MODEL

VF4

Inline Style

Vortex Shedding Flow Meter

HIGHLIGHTS

- Measures gas, liquid, and steam
- Multivariable outputs for five process parameters:
    - Mass flow rate
    - Volumetric flow rate
    - Temperature
    - Pressure
    - Density
    - Energy (BTU)
- Single process connection
- Inline configurations for 1/2-inch to 12 inch pipe sizes
- Field-configurable ranges, alarms, outputs, and displays
- Configuration via six push buttons or magnet through explosion-proof window
- Smart DSP electronics extends low flow range down to a Reynolds number of 5,000
- Rangeability up to 100:1
- Temperature up to 750°F (400°C)
- Pressure up to 1,500 psia (100 bara)
- Mass flow equations for real gas, ideal gas, AGA-8 equations for natural gas, API 2540
- Advanced serial communication options: BACnet/IP, Modbus TCP/IP, BACnet MS/TP, and Modbus RTU
- Ideal for steam applications
    - Energy (BTU) monitoring for real-time measurement of energy consumption; compute and output energy use
    - Loop powered to save on energy costs
- FM, FMc, ATEX, IECEx Approval

FOX® THERMAL

OIL & GAS | INDUSTRIAL | BIOGAS | WASTEWATER

VF4/VF4-R INLINE

FAST AND FLEXIBLE LIQUID, STEAM, AND GAS FLOW MEASUREMENT

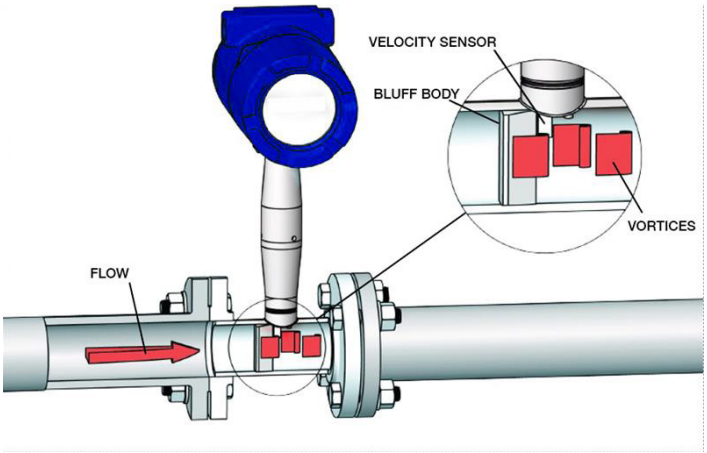
Fox Thermal's multivariable product line features an inline version, the VF4, to measure the mass flow rate of any gas or liquid and is ideally suited for saturated or superheated steam. The VF4 offers customers one instrument and one process connection, measuring five process parameters simultaneously: mass flow rate, temperature, pressure, volumetric flow rate, and fluid density.

VF4 is a true high performance, rugged, and reliable flow meter. The VF4-R (inline reducer version) allows lower flow rate measurement than traditional vortex meters and eliminates the need for field-installed piping reductions. The VF4 is widely used for fluids down to -330°F (-200°C). All models are fully field-programmable, configurable, and feature HART, Modbus RTU, Modbus TCP/IP, BACnet/IP, BACnet MS/TP protocols, and Power over Ethernet (PoE).

THEORY OF OPERATION

Vortex flow meters measure fluid velocity using a principle of operation referred to as the von Kármán effect. It states that when flow passes by an obstruction in the flow path, vortices are generated in a repeating pattern.

In a Vortex flow meter, this obstruction is often referred to as a bluff body. The bluff body causes the process fluid to separate and form areas of alternating differential pressure known as vortices around the backside of the bluff body. In VF4 vortex flowmeters, a sensitive piezoelectric crystal sensor detects these vortices. The frequency at which the vortices are shed is directly proportional to the flow velocity. With the fluid velocity and area of the pipe known, a volumetric flow rate is calculated.



VF4 is available in inline and remote styles. A reduced-bore inline style is also available for lower flow rates. See the VF3 Insertion datasheet for information on insertion styles.

With optional integrated temperature and pressure sensors, VF4 vortex flowmeters can provide a compensated mass flow rate. With the energy monitoring option, VF4 meters can also provide a reliable (BTU) energy measurement of water, thermal oils, and steam.

Insertion style vortex flowmeters are a more economical option on large line sizes and can be installed under full process conditions by hot tap.

MODEL VF4-VTP

The Model VF4-VTP offers you flow computer functionality in a compact field device. This multivariable instrument incorporates temperature and pressure sensors to provide an instantaneous reading of the compensated mass flow rate of gases, liquids, and steam. In addition to outputs for totalized mass and alarm settings, the field-configurable electronics deliver up to three analog 4-20 mA outputs of five process measurements, including volumetric flow rate, mass flow rate, pressure, temperature, and density.

MODEL VF4-VT

The Model VF4-VT integrates a precision 1000 Ohm platinum RTD temperature sensor that can be used to calculate and output a compensated mass reading. This device is typically used to measure flow rates of saturated steam.

MODEL VF4-V

The Model VF4-V delivers a direct reading of volumetric flow rate — generally the most cost-effective solution for liquid flow monitoring — in applications ranging from general water flows to hydrocarbon fuel flow measurement.

MODEL VF4-EM

The Model VF4 Energy Monitoring option permits real-time calculation of energy consumption for a facility or process. The meter can be programmed to measure steam, hot water, or chilled water. The Model VF4-VTP flowmeter monitors one side of the process, either sent or returned, and uses the input from a second separate temperature sensor on the opposite leg of the process to calculate the change in energy. Selectable energy units include BTU, joules, calories, watt-hours, megawatt-hours and horsepower-hours. The local or remote electronics indicate two temperatures, delta-T, mass total, and energy total.

MODEL VF4-VTEP,VETEP

Similar to VF4-VTP but with the option for an external input (T or P) via RTD or 4-20mA or one of each.

PRODUCT BENEFITS

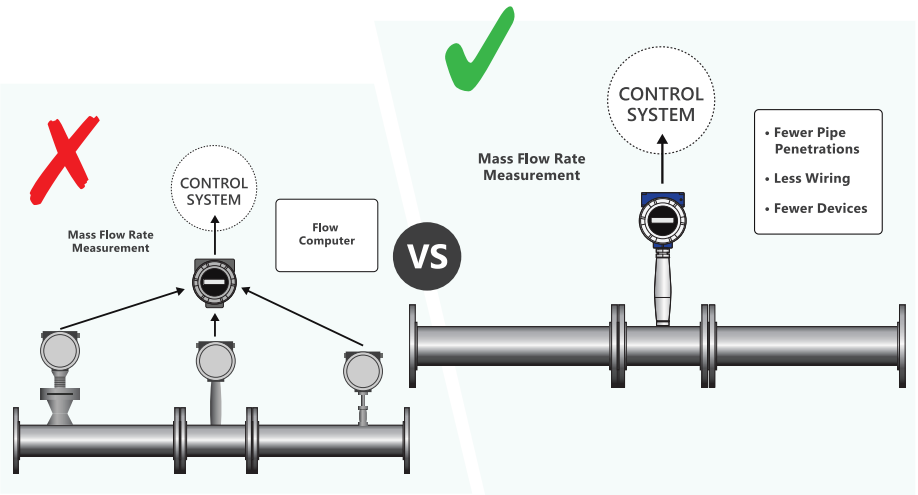
Multiparameter Mass Flow Meter Benefits

Fewer Process Connections | Expanded Process Diagnostics | Ability to Compensate | Lower Cost Per Measurement

The VF4 Advantage

VF4 simplifies what's needed for accurate and repeatable measurement.

- Built-in flow computer with multiple outputs allows users to replace multiple instruments with a single flow meter.
- Single break in piping for lower cost of installation and ownership.
- Vortex shedding principle is stable and reliable because it has no moving parts.
- Capable of measuring at higher pressures than other technologies.
- High Turndown Ratio.
- Calibration is valid for the life of the meter.



Process Variables & Measurement Outputs

VF4 simplifies what's needed for accurate and repeatable measurement.

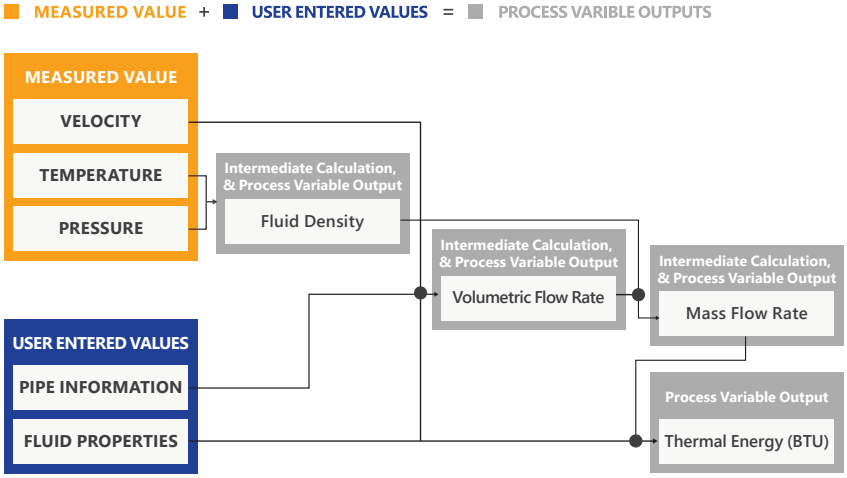
Multiparameter measurement:

- Flow velocity
- Temperature
- Pressure
- Density
- Volumetric flow
- Mass flow
- Thermal Energy

Measurement outputs:

- 4-20mA (up to 3, simultaneous)
- HART
- Modbus
- BACnet
- IP Comms
- Alarm Contacts

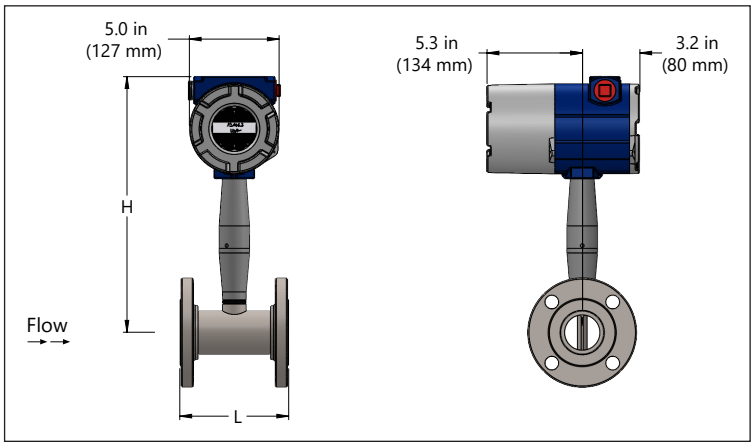
Using a mix of measured and user entered values, a vortex flow meter can provide a variety of process variable outputs.



DIMENSIONS

INLINE STYLES

VF4 Inline Flanged

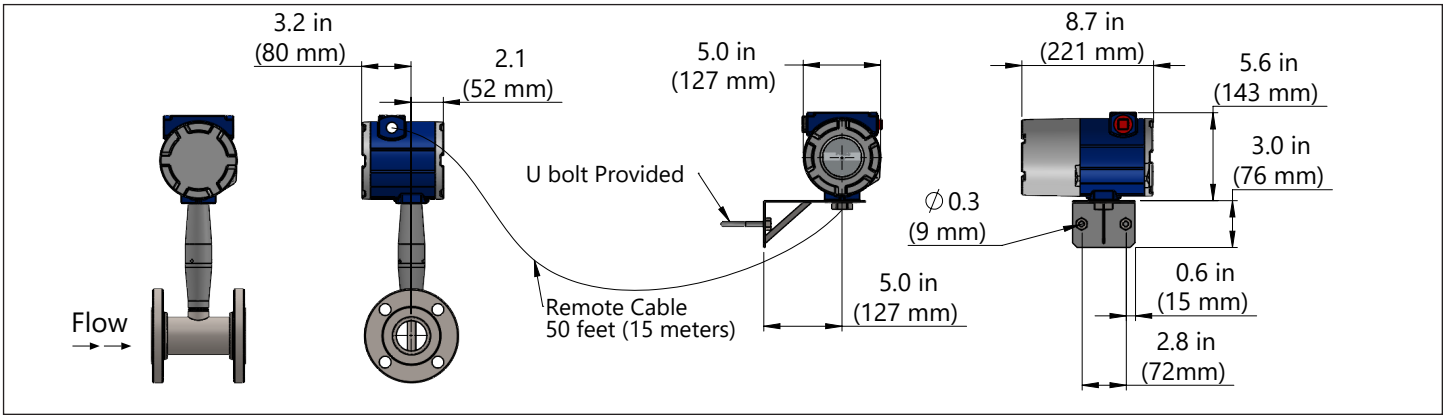


All dimensions are inches (± .25-inch significant value). Millimeters are in parentheses. Certified drawings are available on request.

VF4 Inline Sizes and Weight

Flow Meter Nominal Size	Sizes			Weight			
	L	L (ANSI 900)	H	ANSI 150 (PN 16)	ANSI 300 (PN 40)	ANSI 600 (PN 63)	ANSI 900 (PN 160)
1/2 inch (15 mm)	7.9 in (200 mm)	7.9 in (201 mm)	13.5 in (343 mm)	12.0 lb (5.5 kg)	12.5 lb (5.7 kg)	13.4 lb (6.1 kg)	17.6 lb (8 kg)
3/4 inch (20 mm)	7.9 in (200 mm)	9.7 in (247 mm)	13.5 in (343 mm)	13.0 lb (5.9 kg)	14.6 lb (6.6 kg)	15.6 lb (7.1 kg)	21.0 lb (9.5 kg)
1 inch (25 mm)	7.9 in (200 mm)	10.8 in (274 mm)	13.5 in (343 mm)	13.5 lb (6.1 kg)	16.3 lb (7.4 kg)	16.4 lb (7.5 kg)	26.3 lb (11.9 kg)
1.5 inch (40 mm)	7.9 in (200 mm)	12.0 in (305 mm)	13.8 in (351 mm)	16.3 lb (7.4 kg)	23.3 lb (10.6 kg)	24.6 lb (11.2 kg)	37.2 lb (16.9 kg)
2 inch (50 mm)	7.9 in (200 mm)	14.1 in (357 mm)	14.0 in (356 mm)	21.2 lb (9.6 kg)	26.8 lb (12.2 kg)	33.2 lb (15.1 kg)	60.5 lb (27.4 kg)
3 inch (80 mm)	7.9 in (200 mm)	14.8 in (375 mm)	14.6 in (371 mm)	33.0 lb (15.0 kg)	41.0 lb (18.6 kg)	56.1 lb (25.5 kg)	76.5 lb (34.7 kg)
4 inch (100 mm)	9.84 in (250 mm)	16.9 in (429 mm)	15.1 in (384 mm)	45.8 lb (20.8 kg)	66.8 lb (30.3 kg)	96.0 lb (43.6 kg)	121.2 lb (55.0 kg)
6 inch (150 mm)	11.81 in (300 mm)	19.5 in (495 mm)	16.2 in (411 mm)	68.3 lb (31.0 kg)	106.3 lb (48.2 kg)	194.3 lb (88.2 kg)	254.4 lb (115.4 kg)
8 inch (200 mm)	11.81 in (300 mm)	22.8 in (579 mm)	17.2 in (437 mm)	112.4 lb (51.0 kg)	168.4 lb (76.5 kg)	299.0 lb (136.0 kg)	433.0 lb (196.4 kg)
10 inch (250 mm)	15.0 in (381 mm)	29.0 in (737 mm)	18.2 in (462 mm)	188.3 lb (85.5 kg)	262.3 lb (119.1 kg)	462.3 lb (209.9 kg)	665.9 lb (302.0 kg)
12 inch (300 mm)	17.7 in (450 mm)	30.3 in (770 mm)	19.2 in (488 mm)	298.6 lb (135.6 kg)	402.6 lb (182.8 kg)	606.6 lb (275.4 kg)	926.6 lb (420.3 kg)

VF4 Remote

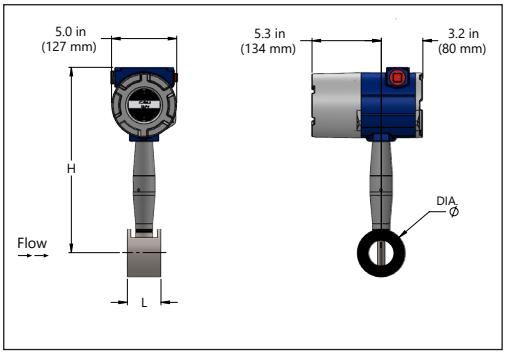


DIMENSIONS

INLINE STYLES

VF4-R Inline Reducing Sizes and Weight							
Flow Meter Nominal Size	Sizes			Weight			
	L	L (ANSI 900)	H	ANSI 150 (PN 16)	ANSI 300 (PN 40)	ANSI 600 (PN 63)	ANSI 900 (PN 160)
3/4 inch (20 mm) x 1/2 inch (15 mm)	7.9 in (200 mm)	8.4 in (213 mm)	13.5 in (343 mm)	13 lb (5.9 kg)	14.6 lb (6.6 kg)	15.6 lb (7.1 kg)	20.6 lb (9.3 kg)
1 inch (25 mm) x 1/2 inch (15 mm)	7.9 in (200 mm)	8.4 in (213 mm)	13.5 in (343 mm)	13 lb (5.9 kg)	16.3 lb (7.4 kg)	16.4 lb (7.5 kg)	22.7 lb (10.3 kg)
1.5 inch (40 mm) x 1 inch (25 mm)	7.9 in (200 mm)	11.1 in (282 mm)	13.8 in (351 mm)	13.4 lb (6.1 kg)	23.3 lb (10.6 kg)	24.6 lb (11.2 kg)	36.3 lb (16.5 kg)
2 inch (50 mm) x 1.5 inch (40 mm)	7.9 in (200 mm)	12.5 in (318 mm)	14.0 in (356 mm)	16.3 lb (7.4 kg)	26.8 lb (12.2 kg)	33.2 lb (15.1 kg)	58.1 lb (26.4 kg)
3 inch (80 mm) x 2 inch (50 mm)	7.9 in (200 mm)	14.1 in (357 mm)	14.6 in (371 mm)	21.2 lb (9.6 kg)	41.0 lb (18.6 kg)	56.1 lb (25.5 kg)	73.7 lb (33.4 kg)
4 inch (100 mm) x 3 inch (80 mm)	9.84 in (250 mm)	15.3 in (389 mm)	15.1 in (384 mm)	33.0 lb (15.0 kg)	66.8 lb (30.3 kg)	96.0 lb (43.6 kg)	116.1 lb (52.7 kg)
6 inch (150 mm) x 4 inch (100 mm)	11.81 in (300 mm)	17.8 in (452 mm)	16.2 in (411 mm)	45.8 lb (20.8 kg)	106.3 lb (48.2 kg)	194.3 lb (136 kg)	220.5 lb (100.0 kg)
8 inch (200 mm) x 6 inch (150 mm)	11.81 in (300 mm)	20.1 in (511 mm)	17.2 in (437 mm)	68.3 lb (31.0 kg)	168.4 lb (76.5 kg)	299.0 lb (88.2 kg)	365.7 lb (165.9 kg)
10 inch (250 mm) x 8 inch (200 mm)	15.0 in (381 mm)	23.3 in (592 mm)	18.2 in (462 mm)	188.3 lb (85.5 kg)	262.3 lb (119.1 kg)	462.3 lb (209.9 kg)	562.8 lb (255.3 kg)
12 inch (300 mm) x 10 inch (250 mm)	17.7 in (450 mm)	29.7 in (754 mm)	19.2 in (488 mm)	298.6 lb (135.6 kg)	402.6 lb (182.8 kg)	606.6 lb (275.4 kg)	792.3 lb (359.4 kg)

VF4 Wafer



VF4 Inline Wafer Model				
Flow Body Size, Diameter in inches (mm) and Weight in lbs (kg)				
Flow Meter Nominal Size	L	H	Diameter	Weight
1/2 inch (15mm)	2.56 (65)	13.5 (343)	1.38 (35)	9.2 (4.2)
3/4 inch (20mm)	2.56 (65)	13.5 (343)	1.69 (43)	9.5 (4.3)
1 inch (25mm)	2.56 (65)	13.5 (343)	2.0 (51)	10.3 (4.7)
1.5 inch (40mm)	2.56 (65)	13.8 (351)	2.88 (73)	12.1 (5.5)
2 inch (50mm)	2.56 (65)	14.0 (356)	3.62 (92)	14.1 (6.4)
3 inch (80mm)	2.56 (65)	14.6 (371)	5.0 (127)	18.7 (8.5)
4 inch (100mm)	2.56 (65)	15.1 (384)	6.19 (157)	23.4 (10.6)

Add 11lb (5kg) for remote electronics.

VF4-R Inline Reducing Wafer Model				
Flow Body Size, Diameter in inches (mm) and Weight in lbs (kg)				
Flow Meter Nominal Size	L	H	Diameter	Weight
3/4 inch (20 mm) X 1/2 inch (15mm)	2.56 (65)	13.5 (343)	1.38 (35)	9.2 (4.2)
1 inch (25 mm) X 3/4 inch (20 mm)	2.56 (65)	13.5 (343)	1.69 (43)	9.5 (4.3)
1-1/2 inch (40 mm) X 1 inch (25 mm)	2.56 (65)	13.8 (351)	2.00 (51)	10.3 (4.7)
2 inch (50 mm) X 1-1/2 inch (40 mm)	2.56 (65)	13.8 (351)	2.88 (73)	12.1 (5.5)
3 inch (80 mm) X 2 inch (50 mm)	3.94 (100)	14.6 (371)	5.00 (127)	23.9 (8.5)
4 inch (100 mm) X 3 inch (80 mm)	4.72 (120)	15.1 (384)	6.19 (157)	35.2 (10.6)

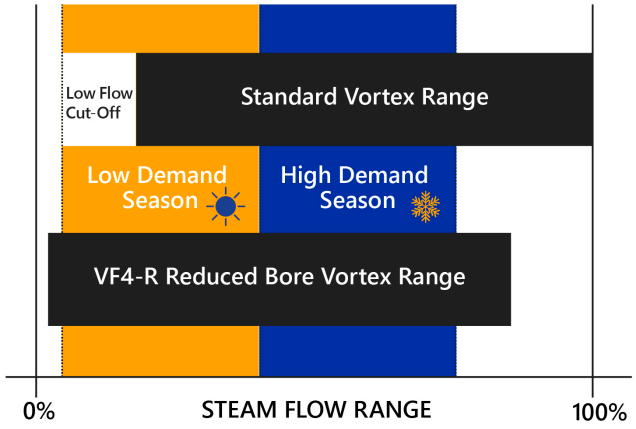
REDUCED BORE OPTION

WHY CHOOSE REDUCED BORE?

- Extended measuring range for lower flow rates
- Captures steam flow in both high and low demand seasons
- Reduced installation costs
- Same face-to-face dimension as a standard vortex meter

EXTENDED MEASURING RANGE FOR LOWER FLOW RATES

Much of the measuring range of a standard vortex flowmeter is at higher fluid velocities. Because of this, measurements at low flow conditions may be missed due to the low flow cutoff. To remedy this issue, users often install pipe reducers and a smaller than line size vortex meter to increase fluid velocities through the meter. The VF4-R reduced bore vortex flowmeter has integrated reducing flanges, eliminating the need for separate pipe reducers and spool pieces.



CAPTURES STEAM FLOW IN BOTH HIGH AND LOW DEMAND SEASONS

Steam usage in heating systems can vary widely based on seasonal demands. These systems are commonly sized with the high demand season (colder weather) in mind, and little thought is given to the low demand season (warmer weather). This leads to a situation where steam flowmeters are oversized and may miss flow measurements at low flow conditions. VF4-R reduced bore vortex flowmeters have an extended low flow measuring range, capturing both high and low demand seasons.

REDUCED INSTALLATION COSTS

Like most flowmeters, vortex flowmeters have requirements for unobstructed upstream and downstream piping lengths to ensure a proper flow profile through the meter. Adding pipe reducers adds cost and complexity to the piping design since those unobstructed piping lengths are required before and after the pipe reducers.

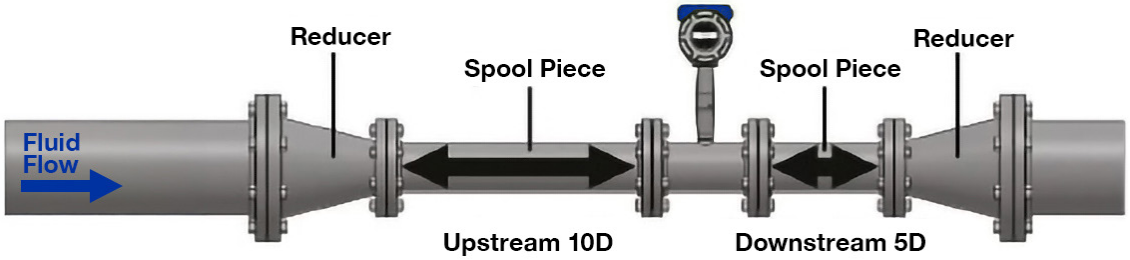
The VF4-R reduced bore vortex flowmeter has integrated reducing flanges, eliminating the need for separate pipe reducers and spool pieces. Drastically reducing both the complexity and cost of the meter installation.

SAME FACE-TO-FACE DIMENSION AS A STANDARD VORTEX METER

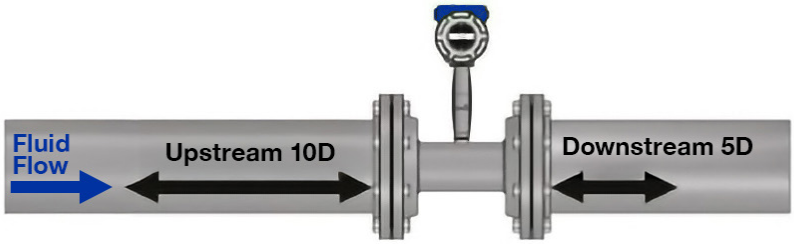
VF4-R reduced bore vortex flowmeters have the same face-to-face dimension as a standard VF4 meter for pressure classes up to ANSI 600. So if process

conditions change, the meter size can be changed without any costly piping modifications. This is especially useful in project planning, as it allows for flexibility into the future.

Typical piping reduction using reducers and spool pieces



VF4-R Reduced Bore Vortex with intergrated reducing flanges



PERFORMANCE SPECIFICATIONS

ACCURACY

Process Variables	VF4 Series Inline Meters	
	Liquids	Gas and Steam
Mass Flow Rate	± 1.0% of rate over a 30:1 range[3]	± 1.5% of rate[2] over a 30:1 range[3]
Volumetric Flow Rate	± 0.7% of rate over a 30:1 range[3]	± 1.0% of rate over a 30:1 range[3]
Temperature	± 2°F (± 1°C)	± 2°F (± 1°C)
Pressure	± 0.3% of transducer full scale	± 0.3% of transducer full scale
Density	± 0.3% of reading	± 0.5% of reading[2]

Notes: (1) Accuracies stated are for the total mass flow through the pipe. (2) Over 50 to 100% of the pressure transducer's full scale. (3) Nominal rangeability is stated. (4) Precise rangeability depends on fluid and pipe size.

REPEATABILITY

Mass Flow Rate . . . . . ± 0.2% of reading
Volumetric Flow Rate . . . . . ± 0.1% of reading
Temperature . . . . . ± 0.2° F (± 0.1° C)
Pressure . . . . . ± 0.05% of full scale
Density . . . . . ± 0.1% of reading

STABILITY OVER 12 MONTHS

Mass Flow Rate . . . . . ± 0.2% of reading maximum
Volumetric Flow Rate . . . . . Negligible error
Temperature . . . . . ± 0.9° F (± 0.5° C) maximum
Pressure . . . . . ± 0.1% of full scale maximum
Density . . . . . ± 0.1% of reading maximum

RESPONSE TIME

Adjustable from 1 to 100 seconds

Differential Pressure Requirements, △ P
Permanent pressure loss of inline meters for air at 68°F (20°C) and 14.70 psi (1.104 bara).
Permanent pressure loss of inline meters for water at 68°F (20°C)

MATERIAL COMPATABILITY

Any gas, liquid or steam compatible with 316L stainless steel, C276 Hastalloy® , or A105 carbon steel. Not recommended for multi-phase fluids.

VELOCITY RANGE

Smart electronics corrects for lower flow down to a Reynolds number of 5000. The Reynolds number is calculated using the fluid's actual temperature and pressure monitored by the meter. Rangeability depends on the fluid, process connections, and pipe size. Consult factory for your application. Velocity rangeability under ideal conditions is as follows:

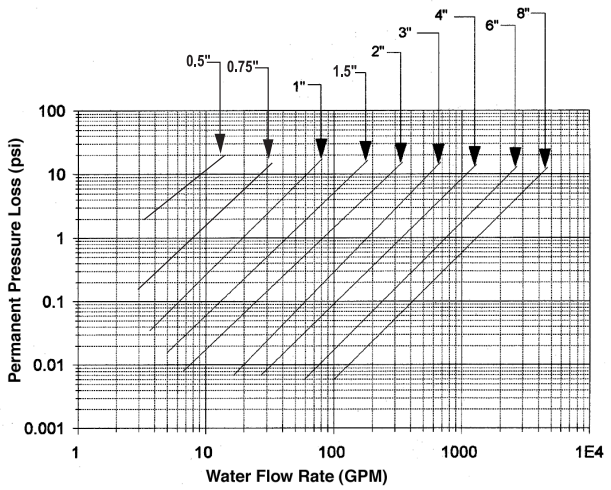
Liquids 30:1 — 1 foot per second velocity minimum
30 feet per second velocity maximum

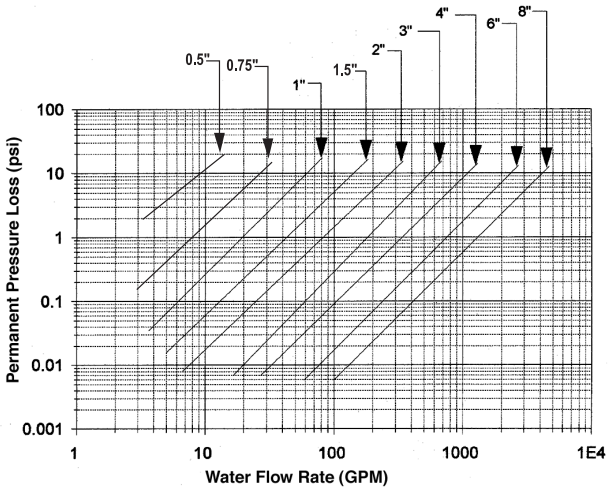
Gases 30:1 — 300 feet per second velocity maximum
Minimum is fluid dependent: range must be calculated using below equations:

$$\frac{5}{\sqrt{\text{density (lb/ft}^3\text{)}}} \qquad \frac{6.1}{\sqrt{\text{density (kg/m}^3\text{)}}}$$

PRESSURE DROP EQUATIONS

$\Delta P = 0.00024 \rho V^2$ English Units (ΔP in psi, ρ in lb/ft³, V in ft/sec)
$\Delta P = 0.00011 \rho V^2$ Metric Units (ΔP in bar, ρ in kg/m³, V in m/sec)





PERFORMANCE SPECIFICATIONS

WETTED MATERIALS
316L stainless steel standard
C276 Hastalloy® or A105 carbon steel optional
Teflon-based thread sealant on pressure transducer

Teflon is a registered trademark of DuPont.

ENCLOSURE
NEMA 4X/7 (IP66) cast enclosure

ELECTRICAL PORTS
Two 3/4-inch female NPT ports

PROCESS CONNECTIONS
Wafer or 150, 300, 600, 900 lb ANSI flange

MOUNTING CONNECTIONS
No effect

APPROVALS
FM, FMC Approval
Explosion proof for Class I, Division 1,
Groups B, C & D.
Dust-ignition proof for Class II/III, Division 1,
Groups E, F & G.
NEMA Type 4X and IP66
T6 at Tamb = -40°F to 60°C

ATEX Approval
II 2 G Ex d IIB + H2 T6
II 2 D EX tD A21 IP66 T85°C, Ta = -40°F to 60°C

IECEx Approval
Ex d IIB + H2 T6
Ex tD A21 IP66 T85°C, Ta = -40°F to 60°C

CE Approval

Optional Certifications
Construction and inspection (ANSI/ASME B31.3)

Materials (NACE MR-01-75(90)

OPERATING SPECIFICATIONS

Any gas, liquid, or steam compatible with 316L stainless steel, C276 hastelloy, or A105 carbon steel. Not recommended for multi-phase fluids.

POWER REQUIREMENTS
DCL option: 12-36 VDC, 25mA, 1W max, loop powered (single output)
DCH option: 12-36 VDC, 300 mA, 9W max, (multiple outputs)
DCHPOE option: 12-28 VDC or Power over Ethernet, 5W max (multiple outputs)
AC option: 100-240 VAC, 50/60Hz line power, 5W (multiple outputs)

MULTIPARAMETER MASS OPTIONS
Specific power supply and wiring recommendations are dependent on the process requirements and stack type/electronics ordered. Refer to the model codes section for power requirements stated for each stack type.
Use a Class 2 isolated power supply that is grounded, provides DC output, and has no more than 10% output ripple.

Installation (Over-voltage) Category II for transient over-voltages.

AC & DC Mains supply voltage fluctuations are not to exceed ±10% of the rated supply voltage range.

User is responsible for the provision of an external disconnect means, disconnect line 1 and line 2 when 220 / 240 VAC power is used, also provide over-current protection for the equipment (both AC and DC models).

DISPLAY
Alphanumeric 2 line x 16 character LCD digital display.
Six push buttons for full field configuration.
Pushbuttons can be operated with magnetic wand without removal of enclosure covers.
Switches (up, down, right, left, enter, exit).
Display can be mounted in 90° to 180° intervals for better viewing.

PROCESS FLUID TEMPERATURE
Process Fluid	Standard Temperature Sensor: -330°F to 500°F (-200°C to 260°C) High Temperature Sensor: Up to 750°F (400°C)

AMBIENT TEMPERATURE
Ambient	Operating: -40°F to 140°F (-40° to 60°C) Storage: -40°F to 185°F (-40° to 85°C) 0-98% relative humidity, noncondensing conditions

OUTPUT SIGNALS[1]
Analog	One to three field rangeable, simultaneous linear 4-20 mA output signals (1000 ohms maximum loop resistance) selected by user from the six parameters—mass flow rate, volumetric flow rate, temperature, pressure, density, and total/totalizer count.
Pulse	Pulse output for totalization is a 50-millisecond duration pulse operating a solid-state relay capable of switching 40 VDC, 40 mA maximum HART standard, optional MODBUS RTU.
Frequency	Frequency output is used for a remote counter. It can be scaled to output a 1 to 10 kHz signal proportional to mass or volume flow, temperature, pressure, or density.

Note: (1) All outputs are optically isolated and require external power for operation.

OPERATING SPECIFICATIONS

ALARMS

Up to three programmable solid-state relays for high, low, or window alarms capable of switching to 40 VDC, 40 mA maximum

TOTALIZER

Based on user-determined flow units, nine full digits, with rollover at 999,999,999; total stored in non-volatile memory.

VOLUMETRIC OR LOOP POWERED MASS

One analog, one totalizer pulse, HART
HART (with DD)
Modbus
BACnet

TURNDOWN

Turndown is application dependent. Consult Fox Thermal Sizing Program for exact values.
Turndown can exceed 100:1.

FLOW RATES

Typical mass flow ranges are given in the following table. Precise flow ranges depend on the fluid and pipe size. Consult factory for sizing program..

Water Minimum and Maximum Flow Rates											
	0.5-inch	0.75-inch	1-inch	1.5-inch	2-inch	3-inch	4-inch	6-inch	8-inch	10-inch	12-inch
gpm	0.9 22	1.4 40	2.2 67	5.5 166	9.2 276	21 618	36 1076	81 2437	142 4270	224 6715	317 9501
	15mm	20mm	25mm	40mm	50mm	80mm	100mm	150mm	200mm	250mm	300mm
m^3/hr	0.2 5	0.3 9	0.5 15	1.3 38	2.1 63	4.7 140	8.1 244	18 554	32 970	51 1525	72 2158

Gas or Steam Maximum Velocity											
	0.5-inch	0.75-inch	1-inch	1.5-inch	2-inch	3-inch	4-inch	6-inch	8-inch	10-inch	12-inch
ft/sec	175	250	250	300	300	300	300	300	300	300	300
	15mm	20mm	25mm	40mm	50mm	80mm	100mm	150mm	200mm	250mm	300mm
m/sec	53	76	76	90	90	90	90	90	90	90	90

INSTALLATION SPECIFICATIONS

Straight Pipe Length Requirements (in number of internal diameters, D)		
	Upstream	Downstream
One 90° elbow before meter	10 D	5 D
Two 90° elbows before meter	15 D	5 D
Two 90° elbows before meter out of plane (If three 90° bends present, double recommend length)	30 D	10 D
Reduction before meter	10 D	5 D
Expansion before meter	20 D	5 D
Regulator or valve partially closed before meter (If valve wide open, base length requirements on fitting directly preceding it.)	30 D	10 D

PROCESS TRANSDUCER PRESSURE

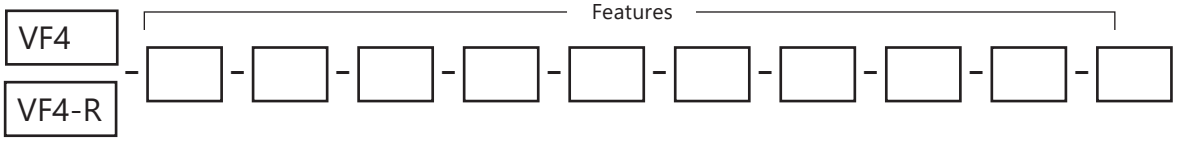
Pressure Sensor Ranges [1] psia (bara)			
Full Scale Operating Pressure		Maximum Over-Range Pressure	
psia	(bara)	psia	(bara)
30	2	60	4
100	7	200	14
300	20	600	40
500	35	1000	70
1500	100	2750	175

Note: (1) To maximize accuracy, specify the lowest full scale operating pressure range for the application. To avoid damage, the flow meter must never be subjected to pressure above the over-range pressure shown above.

PROCESS FLUID PRESSURE

VF4 Pressure Ratings		
Process Connection	Material	Rating
Flanged	316L SS, A105 carbon steel, C276 Hastalloy®	150, 300, 600, 900 lb
Wafer	316L SS, A105 carbon steel, C276 Hastalloy®	600 lb

INLINE CONFIGURATIONS



Instructions: To order a VF4 please fill in each number block by selecting the codes from the corresponding features below and following pages.

Feature 1: Multivariable Options	
Code	Description
V	Base Velocity Flowmeter for liquid, gas, and steam
VT	Velocity and Temperature Sensors
VTP	Velocity, Temperature, and Pressure Sensors
VTEP	Velocity, Temperature, and External 4-20mA input (T or P)
VETEP	Velocity, External RTD Temperature input, External 4-20mA input (T or P)
VT-EM	Energy output options
VTP-EM	Energy options with Pressure Sensor
VTEP-EM	Velocity, Temperature, and External 4-20mA input (T or P)
VETEP-EM	Velocity, External RTD Temperature input, External 4-20mA input (T or P)

Feature 2: Flow Body		
Code	VF4 Description	VF4-R Description
04	1/2-inch Nominal Bore (15mm)	
06	3/4-inch Nominal Bore (20mm)	3/4-inch by 1/2-inch Reducing Meter (15mm)
08	1-inch Nominal Bore (25mm)	1-inch by 1/2-inch Reducing Meter (15mm)
12	1.5-inch Nominal Bore (40mm)	1.5-inch by 1-inch Reducing Meter (25mm)
16	2-inch Nominal Bore (50mm)	2-inch by 1.5-inch Reducing Meter (40mm)
24	3-inch Nominal Bore (80mm)	3-inch by 2-inch Reducing Meter (50mm)
32	4-inch Nominal Bore (100mm)	4-inch by 3-inch Reducing Meter (80mm)
48	6-inch Nominal Bore (150mm)	6-inch by 4-inch Reducing Meter (100mm)
64	8-inch Nominal Bore (200mm)	8-inch by 6-inch Reducing Meter (150mm)
80	10-inch Nominal Bore (250mm)	10-inch by 8-inch Reducing Meter (200mm)
96	12-inch Nominal Bore (300mm)	12-inch by 10-inch Reducing Meter (250mm)

Feature 3: Flow Body Material	
Code	Description
C	Carbon Steel (1.5" and up)
S	316 Stainless Steel
H	Hastelloy

Feature 4: Process Connection	
Code	Description
150	ANSI 150lb Flange
300	ANSI 300lb Flange
600	ANSI 600lb Flange
900	ANSI 900lb Flange
W	Wafer ANSI 600lb
16	PN 16
40	PN 40
63	PN 63
100	PN 100

JIS flanges are available upon request.

INLINE CONFIGURATIONS

Feature 5: Electronics Enclosure	
Code	Description
L	NEMA 4X, IP66 Enclosure
R ( )	Remote Electronics NEMA 4X, IP66, Specify cable length in parenthesis

Feature 6: Diplay Options	
Code	Description
DD	Digital Display and Programming Buttons

Feature 7: Input Power	
Code	Description
DCL	12-36 VDC, 25mA, 1W max. required on loop powered meters, 1AHL only
DCH	12-36 VDC, 300mA, 9W max. - use with 1AH, 1AM, 3AH, 34AM
DCHPOE	12-28 VDC or Power over Ethernet, 5 Watts max, required on 1AMIP, 1ABIP, 3AMIP, 3ABIP
AC	100-240 VAC, 50/60 Hz line power, 5W max. - use with 1AH, 1AM, 3AH, 3AM

Feature 8: Output	
Code	Description
1AHL	Loop powered option - one analog output (4-20mA), one scaled frequency, one pulse, HART, DCL input power only
1AH	One analog output (4-20mA), one alarm, one pulse, HART Communication Protocol, DCH or AC option only*
1AM	One analog output (4-20mA), one alarm, one pulse, MODBUS RTU Communication Protocol, DCH or AC option only*
1AMIP	One analog output (4-20mA), one alarm, one pulse, MODBUS TCP/IP Communication Protocol, DCHPOE ONLY*
1AB	One analog output (4-20mA), one alarm, one pulse, BACnet MS/TP Communication Protocol, DCH or AC option only*
1ABIP	One analog output (4-20mA), one alarm, one pulse, BACnet/IP Communication Protocol, DCHPOE ONLY*
3AH	Three analog outputs (4-20mA), three alarms, one pulse, HART (VT,VTP only), DCH or AC option only*
3AM	Three analog outputs (4-20mA), three alarms, one pulse, MODBUS RTU (VT,VTP only), DCH or AC option only*
3AMIP	Three analog outputs (4-20mA), three alarms, one pulse, MODBUS TCP/IP (VT,VTP only), DCHPOE ONLY*
3AB	Three analog outputs (4-20mA), three alarms, one pulse, BACnet MS/TP (VT,VTP only), DCH or AC option only*
3ABIP	Three analog outputs (4-20mA), three alarms, one pulse, BACnet/IP (VT,VTP only), DCHPOE ONLY*

*includes scaled frequency output

Feature 9: Temperature Options	
Code	Description
ST	Standard temperature, Process Temperature - 330 to 500°F (-200 to 260°C)
HT	High temperature, Process Temperature to 750°F (400°C)

Feature 10: Pressure Options	
Code	Description
P0	No pressure sensor
P1	Maximum 30 psia (2 bara), Proof 60 psia (4 bara)
P2	Maximum 100 psia (7 bara), Proof 200 psia (14 bara)
P3	Maximum 300 psia (20 bara), Proof 600 psia (41 bara)
P4	Maximum 500 psia (34 bara), Proof 1000 psia (64 bara)
P5	Maximum 1500 psia (100 bara), Proof 2500 psia (175 bara)

Make downtime a thing of the past.

399 Reservation Road | Marina, CA 93933
Email: sales@foxthermal.com | Tel: 831.384.4300
foxthermal.com