UTECO

Superior Flow Measurement Accuracy
with ***No Straight Run Requirements*** *and*
Operating Ranges Never Before Attainable

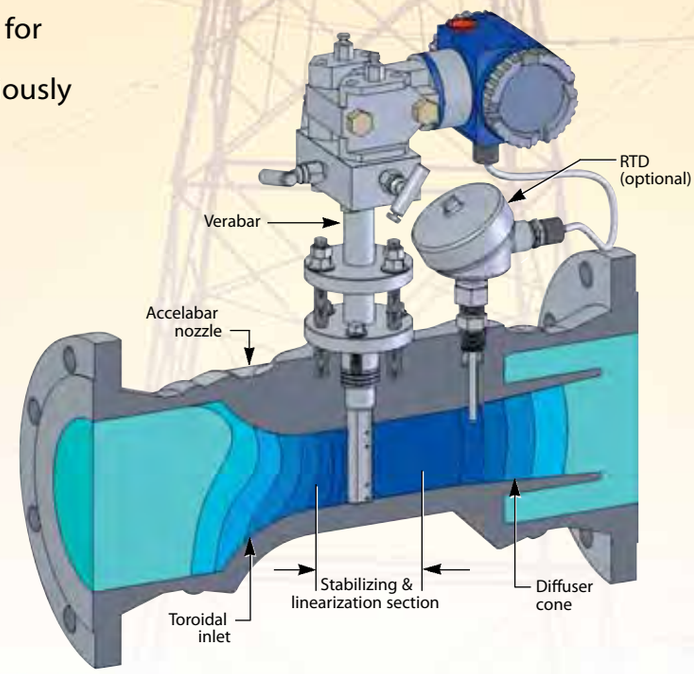
...Until Now

Accelabar®

Accelabar®... A New Idea in Flow Measurement

The Unique Accelabar Flow Meter

The Accelabar is a new and unique flow meter that combines two differential pressure technologies to produce operating ranges never before attainable in a single flow meter. It is capable of generating high differential pressures for measuring gas, liquids and steam at turndowns previously unattainable — with no straight run requirements.



How the Accelabar Works

The Accelabar consists of a unique toroidal nozzle design and a Verabar · averaging pitot. The nozzle has a patented straight run "settling distance" that accelerates, linearizes and stabilizes the velocity profile sensed by the Verabar. The Verabar located within the nozzle accurately measures and significantly increases the differential pressure output to increase the operating range (turndown). The Accelabar has a constant flow coefficient and produces an accuracy of up to ±0.50%.

Other manufacturers claim high accuracy, but over a limited turndown.

No Straight Run Required

The Accelabar can be used in extremely limited straight run piping configurations. The straight run is integral to the meter. The stabilization and linearization of the velocity profile within the throat of the nozzle eliminates the need for any upstream run.

Engineering Specifications

- Low velocity flow rates
- High accuracy: to ± 0.50%
- Repeatability: ±0.050%
- Verified flow coefficients
- No calibration required
- Extended turndown
- No straight run requirements
- Low permanent pressure loss
- Mass or volumetric flow

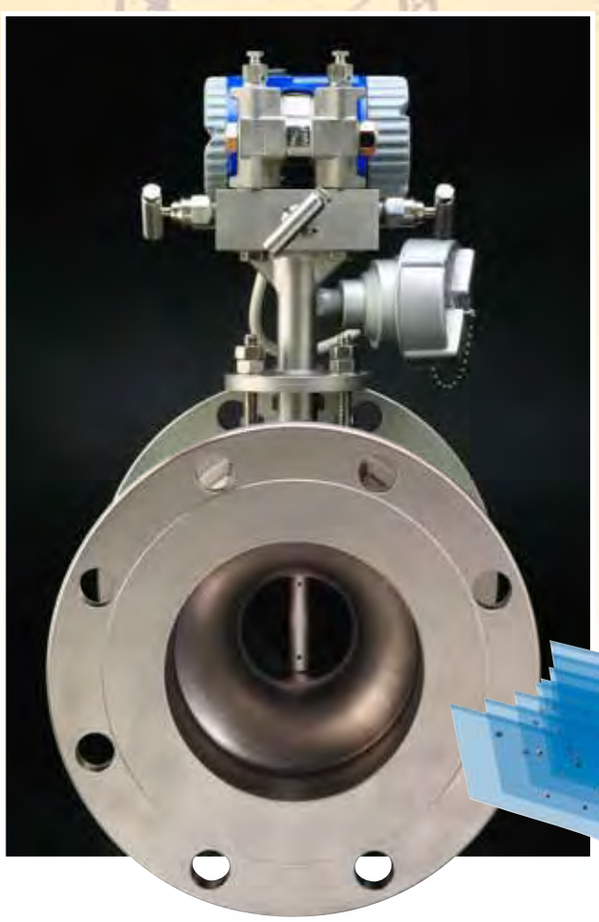
US Patent No. 6,868,741 B2 and various foreign patents pending.

Actual Application

(see data on page 4)

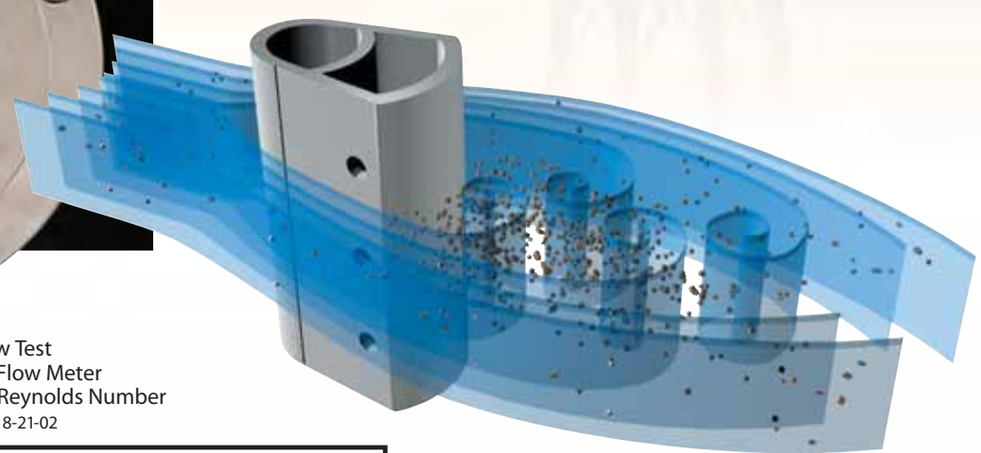
Application:	3" Sch 40 Natural Gas
Operating Pressure/ Temperature:	50 PSIG/70° F
Max/Min Flow Rate:	60,000 SCFH/1,000 SCFH
Flow Turndown:	60:1
Straight Run:	0"

Engineered to be the Best

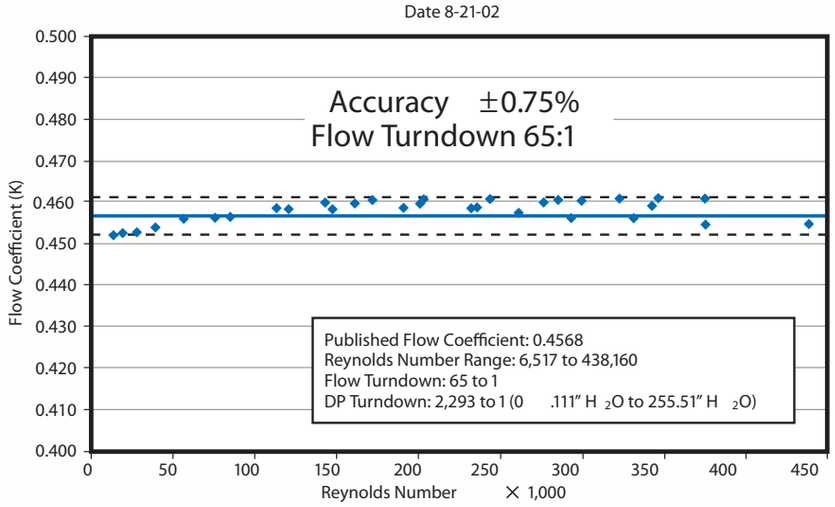


Verabar Provides the Accuracy

The proven technology of the Verabar makes the Accelabar work. It accurately measures the flow rate within the nozzle. Its unique bullet shape, constant flow coefficient, solid one-piece construction, non-clog design and signal stability make it the only design capable of producing the overall performance.



Flow Test
Accelabar Flow Meter
Flow Coefficient vs. Reynolds Number
Date 8-21-02



Verified Accuracy and Flow Coefficients

Empirical test data from independent laboratories verified an analytical model and flow coefficients as constant and independent of Reynolds Number and within ±0.75% of the predicted value over a flow turndown of 65:1 (see actual test). This eliminates the need for calibration.

Comparative Analysis vs. Other Flow Meters

The Accelabar fills the need not presently being filled by other flow meters for applications that:

- Do not have sufficient velocity to produce a readable signal or sufficient turndown
- Require the highest accuracy over an extended range
- Have little or no straight run piping before the meter

The Accelabar performance characteristics far exceed those of other DP meters, vortex meters and many other flow meters.

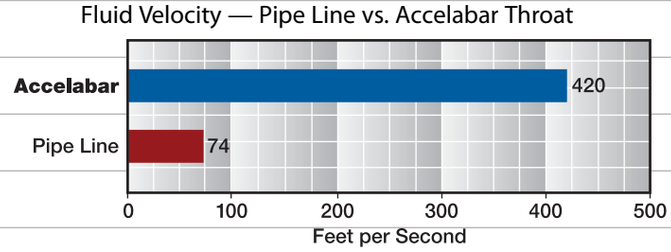
These charts show the actual performance characteristics of the Accelabar versus other flow meters based on the following flow conditions:

Flow Conditions

Fluid	Natural Gas
Pipe Size	3" Sch 40
Max Flow	60,000 SCFH
SG	0.6
Pressure	50 psig
Temperature	70°F
Pipe Line Velocity	74 ft/sec

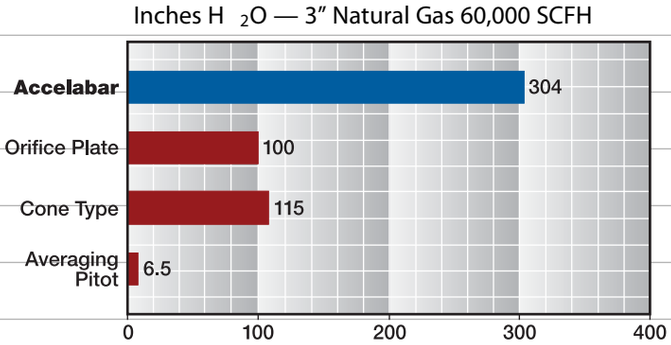
Accelabar Increased Velocity

Fluid Velocity — Pipe Line vs. Accelabar Throat



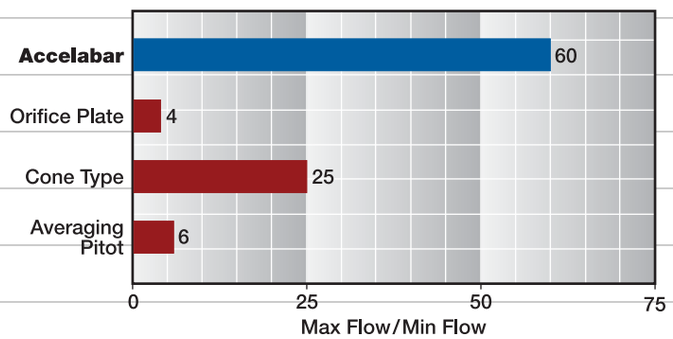
DP at Maximum Flow

Inches H_2O — 3" Natural Gas 60,000 SCFH



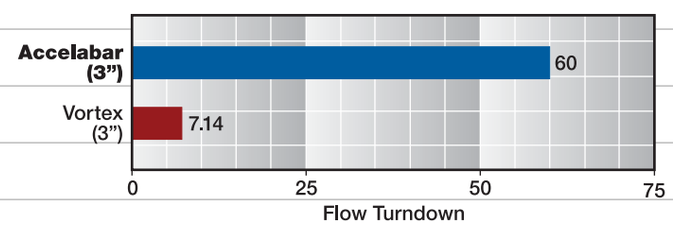
Flow Turndown

Maximum & Minimum

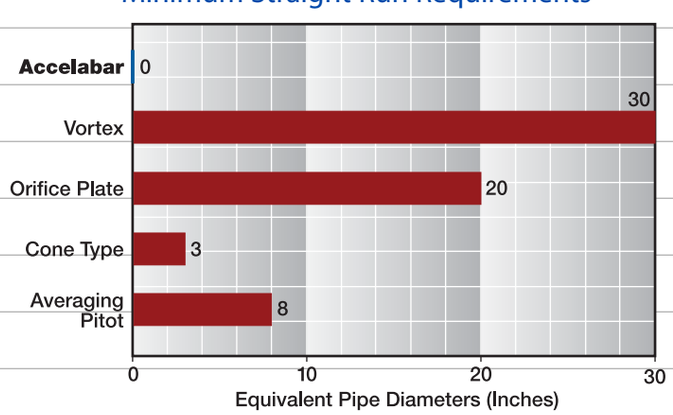


Flow Turndown

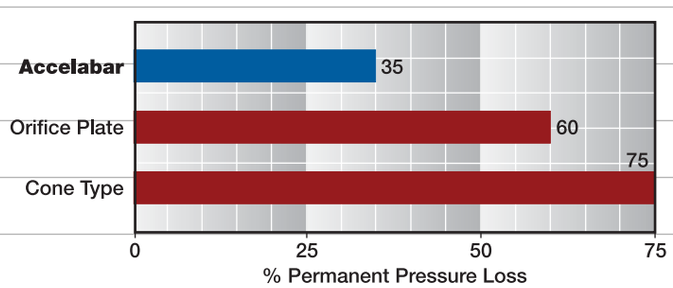
Accelabar vs. Vortex



Minimum Straight Run Requirements



Permanent Pressure Loss

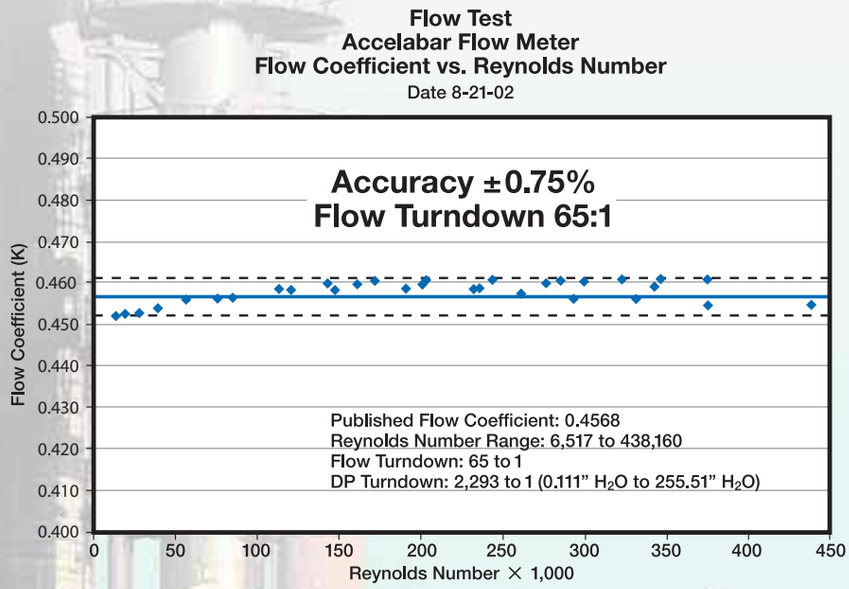


Accelabar® Test Data

The Proof Is In The Data

Many flow meters claim high accuracy and rangeability or turndown. However, few manufacturers define their limitations and even fewer can support it with actual test data. The tests below show the performance capabilities of the Accelabar.

Turndown Test



Test Specifications*

Pipe Size: 3" sch 40
Fluid: Air
Flow Rate: 145 ACFM
Max Pressure: 60 psig
Max Temperature: 75°F

Results

The Accelabar produced a DP of 255.5" H_2O at 145 ACFM. An accuracy of ±0.75% was maintained over a Reynolds Number range of 65 to 1. No other flow meter is capable of this operating range.

*Independent, NIST traceable tests were performed as follows:

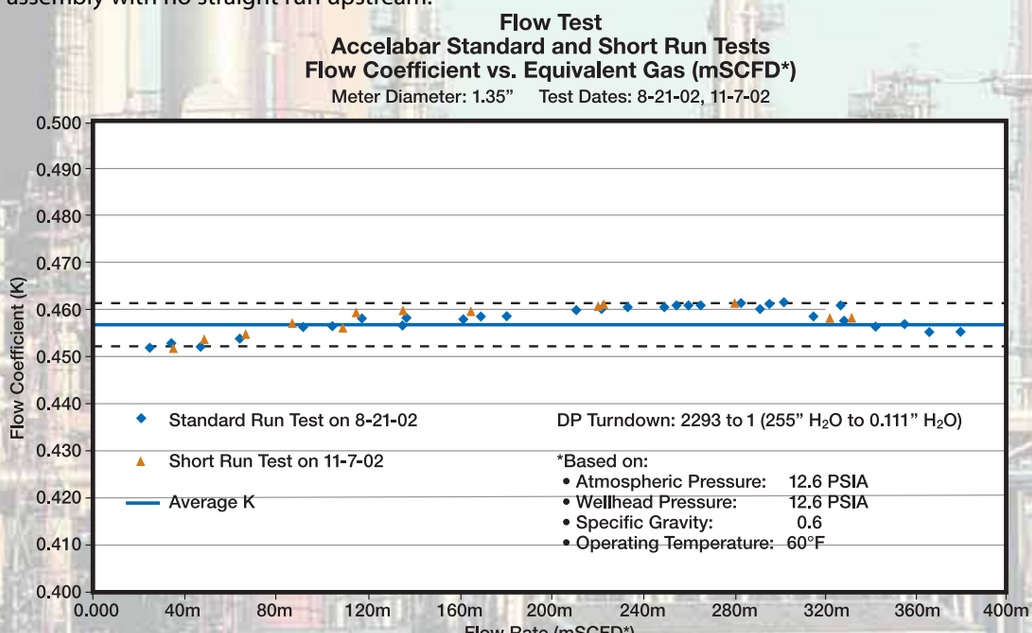
- Air tests in 3", 4", 6" and 12" pipes
- NIST traceable water tests
- Large turndown natural gas testing
- Short straight-run testing

Consult factory for a copy of certified tests.

No Straight Run Test Comparison

Test Specifications

The Accelabar was tested immediately downstream of a valve, tee and expander assembly with no straight run upstream.



Results

The short run test plotted with the standard straight run test verifies there is no shift in the flow coefficient.

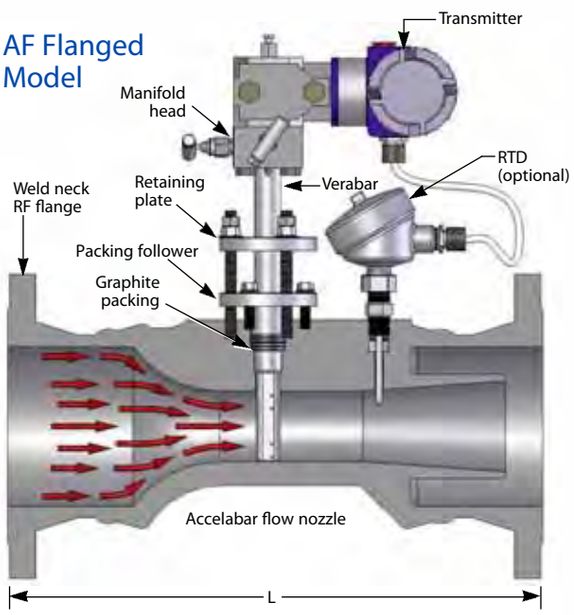
Models and Specifications

Ready to Install

The Accelabar is a complete flow meter ready to install. It comes complete with single or dual transmitters depending on the turndown requirements.

An optional RTD is supplied in a Thermowell for dynamic compensation (required for use with multivariable transmitter).

AF Flanged Model



Single Transmitter

Dual Transmitter

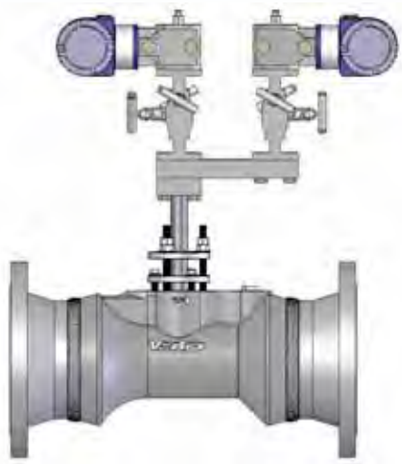


Chart A

Meter Size	Verabar Sensor	Face to Face "L"*		
		150#	300#	600#
3" (75mm)	-05 1/2"	13.78"	14.53"	15.28"
4" (100mm)	-05 1/2"	15.15"	15.90"	17.65"
6" (150mm)	-10 1"	19.15"	19.90"	21.90"
8" (200mm)	-10 1"	21.40"	22.15"	24.40"
10" (250mm)	-10 1"	23.15"	24.40"	27.65"
12" (300mm)	-10 1"	26.17"	27.78"	29.67"

* Face to face dimensions nominal. Custom lengths available.

Accelabar Model Selection

1. Furnish your flowing conditions. A flow calculation is required to determine the DP and verification of the operating limits.
   - Each meter size has a standard beta ratio sized for the optimal operating range.
   - The maximum operating limits are determined by the Accelabar flow calculation.
2. If your flowing conditions exceed the operating limits, a larger or smaller model (meter size) must be selected.

Specifications

Accuracy	Repeatability	Sensor, Body & Flange
to ± 0.50%	±0.050%	316SS

Flowing Conditions

General Data	Fluid Parameters	Maximum	Normal	Minimum	Units
Tag number	Flow Rate				
Pipe size & schedule or exact ID & wall thickness	Pressure				
	Temperature				
Fluid name:	Density*				

*Density is not required for steam applications.

Model	Accelabar 316SS
AFS ABS	Flanged Connections Bevel for Weld

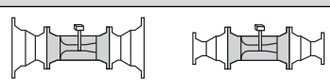
User Mating Pipe Size and Schedule or Exact ID and Wall Thickness

Code	User Mating Flange (Model AFS Only)
150 300 600	150# ANSI Class 275 psig @ 100°F, 80 psig @ 800°F (19 Bars @ 38°C, 5.5 Bars @ 426°C) 300# ANSI Class 720 psig @ 100°F, 330 psig @ 800°F (49.6 Bars @ 38°C, 22.8 Bars @ 426°C) 600# ANSI Class 1440 psig @ 100°F, 660 psig @ 800°F (99.3 Bars @ 38°C, 45.5 Bars @ 426°C) If other than ANSI, specify Standard (DIN, JIS) Size and Rating

Code	Flange Material
C S	Carbon Steel Stainless Steel

Accelabar Meter Size

Important: If the selected meter size is larger or smaller than the user's mating pipe and flange, expanders or reducers are required. Consult the factory for price and delivery.

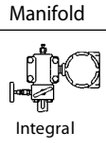
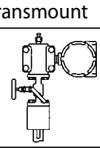
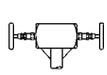


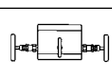
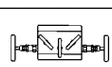
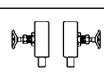
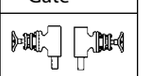
3″ (75mm)	4″ (100mm)	6″ (150mm)	8″ (200mm)	10″ (250mm)	12″ (300mm)

Code	Verabar Size
05 10	7/16″ (11mm) 7/8″ (22mm)

Code	Pipe Orientation
H V	Horizontal Vertical

Instrument Head Connections (Select Remote or Direct Mount Transmitter — Sold Separately)

Direct Mount Transmitter (Flanged 450°F/232°C Max.)		Remote Mount Transmitter (1/2″ NPT)		
Manifold	Transmount	Valve	Regular	Parallel
 Integral		 Integral		
M	F	T	R	P

Manifolds (Optional)				Instrument Valves (Optional)	
Direct Mount				Remote Mount	
3-Valve		5-Valve		Needle	Gate
 Soft Seat	Hard Seat	 Soft Seat	Hard Seat	 1/2″ NPT	 1/2″ NPT
F3SC (CS) F3SS (SS)	F3HC (CS) F3HS (SS)	F5SC (CS) F5SS (SS)	F5HC (CS) F5HS (SS)	C2NC (CS) C2NS (SS)	C2GC (CS) C2GS (SS)

Optional

Code	RTD in Thermowell
H1 H2 HT NH	Hazardous Location, Class 1 Div 1, Explosion Proof Hazardous Location, Class 1 Div 2, Non-Incendive Wiring High Temperature (500°F to 900°F, 260°C to 482°C) Non-Hazardous Location

Optional

Code	Connection Cable to Transmitter (Direct Mount Only)
XP N4	Explosion Proof (hazardous locations) NEMA 4

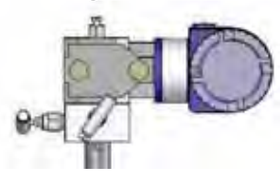
Optional

AFS	6″ Sch 40	150	SS	4″	05	H	R	C2NC	H2	XP	For Transmitter Selection, see Page 8.

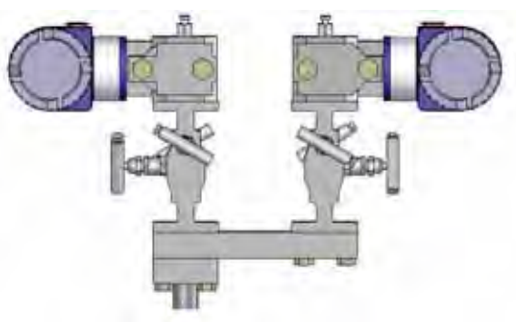
Transmitter Selection

Accelabar accuracy is percent of rate. The Accelabar maintains a constant flow coefficient over a wide range of flow rates and differential pressures.

Single Transmitter



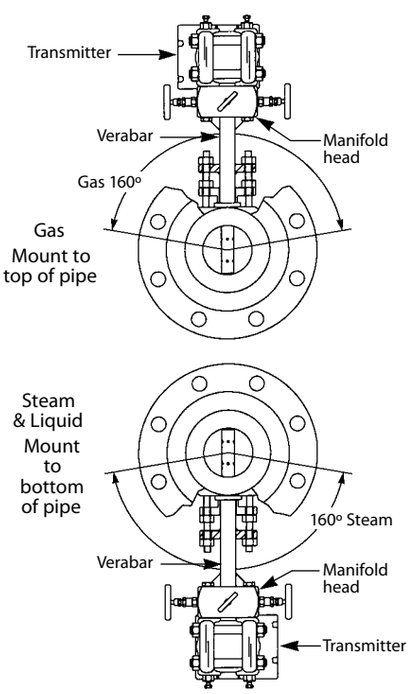
Dual Transmitter



DP transmitter accuracy is percent of scale. While most Accelabar installations are equipped with one DP transmitter, some applications requiring superior accuracy over an extreme DP turndown may require a dual DP transmitter installation.

Installation Orientation

Direct Mount



Remote Mount