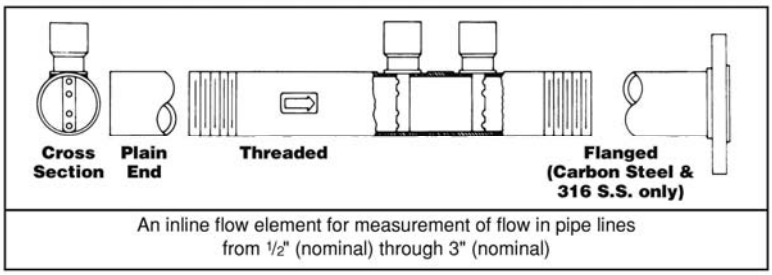
FLOW MEASUREMENT PRODUCTS

Delta tube

MODEL 300



An inline flow element for measurement of flow in pipe lines from ½" (nominal) through 3" (nominal)

VERIS

VERABAR FLOW SENSORS

PRECISION FLOW TEST KITS

For Installation and Operation Manuals
Please Visit: www.midwestinstrument.com/literature

Mid-West
Instrument

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Product Notes:

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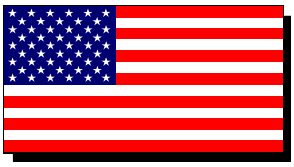
MODEL 805

PRECISION FLOW TEST KIT



Made In USA

Functions & Applications:

High accuracy portable test kit for precise flow indication and leak detection. This kit is equipped with a precise (±1% of full scale) accuracy differential pressure gauge. Popular applications include but are not limited to: measuring the pressure drop across various types of equipment i.e. filters, balancing HVAC systems, checking pump performance, orifice plates, checking calibration of transmitters, or reading flow directly when ordered with a square root dial etc.

When being used the gauge should be placed in as nearly vertical position as possible. This gauge is position sensitive and accuracy may be less than stated, if not in a vertical position.

Product Features/Benefits:

- Over 30 Years of Input from Professional Testing Technicians
- Soft-Seated Brass Needle Valves (with replaceable valve seats)
- Test kit is protected with 90 micron filters to minimize plugging with scale, sand, etc. Filter elements can be cleaned or replaced
- Durable Molded Plastic Carrying Case with Removable lid
- Test Procedures are Laminated in Clear Plastic
- 5 Year Warranty

Specifications:

- Gauge Type: Bellows Differential Pressure
- Dial Size: 4-1/2” Standard (6” Optional)
- Range (4-1/2") 0-10” thru 0-79.9” H2O ranges available
- Accuracy: ±1% Full Scale (Ascending) Std.
  (Accuracy: ±1/2% Full Scale available)
- Working Pressure: 500 PSIG (Standard)
- Gauge Material: Aluminum Body & Copper Alloy Internals
- Wetted Internals: Buna-N Seals, Aluminum & Copper Alloy
- Hoses & End Fittings: Nitrile Jacket and liner. Schrader 1/4" brass coupler
  (Connects with 1/4” 37° Flare Male Fittings)
- Valves: Soft-Seated Brass
- Tubing & Fittings: Nylon & Brass
- Hose Length: 10' long (3 meter)
- Filters: 90 Micron Brass **(Order Replacement Filter Kit No. 98008)**
- Approximate Shipping Wgt: 15 lbs / 6.8 kg
- Case: Polyethylene
- Dimensional Data: 13.75" x 15.5” x 8.5"
- Temperature Limitations: Maximum 150°F/65°C
  Freezing Temperatures must be avoided

Model 805 plumbed for water service only. Please contact the factory for assistance on kits for use with other liquids or gases.

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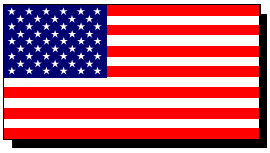
MODEL 806

PRECISION FLOW TEST KIT



Made In USA

Functions & Applications:

High accuracy portable test kit for precise flow indication and leak detection. This kit is equipped with a precise (±1% of full scale) accuracy differential pressure gauge. Popular applications include but are not limited to: measuring the pressure drop across various types of equipment i.e. filters, balancing HVAC systems, checking pump performance, orifice plates, checking calibration of transmitters, or reading flow directly when ordered with a square root dial etc.

When being used the gauge should be placed in as nearly vertical position as possible. This gauge is position sensitive and accuracy may be less than stated, if not in a vertical position.

Product Features/Benefits:

- Over 30 Years of Input from Professional Testing Technicians
- Soft-Seated Brass Needle Valves (with replaceable valve seats)
- Test kit is protected with 90 micron filters to minimize plugging with scale, sand, etc. Filter elements can be cleaned or replaced
- Durable Molded Plastic Carrying Case with Removable lid
- Test Procedures are Laminated in Clear Plastic
- 5 Year Warranty

Specifications:

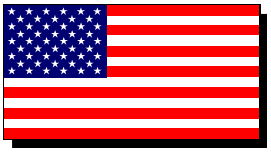
- Gauge Type: Bellows Differential Pressure
- Dial Size: 4-1/2” Standard (6” Optional)
- Range (4-1/2") 0-80” thru 0-400” H2O ranges available
- Differential Pressure Accuracy: ±1% Full Scale (Ascending) Std. (**Accuracy: ±1/2% Full Scale available)**
- Working Pressure: 500 PSIG (Standard)
- Gauge Material: Aluminum Body & Copper Alloy Internals
- Wetted Internals: Buna-N Seals, Aluminum & Copper Alloy
- Hoses & End Fittings: Nitrile Jacket and liner. Schrader 1/4" brass coupler **(Connects with 1/4” 37° Flare Male Fittings)**
- Valves: Soft-Seated Brass
- Tubing & Fittings: Nylon & Brass
- Hose Length: 10' long (3 meter)
- Filters: 90 Micron Brass **(Order Replacement Filter Kit No. 98008)**
- Approximate Shipping Wgt: 15 lbs / 6.8 kg
- Case: Polyethylene
- Dimensional Data: 13.75" x 15.5” x 8.5"
- Temperature Limitations: Maximum 150°F/65°C **Freezing Temperatures must be avoided**

Model 806 plumbed for water service only. Please contact the factory for assistance on kits for use with other liquids or gases.

Mid-West® Instrument

MODEL 809

PRECISION FLOW TEST KIT



Made In USA

Functions & Applications:

High accuracy portable test kit for precise flow indication and leak detection. This kit is equipped with a precise (±1% of full scale) accuracy differential pressure gauge. Popular applications include but are not limited to: measuring the pressure drop across various types of equipment i.e. filters, balancing HVAC systems, checking pump performance, orifice plates, checking calibration of transmitters, or reading flow directly when ordered with a square root dial etc.

When being used the gauge should be placed in as nearly vertical position as possible. This gauge is position sensitive and accuracy may be less than stated, if not in a vertical position.

Product Features/Benefits:

- Over 30 Years of Input from Professional Testing Technicians
- Soft-Seated Brass Needle Valves (with replaceable valve seats)
- Test kit is protected with 90 micron filters to minimize plugging with scale, sand, etc. Filter elements can be cleaned or replaced
- Durable Molded Plastic Carrying Case with Removable lid
- Test Procedures are Laminated in Clear Plastic
- 5 Year Warranty

Specifications:

- Gauge Type: “Bourdon Tube” Differential Pressure
- Dial Size: 4-1/2” Standard (6” Optional)
- Range (4-1/2") 0-15 PSID thru 0-500 PSID ranges available
- Differential Pressure Accuracy: ±1% Full Scale (Ascending) Std. (**Accuracy: ±1/2% Full Scale available)**
- Working Pressure: 500 PSIG (Standard)
- Gauge Material: Aluminum Body & Copper Alloy Internals
- Wetted Internals: Buna-N Seals, Aluminum & Copper Alloy
- Hoses & End Fittings: Nitrile Jacket and liner. Schrader 1/4" brass coupler **(Connects with 1/4” 37° Flare Male Fittings)**
- Valves: Soft-Seated Brass
- Tubing & Fittings: Nylon & Brass
- Hose Length: 10' long (3 meter)
- Filters: 90 Micron Brass **(Order Replacement Filter Kit No. 98008)**
- Approximate Shipping Wgt: 15 lbs / 6.8 kg
- Case: Polyethylene
- Dimensional Data: 13.75" x 15.5” x 8.5"
- Temperature Limitations: Maximum 150°F/65°C **Freezing Temperatures must be avoided**

Model 809 plumbed for water service only. Please contact the factory for assistance on kits for use with other liquids or gases.

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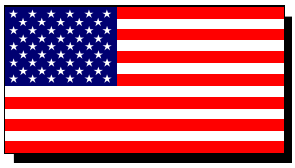
MODEL 820
PRECISION FLOW TEST KIT



Made In USA

Functions & Applications:

Rugged Medium Duty Portable Test Kit. This test kit is equipped with a ±3-2-3% of full scale accuracy (ascending) piston type differential pressure gauge. Popular applications include but are not limited to, measuring pressure drop across various types of equipment, filters, checking pump performance, balancing valves, checking equipment for excessive pressure drop, leakage, etc.

Product Features/Benefits:

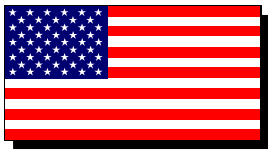
- Over 30 Years of Input from Professional Testing Technicians
- Test kit is protected with 90 micron filters to minimize plugging with scale, sand, etc. Filter elements can be cleaned or replaced
- Durable Molded Plastic Carrying Case
- Test Procedures are Laminated in Clear Plastic
- 5 Year Warranty

Specifications:

- Gauge Type: “Piston” Differential Pressure
- Dial Size: 2-1/2”
- Range: 0-10 PSID thru 0-100 PSID ranges available
- Accuracy: ±3-2-3% Full Scale (Ascending)
- Working Pressure: 500 PSIG (Standard)
- Gauge Material: Aluminum Body & 316 S.S. Internals
- Wetted Internals: Buna-N Seals, Aluminum & 316 Stainless Steel
- Hoses & End Fittings: Nitrile Jacket and liner. Schrader 1/4" brass coupler **(Connects with 1/4” 37° Flare Male Fittings).**
- Tubing & Fittings: Nylon & Brass
- Hose Length: 5' long (1.5 meter)
- Filters: 90 Micron Brass **(Order Replacement Filter Kit No. 98008)**
- Approximate Shipping Wgt: 3.5 lbs / 1.6 kg
- Case: Polyethylene
- Dimensional Data: 12.25" x 6” x 7"
- Temperature Limitations: Maximum 150°F/65°C
  Freezing Temperatures must be avoided

Mid-West® Instrument

MODEL 831
PRECISION FLOW TEST KIT



Made In USA

Functions & Applications:

Sensitive yet rugged medium duty portable test kit. This test kit is equipped with a ±3-2-3% of full scale accuracy (ascending) diaphragm type differential pressure gauge. Ideally suited for applications where differential pressures of 0-5" to 0-400" H_2O may be encountered. Popular applications are balancing heating & cooling systems, checking pump performance, leakage, checking equipment for excessive pressure drop, (i.e. filters, balancing valves, averaging pitot tubes, orfice plates etc.) Dials may be for reading differential pressure, or reading flow directly, if ordered with a flow (square root) dial.

Product Features/Benefits:

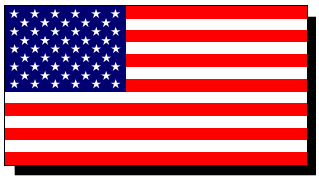
- Over 30 Years of Input from Professional Testing Technicians
- Soft-Seated Brass Needle Valves (with replaceable valve seats)
- Test kit is protected with 90 micron filters to minimize plugging with scale, sand, etc. Filter elements can be cleaned or replaced
- Durable Molded Plastic Carrying Case with Removable lid
- Test Procedures are Laminated in Clear Plastic
- 5 Year Warranty

Specifications:

- Gauge Type: "Diaphragm" Differential Pressure
- Dial Size: 4-1/2"
- Range: 0-10" H2O thru 0-400" H2O ranges available
- **Accuracy**: ±5% Full Scale (Ascending) 0-5" H2O thru 0-9.9" H2O
  ±2% Full Scale (Ascending) 0-10" H2O thru 0-400" H2O
- Working Pressure: 300 PSIG (Standard)
- Gauge Material: Engineered Plastic Body & 316 S.S. Internals
- Wetted Internals: Buna-N Seal & Diaphragm, Plastic, Aluminum & S.S., Brass
- Hoses & End Fittings: Nitrile Jacket and liner. Schrader 1/4" brass coupler
  (Connects with 1/4" 37° Flare Male Fittings).
- Valves: Soft-Seated Brass
- Tubing & Fittings: Nylon & Brass
- Hose Length: 10' long (3.0 meter)
- Filters: 90 Micron Brass **(Order Replacement Filter Kit No. 98008)**
- Approximate Shipping Wgt: 12 lbs / 5.5 kgs
- Case: Polyethylene
- Dimensional Data: 13.75" x 15.5" x 8.5"
- Temperature Limitations: Maximum 150°F/65°C
  Freezing Temperatures must be avoided

Mid-West® Instrument

MODEL 841
PRECISION FLOW TEST KIT



Made In USA

Functions & Applications:

Rugged Medium Duty Portable Test Kit. This test kit is equipped with a ±3-2-3% of full scale accuracy (ascending) diaphragm type differential pressure gauge. Popular applications include but are not limited to, measuring pressure drop across various types of equipment, filters, checking pump performance, balancing valves, checking equipment for excessive pressure drop, leakage, etc.

Product Features/Benefits:

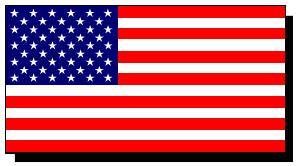
- Over 30 Years of Input from Professional Testing Technicians
- Test kit is protected with 90 micron filters to minimize plugging with scale, sand, etc. Filter elements can be cleaned or replaced
- Durable Molded Plastic Carrying Case
- Test Procedures are Laminated in Clear Plastic
- 5 Year Warranty

Specifications:

- Gauge Type: “Diaphragm” Differential Pressure
- Dial Size: 2-1/2”
- Range: 0-50” H2O thru 0-100 PSID ranges available
- Differential Pressure Accuracy: ±5% Full Scale (Ascending) 0-50” thru 0-399.9” H2O ±3-2-3% Full Scale (Ascending) 0-400” H2O thru 0-100 PSID
- Working Pressure: 500 PSIG (Standard)
- Gauge Material: Aluminum Body & 316 S.S. Internals
- Wetted Internals: Buna-N Seal & Diaphragm, Aluminum & 316 Stainless Steel
- Hoses & End Fittings: Nitrile Jacket and liner. Schrader 1/4" brass coupler **(Connects with 1/4” 37° Flare Male Fittings).**
- Tubing & Fittings: Nylon & Brass
- Hose Length: 5' long (1.5 meter)
- Filters: 90 Micron Brass **(Order Replacement Filter Kit No. 98008)**
- Approximate Shipping Wgt: 8 lbs / 3.6 kgs
- Case: Polyethylene
- Dimensional Data: 12.25" x 6” x 7"
- Temperature Limitations: Maximum 150°F/65°C **Freezing Temperatures must be avoided**

Mid-West® Instrument

MODEL 842
PRECISION FLOW TEST KIT



Made In USA

Functions & Applications:

Rugged (2) gauge medium duty portable flow test kit. This kit is equipped with two differential pressure gauges with complimentary dials ranges, enabling it to cover a broad range of differential pressures with accuracies of ± 3-2-3% full scale (ascending). Both gauges are protected against over-range to the maximum working pressure of the test kit. While primarily used for balancing HVAC systems it has numerous other applications which include but are not limited to: checking pump performance, checking pressure drop across filters, leakage, etc…

Product Features/Benefits:

- Over 30 Years of Input from Professional Testing Technicians
- Combination kit includes both 820 & 841 Flow test gauges
- Test kit is protected with 90 micron filters to minimize plugging with scale, sand, etc. Filter elements can be cleaned or replaced
- Durable Molded Plastic Carrying Case
- Test Procedures are Laminated in Clear Plastic
- 5 Year Warranty

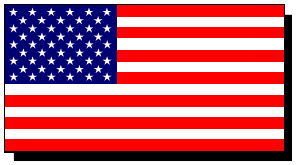
Specifications:

- Gauge Type: **(1)** “Piston” & **(1)** “Diaphragm” Differential Pressure
- Dial Size: **(2)** 2-1/2”
- Range: 0-50” H2O thru 0-100 PSID ranges available
- Differential Pressure Accuracy: ±3-2-3% Full Scale (Ascending) 0-50” H2O thru 0-100 PSID
- Working Pressure: 500 PSIG (Standard)
- Gauge Material: **(2)** Aluminum Body & 316 S.S. Internals
- Wetted Parts: Buna-N Seal & Diaphragm, Brass, Aluminum & 316 Stainless Steel
- Hoses & End Fittings: Nitrile Jacket and liner. Schrader 1/4" brass coupler **(Connects with 1/4” 37° Flare Male Fittings).**
- Tubing & Fittings: Nylon & Brass
- Hose Length: 5' long (1.5 meter)
- Filters: 90 Micron Brass **(Order Replacement Filter Kit No. 98008)**
- Approximate Shipping Wgt: 10 lbs / 4.5 kg
- Case: Polyethylene
- Dimensional Data: 12.25" x 6” x 7"
- Temperature Limitations: Maximum 150°F/65°C **Freezing Temperatures must be avoided**

Mid-West® Instrument

MODEL 843

PRECISION FLOW TEST KIT



Made In USA

Functions & Applications:

Rugged (2) gauge medium duty portable flow test kit. This kit is equipped with two differential pressure gauges with complimentary dials ranges, enabling it to cover a broad range differential pressures and accuracies of ± 3-2-3% full scale (ascending). Both gauges are protected against over-range to the maximum working pressure of the test kit. While primarily used for balancing HVAC systems it has numerous other applications which include but are not limited to: checking pump performance, checking pressure drop across filters, leakage, etc…

Product Features/Benefits:

- Over 30 Years of Input from Professional Testing Technicians
- Combination kit includes both 831 & 841 Flow test gauges
- Test kit is protected with 90 micron filters to minimize plugging with scale, sand, etc. Filter elements can be cleaned or replaced.
- Durable Molded Plastic Carrying Case
- Test Procedures are Laminated in Clear Plastic
- 5 Year Warranty

Specifications:

- Gauge Type: **(2)** “Diaphragm” Differential Pressure
- Dial Size: **(2)** 4-1/2”
- Range: 0-10” H2O thru 0-100 PSID ranges available
- Pressure Accuracy: ±5% Full Scale (Ascending) 0-10” H2O thru 0-400” H2O
- ±3-2-3% Full Scale (Ascending) 0-400” H2O thru 0-100 PSID
- Working Pressure: 300 PSIG (Standard)
- Gauge Material: **(1)** Engineered Plastic Body **(1)** Aluminum Body & 316 S.S. Internals
- Wetted Internals: Buna-N Seal & Diaphragm, Plastic, Aluminum & S.S., Brass
- Hoses & End Fittings: Nitrile Jacket and liner. Schrader 1/4" brass coupler **(Connects with 1/4” 37° Flare Male Fittings).**
- Tubing & Fittings: Nylon & Brass
- Hose Length: 5' long (1.5 meter)
- Filters: 90 Micron Brass **(Order Replacement Filter Kit No. 98008)**
- Approximate Shipping Weight: 12 lbs / 5.5 kgs
- Case: Polyethylene
- Dimensional Data: 16.5" x 7.25” x 9"
- Temperature Limitations: Maximum 150°F/65°C **Freezing Temperatures must be avoided**

Mid-West® Instrument

Need to measure flow?
Mid-West Instrument has the gauge for you.

Veris Verabar
Flow Sensor

Typical Flow Dial

Veris Accelabr
Flow Meter

Flow measurement using Mid-West Instrument differential pressure gauge technology will provide accuracy and reliability you've come to know and trust. Our industrial quality differential pressure flow gauge uses modern materials and current technology to provide an easy to read flow scale.

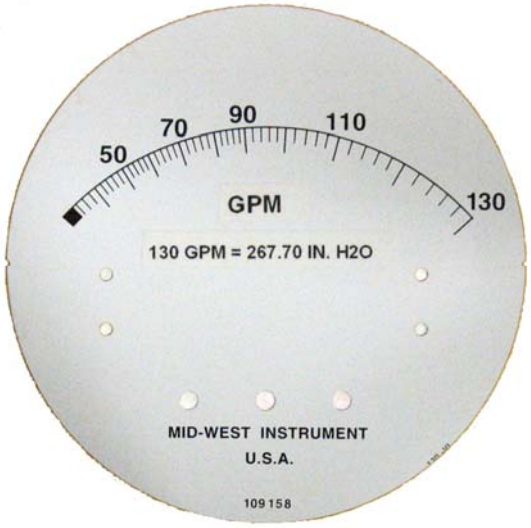
Mid-West differential pressure flow gauges indicate such flow rates as liters per minute up to gallons per hour, even when used at high line pressures. Units can be supplied with reed switches or relays to initiate alarms, activate other equipment, or shut the system down. Two switches are available when high and low limits are required. 4-20 mA Transmitter also available.

Here are some typical flow designators: ***GPM, USGPM, ACFM, SCFM, NM3/HR, LBS/HR, L/MIN, L/SEC, KG/HR, TONS/HR***. Flow scale dials are available for the following Mid-West differential pressure gauges: Model 150, 106, 109, 130, 140 and 142

Model 105/106 Range: 0-10" H2O to 0-400" H2O (25 mbar to 1 bar)
Model 109 DP Range: 0-15 PSID (0-1.0 bar) to 0-6000 PSID (0-400 bar)
± 1/2% or ± 1% Full Scale Accuracy
Uni-Directional Dial Ranges are available in either
LINEAR or SQUARE ROOT FLOW SCALES

Available Flow Scales Models: 105, 106, & 109

Uni-Directional Dial Ranges are available in either LINEAR or SQUARE ROOT FLOW SCALES with any appropriate legend (I.E. GPM, SCFM, USGPM, NM3/HR, L/MIN, ETC) at no extra charge			LINEAR Bi-Directional Dials are available with any appropriate Legend at No Charge	
0-0.5	0-30	0-300	1.0-0-1.0	75-0-75
0-1.0	0-35	0-400	2.0-0-2.0	100-0-100
0-1.6	0-40	0-500	5.0-0-5.0	150-0-150
0-2.0	0-50	0-600	10-0-10	200-0-200
0-3.0	0-60	0-700	15-0-15	300-0-300
0-4.0	0-70	0-800	25-0-25	400-0-400
0-5.0	0-75	0-900	30-0-30	750-0-750
0-6.0	0-80	0-1000	50-0-50	1000-0-1000
0-7.0	0-100	0-1500		
0-8.0	0-135	0-1600		
0-10	0-150	0-2000		
0-15	0-160	0-3000		
0-20	0-200	0-4000		
0-25	0-250	0-5000		
		0-6000		



Model 130
Range: 0-5" H2O to 0-400" H2O
0-5" to 0-9.9" H2O ± 5%
0-10" to 0-400" H2O ± 2%
Full Scale Accuracy

Model 140 or 142
142 Range:
0-20" H2O to 0-25 PSID
140 Range:
0-25 PSID to 0-100 PSID
± 2% Full Scale Accuracy

Uni-Directional Dial Ranges are available in either LINEAR or SQUARE ROOT FLOW SCALES

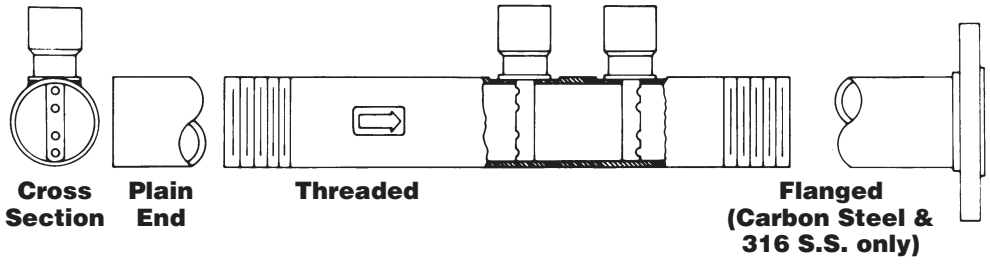
Available Flow Scales Models: 130, 140, 142

Uni-Directional Dial Ranges are available in either LINEAR or SQUARE ROOT FLOW SCALES with any appropriate legend (I.E.GPM, SCFM, USGPM, NM3/HR, L/MIN, ETC) at no extra charge		
Model 130 Flow Dials		**Models 140/142 Flow Dials**
0-1.0		0-1.0
0-1.25		0-1.5
0-1.5		0-2.0
0-1.75		0-2.5
0-2.0		0-5.0
0-2.5		0-10.0
0-3.0		
0-3.5		
0-4.0		
0-4.5		
0-5.0		
0-5.5		
0-6.0		
0-6.5		
0-7.0		
0-7.5		
0-8.0		
0-8.5		
0-9.0		
0-9.5		
0-10		
Available Multipliers for Flow Dials: X10, X100, X1000, and X10,000		
Note: Not all ranges available in all diaphragm materials		

Mid-West Instrument • 6500 Dobry Dr. • Sterling Heights, MI 48314 • Ph. 586-254-6500 • Fax 586-254-6509
Web Site: www.midwestinstrument.com • Email: sales@midwestinstrument.com

BULLETIN NO. 300/02
(Supersedes 300/00)

MODEL 300



Functions & Applications:

An inline flow element for measurement of flow in pipe lines from 1/2" (nominal) through 3" (nominal)

Specifications:

Materials		Carbon Steel (a)		316 Stainless Steel (b)		CPVC Solvent Welded
Pipe Size		1/2", 3/4", 1", 1 1/2", 2", 2 1/2", 3"				1/2", 3/4", 1", 1 1/2", 2", 2 1/2", 3" Schedule 80 only
End Connections		Threaded	Welded	Threaded	Welded	Threaded - Standard Plain End - Optional
Working Pressure (PSIG) Carbon Steel Based on -20 to 600°F 316 S.S. Based on -20 to 200°F CPVC (Water Service) Up to 73.4°F (23°C) For other media and/or temperatures, see Engineering Data.	**Pipe Size**	**Schedule 40**	**Schedule 40**	**Schedule 40**	**Schedule 40**	**Schedule 80**
	1/2	1320	2950	2080	4640	300
	3/4	1130	2400	1770	3770	240
	1	1020	2240	1600	3520	220
	1 1/2	830	1660	1310	2600	170
	2	740	1390	1170	2190	140
	2 1/2	750	1530	1180	2400	150
	3	690	1320	1080	2080	130
NOTES:		For flange applications, see ASME/ANSI B16.5 or Mid-West Bulletin No. ASDE/Latest. (a) Pressures & Temperatures are based on ASTM A53 Grade A Welded Schedule 40 Carbon Steel Pipe. (b) Pressures & Temperatures are based on ASTM A 312 TP 316 Welded Schedule 40 Stainless Steel Pipe. For additional System Pressure (PSIG) vs Temperature (°F) see Mid-West Bulletin No. ASDE/Latest.				
Instrument Connections		1/4" FNPT (Standard), 1/2" (Optional for C.S. or S.S. only)				

Special Features:

Utilizes two averaging flow elements of equal area to sense stagnation (RAM) and static differential pressure providing minimum permanent pressure loss.

Related Products Available:

Indicators & Switches	A broad selection of indicators, with or without switching, are available. For details, please refer to Mid-West Bulletins on Models 105 & 130.
Portable Indicators	A wide variety of portable indicators are also available. Please see Mid-West Bulletin 800/Latest.

Part Numbering System

3 0 0 - A A - 0 0 - A A

1 Basic Model Number

2 Material
A - Steel
B - 316 Stainless Steel
C - CPVC

3 Size
(Nominal Pipe Size)
A - 1/2"
B - 3/4"
C - 1"
D - 1 1/2"
E - 2"
F - 2 1/2"
G - 3"

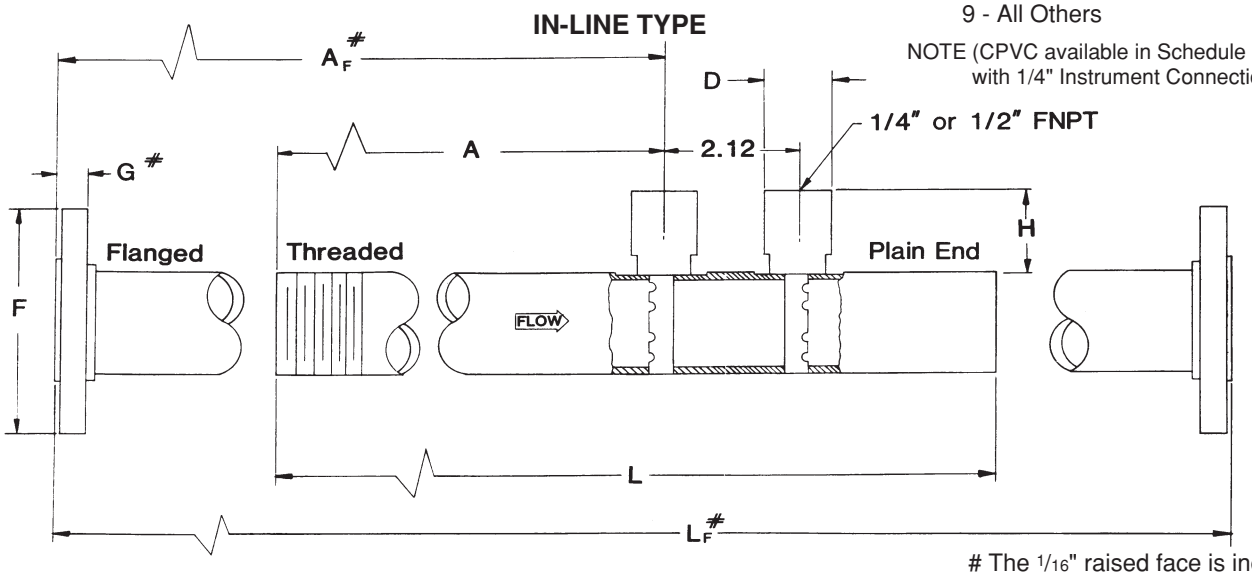
4 Pipe Schedule
0 - Schedule 40
1 - Schedule 80
9 - All Others

5 Construction
0 - Solvent Welded CPVC
1 - Welded (Steel & Stainless Steel)

6 Instrument Connections
A - 1/4" FNPT (Standard)
B - 1/2" FNPT (Optional)

7 End Configuration
A - Threaded
F - Flanged (150# RF)
P - Plain End
Z - All Others

IN-LINE TYPE



NOTE (CPVC available in Schedule 80 only & with 1/4" Instrument Connections only)

The 1/16" raised face is included in thickness "G" and length A_F & L_F

Dimensional Data

Manufacturer reserves the right to change specifications without prior notice.

Pipe Size (Nominal)	L	A	A_F	H	D		F	G	L_F
				(Max.)	1/4" FNPT	1/2" FNPT	Flanged Only*		
1/2"	6"	2 3/16"	2 7/16"	1.38			3.5	.44	6.62
3/4"	6"	2 3/16"	2 3/8"	1.38			3.88	.50	6.53
1"	8"	3 11/16"	3 7/8	1.38			4.25	.56	8.5
1 1/2"	8"	3 11/16"	3 15/16"	1.38	.75	1.12	5.0	.69	8.63
2"	10"	4 15/16"	5 1/4"	1.38			6.0	.75	10.75
2 1/2"	10"	4 15/16"	5 5/16"	1.38			7.0	.88	10.87
3"	12"	5 15/16"	6 5/16"	1.38			7.5	.94	13.0

*** Dimensions are for socket weld flanges (150 lb.). For other flange ratings consult factory.**

REPRESENTED BY

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Instrument

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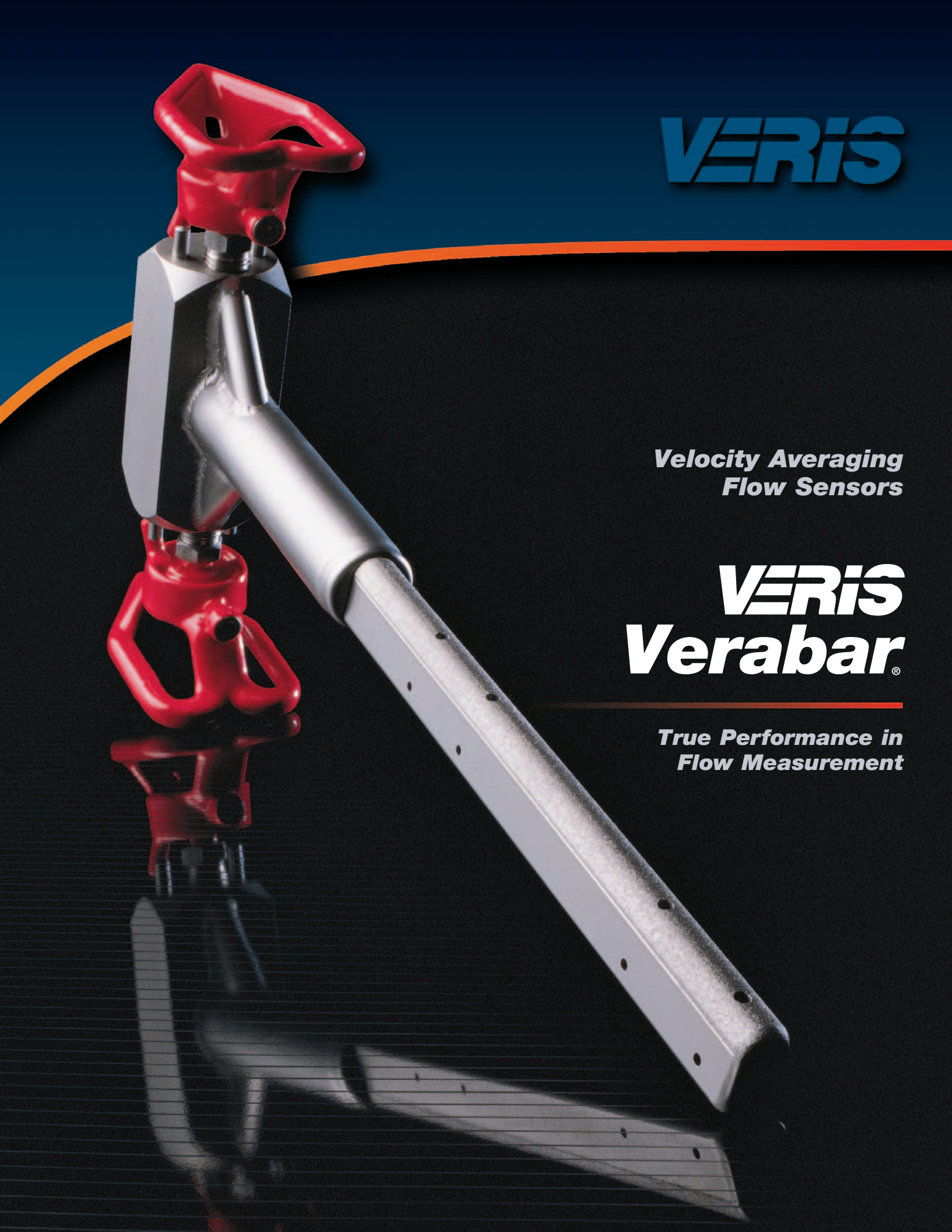

VERIS
Velocity Averaging
Flow Sensors
VERIS
Verabar®
True Performance in
Flow Measurement

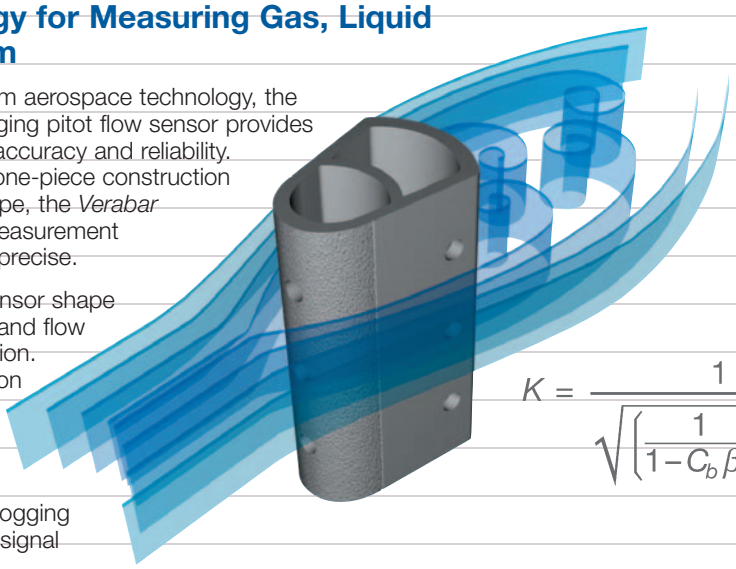
VERIS Verabar®
Advanced DP Flow Measurement Technology

From Veris Research…*True Performance in DP Flow Measurement*

The Most Accurate and Reliable Technology for Measuring Gas, Liquid and Steam

Developed from aerospace technology, the *Verabar* averaging pitot flow sensor provides unsurpassed accuracy and reliability. With its solid one-piece construction and bullet shape, the *Verabar* makes flow measurement clog-free and precise.

The unique sensor shape reduces drag and flow induced vibration. And the location of the low pressure ports eliminates the potential for clogging and improves signal stability.



In God We Trust… All Others Bring Data

The unique and exclusive breakthrough in improved accuracy derived from the development of a **verified theoretical model** predicts the Verabar flow coefficients. **This eliminates the need for calibration tests to characterize the flow coefficients.**

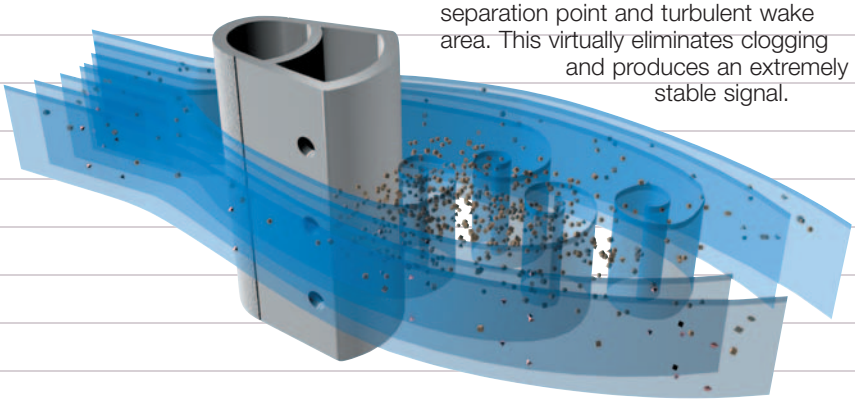
$$K = \frac{1}{\sqrt{\left(\frac{1}{1 - C_b \beta_v}\right)^2 + C_\infty}}$$

Without such a model, the uncertainty of the flow coefficients is dramatically increased and expensive calibration may be required.

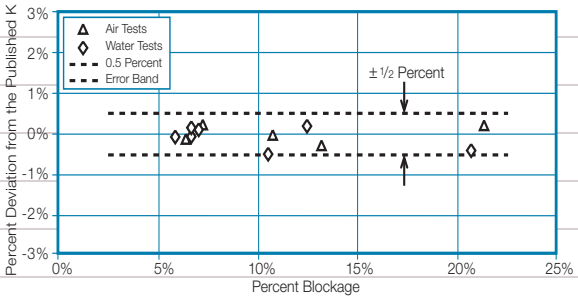
Empirical test data from independent laboratories verified the theoretical model and flow coefficients as a constant, independent of Reynolds number and within ±0.5% of the predicted value. The derivation of the theoretical model and test data is published in the Verabar Flow Test Report (ED-100).

Superior Signal Stability and Greater Resistance to Clogging

Clogging can occur in low pressure ports located in or near the partial vacuum at the rear of the sensor. The *Verabar* design locates the low pressure ports on the sides of the sensor, forward of the fluid separation point and turbulent wake area. This virtually eliminates clogging and produces an extremely stable signal.



Test Data Summary

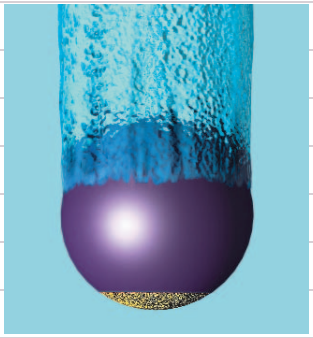


Lower Drag and Extended Turndown

Golf balls fly farther because they have a dimpled surface that lowers aerodynamic drag.

The grooves and roughness on the *Verabar's* frontal surface apply the same principle. This simple design feature relieves the partial vacuum at the rear of the sensor, reducing the pressure drag. This extends the accuracy and rangeability to very low velocities.

Rough Surface



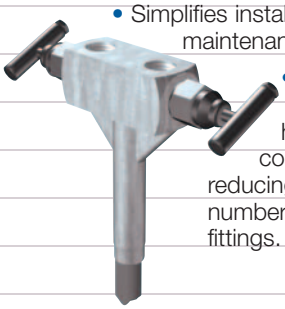
Smooth Surface

Verabar... New Ideas That Work

Unique Valve Head

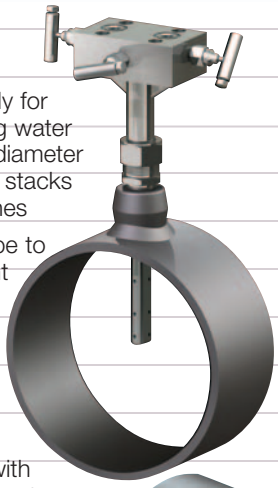
Verabar offers a new concept… built-in valves in the head of the instrument.

This superior design:



- Simplifies installation and maintenance.
- Lowers the connecting hardware cost by reducing the number of fittings.

Partial Insert



- Designed specifically for high velocity cooling water applications, large diameter pipes, large vertical stacks and buried water lines
- Extends 1/3 into pipe to reduce procurement and installation costs — specifically useful when a hot tap is required
- Partial Insert hot tap sensors can be inserted/retracted with no reduction in flow rate

Spring-Lock… Offers a Superior Mounting Method

This advanced, patented design ensures the sensor remains sealed, locked and pre-loaded to the opposite wall regardless of changes in pipe diameter due to pressure, temperature or mechanical force.

This design has important advantages:

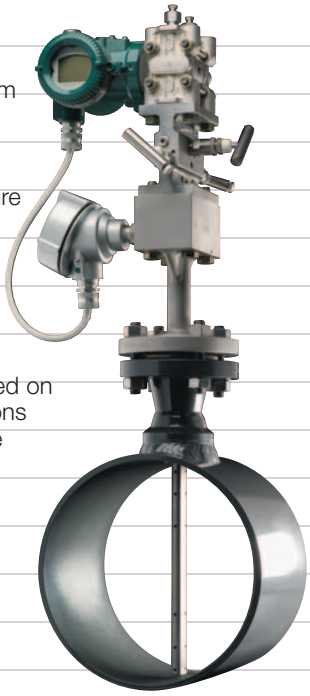
- Fugitive emission and leak prevention… The Spring-Lock continually compensates for the differential in packing and body growth rates due to increased temperature.
- Increases sensor strength, thereby eliminating the need for an opposite wall support. A locked, pre-loaded sensor is four times stronger than a non-preloaded, cantilevered sensor.
- Other mounting methods do not pre-load the sensor or the packing seal and are subject to increased sensor vibration, metal fatigue, breakage and leakage.

Transmount

A Transmount flow system is the first choice for all liquids; and for gas and steam applications, with slight variations in pressure and temperature.

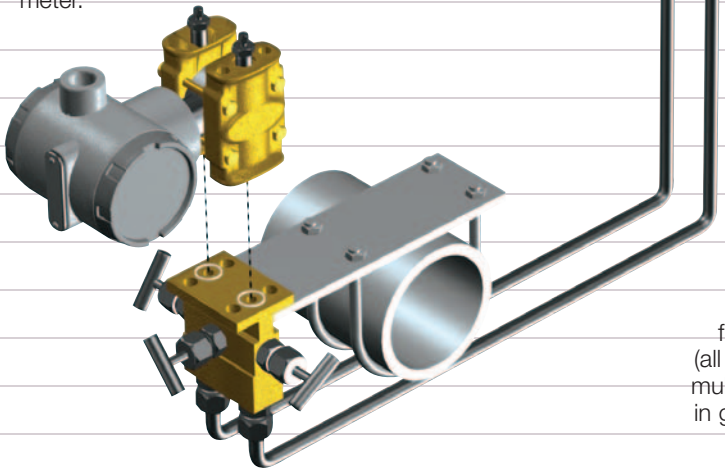
Mass Transmount

A Mass Transmount flow system should be selected on steam and gas applications with variable temperature and pressure.

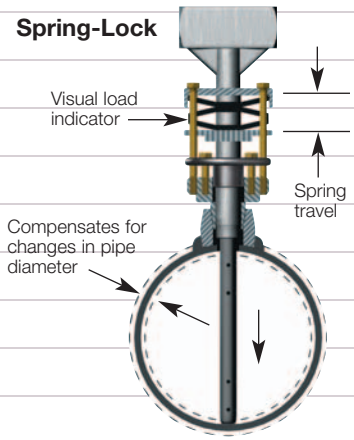


Field Flow Systems

Ready to install, the Verabar can be ordered with a manifold, transmitter or local indicating meter.



Complete Installation in Less than an Hour

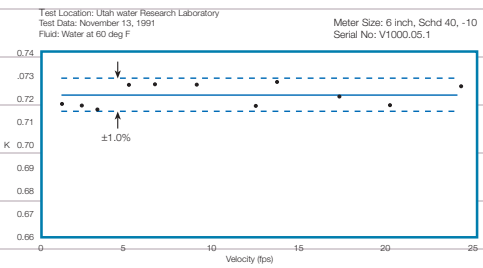


The Proof of *Verabar* Accuracy

Accurate Flow Coefficients

The true test of a flow measurement device is its ability to repeat its published flow coefficient within its accuracy band. *Verabar* has been thoroughly tested at independent flow laboratories (all sensor sizes, in multiple pipe sizes, in gas and liquids).

Actual Flow Test



Verabar...The Versatile Flow Sensor

Fast and Easy Model Selection

The easy-to-operate Veracalc computer program features:

- **Flow Calculations:** DP from flow rate, or flow rate from DP.
- **Model Selection:** Complete model selection from drop down menus.
- **Structural Analysis:** Verifies sensor strength at flowing conditions.
- **Temperature and Pressure Limits:** Error warnings if limits are exceeded.

The Veracalc PC program is available from your local representative, the factory or it can be downloaded from our website at *www.veris-inc.com*.

Verabar Model Selector

Regular Models — (Threaded Components)

Model Number	Type of Mounting
V100, V110, V150	**Tube Fitting** **V100** (Single Support) **V110** (Double Support)
	Spring-Lock **V150** (No opposite support required)

Hot Tap Models — (Threaded Components)

V200, V250	**Screw Drive** **V200**
	Low Pressure Hand Insertion **V250**

Hot Tap Models — (Flanged Components)

Model Number	Type of Mounting
V400, V450	**Screw Drive** **V400**
	Low Pressure Hand Insertion **V450**

Flanged Models — (Flanged Components)

V500, V510, V550	**Flanged** **V500** (Single Support) **V510** (Double Support)
	Flanged Spring-Lock **V550** (No opposite support required)

Verabar Applications

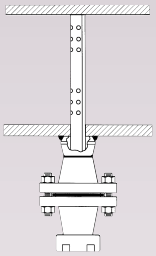
The *Verabar* offers the widest application range of any flow sensor. It accurately measures gas, liquid and steam.

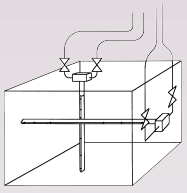
Gas	Liquid	Steam
Natural Gas	Cooling/Chilled water	Saturated
Compressed Air	Boiler Feed Water	Superheated
Combustion Air	De-Mineralized Water	Main Header
Hydrocarbon Gas	Hydrocarbon Liquids	Custody Transfer
Hot Air	Cryogenic	Distribution
Blast Furnace Gas	Thermal Transfer Fluids	Energy Studies

Extended Range Applications

The *Verabar's* versatile design lends itself to a wide range of applications. Contact Veris application engineering for your special requirements.

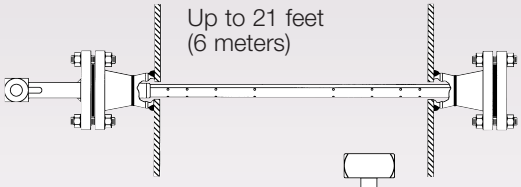
High Pressure Design
2500# ANSI Class
6000PSI and 1000ºF





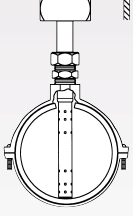
Square and Rectangular Ducts

Large Stacks and Ducts
Up to 21 feet
(6 meters)



Specialized Mounting

- PVC
- Concrete
- FRP
- Cast Iron Pipe



Verabar Compared to Orifice Plates

Through Accuracy of Measurement, Low Installed and Operating Costs, *Verabar* Proves Its Performance, Efficiency and Value.

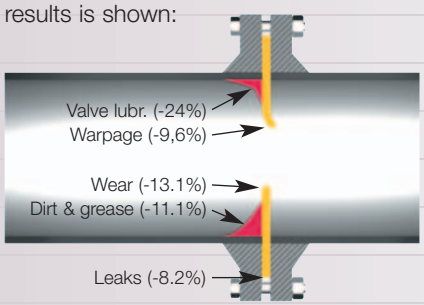
Verabar Maintains Its Accuracy

Orifice plates show long term deterioration of accuracy.

The initial accuracy of the orifice plate is ±1%. However, long term accuracy deteriorates unless the plate is periodically inspected. Senior, dual chamber fittings are available to check the plate without requiring system shutdown, but such fittings are very expensive.

Orifice Plate Test Results

Florida Gas Transmission Company conducted a test to quantify various conditions which can result in inaccurate measurement. A partial list of the results is shown:



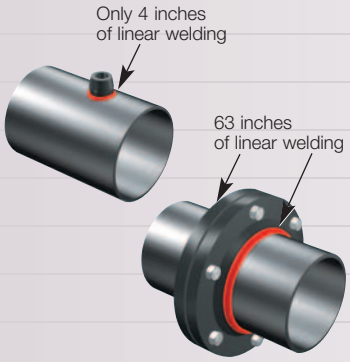
Condition	% Deviation
Wear of knife edge:	
0.010”	-2.2
0.020”	-4.5
0.050”	-13.1
Dirt and grease deposits in pipe	-11.1
Valve lubrication upstream:	
one side of plate	-15.8
both sides	-24.0
Leaks around plate	-8.2
Plate warpage	-9.6

Verabar Lowers Installed Costs

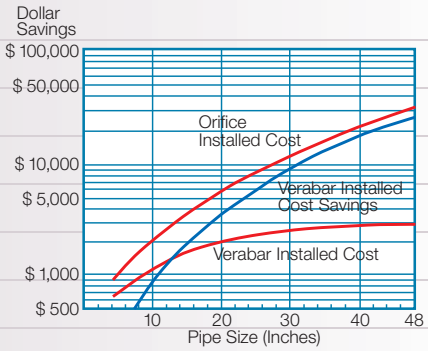
Verabar can save you more than 60% in installation costs over an orifice plate in a 10” pipe.

The graph shows the total installed cost by pipe size of the orifice plate, the *Verabar*, and the resultant *Verabar* savings. The most significant portion of the savings is the reduction in the linear inches of weld.

Savings in Weld Time



Installed Cost Savings

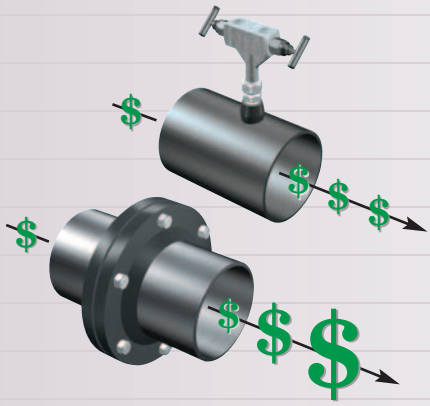


Verabar Has the Lowest Operating Costs

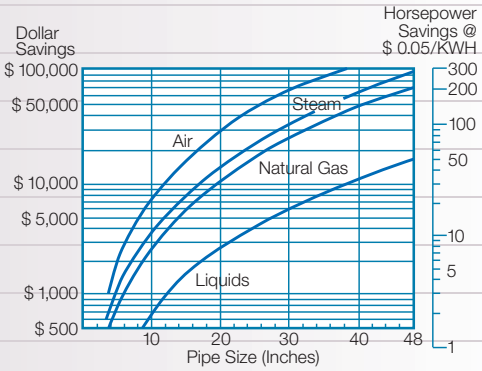
Verabar pays for itself in less than a year.

The graph shows the yearly operating cost savings and equivalent horsepower savings of the non-constricting, low permanent pressure loss *Verabar* compared to the extremely constricting, high permanent pressure loss orifice plate. Savings are shown for gases, liquids and steam — at typical design velocities, by pipe size.

Verabar vs. Orifice



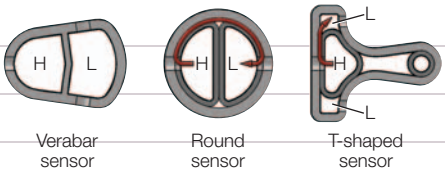
Operating Cost Savings



Verabar Compared To Other Insert Flow Sensors

Quality Assurance

Veris manufactures its own leak-proof, solid *one-piece* sensor. Our primary goal is to provide the highest quality and most accurate sensor in the industry.



Verabar sensor | Round sensor | T-shaped sensor

Other manufacturers use a *three-piece* sensor design that has no positive mechanical method of maintaining a seal between the tubes. Therefore, temperature, pressure, vibration and even manufacturing variations can *cause leakage between the chambers.*

This can result in a significant undetectable loss in accuracy.

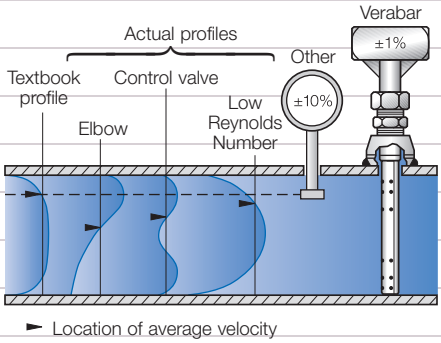
Verabar is designed to meet or exceed applicable ANSI and ASME codes. The *Verabar* is available to meet B31.1, B31.3, B31.8, NACE MR-01-75, etc.

Additional QA capabilities include code welding, hydrostatic and other non-destructive testing.

Why Average the Velocity Profile?

Verabar averages the velocity profile through multi-sensing ports which span the entire pipe diameter. Other types of non-averaging insert meters are SINGLE POINT INSERT METERS (turbine, vortex, magnetic, sonic, etc.). They assume a "textbook: turbulent velocity profile, and use a single "critical" point to infer an average velocity. In actual industrial applications, sensors are located downstream of disturbances, such as elbows or valves, which produce non-uniform velocity profiles. This makes it virtually impossible to locate a single point that represents the average velocity.

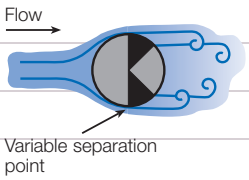
Result: *Inaccuracy ranging from ±10% to ±20%.*



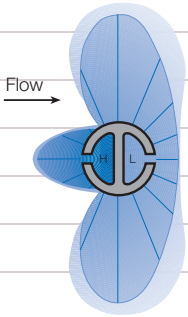
Problems with Other Sensor Shapes

Round Sensors

Round sensors produce unpredictable accuracy. The original round sensors were designed for economical fluid balancing and did not meet industrial demands for accuracy. Round sensors have a variable fluid separation point that causes an unstable low pressure distribution around the sensor.

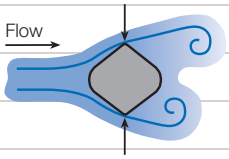


Result: *Inaccuracy in excess of ±5% and as high as ±10%.*

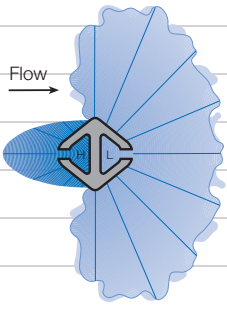


Diamond and T-Shaped Sensors

These sensors produce pulsating, noisy signals. They improved accuracy by use of a sharp edge to fix the fluid's separation point. However, this greatly amplified the vortex shedding forces.

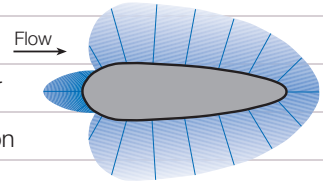


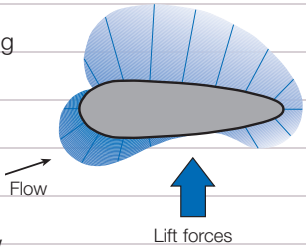
Result: *The sharp edges generate extreme vortices, causing sensor vibration, pulsations and a noisy signal to the point that transmitter dampening and signal averaging are recommended.*



Aerodynamic-Shaped Sensors

Extreme aerodynamic shapes that permit the stream lines to reattach are subject to airfoil type lift forces. This occurs when the angle of attack varies due to sensor misalignment, or the direction of the fluid varies, as is common in industrial piping with upstream disturbances.





Result: The lift forces can cause an unpredictable shift in the low pressure distribution, producing inaccurate measurement.

Mid-West® Instrument

ISO 9001 Certified

Verabar…True Performance in Flow Measurement

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