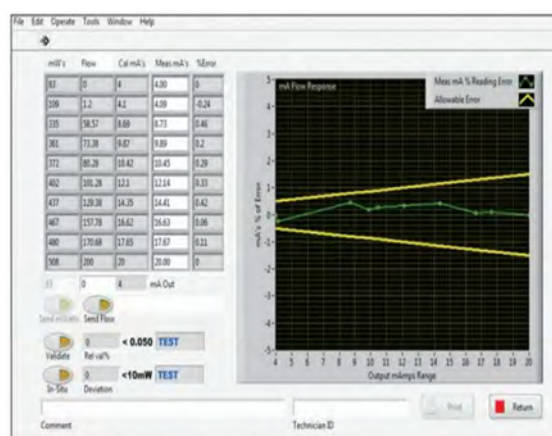
- Sizes ¼" - 4" (6.35-100mm)
- FM/CSA Class1, Div2, Groups B, C, D, T4
- Calibration milliwatt (mw) displayed for ongoing diagnostics
- Available in 12V_{DC}, 24V_{DC}, 115-230V_{AC} (2.5W)
- Calibration self-check (built in diagnostics)
- Available with MODBUS RS485-RTU or HART or BACnet
- Accuracy (and linearity) : $\pm 1\%$ of Reading + (0.5% FS)]
- Separate power and output terminals
- 4 line OLED displays rate, total, temperature and graphical Flowrate,
- Remote electronics for both SP and NH with dual compartment option
- 6-conductor max loop resistance 10 ohms, over 1000 ft (300M)
- 4 line rate, total, temperature and graphical Flowrate SP version and 2 line displays rate, total, for NH versions

- Sizes ¼" - 4" (6.35-100mm)
- Designed for inexpensive non-hazardous use with Exd enclosure
- Low power dissipation, under 2.5 Watts (e.g., under 100 ma at 24 V_{DC})
- Accuracy (and linearity) : $\pm[1\% \text{ of Reading} + (0.5\% \text{ FS})]$
- Modbus[®] compliant RS485 RTU communications
- 24 V_{DC} or 115V_{AC}/230 V_{AC}
- Flow Rate, Totalizer
- Available with either high and low pressure ball valve retractor
- Field reconfigurability via optional software
- 2 line OLED displays rate, total
- Diagnostic & graphic display



- Reconfiguration of full scale, pipe size, engineering units, factors, or decimal points
- Verify that the flow meter is within original calibration and that the sensors are clean
- Confirmation of original factory calibration and that the linear output signal is correct
- Reconfiguration for new gas mix constituents which automatically corrects outputs
- Real-Time tab logs data which is easily exported to Excel; and print a validation report
- Verify 4-20 mA out by generating user input flow rates
- Diagnostic features such as linearity of various user input; up to 10 points
- Sensor drift validation with In-situ calibration verification under a no-flow condition
- Ability to check flow meter output versus expected value.
- Ability to do "loop check "by generating any desired 4-20 mA output to verify digital outputs
- And many more features

Flux Units: SCF	ANP Area Count	1/23/2011		
Total Units: SCF	Master Volume: 11659	7:35:46 AM		
Test Program: F	ANP Flow: v234	Tag ID:		
Test report				
Work performed by: R.F.				
<hr/>				
Unit's	Flow	Cal val's	Units val's	Volume
77.000	0.000	0.000	-0.000	0.000
82.500	8.889	10.000	4.000	0.000
87.000	1266.774	9.000	9.000	0.000
141.100	171.478	9.400	9.400	0.000
151.100	121.029	10.700	10.700	-0.000
165.000	2088.048	12.910	12.910	0.000
194.000	1037.000	13.860	13.860	-0.000
198.000	3066.988	15.400	15.400	0.000
205.000	4116.019	17.130	17.130	0.000
193.000	1030.000	20.000	20.000	-0.000
<hr/>			<hr/>	
--- Meter Flow = 0.000 --- Meter Flow SD = 0.000 --- Meter Zero = 0.000 --- Meter Bias = 0.000 --- Filtering = 0.000 --- R Factor = 1.000 --- Cal val = 15.187				
<hr/>				
----- VALIDATION RESULTS -----				
--- Sum of Residuals = 0.0000 --- 0.0000 --- 0.0000 --- 0.0000 --- 0.0000 ---				
<hr/>				
----- ANALYSIS RESULTS -----				
--- Correlation Coefficient = 1.0000 --- 1.0000 --- 1.0000 --- 1.0000 --- 1.0000 ---				
--- CORRELATION COEFFICIENT (SQUARED) ---				



■ Flow Range, Dimensions and Weights

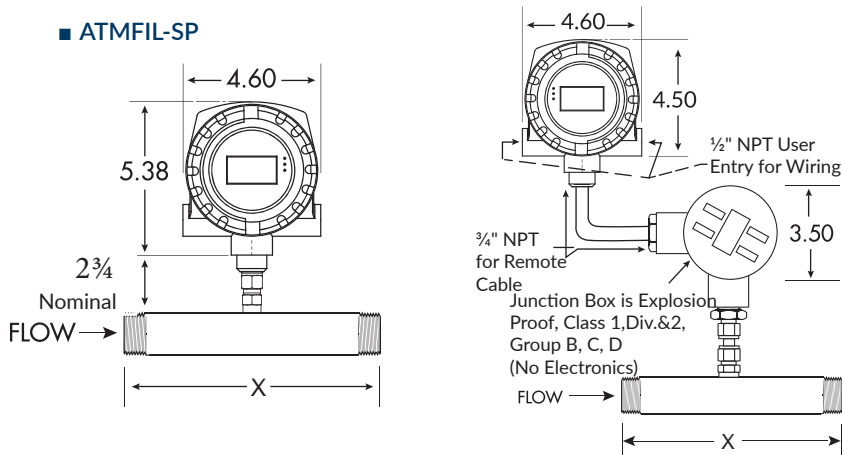
Diameter (size)	Length (X)	Weight Lb (KG) Integral	Weight Lb (KG) Remote	Range in Air (SCFM)	Range in Air (NCMH)	Range in Natural Gas (SCFM)	Range in Natural Gas (NCMH)
¼" (6.35mm)	6" (152.4mm)	2.2 (1)	6.6 (3)	0.3-30	0.51-51	0.23-23	0.391-39.1
⅜" (9.53mm)	6" (152.4mm)	3.3 (1.5)	7.7 (3.5)	0.5-50	0.85-85	0.4-40	0.68-68
½" (12.7MM)	7" (177.8mm)	4.4 (2)	8.8 (4)	0.7-70	1.19-119	0.5-50	0.85-85
¾" (19.05mm)	7" (177.8mm)	5.5 (2.5)	9.9 (4.5)	1.3-130	2.21-221	1-100	1.7-170
1" (25mm)	8" (203.2mm)	6.6 (3)	11 (5)	2.1-210	3.57-357	1.6-160	2.72-272
1 ¼" (31.75mm)	10" (254mm)	7.7 (3.5)	13 (6)	3.6-260	6.12-621	2.7-270	4.59-459
1 ½" (38.1mm)	12" (304.8mm)	8.81 (4)	14.33 (6.5)	4.90-490	8.33-833	3.7-370	6.29-629
2" (50mm)	12" (304.8mm)	9.9 (4.5)	15.5 (7)	8.2-820	13.94-1394	6.2-620	10.54-1054
2 ½" (63.5mm)	12" (304.8mm)	11 (5.5)	14.6 (8)	11.6-1160	19.72-1972	8.8-880	14.96-1496
3" (80mm)	12" (304.8mm)	14.33 (6.5)	19.8 (9)	18.0-1800	30.6-3060	13.7-1370	23.29-2329
4" (100mm)	12" (304.8mm)	17.6 (8)	22 (10)	31-3100	52.7-5270	23-2350	39.1-3910

Note: • Weight +0.5 kg (1 Lb) for 150# flanges + 1kg (2.2Lb) for 300#

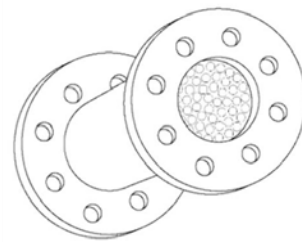
• Rates for air, O2 and N2 similar

• Flow rate based on schd 40 pipe @ 1bar and 0oC
• Flow rates for H2 and He much less than natural gas, others similar (contact factory)

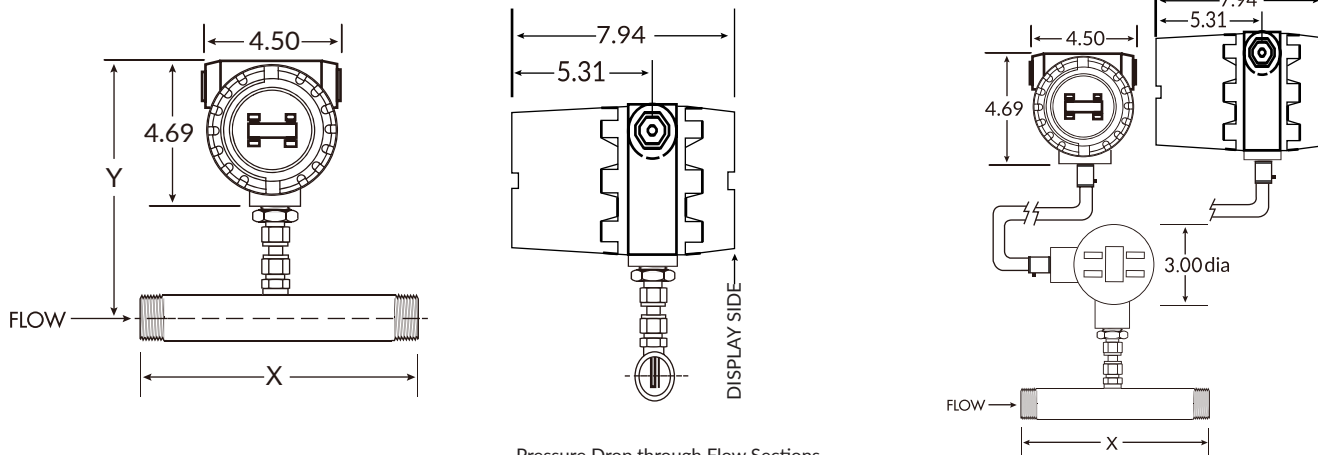
■ ATMFIL-SP



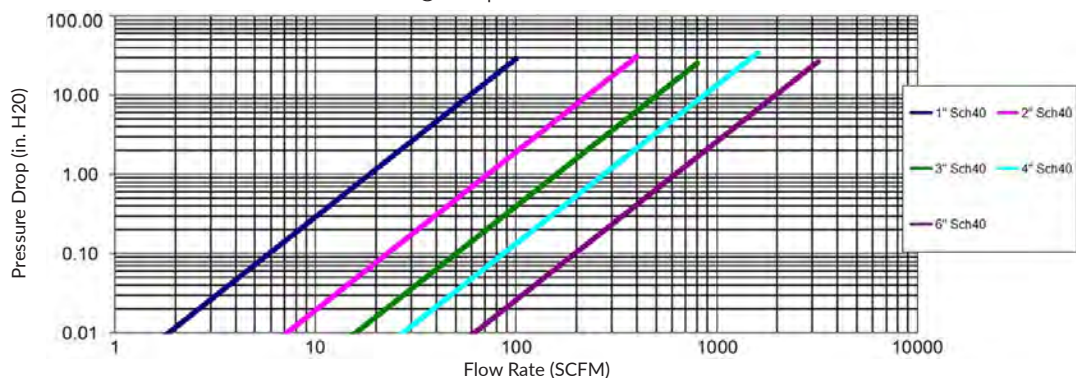
■ Flow conditioner included for SP and NH



■ ATMFIL-NH



Pressure Drop through Flow Sections
@ Atmospheric Conditions



Procedures to specify our inline mass meters

You also need to provide the following information:

GAS COMPOSITION	NIST certified calibration is done with actual or equivalent gas - gas type or mixture MUST be given
FULL SCALE FLOW	Maximum and minimum flow rates and units MUST be provided
LINE SIZE	Line size and connection MUST be provided (see selection guide below for options)
GAS PRESSURE AND TEMPERATURE	Calibration is done at operating or maximum pressure and temperature
ELECTRONICS TEMPERATURE	Temperature of the environment surrounding the flowmeter electronics.
POWER REQUIREMENTS	Specify requirements such as 12, 24 V _{DC} or 115 V _{AC} or 230 V _{AC}
CONFIGURATION	See below transmitter styles

ATMF SERIES INLINE METERS

EXAMPLE ATMFIL-SP-I-100-NPT-24VDC-AIR-NN (40 NCMH , 40C AND 12 BARG)

		**	**	**	**	**	**	**	**	DESCRIPTION
Ex proof with graphical display & advanced features	SP									Transmitter
Non-hazordous type	NH									
Integral	I									Style
Remote	R									
¼" X 6"L inline flowbody**			025							Connection
⅜" X 6"L inline flowbody			030							
½" X 7"L inline flowbody			050							
¾" X 7"L inline flowbody w/ Flow Conditioners			075							
1" X 8"L inline flowbody w/ Flow Conditioners			100							
1¼" X 10"L inline flowbody w/ Flow Conditioners			125							
1½" X 12"L inline flowbody w/ Flow Conditioners			150							
2" X 12"L inline flowbody w/ Flow Conditioners			200							
2½" X 12"L inline flowbody w/ Flow Conditioners			250							
3" X 12"L inline flowbody w/ Flow Conditioners			300							
4" X 12"L inline flowbody w/ Flow Conditioners			400							
Tube versus pipe (To Advise)			TUBE							
150 LB ANSI raised flanged ends				S150FLG						
300 LB ANSI raised flanged ends				S300FLG						
12 V _{DC}					12VDC					Power Supply
24V _{DC}					24VDC					
110-115 V _{AC}					115 VAC					
220-240V _{AC}					230VAC					
Specify gas type and max velocity						Gas				Gas
Options (please contact SmartMeasurement for others not included here)										
Non-std cable length for remote meters								CBL xxx		Options
After-cal data and certificate								CACERT		
Hastelloy sensor								HSILS		
High temp operation (gasses from 200 - 350° F- 93°C to 177°C)								HTO1		
Very high temperature operation (gasses from 350 - 450°F 177°C to 232°C)								HTO2		
Extra ranges (up to four) for SE and SG models only								RG2		
Oxygen scrubbing (with Certificate)								OFC		



TOTALMAS SDN BHD

No.28-1 Jln Wangsa Setia 4, Wangsa Melawati,
53300 Kuala Lumpur, Malaysia
T: +603-4148 1003 F: +603-4143 9979
E: sales@totalmas.com