

EASTERN INSTRUMENTS



INDUSTRIAL AIR FLOW PRODUCTS & TECHNOLOGY



Precision Air Flow Measurement Devices

Eastern Instruments

Material Handling Solutions

About Eastern Instruments

Eastern Instruments, a Certified Women's Business Enterprise, is an engineered solutions company located adjacent to the North Carolina International State Port in Wilmington, North Carolina. Since 1984, we have been engaged in the design and manufacture of devices that accurately measure and profile the flow of air and gases in the industrial and power sectors. These devices have been integrated into a variety of systems for regulating operations and improving efficiency across nearly every industry. Every device within Eastern Instruments' air flow measurement product line provides a high degree of accuracy, easy installation and an extremely simple and intuitive operation and maintenance schedule that is perfect for nearly every application.

The following catalog is an overview of our industrial air flow measurement pitots and other flow measurement devices, however, we do offer an entire line of power air flow measurement devices as well as solids flow meters, feeders and fillers, so if you are in need of equipment other than those found within this catalog, Eastern Instruments can help.

Contact us today.

Mildred R. Brandt
President and CEO

FOR MORE INFORMATION
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Insertion Pitots



Flanged Duct Sections



Flow Conditioners



Options

Why choose an Eastern Instruments Air Flow Measurement Device?



Accuracy

Because all Eastern Instruments' flow measurement devices are based on the accuracy delivered by the VAP³[®] Pitot, all of our devices are extremely accurate and can measure flow to within $\pm 2.00\%$ or better when calibrated.

Plug-Resistance

When installed in the PA (Particulate Application) mode, the VAP³[®] Pitot has no impact ports which offer a plug resistant design that rarely requires the use of expensive purging systems.

Parallel Plate Cross Sectional Design

The VAP³[®] Pitot's unique cross sectional design minimizes disturbances of the air flow at and around the sensing ports, thus minimizing the potential for particulate to build up on and around the ports.

Material of Construction

The standard VAP³[®] Pitot is constructed of 6063 Anodized Aluminum, however pitots can also be constructed of Stainless Steel or PVC for increased temperatures or resistance to the corrosive properties of the air/gas flowing through the duct.

No "K" Factor is Required

Because the flow measurement of the VAP³[®] Pitot is not dependant on velocity, no "K" factor is required in the calculation of flow (the flow coefficient is not Reynolds Number dependent).

Multiple Sensing Ports

With multiple sensing ports on each pitot, VAP³[®] Pitots ensure velocity averaging across the full traverse of the duct.

Special Engineered Solutions

For extremely large ducts (up to 240 inches in width) Eastern Instruments offers VAP³[®]-AEX Pitots with a larger, more robust profile.

Heated Pitots are also available in which heater elements are inserted into the pitot in order to prevent the pitot from freezing.

Low Unrecovered Pressure Loss

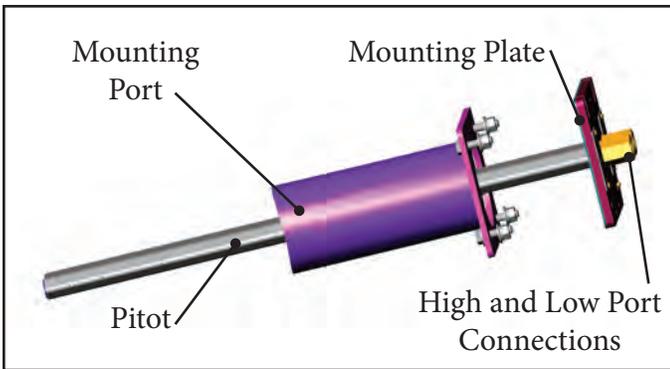
When utilizing the VAP³[®] Insertion Style Pitot, the unique low profile design ensures that pressure loss due to the pitots themselves is negligible. Even when utilizing the High Beta[®] Flow Conditioner, pressure loss is remarkably low.



Insertion Style Pitots

The VAP³ Pitot comes in a variety of models, each designed to accurately measure the flow of air or gas under particular circumstances. Whether measuring clean air or air that is particulate-laden, the VAP³ pitot delivers an extremely accurate differential pressure output. The standard VAP³ pitot is constructed out of Anodized Aluminum for maximum durability, however, both PVC and Stainless Steel versions are available for caustic applications or where temperatures within the duct may reach up to 900° F. All models of VAP Pitots can be utilized in both round ducts and in square/rectangular ducts.

What is a VAP?

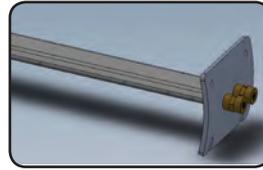


Insertion Style Pitot Models



VAP³-AES: Aluminum Pitot

- Anodized Aluminum Pitot
- Perfect for most applications
- Moderate Heat Applications
- Port Mounted



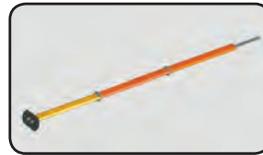
VAP³-PES: PVC Pitot

- Extruded PVC Pitot
- Perfect for Corrosive Gases
- Low Heat Applications
- Port Mounted



VAP³-SFS: Stainless Steel Pitot

- Stainless Steel Pitot
- Perfect for Corrosive Gases
- High Heat Applications
- Port Mounted

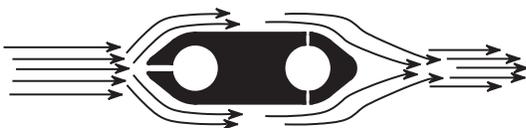


VAP³-AEX: Extra Large Pitot

- Anodized Aluminum Pitot
- Profile twice that of VAP³-AES
- Perfect for Extra Large Ducts
- Port Mounted

VAP³/SA CLEAN AIR

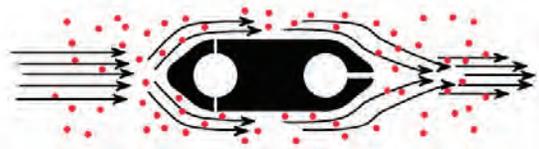
When mounted in SA (Superior Accuracy) mode, all models mentioned above will accurately measure the flow of clean air through nearly any duct. While positioning the High Port so that it faces into the air stream (shown below) makes the measurement more accurate, it also limits the use of SA mode to particulate-free air. Mounted in SA mode, VAP³ pitots provide an accurate differential pressure output which allows for precise air flow measurement to within $\pm 2.00\%$ accuracy or better when calibrated.



VAP³/SA PITOT PROFILE: "CLEAN" AIR

VAP³/PA "DIRTY" AIR

When mounted in PA (Particulate-laden Air) mode, all of the models mentioned above will accurately measure the flow of "dirty" or particulate-laden air through nearly any duct. In PA mode, the High Port is positioned so that it faces away from the oncoming air stream, making the pitot resistant to plugging. Mounted in PA mode, VAP³ pitots provide an accurate differential pressure output which can allow for precise air flow measurement and control of your process to within $\pm 2.00\%$ accuracy or better when calibrated.



VAP³/PA PITOT PROFILE: "DIRTY" AIR

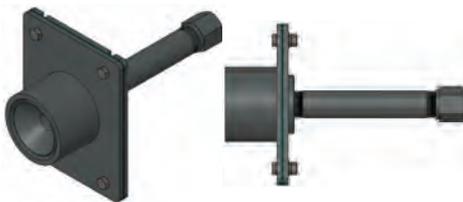
Pitot Installation: Round Ducts

Insertion Port: Curved Radius



An insertion port is typically welded to the exterior of a duct and pitots are then bolted to the insertion port. A curved radius allows the port to be easily mounted to the exterior of round ducts.

Bull Nose Port: Round Ducts



A Bull Nose receiver and port is typically used on round ducts over 34" in diameter and helps to stabilize and support the pitot inside the duct. The Bull Nose Receiver is welded to the exterior of the duct just like the insertion port and the pitot's bull nose is inserted into the receiver.

Pitot Installation within a Duct: Round Duct

Insertion Port



Bull Nose Receiver



Single Pitot:
Duct size 8" or less



Two Pitots:
Duct size 10" - 18"



Three Pitots:
Duct size 20" - 240"

Pitot Installation: Rectangular Ducts

Insertion Port: Flat Mounted



An insertion port is typically welded to the exterior of a duct and pitots are then bolted to the insertion port. A flat surface allows the port to be easily mounted to the exterior of rectangular/square ducts.

Bull Nose Port: Rectangular Ducts



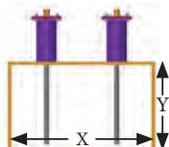
A Bull Nose receiver and port is typically used on square/rectangular ducts where pitots are over 34". The pitot's Bull Nose is inserted into the Bull Nose Receiver which is welded to the exterior of the duct.

Pitot Installation within a Duct: Rectangular Duct

Insertion Port



Bull Nose Receiver



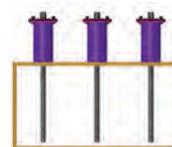
"X" longer side;
"Y" shorter side



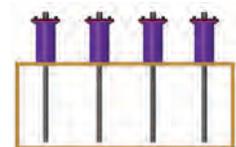
Single Pitot:
"X" is 8" or smaller



Two Pitots:
"X" is 10" - 26"



Three Pitots:
"X" is 28" - 36"

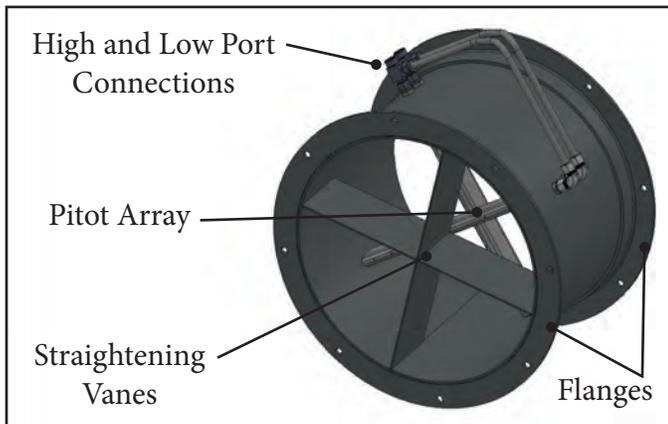


Four Pitots:
"X" is 38" - 60"

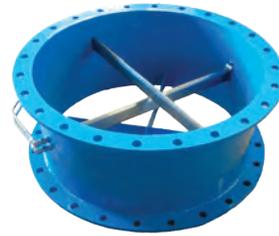
Flanged Duct Sections

The Duct Section VAP³® (DSV) is a flanged duct section which includes an integral array of VAP³® pitots. The DSV allows for the easy installation of pitots within both new or existing duct work. Whether inserting the DSV into either Carbon Steel or Stainless Steel duct work or into air streams with extreme heat or that contain caustic gases, there is a DSV which will work for your specific application. The DSV can be utilized in both round or in square or rectangular duct work for accurate flow measurement when the recommended upstream and downstream straight duct runs are present.

What is a DSV?



Flanged Duct Section Models



DSV: Round Duct Work

- CS/SS Flanged Spool Section
- Easy Installation in any Duct
- For Clean or Particulate-laden Air or Gas
- Can be used with either Aluminum or SS Pitots

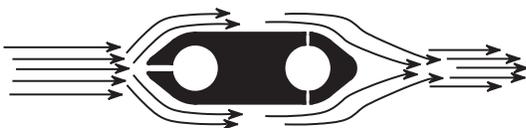


DSV: Rectangular Duct Work

- CS/SS Flanged Spool Section
- Easy Installation in any Duct
- For Clean or Particulate-laden Air or Gas
- Can be used with either Aluminum or SS Pitots

DSV W/ VAP³®/SA CLEAN AIR

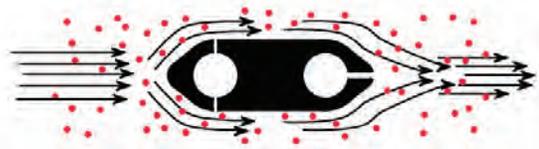
When mounted in SA (Superior Accuracy) mode, all models mentioned above will accurately measure the flow of clean air through nearly any duct. While positioning the High Port so that it faces into the air stream (shown below) makes the measurement more accurate, it also limits the use of SA mode to particulate-free air. Mounted in SA mode, VAP³® pitots provide an accurate differential pressure output which allows for precise air flow measurement to within $\pm 2.00\%$ accuracy or better when calibrated.



VAP³®/SA PITOT PROFILE: "CLEAN" AIR

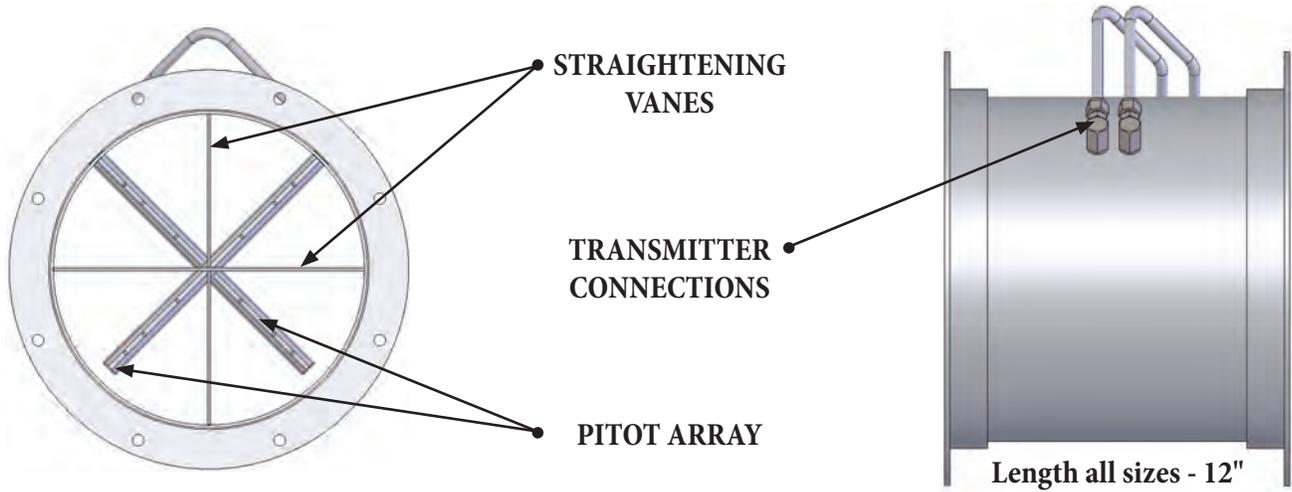
DSV W/ VAP³®/PA "DIRTY" AIR

When mounted in PA (Particulate-laden Air) mode, all of the models mentioned above will accurately measure the flow of "dirty" or particulate-laden air through nearly any duct. In PA mode, the High Port is positioned so that it faces away from the oncoming air stream, making the pitot resistant to plugging. Mounted in PA mode, VAP³® pitots provide an accurate differential pressure output which can allow for precise air flow measurement and control of your process to within $\pm 2.00\%$ accuracy or better when calibrated.



VAP³®/PA PITOT PROFILE: "DIRTY" AIR

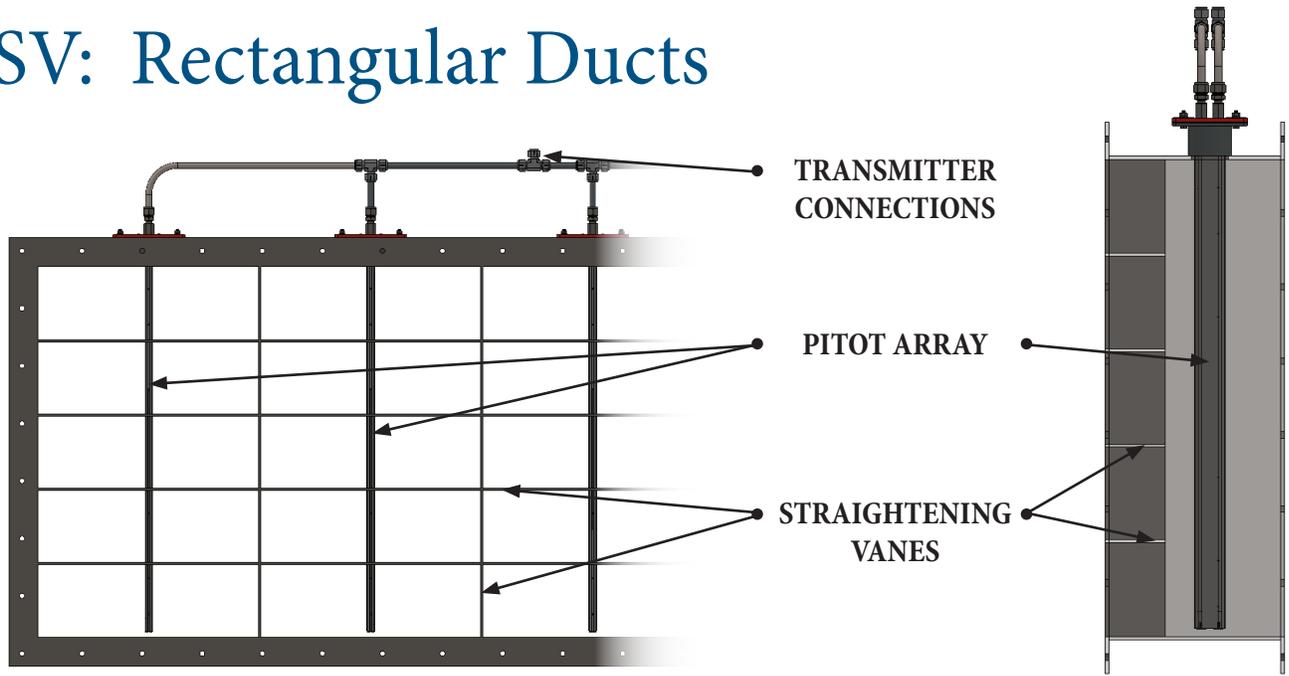
DSV: Round Ducts



DSV Shown with Standard Angle Ring Flanges. Other Flange Styles Available.

Standard sizes available for 6" to 36" duct diameters. Custom Sizes available.

DSV: Rectangular Ducts

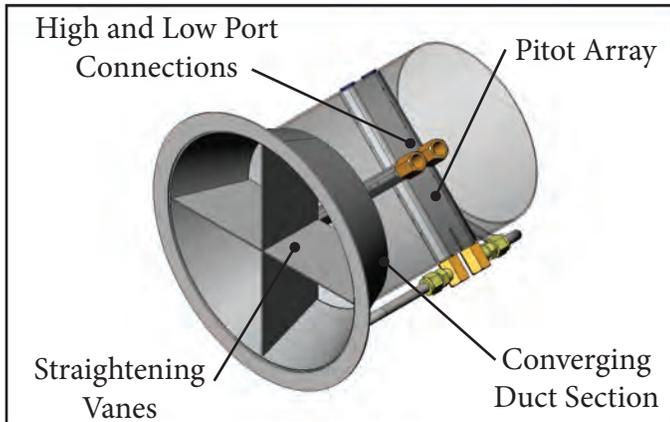


Rectangular DSV is made to your duct dimensions. Flanges are matched to your flange pattern.

Flow Conditioners

The High Beta® Flow Conditioner incorporates both a converging/nozzled duct section for flow profiling, as well as an integral flow straightener in order to eliminate cyclonic flow at the point of measurement. The air, once straightened, passes through the element to the integral pitot array which accurately measures the flow of air in any circular duct in a fraction of the space that alternative technologies require. With the High Beta® Flow Conditioner, you can accurately measure flow with virtually no upstream or downstream straight duct runs.

What is a High Beta®?



Flow Conditioner Models

HBP: Round Duct



- CS/SS Flanged Spool Section
- For ducts up to 36" in diameter
- For Clean or Particulate-laden Air
- Can be used with either Aluminum or SS Pitots

CUSTOM HBE: Round Duct



- For Custom Applications
- For ducts over 36" in diameter
- For Clean or Particulate-laden Air
- Can be used with either Aluminum or SS Pitots

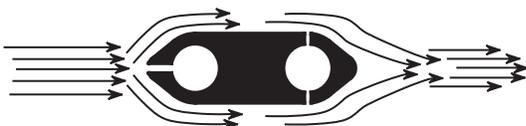
CUSTOM HBE: Rectangular Duct



- For any size rectangular duct work
- Mounting Plate welds inside duct
- For Clean or Particulate-laden Air
- Can be used with either Aluminum or SS Pitots

HIGH BETA W/ VAP³/SA CLEAN AIR

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VAP³/SA PITOT PROFILE: "CLEAN" AIR

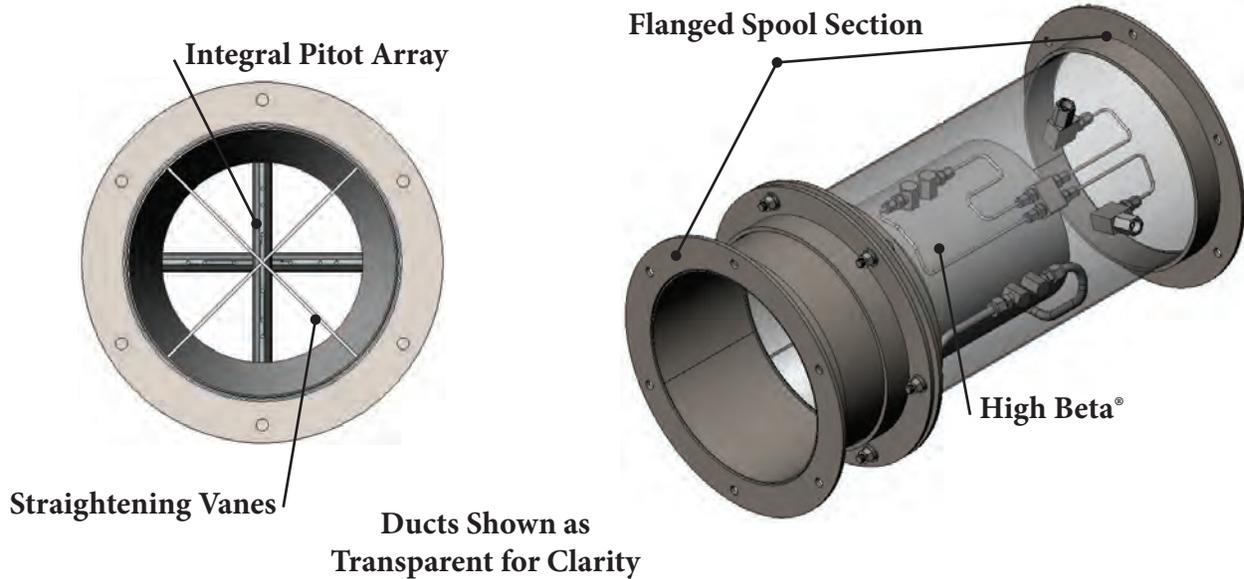
HIGH BETA W/ VAP³/PA "DIRTY" AIR

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VAP³/PA PITOT PROFILE: "DIRTY" AIR

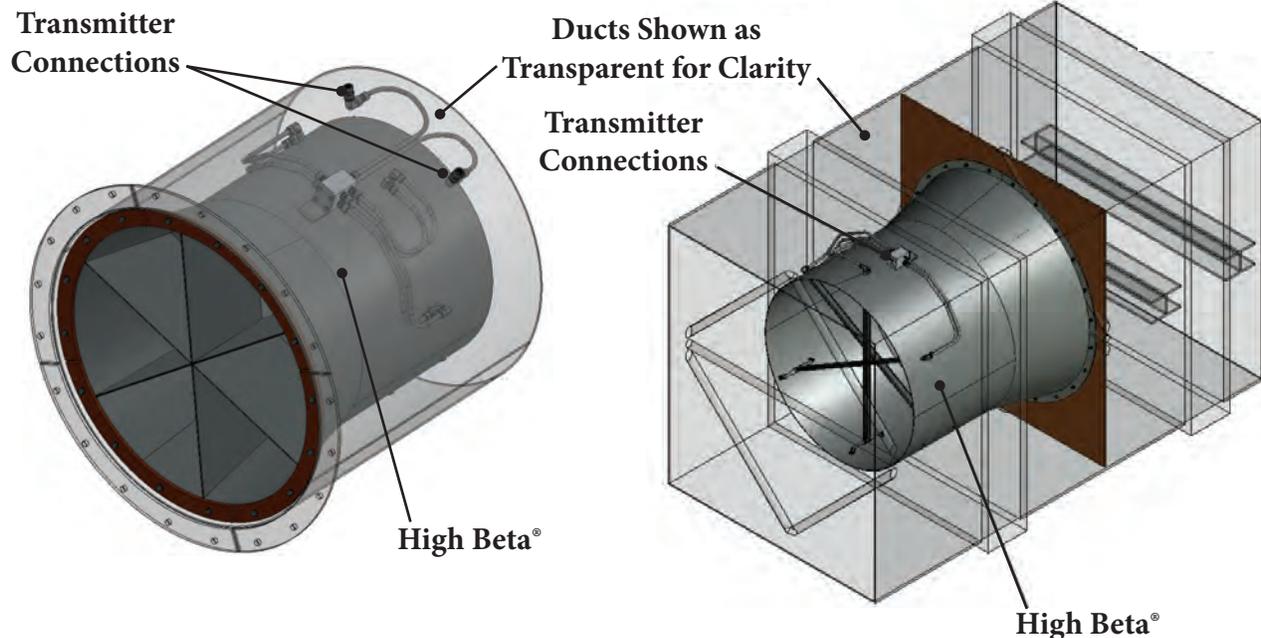
HBP Installation: Round Ducts



HBE Installation: Round & Rectangular

High Beta Installations:
Round Ducts

High Beta Installations:
Rectangular Ducts



Air Flow Options

MATERIAL OF CONSTRUCTION

Pitots and Spool Section

Depending on the application, most of the spool sections for our DP Based flow measurement devices can be constructed out of Aluminum, Carbon Steel, Stainless Steel (either 304 or 316), or PVC. The pitots themselves can be manufactured out of Anodized Aluminum, Stainless Steel or PVC. If your ducts are constructed of another material or if your flows contain caustic materials that will react with these materials, other materials of construction may be available.

Coatings

A variety of coatings are also available for coating the spool sections of the various elements for increased corrosion resistance or increased heat tolerance.

AIRBORNE PARTICULATE

Line Mounted Purge

For heavily particulate-laden air streams a line mounted purge is available. The line mounted purge discharges a steady stream of clean, dry instrument air either through the impulse lines of the transmitter, or as positive pressure through the ports of the pitots in order to reduce the possibility of particulate or moisture disrupting the measurement devices' measurement accuracy.

EASY INSTALLATION

Custom Flanges

The flanges that come standard with our round, spooled flow measurement devices such as the DSV or HBP are angle ring flanges with a standard angle ring hole pattern. Custom Flanges for any of the devices are available upon request. Please let us know the desired hole pattern and we will be happy to customize the flanges for easy installation into your process. For easy installation of electronics such as transmitters or temperature sensors, a variety of customizable mounts are also available.



Various Materials of Construction



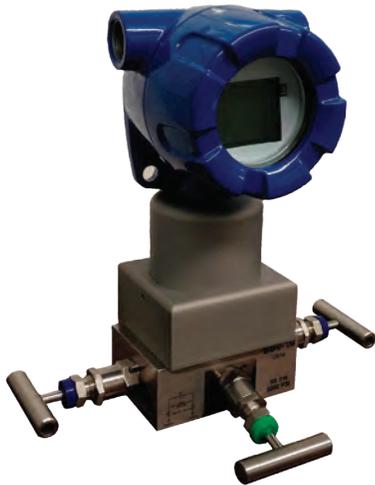
Line Mounted Purge Block



Custom Flanges Available Upon Request

Instrumentation

QVT™ Multivariable Transmitter



The QVT™ Multivariable Transmitter from Eastern Instruments is a Smart Transmitter that can be used for the accurate measurement of up to four separate process variables including Differential Pressure, Temperature and Absolute Pressure. When coupled with any DP based flow measurement element, the QVT™ will calculate the fully compensated mass flow of air/gas travelling through any process which is at or near atmospheric pressure (5 - 25 psia). The QVT™ is uniquely designed for high accuracy at low DP ranges and can accurately measure differential pressures down to 0.0009 in WC. Its high accuracy is due in part to its unique process seal which requires no diaphragm seal. Due to condensate, diaphragm seals often cause inaccuracies in a transmitter's sensor readings.

FEATURES AND BENEFITS

- **Modes of Operation:** Multivariable Transmitter (Measurement of two or more of DP, Temperature and Absolute Pressure), DP Transmitter (DP Measurement only)
- **DP Measurement:** Operating Range is 10000:1 (0.0009 in WC to 9.0 in WC) measuring Differential Pressure across any primary flow element such as VAP Averaging Pitot or HBP Flow Conditioner
- **AP Measurement:** Measurement of Absolute Pressure (integral sensor tied to low port of primary flow element)
- **Temperature Measurement:** Measurement of Temperature via 100 ohm 3-Wire Class A DIN RTD
- **Process Seal:** Our unique method of isolating sensors from the process requires no diaphragm seal and can be further enhanced with a Purge Seal (Low Volume Continuous Purge coupled directly to transmitter)
- **Flow Accuracy:** The accuracy of the flow measurement can be as high as $\pm 0.50\%$ of Reading over 100:1 DP (10:1 flow) range
- **Rangeability:** the span of the 4-20 mA signal corresponding to DP can be ranged from 0 to 0.05 in WC up to 0 to 8 in WC (160:1)
- **Response Time:** Updates flow calculation 10 times a second
- **Functionality:** All measured and calculated variables are available on LCD panel
- **Output:** 4-20 mA Compensated flow output using measured/input values for Differential Pressure, Absolute Pressure and Temperature (Can also be a single variable output only)
- **Simplicity:** Ae and the 4-20 mA full scale value are set from LCD panel's push buttons
- **Zero:** Differential pressure can be zeroed from the LCD/push button interface
- **Power Supply:** Loop Power 8.8 - 42.5 vDC range
- **Versatility:** LCD can be rotated independently of the head (LCD rotates 270° and head can rotate 180°) for ultimate adjustability



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6,640,158; 6,814,108; 6,679,125. Other patents pending.

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