

**VERIS**  
**Verabar**<sup>®</sup>

***Field Flow Systems***

***Transmount<sup>®</sup> and  
Mass Transmount<sup>®</sup>***

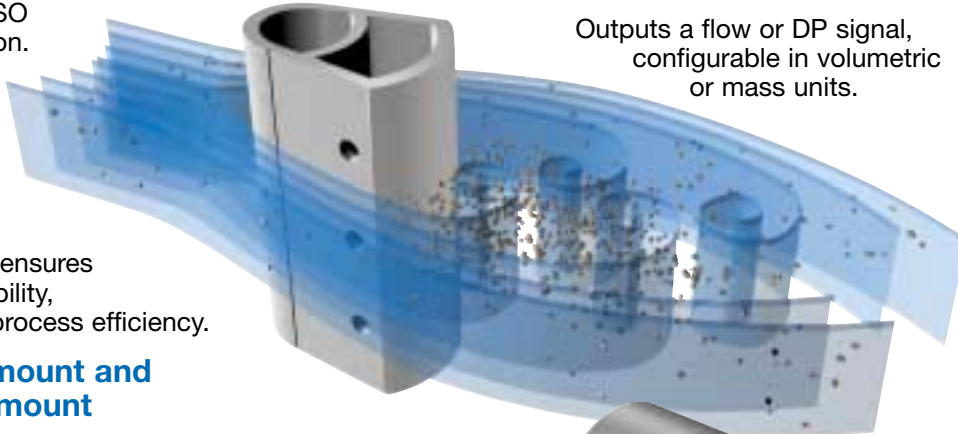


# Verabar... A New Idea in Field Flow Systems

## Veris Field Flow Systems

Accurate and dependable flow measurement begins in the pipe with the Verabar, the proven leader in dependability and accuracy. Its patented non-clog design, verified flow coefficients and solid one-piece construction are backed by a 5-year performance warranty and ISO 9001 certification.

The superior performance of the Verabar primary flow element and its companion DP transmitter ensures maximum reliability, accuracy and process efficiency.



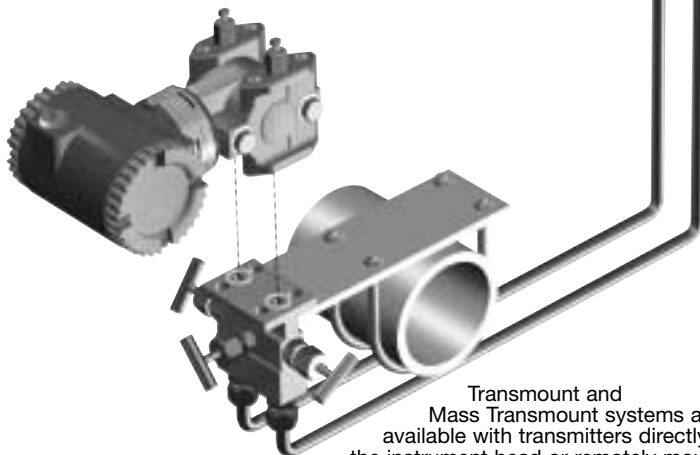
## Veris Transmount and Mass Transmount

Veris Transmount & Mass Transmount field flow systems include:

- The Verabar flow sensor
- DP transmitter configured to your application, available in three types:
  - Economical and easy to use, push-button field configurable (no communicator required, upgradeable to fully intelligent version)
  - Fully intelligent transmitters, which outputs include Foxcom, Hart or Fieldbus
  - Multivariable transmitters that output pressure, temperature and a dynamically compensated flow signal
- Instrument valves, interchangeable standard manifold and RTD (as required)

## For your records...the best documentation package in the industry

- Flow calculation (determines DP based on your flowing conditions)
- Structural Calculation (when requested)
- Up and downstream straight run requirements
- Detailed Dimensional Drawings
- Installation Bill of Materials
- Installation Instructions

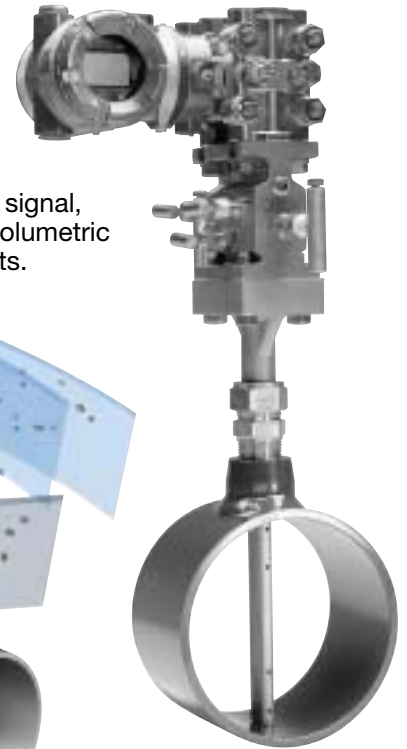


Transmount and Mass Transmount systems are available with transmitters directly mounted to the instrument head or remotely mounted as shown.

## Transmount

A Transmount flow system is the first choice for all liquids, gas and steam applications.

Outputs a flow or DP signal, configurable in volumetric or mass units.



## Mass Transmount

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

A Multivariable transmitter with integral or remote RTD measures pressure, temperature and DP to calculate a dynamically compensated flow rate. The integral RTD design requires only a single pipe penetration which lowers installation costs by 50%.

## Veris Application Assistance

If you have any questions or need assistance in determining which system to select and the effects on system accuracy, contact Veris through **FASTER** (Factory Assisted Sales and Technical Response). See details on Page 11.



# How to Select a Veris Field Flow System

How to Order information, specifications and documentation on following pages.

## Transmount

### Non-Compensated Pressure and Temperature

All liquids, gas and steam applications with constant or minor changes in pressure or temperature.

## Mass Transmount

### Compensated Pressure and Temperature

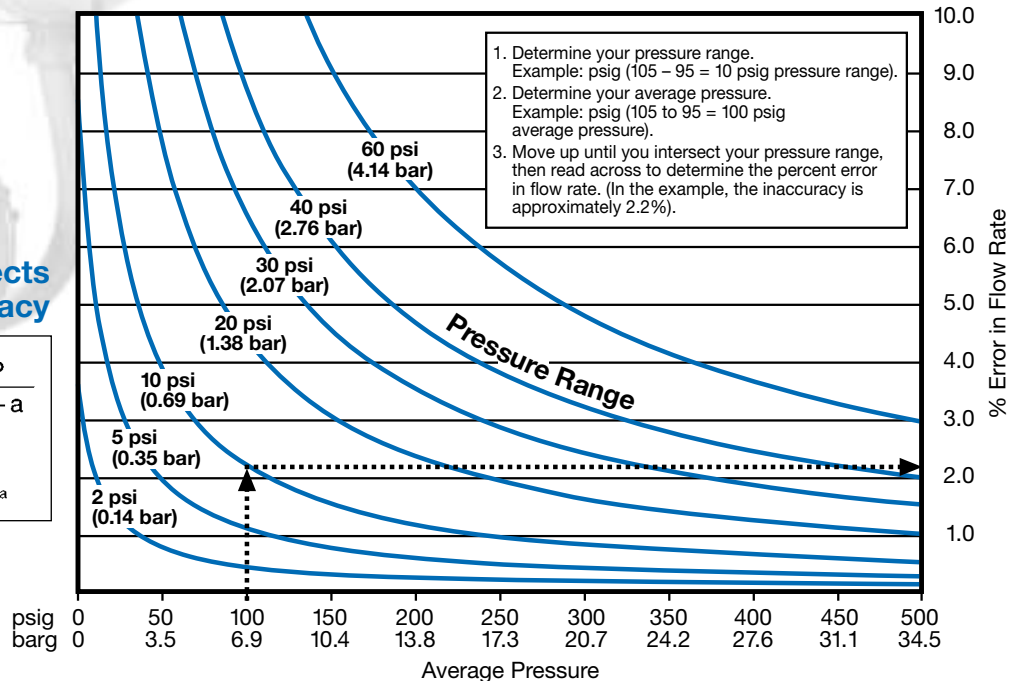
Gas and steam applications with major changes in pressure and/or temperature.

The first step is to determine the effects of the variations in pressure and temperature on your system accuracy. The equations and charts below can be used to determine the percent error in flow rate due to variations in pressure and temperature. If the accuracy is within acceptable limits, select the lower cost Transmount; if not, select Mass Transmount.

### Pressure Effects on Accuracy

$$\% Q_{\text{Error}} = \frac{25 \Delta P}{P_{\text{avg gage}} + a}$$

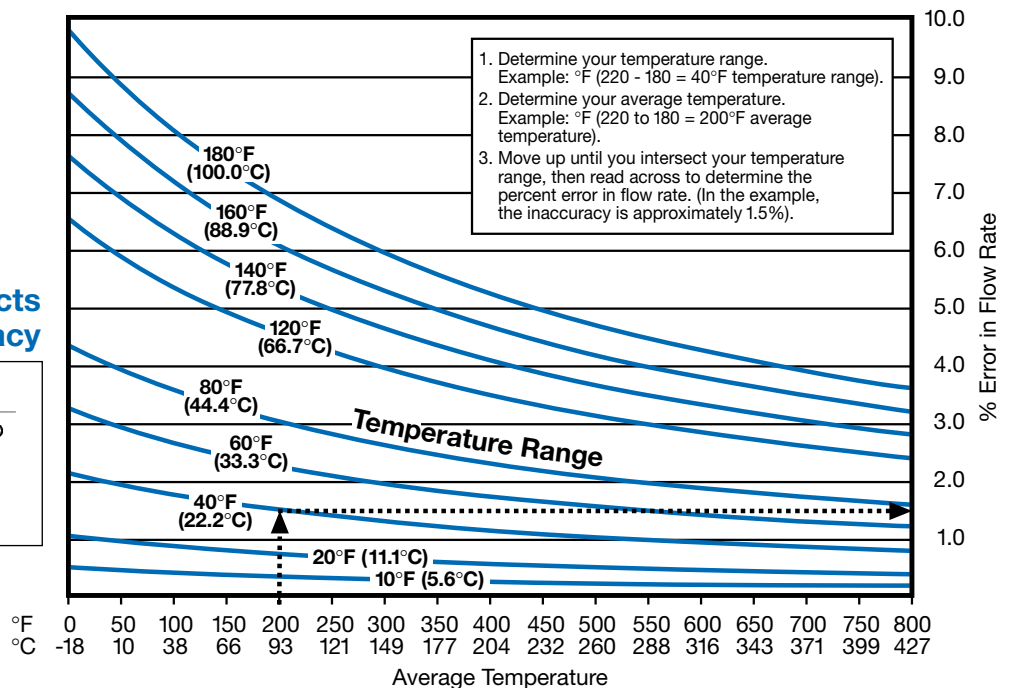
a = 14.73 for PSI  
a = 101.32 for K<sub>Pa</sub>



### Temperature Effects on Accuracy

$$\% Q_{\text{Error}} = \frac{25 \Delta T}{T_{\text{avg}} + b}$$

b = 460 for °F  
b = 273 for °C



# How to Order

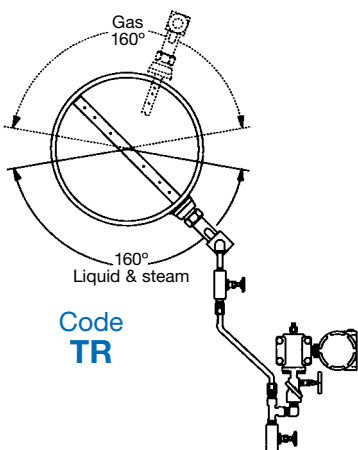
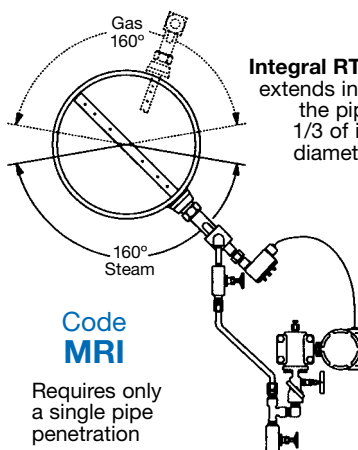
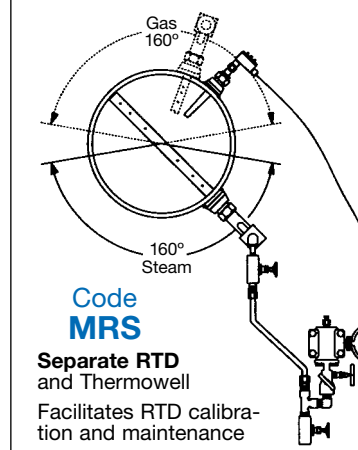
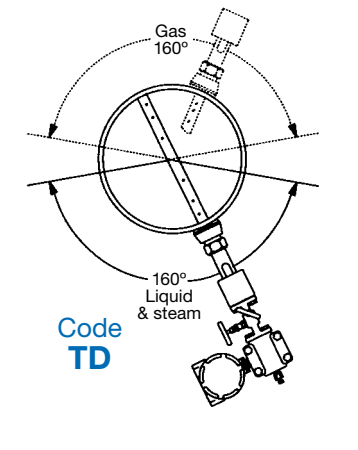
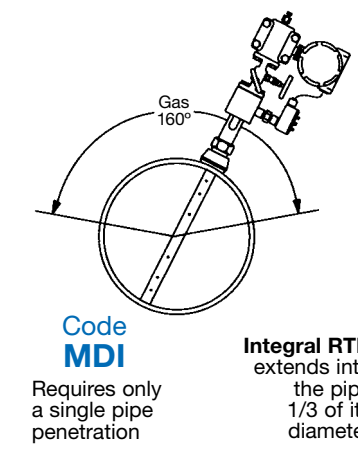
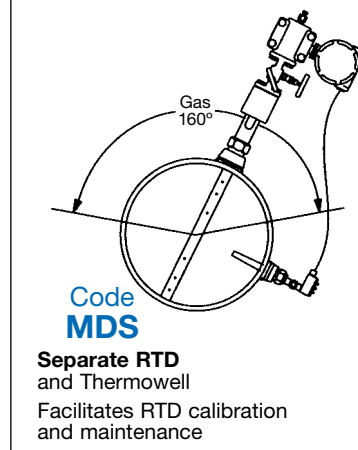
## Quick & Easy Specifications

1. Select a Transmount or Mass Transmount System and transmitter installation location (remote or direct mount) from the chart below.
2. Complete the Quick Flow System Selection (opposite page). Veris will complete the model numbers and furnish flow calculations, drawings, complete specifications and quotations.

## Complete Catalog Specifications

Select each system component:

Transmount —	Page
• Remote mount (TR).....	6
• Direct mount (TD).....	7
Mass Transmount —	
• Remote mount (MRI, MRS).....	8
• Direct mount (MDI, MDS).....	9

	Transmount® (Regular Transmitter)	Mass Transmount® (Multivariable Transmitter)	
	Outputs DP or flow $Q = C' \sqrt{DP}$	Outputs DP, pressure, temperature and calculates a dynamic compensated flow rate at the transmitter $Q = C' \sqrt{\frac{DP \times P}{T}}$	
<b>Remote Mount</b>	 <p>Code TR</p>	 <p>Code MRI</p> <p>Integral RTD extends into the pipe 1/3 of its diameter</p> <p>Requires only a single pipe penetration</p>	 <p>Code MRS</p> <p>Separate RTD and Thermowell</p> <p>Facilitates RTD calibration and maintenance</p>
<b>Direct Mount</b>	 <p>Code TD</p>	 <p>Code MDI</p> <p>Integral RTD extends into the pipe 1/3 of its diameter</p> <p>Requires only a single pipe penetration</p>	 <p>Code MDS</p> <p>Separate RTD and Thermowell</p> <p>Facilitates RTD calibration and maintenance</p>

Specifications	Transmount	Mass Transmount
System Accuracy	± 1.0% @ constant T&P	± 1.3% @ variable T&P
Pressure	ANSI 600# (max)*	
Temperature	<b>Remote Mount</b> 800°F (max)* <b>Direct Mount</b> Limited by the DP transmitter**	
* Model and component selection must be verified by Veracalc (Flow & Structural Calculation Program)		
** Process: -40°F to +250°F (-40°C to +121°C) Ambient: -40°F to +185°F (-40°C to +85°C)		

Notes:

1. Instrument tubing and fittings are not included.
2. Each system is shipped pre-configured and ready to install.

# VERIS Verabar® Quick Flow System Selection

Fill in the form below, complete sections **1** through **7** and fax to: **303-652-8552**

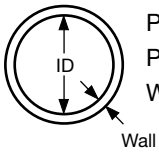
**VERIS, inc.** 6315 Monarch Park Place  
Niwot, CO 80503 USA

Phone: 303-652-8550  
Fax: 303-652-8552

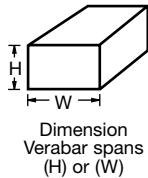
E-Mail: [contact@veris-inc.com](mailto:contact@veris-inc.com)  
Website: [www.veris-inc.com](http://www.veris-inc.com)



## 1. Enter Pipe Dimensions or Duct Dimensions



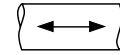
Pipe Size \_\_\_\_ Sch \_\_\_\_  
Pipe ID \_\_\_\_ and  
Wall \_\_\_\_ Pipe Mat'l \_\_\_\_



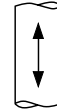
Height (H) \_\_\_\_  
Width (W) \_\_\_\_  
Wall \_\_\_\_  
Duct Mat'l \_\_\_\_

Dimension  
Verabar spans  
(H) or (W)

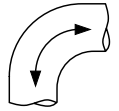
## 2. Pipe or Duct Orientation



(H) Horizontal



(V) Vertical

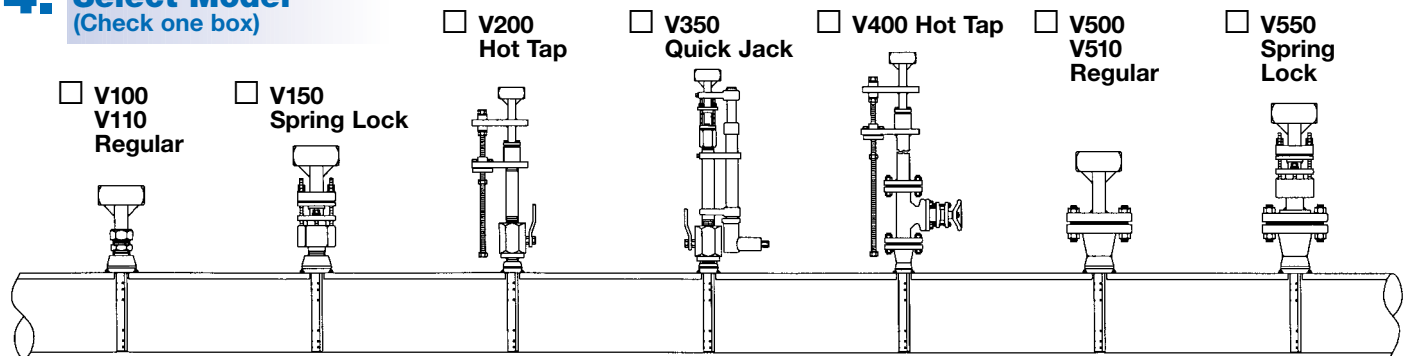


Short  
Straight Run  
Consult Factory

## 3. Enter Flow Conditions

Fluid Name:		Maximum	Normal	Minimum	Units	Special Instructions	
Flow Rate							
All Fluids	Pressure @ Flow						
	Temperature @ Flow						
Gas	Specific Gravity, or						
	Molecular Weight						
Liquid	Specific Gravity						
Steam	Veracalc Program can calculate Density from Temperature and Pressure						

## 4. Select Model (Check one box)



## 5. System Code

Transmount	<input type="checkbox"/> Remote (TR) or <input type="checkbox"/> Direct (TD)	_____
Mass Transmount — Integral RTD	<input type="checkbox"/> Remote (MRI) or <input type="checkbox"/> Direct (MDI)	_____
— Thermowell & RTD	<input type="checkbox"/> Remote (MRS) or <input type="checkbox"/> Direct (MDS)	_____

## 6. Select Manifold

Number of Valves	Material
<input type="checkbox"/> 3	<input type="checkbox"/> CS
<input type="checkbox"/> 5	<input type="checkbox"/> SS

## 7. Select Transmitter

Indicator	Output	Approvals
<input type="checkbox"/> Yes	<input type="checkbox"/> 4-20mA	Explosion-Proof: <input type="checkbox"/> FM <input type="checkbox"/> CSA <input type="checkbox"/> CENELEC
<input type="checkbox"/> No	<input type="checkbox"/> Digital Hart/4-20mA	Intrinsic Safety: <input type="checkbox"/> FM <input type="checkbox"/> CSA <input type="checkbox"/> CENELEC
	<input type="checkbox"/> Other	

## 8. Veris or your local representative will complete the Verabar specifications

A Flow calculation to determine the DP, select the instrument head and valves and verify the application.

Complete documentation will be furnished with a quotation or order, including:

- Flow calculation
- Installation bill of materials
- Submittal drawing
- Straight run requirements (See pages 10 and 11)

# Transmount, Remote Mount (TR)

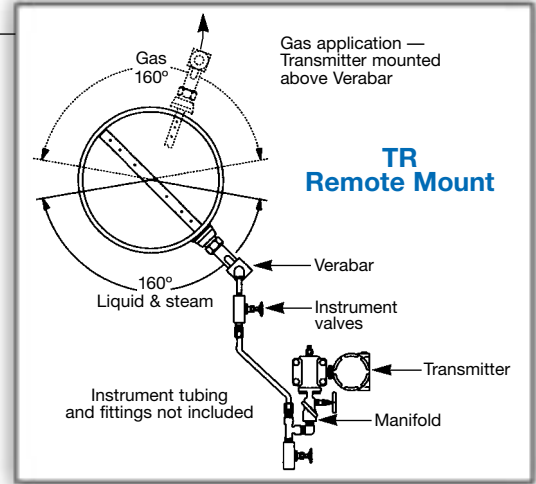
## Output — DP (Linear or Square Root)

### How to order

1. Select complete Verabar model from Veracalc Flow Calculation Program or Product Specification Sheet.
2. Select type of Field Flow System.
3. Select instrument valves & manifold.
4. Select transmitter.

### Veris will:

1. Verify the application.
2. Configure the transmitter.
3. Ship the system ready to install.



Select Verabar Model from Veracalc Flow Calculation or Verabar Catalog  
**V100, V110, V150, V200, V250, V350, V400, V450, V500, V510, V550**

Code	Type Field Flow System		
TR	Transmount, Remote Mount		
Code	Instrument Valves (P & R Heads only)		
C2NC	Needle, CS		
C2NS	Needle, SS		
C2GC	Gate, CS, Steam Applications		
C2GS	Gate, SS, Steam Applications		
N	None Required		
Code	Manifold, Flanged x 1/2" NPT		
T3SC	3 valve	CS	Soft Seat, Derlin
T3SS		SS	
T3HC	3 valve	CS	Hard Seat, Metal
T3HS		SS	
T5SC	5 valve	CS	Soft Seat, Derlin
T5SS		SS	
T5HC	5 valve	CS	Hard Seat, Metal
T5HS		SS	
N	None Required		
Transmitter			
Code	Transmitter Output		
MA	4-20 mA		
HT	Digital Hart /4-20mA		
Code	Approvals		
FX	FM Explosion-Proof Approval		
FS	FM Explosion-Proof & Intrinsic Safety		
CX	CSA Explosion-Proof Approval		
CS	CSA Explosion-Proof & Intrinsic Safety		
KX	CENELEC Flame-Proof		
KS	CENELEC Intrinsic Safety		
Code	Optional Meter		
LC	LCD Meter		
Code	Mounting Bracket		
M1	CS Painted		
M2	316SS		
Code	Differential Pressure (DP) Range		
DP	Veris or your representative will select the transmitter DP range based on your application		
Code	Transmitter Manufacturer		
SV	Selection by Veris		
SC	Selection by customer — designate a manufacturer's name in space below		

Example

V100	8"/40	10	H	R	TR	C2NS	T3SS	HT	FX	LC	M1	DP	SC		Catalog Number
Verabar Model					System	Valves	Manifold	Transmitter							

# Transmount, Direct Mount (TD)

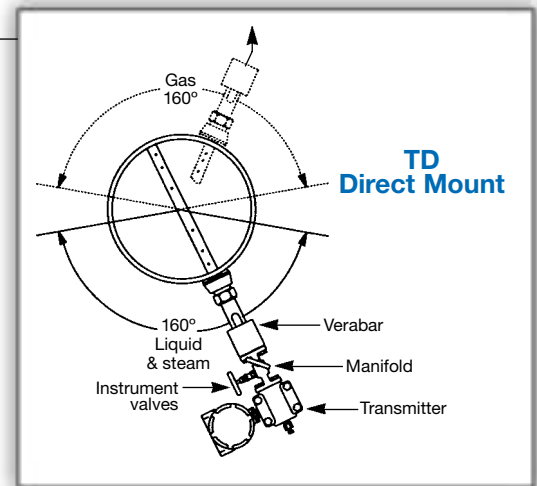
## Output — DP (Linear or Square Root)

### How to order

1. Select complete Verabar model from Veracalc Flow Calculation Program or Product Specification Sheet.
2. Select type of Field Flow System.
3. Select manifold.
4. Select transmitter.

### Veris will:

1. Verify the application.
2. Configure the transmitter.
3. Ship the system ready to install.



Select Verabar Model from Veracalc Flow Calculation or Verabar Catalog  
**V100, V110, V150, V200, V250, V350, V400, V450, V500, V510, V550**

Code	Type Field Flow System
<b>TD</b>	Transmount, Direct Mount
Code	Manifold, Flanged x Flanged
<b>F3SC</b> <b>F3SS</b>	3 valve CS SS Soft Seat, Derlin
<b>F3HC</b> <b>F3HS</b>	3 valve CS SS Hard Seat, Metal
<b>F5SC</b> <b>F5SS</b>	5 valve CS SS Soft Seat, Derlin
<b>F5HC</b> <b>F5HS</b>	5 valve CS SS Hard Seat, Metal
<b>N</b>	None Required
Transmitter	
Code	Transmitter Output
<b>MA</b>	4-20 mA
<b>HT</b>	Digital Hart/4-20mA
Code	Approvals
<b>FX</b>	FM Explosion-Proof Approval
<b>FS</b>	FM Explosion-Proof & Intrinsic Safety
<b>CX</b>	CSA Explosion-Proof Approval
<b>CS</b>	CSA Explosion-Proof & Intrinsic Safety
<b>KX</b>	CENELEC Flame-Proof
<b>KS</b>	CENELEC Intrinsic Safety
Code	Optional Meter
<b>LC</b>	LCD Meter
Code	Differential Pressure (DP) Range
<b>DP</b>	Veris or your representative will select the transmitter DP range based on your application
Code	Transmitter Manufacturer
<b>SV</b>	Selection by Veris
<b>SC</b>	Selection by customer — designate a manufacturer's name in space below

<i>Example</i>	V100	8"/40	10	H	F	TD	F3SS	HT	FX	LC	DP	SC		Catalog Number
	Verabar Model					System	Manifold	Transmitter						

# Mass Transmount, Remote Mount (MRI & MRS)

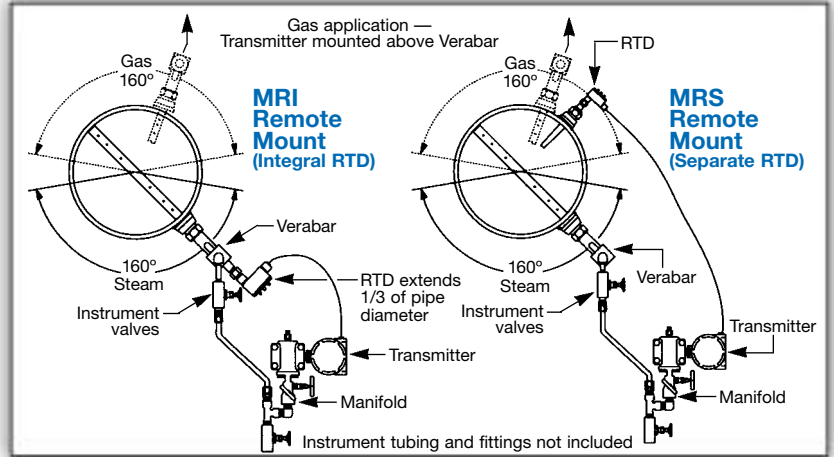
## Multivariable Transmitter Output — Compensated Flow, DP, Pressure & Temperature

### How to order

1. Select complete Verabar model from Veracalc Flow Calculation Program or Product Specification Sheet.
2. Select type of Field Flow System.
3. Select instrument valves & manifold.
4. Select transmitter.

### Veris will:

1. Verify the application.
2. Configure the transmitter.
3. Ship the system ready to install.



### Select Verabar Model from Veracalc Flow Calculation or Verabar Catalog

V100, V110, V150, V200, V250, V350, V400, V450, V500, V510, V550

Code	Type	Field Flow System
<b>MRI</b>	Remote Mount, Integral RTD	
<b>MRS</b>	Remote Mount, Separate RTD	
Code	Instrument Valves (P & R Heads only)	
<b>C2NC</b>	Needle, CS	
<b>C2NS</b>	Needle, SS	
<b>C2GC</b>	Gate, CS, Steam Applications	
<b>C2GS</b>	Gate, SS, Steam Applications	
<b>N</b>	None Required	
Code	Manifold, Flanged x 1/2" NPT	
<b>T3SC</b>	3 valve	CS Soft Seat, Derlin
<b>T3SS</b>		SS Soft Seat, Derlin
<b>T3HC</b>	3 valve	CS Hard Seat, Metal
<b>T3HS</b>		SS Hard Seat, Metal
<b>T5SC</b>	5 valve	CS Soft Seat, Derlin
<b>T5SS</b>		SS Soft Seat, Derlin
<b>T5HC</b>	5 valve	CS Hard Seat, Metal
<b>T5HS</b>		SS Hard Seat, Metal
<b>N</b>	None Required	
Transmitter		
Code	Transmitter Output	
<b>MA</b>	4-20 mA	
<b>HT</b>	Digital Hart/4-20mA	
Code	Approvals	
<b>FX</b>	FM Explosion-Proof Approval	
<b>FS</b>	FM Explosion-Proof & Intrinsic Safety	
<b>CX</b>	CSA Explosion-Proof Approval	
<b>CS</b>	CSA Explosion-Proof & Intrinsic Safety	
<b>KX</b>	CENELEC Flame-Proof	
<b>KS</b>	CENELEC Intrinsic Safety	
Code	Optional Meter	
<b>LC</b>	LCD Meter	
Code	Mounting Bracket	
<b>M1</b>	CS Painted	
<b>M2</b>	316SS	
Code	Differential Pressure (DP) Range	
<b>DP</b>	Veris or your representative will select the transmitter DP range based on your application	
Code	Transmitter Output	
<b>SV</b>	Selection by Veris	
<b>SC</b>	Selection by customer — designate a manufacturer's name in space below	

Example

V100	8"/40	10	H	R	MRS	C2NS	T3SS	HT	FX	LC	M1	DP	SC		Catalog Number
Verabar Model					System	Valves	Manifold	Transmitter							

# Mass Transmount, Direct Mount (MDI & MDS)

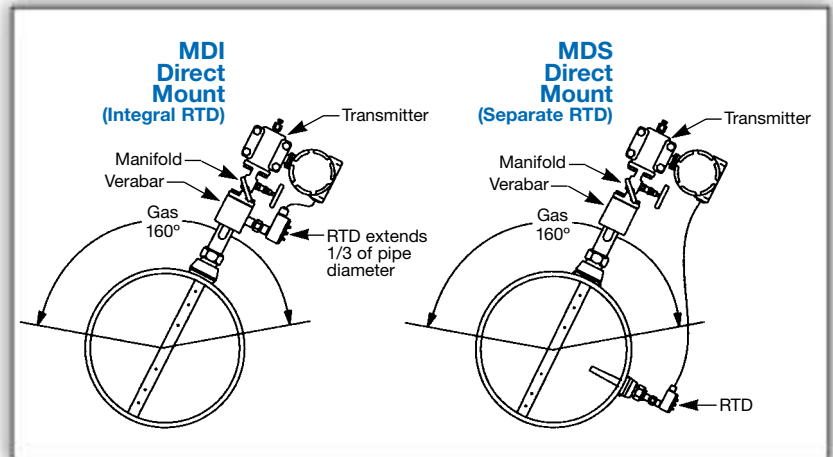
## Multivariable Transmitter Output — Compensated Flow, DP, Pressure & Temperature

### How to order

1. Select complete Verabar model from Veracalc Flow Calculation Program or Product Specification Sheet.
2. Select type of Field Flow System.
3. Select manifold.
4. Select transmitter.

### Veris will:

1. Verify the application.
2. Configure the transmitter.
3. Ship the system ready to install.



Select Verabar Model from Veracalc Flow Calculation or Verabar Catalog  
**V100, V110, V150, V200, V250, V350, V400, V450, V500, V510, V550**

Code	Type Field Flow System
<b>MDI</b>	Direct Mount, Integral RTD
<b>MDS</b>	Direct Mount, Separate RTD
Code	Manifold, Flanged x Flanged
<b>F3SC</b> <b>F3SS</b>	3 valve CS SS Soft Seat, Derlin
<b>F3HC</b> <b>F3HS</b>	3 valve CS SS Hard Seat, Metal
<b>F5SC</b> <b>F5SS</b>	5 valve CS SS Soft Seat, Derlin
<b>F5HC</b> <b>F5HS</b>	5 valve CS SS Hard Seat, Metal
<b>N</b>	None Required
Transmitter	
Code	Transmitter Output
<b>MA</b>	4-20 mA
<b>HT</b>	Digital Hart/4-20mA
Code	Approvals
<b>FX</b>	FM Explosion-Proof Approval
<b>FS</b>	FM Explosion-Proof & Intrinsic Safety
<b>CX</b>	CSA Explosion-Proof Approval
<b>CS</b>	CSA Explosion-Proof & Intrinsic Safety
<b>KX</b>	CENELEC Flame-Proof
<b>KS</b>	CENELEC Intrinsic Safety
Code	Optional Meter
<b>LC</b>	LCD Meter
Code	Differential Pressure (DP) Range
<b>DP</b>	Veris or your representative will select the transmitter DP range based on your application
Code	Transmitter Manufacturer
<b>SV</b>	Selection by Veris
<b>SC</b>	Selection by customer — designate a manufacturer's name in space below

Example

V100	8"/40	10	H	F	MDS	F3SS	HT	FX	LC	DP	SC		Catalog Number
Verabar Model					System	Manifold	Transmitter						

# Reliable Verabar® Installations

The best documentation package ensures the system is installed and operating right...the first time.

## Flow Calculation

Calculates the Verabar DP based on your flowing conditions; DP is used to size and configure the transmitter

## Structural Calculation

Verifies the structural integrity of the sensor at the flowing conditions

## Structural Calculation

**VERIS Verabar.** Model No.: V150-05-V-R, Serial No.: V4800-01.1, Tag Info.: FE-3456

**Flow Calculation** VeraCalc 2000 Ver. 1.0

Customer: 123-2001, Customer PO: 123-2001, Processed By: Steven Maurer, Vens Ref.: V4800, Process Date: 14 Sep. 2001, Fluid Name: Water, File Name: test4.vfc

Pipe Size: 4.0 in SCHD 40, ID: 4.026 in, Wall: 0.237 in, Process: Feed Water

**I. Flow Equation**  
 $q_v = C' \sqrt{h_w}$   
 $h_w = \left[ \frac{q_v}{C'} \right]^2$   
 $C' = \frac{NKD^2}{\sqrt{\rho}}$

**II. Constants**

Term	Description	Value	Units
N	Numeric Constant	0.757487	
K	Flow Coefficient	0.7345	
D	Internal Pipe Diameter	4.026	in

**III. Flowing Conditions**

Term	Description	Maximum	Nominal	Minimum	Units
$q_v$	Actual Volumetric Flow Rate	150.0000	100.0000	50.0000	CFM
$T_f$	Temperature at Flow	60.0000	60.0000	60.0000	°F
$P_f$	Pressure at Flow	200.000000	200.000000	200.000000	PSI
$\rho$	Density	1.00000000	1.00000000	1.00000000	S.G. @flow
$C'$	Flow Constant	9.018067	9.018067	9.018067	
$h_w$	Differential Pressure		122.963	30.7407	in H2O

**IV. Sensor Structural Limits**

Term	ANSI Eq.	at User's Maximum	Ultimate Maximum	Limiting Factor
Max Temp	ANSI 600	800.0 °F at 200.0 PSIG	800.0 °F at 960.0 PSIG	Sensor
Max Pres	ANSI 600	1440.0 PSIG at 60.0 °F	1440.0 PSIG at 100.0 °F	Sensor

Maximum Allowable Flow Rate: 177.7 CFM (398.1 in H2O)

**V. Notes**



## Dimensional Drawing

Defines the model, dimensions and tolerances

**PARALLEL REGULAR RTD VALVE V-VALVES NEEDLE GATE**

**TRANSOMOUNT MASS TRANSMOUNT MANIFOLD 3-VALVES 5-VALVES**

**SOFT SEAT HARD SEAT FUSION (CS) FUSION (SS)**

**INTEGRAL**

**OPTIONAL SECOND DRIVE ROD FOR -10, -15 SENSORS WHEN PRESSURE IS ABOVE 1500 ANSI.**

**SYN (OPTION SYNCHRONIZED CHAIN & SPROCKET ASSEMBLY).**

**INSTRUMENT HEAD (SS) (SEE OPTIONS ABOVE)**

**PACKING GLAND (SS)**

**ANTI SEIZE ORBITAL BEARING**

**ACCESS NIPPLE (CS) (SS-OPTIONAL)**

**ACCESS VALVE (CS, SS OR BRZ) (SUPPLIED WITH SENSOR)**

**WELD COUPLING (CS) (SS-OPTIONAL) (SUPPLIED WITH SENSOR)**

**SENSOR (318SS)**

**WALL**

**PIPE OD TO VALVE FACE**

**D (DRILLED HOLE DIA.)**

**SECTION A-A**

ITEM	SENSOR -10	SENSOR -15	SENSOR -18	PRESSURE RATING
SENSOR DIA.	7/16" (11mm)	7/8" (22mm)	1-3/16" (35mm)	-
COUPLING SIZE	3/4" NPT	1-1/4" NPT	2" NPT	-
DIM "D" DRILLED HOLE DIAMETER	1/2" (13mm)	1" (26mm)	1-1/2" (38mm)	800PSI @ 100F/100PSI @ 400F
DIM "X" FOR BROUZE BALL VALVE	5.8" (147mm)	7.2" (183mm)	8.4" (213mm)	1000PSI @ 100F/100PSI @ 400F
DIM "X" FOR CS BALL VALVE	6.2" (157mm)	7.7" (195mm)	9.1" (231mm)	1000PSI @ 100F/100PSI @ 400F
DIM "X" FOR SS BALL VALVE	6.0" (153mm)	7.7" (195mm)	10.1" (257mm)	ANSI CLASS 6009
DIM "X" FOR CS GATE VALVE	8.0" (182mm)	7.7" (195mm)	8.8" (224mm)	1200PSI @ 100F/800PSI @ 800F
DIM "X" FOR SS GATE VALVE	8.0" (182mm)	7.7" (195mm)	8.8" (224mm)	1200PSI @ 100F/800PSI @ 800F

\* "H" & "X" DIMENSIONS ARE APPROXIMATE (FOR SIZING PURPOSES ONLY).

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**VERABAR MODEL: V200 SINGLE & DOUBLE ROD THREADED** DWG NO. SUB-3936, DATE 09/20/01, SCALE NTS, REV A, PAGE 1 OF 1



## Installation Bill of Materials

A complete list of the materials required to install the Verabar based on the fluid (gas, liquid or steam)

## Installation Instructions

Complete written and illustrated installation instructions

## VERIS Verabar

Differential Pressure Flow Sensors

## Installation Instructions

V100, V110 Compression Fitting  
V150 Spring Lock

### 1.0 SCOPE

These instructions provide a description of procedures for installing the V100 Verabar flow sensor. Procedures are given for all industrial flow measurement applications including liquid, steam and gas service for both horizontal and vertical piping configurations.

### 2.0 RECEIVING INSPECTION

- The following tasks should be performed as part of the receiving inspection procedure:
- Check items received against the packing list.
  - Check sensor nameplate for proper model number, serial number and customer number.
  - Verify that the actual pipe diameter matches the ID stated on the sensor nameplate.
  - Check the bullet shaped sensor tube for any signs of damage. Damage to the sensor tube may result in erroneous flow readings.
  - Check the round cover tube for any damage, especially axial gouges or scratches. Damage to the cover tube may prevent the ferrule from seating properly.

### 3.0 SAFETY PRECAUTIONS

- The following tasks should be conducted prior to installing the Verabar flow sensor:
- Check maximum operating conditions on the sensor nameplate and verify that they exceed the

maximum conditions of the installation. If any pressure, temperature or flow limits will be exceeded, consult the factory before proceeding. Check that the pipe is depressurized and drained prior to installation. If installation under pressure is desired, refer to the Verabar catalog for information on the V200, V350 and V400 Hot Tap models.

- Check that all pressure containing components are properly installed and tightened prior to pressurizing the system.

### 4.0 INSTALLATION PREPARATIONS

#### 4.1 Location

For the most accurate flow measurement, a minimum straight run of pipe is required. Table 1 shows the minimum straight run requirements. If longer straight runs are available, position the Verabar such that the ratio of upstream straight run to downstream straight run is approximately 4 to 1. If straight run lengths are less than the values stated in Table 1, consult the factory for additional accuracy and location information.

Position straightening vanes such that the end closest to the Verabar is half way between the Verabar and the closest upstream obstruction. For elbow installations, mount the Verabar in the same plane as the closest upstream elbow.

Obstruction	Dimension		
	Without Straightening Vanes	With Straightening Vanes	Dimension -B-
Elbow	7	7	3
Multiple Elbows in the Same Plane	7	7	3
Multiple Elbows in Different Planes	9	9	3
Increase in Pipe Size	18	9	3
Reduction in Pipe Size	8	8	3
Control Valve	8	8	3
	24	9	4

Table 1. Straight Run Requirements

**HEADS**

PARALLEL	REGULAR	RTD	VALVE	NEEDLE	GATE
1/2" NPT	1/2" NPT	1/2" NPT	1/2" NPT	1/2" NPT	1/2" NPT
P	R	RTN	R1X	T	

**VENT VALVES OF DP TRANSMITTER TO POINT UPWARD**

**NOTES**

- TUBING TO SLOPE CONTINUOUSLY UPWARD 1/4" PER FOOT & SHALL BE FREE OF PEAKS. DP TRANSMITTERS TO ACCUMULATE CONDENSATE TO BE MADE WITH A TUBE OF THREE TIMES THE TUBING O.D.
- ALL CONNECTIONS SHALL BE LEAK TIGHT.
- TUBING SHOULD BE LONG ENOUGH TO ALLOW MOST DP TRANSMITTERS TO OPERATE AT TEMPERATURE LIMIT.

**HORIZONTAL PIPE INSTALLATION**

**VERTICAL PIPE (SIDE VIEW) INSTALLATION 360° CIRCUMFERENCE**

**HORIZONTAL PIPE (FRONT VIEW) TOP 180° (TOP 45° PREFERRED)**

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**INSTRUMENT PIPING - GAS FLOW**  
SENSOR TOP OF PIPE  
REMOTE TRANSMITTER  
HORIZONTAL & VERTICAL PIPE

DATE: 3/1/00 DWS/AG T.B.D.  
SCALE: N.T.S. REV: B PAGE 1 OF 1

## Up and Downstream Straight Run

Defines the up and downstream straight run requirements based on the piping configuration

Obstruction	Dimension		
	Without Straightening Vanes	With Straightening Vanes	Dimension -B-
Elbow	7	7	3
Multiple Elbows in the Same Plane	7	7	3
Multiple Elbows in Different Planes	9	9	3
Increase in Pipe Size	18	9	3
Reduction in Pipe Size	8	8	3
Control Valve	8	8	3
	24	9	4

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**PIPE STRAIGHT RUN REQUIREMENTS EXPRESSED IN PIPE DIAMETERS (D)**

DATE: 3/1/00 DWS/AG T.B.D.  
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