

Wallace & Tiernan® Flow Measurement Equipment

Varea-Meter® Series 520.205

Metal Tube Rotameter

The Straight Through Metal Tube Varea-Meter® units are available in a variety of tube sizes, flange faces, and ratings. These are suitable for harsh process conditions and are designed for the measurement of high-volume flows of aggressive fluids and gases. They have high pressure and temperature limits and give reliable flow measurements over a 10:1 range. As a standard feature, a rugged, magnetically coupled flow indicator is provided. An optional flow transmitter is available to provide local indication as well as a mA output. Meters conform to NACE Standard MR-01-75, covering hydrogen sulfide-resistant surfaces.

Features

Anti-Magnetic-Particle Float

The extra long float magnet has a reduced flux density and is located above the metering disk. This discourages accumulation of magnetic particles, especially on the disk edge where they can cause errors in indication. Meter design directs the flow into a pattern, which scrubs the float and guides clean. The Varea-Meter® unit is ideal for suspensions and slurries.

No Float Extensions

When the float is at rest, nothing projects beyond the flanges. Spool pieces are not required for installation and a frequent cause of damage when removing meters from a line is gone. In and out piping is vertical.

Reliable Magnetic Coupling

For reliable indication a powerful magnetic linkage exists between the float magnet and the indicator or transmitter magnets. Transmission and indication are reliable even under sudden flow surges.

Easy Conversion From Flow Indication Only To Flow Transmission

The indication unit and the transmitters are independent. A mounting clamp attaches each to the meter tube. The same clamp attaches the transmitter or optional flow switch 180 degrees from the indicator unit. Clearance between any of these units and the tube leaves room for steam or electric tracing.

Key Benefits

- Simple to install, calibrate and configure
- Reliable long term performance in gas or liquid service
- Highly accurate and stable readings for precise measurement and control
- Stands up to extreme conditions with rugged construction
- Easily adaptable to fit your exact needs with standard options

Easy Field Calibration

Straight Through Varea-Meter® units can be bench calibrated. After mounting in process piping, a minor zero adjustment is made with a screwdriver. There is no need to break piping to get at the top of the meter when making this adjustment.



Metal Tube Varea-Meter® Unit

Product Sheet

Technical Data

Accuracy: 2% of full scale with standard calibration. Special calibration to 1% of full scale.

Range: 10 to 1

Dial Length: 6 inches

Dial Units: Percent of maximum flow is standard. GPM water, SCFM air, or special graduations are optional.

Tube and Float Materials: Tube material 316 stainless steel. Float 316 stainless steel. Write for WT.500.001.000.UA.CG, which is a detailed listing of meter compatibility with a wide range of fluids.

Connections ANSI 150 Lb. Raised face 150 lb. and 300 lb. 316 stainless steel.

How to Determine Air Equivalent

1. From Table B select appropriate Formula to determine Equivalent Flow Rate (QE).
2. From Table C determine FG from Specific Gravity Correction factors.
3. From Table D determine FP from Back-Pressure Correction factors.
4. From Table E determine FT from Temperature Correction factors.
5. From Table F determine FU from Unit Conversion factors.
6. Work Formula to obtain Equivalent Flow Rate (QE).
7. Use Equivalent Flow Rate to select tube and float code from Table I on page 4.

Table C - Gas Specific Gravity
Correction FG

$$F_G = \sqrt{\text{Sp.Gr.} \times \frac{7.96}{\text{FLOAT Sp.Gr.}}}$$

FLOAT Sp.Gr.
316SS = 7.96

Table D - Operating Pressure
Correction FP

$$F_P = \sqrt{\frac{14.7}{14.7 + \text{psig}}}$$

Table E - Operating Temperature
Correction FT

$$F_T = \sqrt{\frac{460 + F}{530}}$$

Table F - Unit Conversion FU

Liters/min	X	.03532	=	Cu ft/min
Cu meters/min	X	35.316	=	Cu ft/min
Lb/min	X	1.0	=	Lb/min
Kg/min	X	2.205	=	Lb/min

QE SCFM air equivalent = desired flow rate (LBS/MIN) x 3.65 x $\sqrt{\text{SPEC. VOL.}}$
For steam service contact your local representative to determine specific volume of steam cu ft/lb

Example: QE SCFM 434.61 = 36.75 x 3.65 x $\sqrt{10.498}$

Selection Procedure For Gas Service

Determine the capacity range, temperature and pressure capability, materials of construction, and options required for each meter. From chemical supplier, determine float material. Table I capacities on page 4 are air SCFM at 14.7 PSIA and 70°F. If the gas is other than the above, its flow rate must be converted to SCFM air (Equivalent Flow Rate)

Table A - Pressure and Temperature Limits

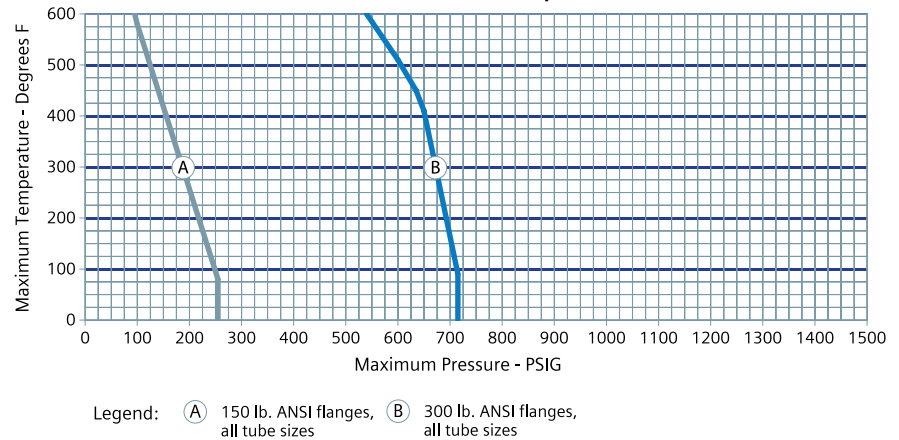


Table B - Formulas

Fluid Condition	Equivalent Flow Rate	=	Desired Flow Rate	x	Correction Factors
Standard (Qs)	QE (SCFM)	=	Qs	x	FG x FP x FT x FU
Weight (W)	QE (SCFM)	=	W x 13.33	x	1/FG x FP x FT x FU

Selection Procedure For Liquid Service

Determine the capacity range, temperature and pressure capability, materials of construction, and options required for each meter. Determine the float material based on the chemical being metered. If the liquid is other than water and or the desired units are other than GPM, flow rate must be converted to GPM water (Equivalent Flow Rate).

Table G - Liquid-Specific Gravity Correction Fe

Specific Gravity	Float Material	Specific Gravity	Float Material
	Fe 316 Stainless Steel		Fe 316 Stainless Steel
0.50	.682	1.30	1.164
0.55	.718	1.35	1.192
0.60	.753	1.40	1.218
0.65	.786	1.45	1.244
0.70	.818	1.50	1.271
0.75	.851	1.55	1.296
0.80	.882	1.60	1.323
0.85	.912	1.65	1.347
0.90	.941	1.70	1.374
0.95	.971	1.75	1.400
1.00	1.000	1.80	1.426
1.05	1.026	1.85	1.450
1.10	1.055	1.90	1.475
1.15	1.083	1.95	1.503
1.20	1.110	2.00	1.527
1.25	1.137		

Note: To determine Fe for specific gravities not shown in Table G, use liquid specific gravity correction equation.

How to Determine Water Equivalent

For liquids with viscosities greater than the viscosity ceiling, consult distributor. For liquids with specific gravity other than 1.0, follow the formula to determine Equivalent Flow Rate in GPM (QE).

Equivalent Flow Rate	=	Desired Flow Rate	x	Correction Factors
$Q_E \text{ GPM}$	=	Q_D	x	$F_E \times F_U$

1. From Table G, determine Fe from Specific Gravity Correction factors.
2. From Table H, determine Fu from Unit Conversation factors.
3. Work formula to obtain Equivalent Flow Rate (QE).
4. Use Equivalent Flow Rate to select tube and float code from Table I on page 4.

Table H - Unit Conversion Fu

IMP			
GAL/MIN	x 1.201	=	GAL/MIN
LTR/MIN	x .2642	=	GAL/MIN
LBS/MIN	x .1198 ÷ SL	=	GAL/MIN
KG/MIN	x .2641 ÷ SL	=	GAL/MIN

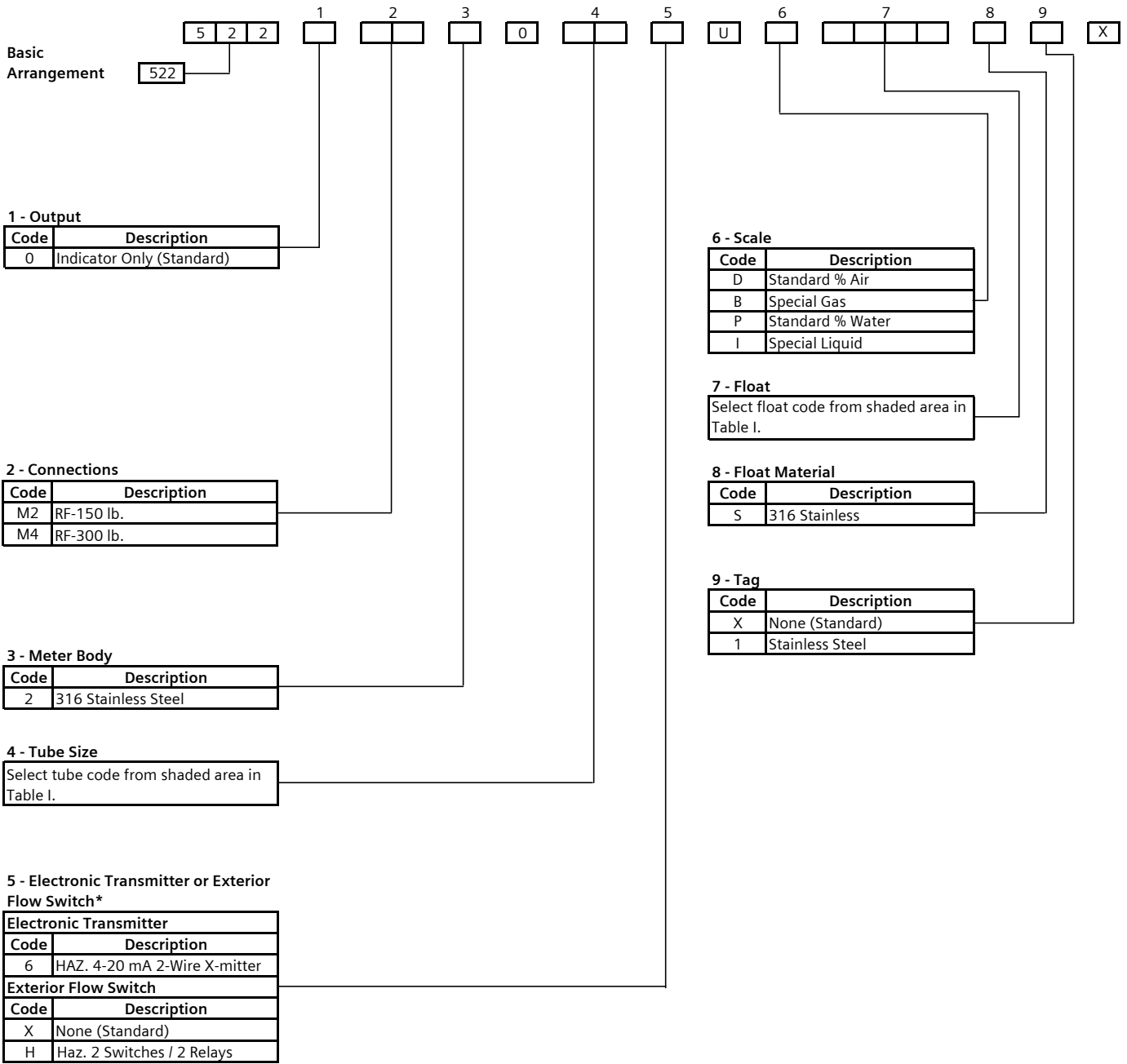
Liquid-Specific Gravity Correction Equation

$F_E = \sqrt{\text{SP. GR.}}$

Table I - Ordering Numbers for Tubes and Floats

Equivalent Capacity		Tube Size Inches	Min. Operating Pres. for Gas Service PSIG	Viscosity Ceiling CSS	Pressure Drop Inches Water	ANSI Flange Size	Tube Code	Float Code
GPM	SCFM							
1.0	4.5	1/2	15	6.0	18	1	08	B102
1.5	6.5	1/2	15	5.0	32	1	08	B106
2.1	9.0	1/2	15	18.0	21	1	08	B302
2.3		1/2		1.0	41	1	08	B126
3.2	13.5	1/2	15	4.5	41	1	08	B306
3.9	16.7	1/2	15	5.0	25	1	08	B402
6.6	26.8	1/2	15	3.5	39	1	08	B406
7.2		1/2		1.6	45	1	08	B410
7.4	30.4	3/4	0	12.0	18	1	12	C402
9.2	39.4	3/4	0	13.0	25	1	12	C406
11.2	49.0	1	0	6.0	15	1	16	D402
14.5	61.0	3/4	0	2.0	49	1	12	C426
15.6	64.5	1	0	7.0	25	1	16	D406
20.9	89.5	1-1/2	0	15.0	12	1-1/2	24	E402
23.9	102.9	1	0	5.0	54	1	16	D410
30.4	129.8	1-1/2	0	40.0	24	1-1/2	24	E406
32.9	139.3	1-1/2	0	1.6	25	1-1/2	24	E422
48.4	205.8	1-1/2	0	12.0	53	1-1/2	24	E410
88.9	350.0	1-1/2	0	3.2	134	1-1/2	24	E430

Table J - Ordering Procedures for Tubes and Floats



*Select either Electronic Transmitter or Exterior Flow Switch.

Ordering Procedure

Example

To order a 1/2" Metal Tube Meter with indicator only with plastic window, 316SS 150 lb. flanges and float having a maximum capacity of 7.2 GPM water specify:
522 0 M2 2 0 08 X U I B 410S X X

Electronic Transmitter

The Varea-Com™ explosion-proof Electronic Transmitter provides accurate magnet angle detection and computation of the angle to a 4-20 mA industry standard output signal. This compact, microprocessor-driven device is capable of filling flow-correction needs at the meter, providing accurate flow information remotely to external support systems. The patented magnetic sensor with automatic gain control enables a high dynamic capture range without sacrificing accuracy.

Features

Separate Flow Indication

The scale and pointer readout is independent of the transmitting mechanism. The pointer indicates flow rate even if the transmitting element is removed or if power fails.

Easy Addition in Field

Any model can be ordered mounted on a new meter or can be easily added to an already-installed meter. Field installation requires calibration to the meter.

Design and Features

- NEMA 4, FM-Approved Hazardous Area enclosure
- Smart, microprocessor-based field transmitter; 2-wire, low power
- Patented sensor with micro-processor-controlled gain
- 4-20 mA Analog Output for magnetic angle signaling. Voltage range: 8.28 VDC
- 11-calibration-point transmitter linearization and storage in nonvolatile memory
- External Zero Button Wire
- Adjustable low-cutoff
- Adjustable low-pass filter
- PC-interface (no external power required)
- Accuracy better than 0.5% (over the range from 0.0 to 360.0 degrees, pick-up accuracy ~0.1 degree)
- Electronics designed to meet international certifications and CE requirements.

Technical Data

Accuracy – Combined meter and transmitter accuracy is 2% of full scale (1% with custom calibration).

Sensitivity – 0.2% of full scale.

Repeatability – 0.3% of full scale.

Speed of Response – Complete response to a flow-rate change in 0.5 seconds.

Output Signals – 4-20 mA DC flow proportional.

Electrical Requirements –

- Input: 24 VDC
- Current Consumption: 5 mA signal current.

Temperature Range – Maximum fluid temperature is 600°F; ambient range is -13 to 140°F.

Electrical Classification – As an explosion-proof arrangement, the transmitter is FM-approved as explosion-proof for Class I, Division 1, Group A, B, C, and D hazardous locations; and FM-approved as dust-ignition-proof for Class II, Division 1, Group E, F and G hazardous locations; suitable for Class III, Division 1.

Connections – Enclosed 1/2" conduit connection. Transmitter to receiver, unshielded wires.

Dimensions – For complete dimensions, please refer to literature: WT.520.205.102.UA.CN



Electronic Flow Transmitter mounted on meter body



Electronic Transmitter

External Flow Switch

The Wallace & Tiernan® External Flow Switch is a compact option that gives reliable high- and/or low-flow switching. The External Flow Switch contains a powerful rotating magnet that responds linearly to float position. Its switches are long life, hermetically sealed reed types. Almost frictionless rotation of the switch magnet and its powerful bond with the float magnet give a dependable magnetic coupling. Even under sudden flow surges, switching remains reliable.

Features

- Available in UL Listed Hazardous Location version.
- Easily retrofitted in the field with the meter in line.
- Switches can be set to open or close on increasing or decreasing flow.
- A simple adjustment sets each switch independently over 0 to 100% of the flow range.

Technical Data

Repeatability: 0.6% of full scale.

Electrical Ratings:

- Series 5500 Hazardous Location: one or two single-pole, double-throw relays rated 10 amperes at 120 VAC; coil supply 120 VAC, 50/60 Hz.
- UL Listed for Class I, Division 1 & 2 Groups C and D or Class II, Division 1 & 2 Groups C and D or Class II, Division 1 & 2 Group E, F, and G.

Temperature Limits – Ambient, -20° to 120° F.

Actuating Time – Reed switches open in one millisecond.

Enclosures – Heavy cast aluminum (NEMA 4) with corrosion resistant finish.

Dimensions – For complete dimensions, please refer to literature: WT.520.205.106.UA.CN.



External flow switch mounted on meter body



Flow switch with switches and relays

Shipping Weights (lbs.)

Meter with Indicator

Tube Size	Meter with Magnetic Indicator
1/2"	25*
3/4"	25*
1"	25*
1 1/2"	40*
2"	55*

* Add 9 lbs. for HAZ. Flow Switch, and 4 lbs. for HAZ. Area Transmitter.

Dimensions – For complete dimensions, please refer to literature: WT.520.205.100.UA.CN

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