

NT Flowmeter, Model 4401

*Simultaneous flow and pressure outputs
for high-temperature applications*

Now more than ever there is a need to measure high-temperature chemicals to ensure the integrity of your processes. Entegris' NT electronic flowmeter, model 4401, combines the latest sensing technology and high-purity materials for greater control of high-temperature chemicals. By separating the flow path from the sensing technology in the 4401 model, Entegris has found an effective way to reliably measure high-temperature chemicals.

Constructed for Compatibility

Model 4401 is designed for use in ultrapure, high-temperature applications and is compatible with highly corrosive chemicals. This instrument features PTFE and PFA for all wetted parts. With the FEP-jacketed pigtail available as the standard electrical connection, the flowmeter is resistant to harsh chemical environments and external spraydowns.

Sensing Technology

Using nonmetallic pressure sensing technology, the instrument utilizes differential pressure to provide accurate, reliable flow and pressure measurement. These measurements are highly tolerant of bubbles within the flow path. All products are factory calibrated and 100% verified, require no field calibration and are simple to install. Standard electronic outputs enable easy integration with PLCs, control systems and electronic displays.

Differential Pressure Measurement

Entegris' patented technology for differential pressure flow measurement incorporates pressure sensors that have the same response time as the proven 4400 model. The pressure sensor is separated from the flow by six inch impulse tubes that can handle up to 180°C (356°F) for more reliable performance. Longer lengths are also available to better position the sensor module further away from the harsh chemical flow. The orifice in the flow stream creates a differential pressure proportional to the fluid flow rate. If there is no flow, the differential pressure is zero. As the flow rate increases, the differential pressure increases.

$$\text{Flow} \propto \sqrt{\text{Inlet pressure} - \text{Outlet pressure}}$$



The flowmeter electronically provides a linear flow signal (4–20 mA output signal) corresponding to the calibrated flow rate. The flowmeter also provides a pressure signal (4–20 mA output signal) corresponding to the pressure measured at the outlet sensor of the flowmeter.

FEATURES & BENEFITS

- No moving parts to generate particles
- Nonmetallic sensing technology for reliable measurement
- Pressure output included—eliminates need for additional instruments
- 1% full scale accuracy for critical measurements
- Easy installation in any orientation

APPLICATIONS

Measuring flow and line pressure allows the user to obtain valuable and critical diagnostic information which is used for monitoring or controlling process applications, such as:

- Single wafer wet etch and clean equipment
- Batch style wet etch and clean equipment
- Precision blending and metering
- System diagnostics

SPECIFICATIONS

Materials of construction	Wetted parts	Sensor module body	PTFE
		Orifice module body	PFA
		Sensor interface	PFA or CTFE (CTFE is temperature limited)*
		Impulse tubes	PFA
		Primary seal	Kalrez® 6375 UP
	Nonwetted parts	Polypropylene, polyethylene, PVDF and PVC or FEP-jacketed cable (in addition to materials listed above)	
Process temperature	10°–180°C (20°–356°F) with PFA interface**		
Inlet/outlet connection	FlareLock® II tube fitting, Super 300 Type Pillar® tube fitting		
Bleed port connection	Flaretek® tube fitting, Super 300 Type Pillar tube fitting—¼"		
Impulse tube connection	FlareLock II tube fitting, Super 300 Type Pillar tube fitting—¼"		
Electrical input	24 VDC (12–28 VDC)		
Electrical output	Two 4–20 mA electronically isolated outputs, one for flow and one for outlet pressure		
Pressure	Output range	0–414 kPa (0–60 psig)**	
	Pressure drop	21 kPa (3 psig) at nominal flow (nominal flow = 80% of full scale flow)	
	Non operating maximum pressure	0–690 kPa (0–100 psig)***	
Flow measurement accuracy	±1% of full scale from greater than 20–100% of full scale		
	±2.5% of full scale from 10–20% of full scale		
	Accuracy stated as % of full scale using deionized water at 23°C (70°F) and includes the combined effects of linearity hysteresis and repeatability		
Flow measurement repeatability	±0.5% of full scale from greater than 20–100% of full scale		
	±1% of full scale from 10–20% of full scale		
Pressure measurement accuracy	±1.0% of full scale, includes the combined effects of linearity, hysteresis and repeatability		
Electrical enclosure	IP54		
Weight	1.50 kg (3.3 lb) approximate		
Approvals	CE		

Note: Preliminary specifications and features subject to change.

*If CTFE is chosen for chemical compatibility, the sensor module temperature must be maintained below 40°C during purging.

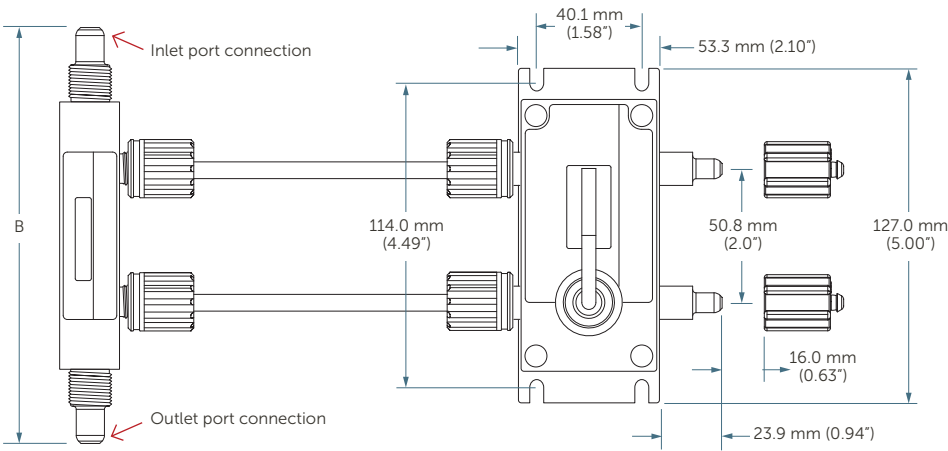
**Consult the factory for specific application support and expanded capabilities.

***Follow fitting design maximum pressure capability for the maximum temperature of your fluid media.

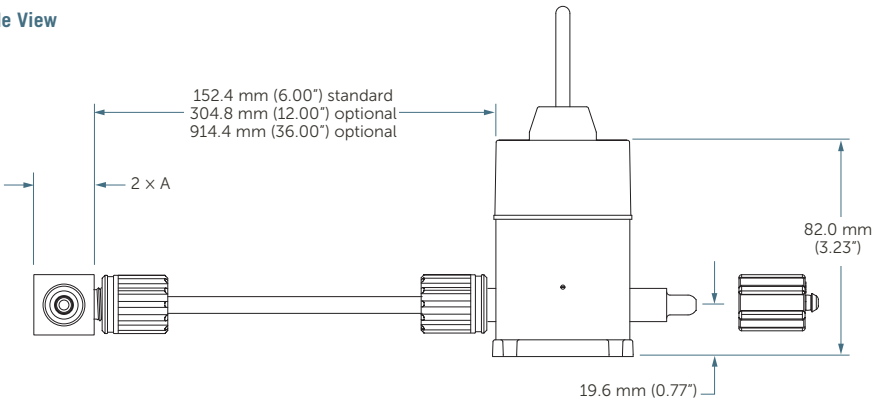
DIMENSIONS

FlareLock II Tube Fitting

Top View



Side View

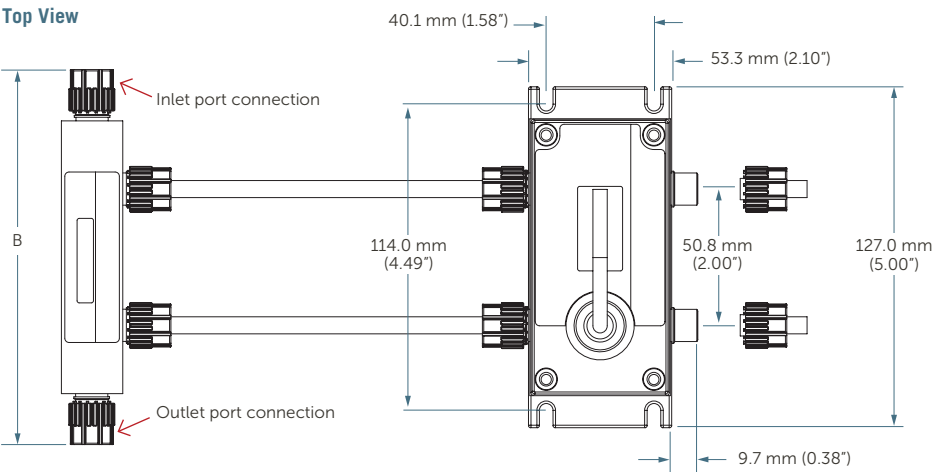


Inlet/outlet port connection	DIMENSION	
	A	B
1/4" (R02)	22.9 mm (0.90")	151.9 mm (5.98")
3/8" (R03)	22.9 mm (0.90")	158.0 mm (6.22")
1/2" (R04)	30.5 mm (1.20")	162.0 mm (6.38")
3/4" (R06)	38.6 mm (1.52")	165.6 mm (6.52")
1" (R08)	48.3 mm (1.90")	180.3 mm (7.10")

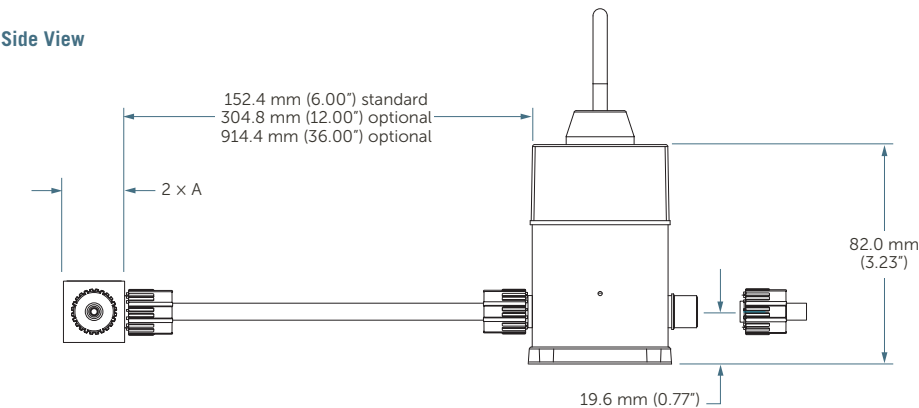
DIMENSIONS (CONTINUED)

Super 300 Type Pillar Tube Fitting

Top View



Side View

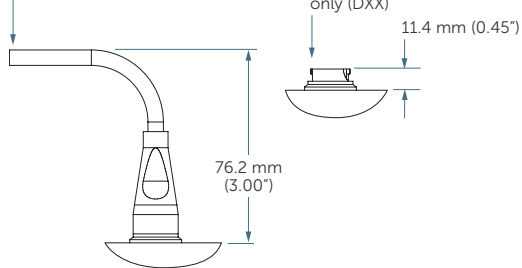


Inlet/Outlet Port Connection	DIMENSION	
	A	B
1/4" (W02)	22.9 mm (0.90")	140.0 mm (5.51")
3/8" (W03)	22.9 mm (0.90")	153.0 mm (6.02")
1/2" (W04)	30.5 mm (1.20")	157.0 mm (6.18")
3/4" (W06)	41.6 mm (1.64")	171.0 mm (6.73")
1" (W08)	59.4 mm (2.34")	187.6 mm (7.39")

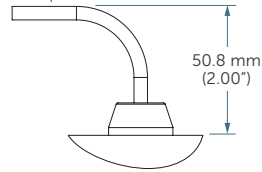
CONNECTIONS

Side View

8-conductor connector/cable (DXX)
(cable length up to 30 feet)



8-conductor FEP-jacketed cable
pigtail connection (BXX)
(cable length up to 30 feet)



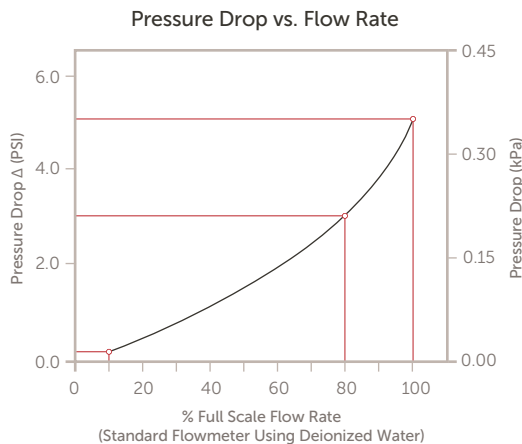
FLOW RANGE

The NT electronic flowmeter is available in the following fitting sizes and flow range combinations.

FLOW RANGE													
Fitting Size	T0 0-50 mL/min	T1 0-125 mL/min	T2 0-250 mL/min	T3 0-500 mL/min	T4 0-1250 mL/min	T5 0-2.5 L/min	T6 0-5 L/min	T7 0-10 L/min	T8 0-20 L/min	T9 0-40 L/min	T10 0-60 L/min	T11 0-90 L/min	T12 0-120 L/min
1/4"	Yes	Yes	Yes	Yes	Yes	—	—	—	—	—	—	—	—
3/8"	Yes	Yes	Yes	Yes	Yes	Yes	Yes	—	—	—	—	—	—
1/2"	—	—	Yes	Yes	Yes	Yes	Yes	Yes	Yes	—	—	—	—
3/4"	—	—	—	—	—	—	—	Yes	Yes	Yes	Yes	—	—
1"	—	—	—	—	—	—	—	—	Yes	Yes	Yes	Yes	Yes

Please consult the factory for custom fitting size and flow range combinations.

PERFORMANCE DATA

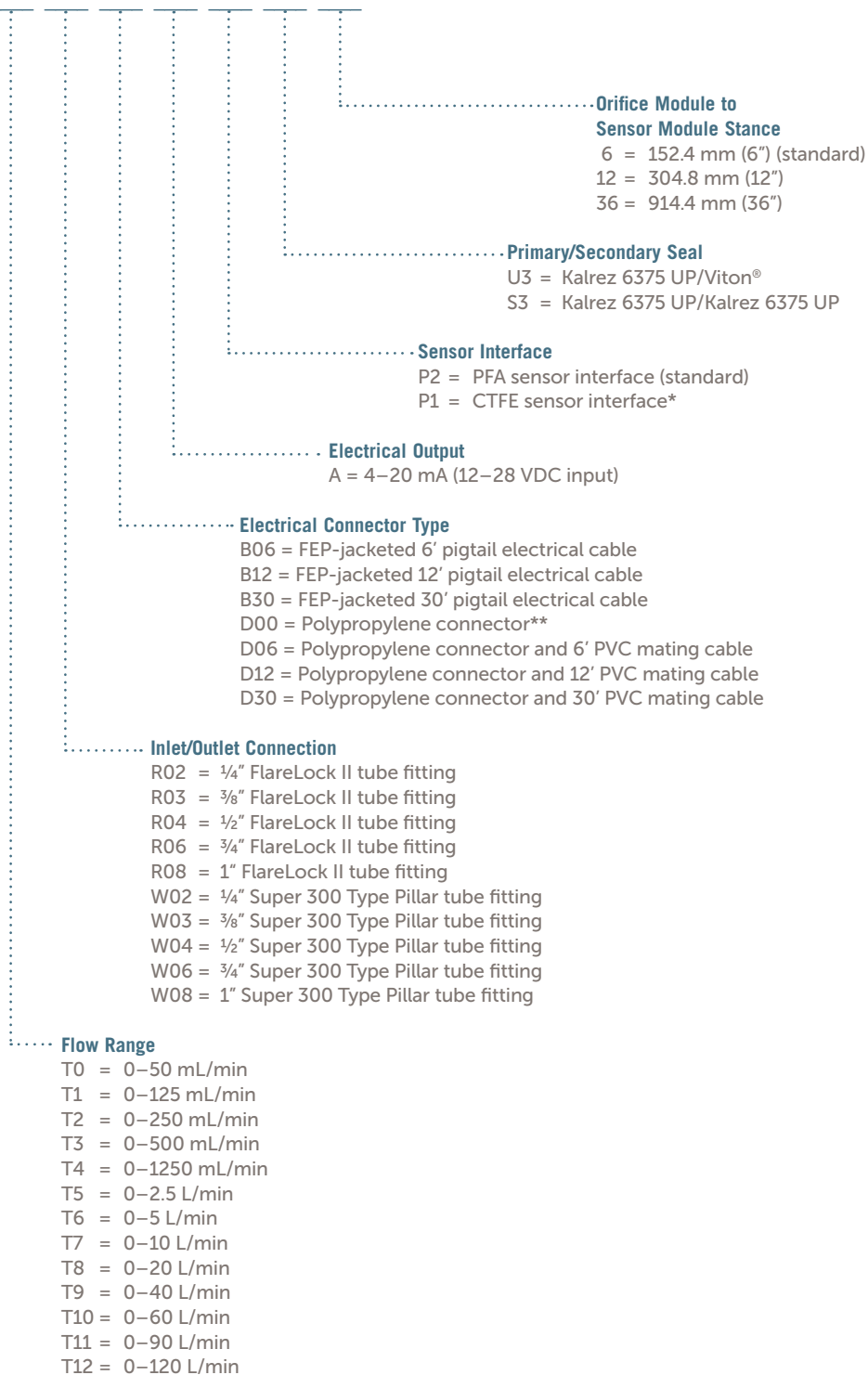


FLOW FACTOR		
Flow Range	Cv	Kv
T0	0.006	0.086
T1	0.015	0.214
T2	0.031	0.443
T3	0.061	0.871
T4	0.15	2.14
T5	0.31	4.43
T6	0.61	8.71
T7	1.2	17.1
T8	2.4	34.3
T9	4.9	70.0
T10	7.3	104.2
T11	11.0	157.1
T12	14.6	208.5

ORDERING INFORMATION

NT High-temperature Flowmeter, Model 4401: model number

4401



*Consult the factory for specific application support and expanded capabilities.

**8-pin mating cable is required for installation.

Visit entegrisfluidhandling.com for ordering information.

FOR MORE INFORMATION

Please call your Regional Customer Service Center today to learn what Entegris can do for you.
Visit entegris.com and select the Contact Us link to find the customer service center nearest you.

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