

# HIGH ACCURACY PITOT TUBES

FPT-6000 Series  
Starts at

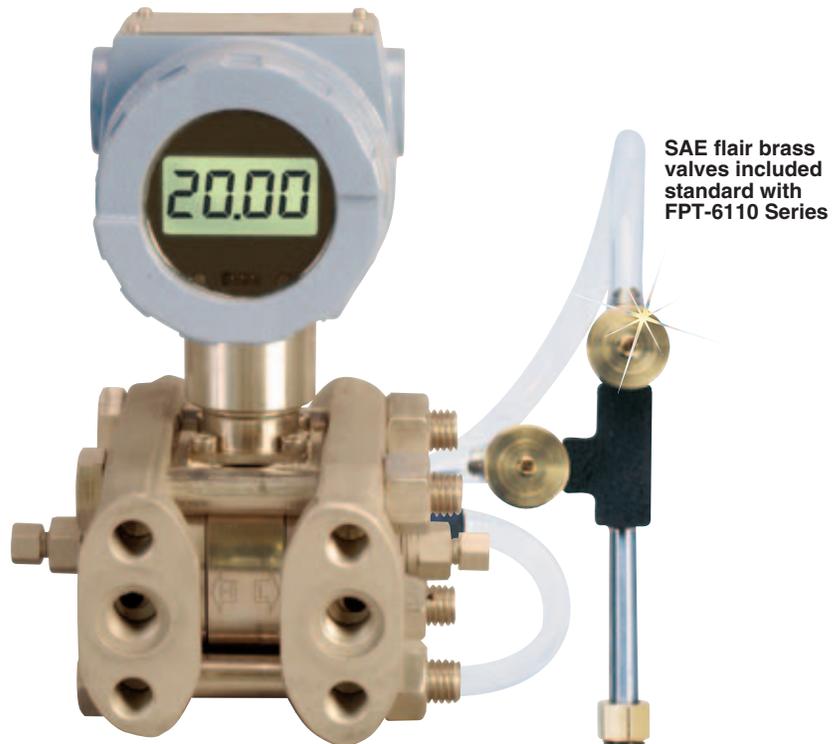
**\$213**



- ✓ Up to  $\pm 1\%$  of Rate Accuracy
- ✓ Easy Installation—Ideal for Retrofits
- ✓ Very Low Pressure Drop
- ✓ Low Maintenance
- ✓ For Clean, Low Viscosity Liquids, Gases, and Steam
- ✓ Valves Included as Standard

The FPT-6110 is a highly accurate averaging pitot tube which generates a pressure differential between its upstream (stagnation) ports and its downstream (static) ports that is proportional to the flowrate squared ( $Q^2$ ). The differential pressure can then be measured by a differential pressure transducer (see page G-12) to provide a 4 to 20 mA output which is proportional to the flowrate squared. This can then be read out as flowrate by devices with square root extraction, such as OMEGA's DPF64-SQRT meter or FC-20 mass flow computer. The FPT-6000 can be used to measure clean, low viscosity liquids, gases and steam in a variety of piping systems and pipe sizes (to 72" and above on special order).

The FPT-6110 offers the following advantages over orifice plates: easy, low-cost installation (weld 1 small coupling into place vs. 2 large flanges); much lower permanent pressure loss; low maintenance (occasionally forcing gas through the pressure ports clears the sensing ports when dirt is a problem); and good resistance to wear. Bi-directional flow measurement capability is standard. And, with special double-mount construction, the flow ranges listed can be extended by to up to 4 times (consult Flow Engineering Department for details).

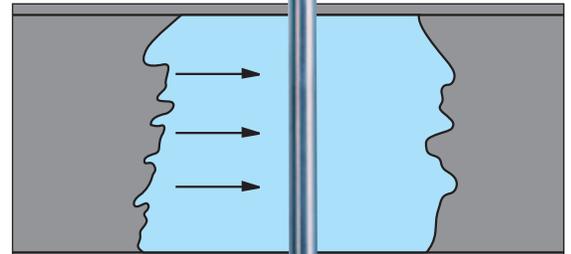


SAE flair brass valves included standard with FPT-6110 Series

PX760 pressure transmitter, \$990, sold separately. See page G-12 for more information



FPT-6110, \$213, shown smaller than actual size



## SPECIFICATIONS

**Accuracy:** Up to 1% of rate (see sizing). (Accuracy stated is for use in schedule 40 pipe. If used in schedule 80 pipe, add 1% to accuracy or request special construction)

**Repeatability:**  $\pm 0.1\%$  of rate

**Max Temperature:** FPT-6100: 93°C (200°F); FPT-6200: 204°C (400°F)

**Max Pressure:** FPT-6100: 150 psig; FPT-6200: 1500 psig

**Unrecoverable Pressure Drop**

(inches H<sub>2</sub>O) = DP x (CP/D) where:  
DP = generated differential pressure (inches H<sub>2</sub>O)

CP = pressure loss coefficient

= 0.296 for 3/8" diameter probe

= 0.387 for 1/2"

= 0.757 for 3/4"

= 0.945 for 1"

D = inside pipe diameter (inches)

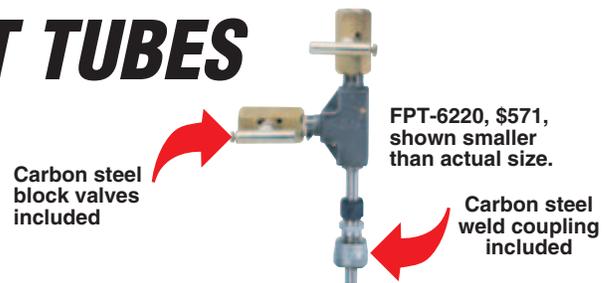
**Wetted Parts:** FPT-6100: 316SS shaft, brass packing and head, carbon steel weld coupling, 1/4" SAE flair brass valve; FPT-6200: 316SS shaft, packing and head, carbon steel weld coupling, 1/2 FNPT Carbon Steel block valves

### Dimensions

**For Model FPT-6100:** Add 4 7/8" to line size to determine overall length without valves. Add 7 1/2" to line size to determine clearance required to install unit.

**For Model FPT-6300:** Add 8 1/4" to line size to determine overall length without valves. Add 11 1/2" to line size to determine clearance required to install unit

# HIGH ACCURACY PITOT TUBES



## Sizing Equations

### 1. Any Liquid:

$$\Delta P \text{ (in. H}_2\text{O)} = \frac{Q^2(\text{GPM}) \times S_f}{K^2 \times D_1^4 \times 32.14}$$

### 2. Steam or Any Gas (steam requires min $\Delta P$ of 10" H<sub>2</sub>O):

$$\Delta P \text{ (in. H}_2\text{O)} = \frac{Q^2(\text{lb/hr})}{K^2 \times D_1^4 \times \rho \times 128,900}$$

### 3. Any Gas:

$$\Delta P \text{ (in. H}_2\text{O)} = \frac{Q^2(\text{scfm}) \times S_g \times (T + 460)}{K^2 \times D_1^4 \times P \times 16,590}$$

Where:

$\Delta P$  = differential pressure  
(in in H<sub>2</sub>O)

Q = flowrate

K = flow coefficient  
(see "how to order")

D<sub>1</sub> = inside diameter of line size  
(in inches for square and rectangular ducts use):

$$D_1 = \sqrt{\frac{4 \times \text{height} \times \text{width}}{\pi}}$$

P = static line pressure (psia)

T = temperature (in °F)

ρ = density of medium (in pounds per cubic foot)

S<sub>f</sub> = Sp. Gr. at flowing conditions

S<sub>g</sub> = Sp. Gr. at 15°C (60°F)

**NOTE:** Use of these equations for liquids yields an accuracy of ±2% of rate. When used for steam, accuracy is ±10% of rate (when steam tables are used). Gas equation yields ±2% of rate accuracy from 21 to 204°C (70 to 400°F) and 0 to 150 psig (when gas is not near its critical point). A ±1% of rate accuracy requires the use of more precise equations which account for shift in K with change in flowrate, gas compressibility, etc. Request a precision flow calibration sheet and please supply the following data: name of fluid, specific gravity, pressure, temperature, inside pipe diameter, viscosity, steam quality, degrees superheat, and ratio of specific heat at constant pressure to that at constant volume (for gas velocities approaching 500 fps).

**MOST POPULAR MODELS HIGHLIGHTED!**

## To Order (Specify Model Number)<sup>†</sup>

Model No. (Low Pressure)	Price	Nominal Line Size	Probe Dia.	Maximum Differential Pressure (inches H <sub>2</sub> O)*	Max GPM (Liquids)	K	Weight Kg (lb)
FPT-6110	\$213	1"	3/8"	1200	115	0.517	0.31 (0.68)
FPT-6112	213	1 1/4"	3/8"	833	179	0.583	0.31 (0.69)
FPT-6115	213	1 1/2"	3/8"	668	220	0.580	0.31 (0.69)
FPT-6120	213	2"	3/8"	459	315	0.638	0.31 (0.70)
FPT-6125	222	2 1/2"	3/8"	338	410	0.617	0.31 (0.71)
FPT-6130	264	3"	3/8"	237	552	0.665	0.32 (0.72)
FPT-6135	264	3 1/2"	3/8"	186	657	0.661	0.32 (0.72)
FPT-6140	274	4"	3/8"	150	756	0.672	0.33 (0.73)
FPT-6160	324	6"	3/8"	72	1230	0.706	0.35 (0.77)
FPT-6180	406	8"	3/4"	164	3109	0.686	0.74 (1.64)
FPT-6181	495	10"	3/4"	107	4006	0.676	0.80 (1.76)
FPT-6182	544	12"	3/4"	77	4830	0.683	0.85 (1.88)

## (High Pressure)<sup>†</sup>

FPT-6220	\$571	2"	1/2"	1064	479	0.557	1.0 (2.30)
FPT-6225	571	2 1/2"	1/2"	713	609	0.598	1.1 (2.32)
FPT-6230	571	3"	1/2"	510	809	0.645	1.1 (2.34)
FPT-6235	583	3 1/2"	1/2"	400	963	0.630	1.1 (2.36)
FPT-6240	583	4"	1/2"	328	1119	0.656	1.1 (2.37)
FPT-6260	600	6"	1/2"	163	1845	0.662	1.1 (2.45)
FPT-6280	633	8"	1/2"	100	2428	0.673	1.1 (2.52)
FPT-6281	696	10"	1/2"	66	3139	0.682	1.2 (2.59)
FPT-6282	1074	12"	1"	140	6565	0.677	3.0 (6.65)
FPT-6283	1125	14"	1"	117	7325	0.665	3.1 (6.78)
FPT-6284	1209	16"	1"	90	8285	0.691	3.2 (6.98)
FPT-6285	1340	18"	1"	72	9683	0.678	3.3 (7.19)
FPT-6286	1422	20"	1"	59	11000	0.705	3.4 (7.40)
FPT-6287	1524	24"	1"	41	13900	0.708	3.5 (7.81)
FPT-6288	1709	36"	1"	18	21400	0.664	4.1 (9.08)

## Options

Add Suffix	Additional Price	Description
-SS	\$122 for 3/8" probe diameter	316SS construction
	168 for 1/2" probe diameter	
	152 for 3/4" probe diameter	
	212 for 1" probe dia. and up	

Comes complete with operator's manual.

\* Max differential pressure shown is for up to 150°C (300°F). Above 150°C (300°F), reduce value by 4% per 56°C (100°F).

† Please complete and send in questionnaire from page G-11 with your order.

For units with stainless steel construction add "-SS" to part number and adjust price based on options above.

**Ordering Examples:** FPT-6220, high pressure model pitot tube, \$571.

FPT-6160-SS, low pressure, 3/4" diameter pitot tube with 316SS, \$324 + 122 = \$446.

Recommended Reference Book: Differential Pressure Flow Transmitters, FW-201, \$250. See Section Y for Additional Books



# HIGH ACCURACY PITOT TUBES

## For Wet Tap Installations



FPT-6320, \$355, shown smaller than actual size.

FPT-6300 Series Starts at

**\$333**



- ✓ Up to  $\pm 1\%$  of Rate Accuracy
- ✓ Wet Tap Assembly Permits Installation/Removal in Live Lines
- ✓ Very Low Pressure Drop
- ✓ Low Maintenance
- ✓ For Clean, Low Viscosity Liquids, Gases, & Steam

The FPT-6300 averaging pitot tube is similar to the FPT-6100 in performance, but features a wet-tap assembly which permits installation and removal of the sensor in pressurized lines without process shutdown.

The weld coupling is first welded into place, then the ball valve and packing are put in place. Next, a drill is used to drill out the pipe. The drill is partially withdrawn and the ball valve is closed. The drill may then be completely removed and the sensing tube partially installed in the assembly. Finally, the ball valve is opened and the sensing tube is inserted into the flowstream. The FPT-6300 is ideal for retrofits on critical flowstreams.

### SPECIFICATIONS

**Accuracy, Repeatability and Unrecoverable Pressure Drop:** Same as the FPT-6100 series

**Max Temperature/Pressure:**  
 88°C (190°F) at 150 psig operating;  
 88°C (190°F) at 100 psig during insertion or removal

#### Wetted Parts:

Carbon steel weld coupling and pipe fittings, brass ball valve and packing, and Zytel ferrule. For 316SS construction, consult Flow Engineering Department.

**MOST POPULAR MODELS HIGHLIGHTED!**

### To Order (Specify Model Number)<sup>†</sup>

Model No.	Price	Nominal Line Size	Probe Dia.	Max Differential Pressure ("H <sub>2</sub> O)	Max GPM	K	Weight kg (lb)	A* (in)
FPT-6310	\$333	1"	3/8"	1200	115	0.517	1.2 (2.6)	10%
FPT-6312	333	1 1/4"	3/8"	833	179	0.583	1.2 (2.6)	10%
FPT-6315	355	1 1/2"	3/8"	668	220	0.580	1.2 (2.6)	11
FPT-6320	355	2"	3/8"	459	315	0.638	1.2 (2.6)	11 1/2
FPT-6325	375	2 1/2"	3/8"	338	419	0.617	1.2 (2.7)	12 1/2
FPT-6330	393	3"	3/8"	237	552	0.665	1.3 (2.8)	13 3/4
FPT-6335	415	3 1/2"	3/8"	186	657	0.661	1.3 (2.8)	14 1/2
FPT-6340	415	4"	3/8"	150	756	0.672	1.3 (2.9)	15 1/2
FPT-6350	415	5"	3/8"	101	956	0.671	1.4 (3.0)	17 1/2
FPT-6360	415	6"	3/8"	72	1230	0.706	1 (3.1)	19 1/2
FPT-6380	676	8"	3/4"	164	3109	0.686	2.9 (6.29)	25%
FPT-6381	698	10"	3/4"	107	4006	0.676	3.1 (6.77)	29%
FPT-6382	708	12"	3/4"	77	4830	0.683	3.2 (7.10)	33%
FPT-6383	737	14"	3/4"	65	5443	0.698	3.3 (7.33)	35%
FPT-6384	760	16"	3/4"	50	6171	0.688	3.5 (7.72)	39
FPT-6385	786	18"	3/4"	40	7195	0.689	3.7 (8.11)	42%
FPT-6386	827	20"	3/4"	32	8173	0.686	3.9 (8.51)	46 1/2
FPT-6387	999	24"	3/4"	22	10210	0.789	4.3 (9.41)	54%
FPT-6388	1220	30"	3/4"	14	12948	0.720	4.8 (10.63)	66 1/2
EE-2455	170	Reference Book: The Engineering Handbook						

Comes with complete operator's manual

<sup>†</sup> Please complete and send in questionnaire from page G-11 with your order.

\* This dimension + nominal line size = approximate overall length. This dimension + nominal line size + 5 inches = approximate minimum distance required for probe removal

Ordering Example: FPT-6310, high accuracy pitot tube, \$333.



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