

# Wallace & Tiernan® Flow Measurement Equipment Series 55-200 Armored Flowmeter

The Wallace & Tiernan® Series 55-200 Armored Flowmeter is a low cost, 5% accuracy, all metal meter for high-pressure and high-temperature flow applications. Its plug and orifice design, overall simplicity, and minimal parts add up to an economical meter. Size for size, Wallace & Tiernan® Armored Flowmeters give high capacities, reliable indication or transmission of flow, and dependable service.

## Features

### Low Cost

The plug and orifice design, overall simplicity, and minimal parts add up to an economical meter.

### High Capacities

Size for size, Wallace & Tiernan® Armored Flowmeters give high capacities. The plug and orifice concept yields capacities often double that of other designs.

### Compact

The self-guiding float requires no rods. The meter is shorter than other designs, which saves space.

### High Pressure and Temperature Gas Service

Limits are 1500 psi and 400°F (with Viton® O-rings) for NPT connections. For flange connections refer to ANSI Spec B16.5 for temperature and pressure ratings.

### Reliable Gas Measurement

Readings steady out quickly. A special polypropylene float gives stable readings. It minimizes violent reactions to flow surges, especially at start-up.

### Reversible, Dual Scale

A reversible scale with gpm water on one side and percent of maximum flow on the other is standard for easy readout changes.

### Key Benefits

- Economical metering and service
- Higher capacities than other designs
- Stable readings
- Reliable flow indication and flow switching
- Choice of mounting arrangement - NPT or Flanged
- Choice of flow switching - external or integral
- Field convertible electronic transmitter

### Reliable Operation

Rotation of the flow switch and indicator magnets is almost frictionless. This and the powerful bond with the float magnet means reliable indicating and flow switching.

### Output

The standard readout is in a magnetically coupled indicator unit. Optional 4-20 mA transmitter and alarm switches are also available.



Armored Flowmeter with 150 lb. RF flanged connections

## Product Sheet

**Technical Data**

**Accuracy** – ±5% of full scale.

**Range** – 10 to 1.

**Connections** – NPT female or 150 lb. flange

**Mounting** – Vertical, in-line.

**Scales** – Reversible scale calibrated 0-100% of full flow on one side and gpm water on the other. Scale length is six inches. Special scales optional.

**Materials of Construction** – Metering tube, end fittings, and orifice are 316 stainless steel. For liquid service, float is 316 stainless with 301 stainless steel guide; for gas, polypropylene or optional TFE body with 301 stainless steel guide. Alarm and indicator housings are cast aluminum finished with special baked-on vinyl melamine enamel for corrosion resistance. Write for WT.500.001.000.UA.CG, which is a detailed listing of meter compatibility with a wide range of fluids.



*Armored Flowmeter with 150 lb. RF flanged connections*

**Selection Procedure For Gas Service**

Determine the capacity range, temperature and pressure capability, materials of construction, and options required for each meter. Determine compatible float material from chemical supplier information. Table G capacities 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 - Formulas**

Fluid Condition	Equivalent Flow Rate	=	Desired Flow Rate	x	Correction Factors
<b>Standard (Qs)</b>	Qe (SCFM)	=	Qs	x	Fg x Fp x Ft x Fu
<b>Weight (W)</b>	Qe (SCFM)	=	W x 13.33*	x	1/Fg x Fp x Ft x Fu

**How to Determine Air Equivalent**

1. From Table A select appropriate Formula to determine Equivalent Flow Rate (Qe).
2. From Table B determine Fg from Specific Gravity Correction factors.
3. From Table C determine Fp from Back-Pressure Correction factors.
4. From Table D determine Ft from Temperature Correction factors.
5. From Table E 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 B - Gas Specific Gravity Correction Fg**

$$F_g = \sqrt{\text{Sp.Gr.}}$$

**Table C - Operating Pressure Correction Fp**

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

**Table D - Operating Temperature Correction Ft**

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

**Table E - 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

### Selection Procedure for Liquid Service

Determine the capacity range, temperature and pressure capability, materials of construction, and options required for each meter. Determine compatible float material from chemical supplier information. If the liquid is other than water, the desired units are other than GPM, therefore its flow rate must be converted to GPM water (Equivalent Flow Rate).

#### 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).

<b>Equivalent Flow Rate</b>	<b>=</b>	<b>Desired Flow Rate</b>	<b>x</b>	<b>Correction Factors</b>
Qe GPM	=	Qd	x	Fe x Fu

1. From Table F, determine Fe from Specific Gravity Correction factors.
2. From Table G, 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 Tables I and J on page 4.

**Table G - 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

**Table H - Liquid Specific Gravity Correction Equation**

$$F_e = \sqrt{\text{Sp.Gr.}}$$

**Table F - Liquid-Specific Gravity Correction Fe**

Specific Gravity	Fe	Specific Gravity	Fe
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 F, use liquid-specific gravity correction equation.



Armored flowmeter with NPT connections

Table I - Capacity Codes

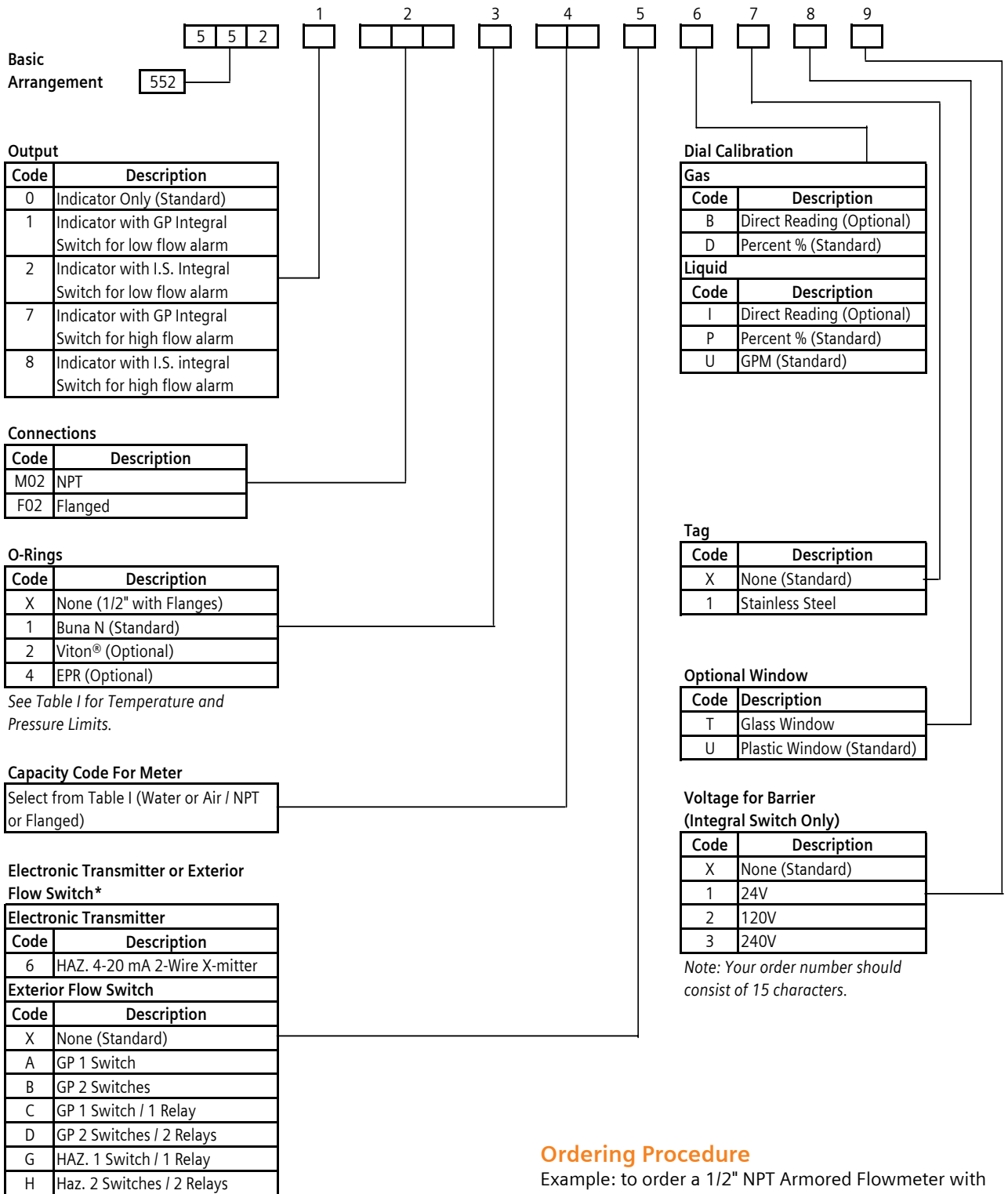
Code	Connection Size	Air (SCFM)	Water (GPM)	Pressure Drop (in H <sub>2</sub> O)	Viscosity Ceiling (cSt)	Process Limits <sup>1</sup>			Float Material	
						Temperature		Pressure (PSI)		
						Liquid	Gas			
01	½"	1.2		9		Buna-N O-rings 200°F	Buna-N O-rings 200°F	NPT: ½-1½" 1500 PSI 2" 1200 PSI	Polypropylene	
02			0.5	23	3				316SS	
03		2.4		10					Polypropylene	
04			1.0	24	3				316SS	
05		6.5		13					Polypropylene	
06			2.4	30	4				316SS	
07		10		17					Polypropylene	
08			5.0	46	5				316SS	
09	1"	12		9		Viton® O-rings 400°F	Viton® O-rings 200°F	1500 PSI	Polypropylene	
11		24		11					Polypropylene	
12			12	35	10				316SS	
13		40		16					Polypropylene	
14			24	52	10				316SS	
16	1½"		34	54	21	EPR O-rings 250°F	EPR O-rings 200°F	Flanged <sup>3</sup> : 150 PSI	316SS	
17		76		15					Polypropylene	
18			75	85	18				316SS	
21	2"	150		18					Polypropylene	
22			130	100	65				316SS	
23	½"	2.0		10			Buna-N O-rings <sup>2</sup> 200°F		TFE	
24		3.75		11					TFE	
25		9.5		12					TFE	
26		15		20					TFE	
27	1"	15		10			10		Viton® O-rings <sup>2</sup> 400°F	TFE
28		30		12			12			TFE
29		54		18			18			TFE
30	1½"	128		16			16		EPR O-rings <sup>2</sup> 250°F	TFE
31	2"	190		20			20			TFE

<sup>1</sup> Pressure and Temperature limits should not be exceeded.

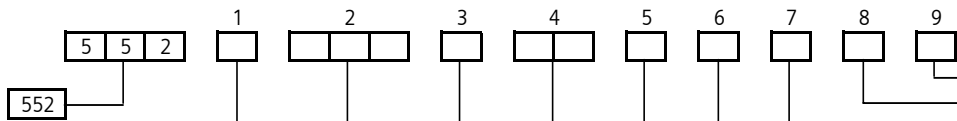
<sup>2</sup> ½" has no O-ring selection.

<sup>3</sup> Consult ANSI B16.5 for pressure ratings of 150 lb. flanged connections.

**Table J - Ordering Procedures for Tubes and Floats**



Basic Arrangement



**Output**

Code	Description
0	Indicator Only (Standard)
1	Indicator with GP Integral Switch for low flow alarm
2	Indicator with I.S. Integral Switch for low flow alarm
7	Indicator with GP Integral Switch for high flow alarm
8	Indicator with I.S. integral Switch for high flow alarm

**Connections**

Code	Description
M02	NPT
F02	Flanged

**O-Rings**

Code	Description
X	None (1/2" with Flanges)
1	Buna N (Standard)
2	Viton® (Optional)
4	EPR (Optional)

See Table I for Temperature and Pressure Limits.

**Capacity Code For Meter**

Select from Table I (Water or Air / NPT or Flanged)

**Electronic Transmitter or Exterior Flow Switch\***

Electronic Transmitter	
Code	Description
6	HAZ. 4-20 mA 2-Wire X-mitter

Exterior Flow Switch	
Code	Description
X	None (Standard)
A	GP 1 Switch
B	GP 2 Switches
C	GP 1 Switch / 1 Relay
D	GP 2 Switches / 2 Relays
G	HAZ. 1 Switch / 1 Relay
H	Haz. 2 Switches / 2 Relays

\*Select either Electronic Transmitter or Exterior Flow Switch.

**Dial Calibration**

Gas	
Code	Description
B	Direct Reading (Optional)
D	Percent % (Standard)
Liquid	
Code	Description
I	Direct Reading (Optional)
P	Percent % (Standard)
U	GPM (Standard)

**Tag**

Code	Description
X	None (Standard)
1	Stainless Steel

**Optional Window**

Code	Description
T	Glass Window
U	Plastic Window (Standard)

**Voltage for Barrier (Integral Switch Only)**

Code	Description
X	None (Standard)
1	24V
2	120V
3	240V

Note: Your order number should consist of 15 characters.

**Ordering Procedure**

Example: to order a 1/2" NPT Armored Flowmeter with indicator only, plastic window, Buna-N O-rings, direct reading scale in GPM, and maximum capacity of 5.0 GPM water specify: 5520M02108XUXUX

## 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.



Electronic Transmitter

## Technical Data

**Accuracy** – Combined meter and transmitter accuracy is 5% of full scale.

**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 400°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.550.200.106.UA.CN and WT.550.200.114.UA.CN



Electronic Flow Transmitter mounted on meter body

## 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 General Purpose arrangement or 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.



*Flow switch with switches and relays*

## Technical Data

**Repeatability** – 0.6% of full scale.

### Electrical Ratings

- Series 5600 General Purpose: one or two switches rated 250 mA at 48 VDC or 120 VAC resistive or 50 mA at 48 VDC or 120 VAC inductive; one or two single-pole, double-throw relays rated 10 amperes at 28 VDC or 120 VAC; coil supply 120 VAC, 50/60 Hz.
- 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.520.200.102.UA.CN

WT.520.200.104.UA.CN

WT.520.200.110.UA.CN

WT.520.200.112.UA.CN



*External general purpose flow switch mounted on meter body*

## Integral Flow Switch

The Wallace & Tiernan® Integral Flow Switch is a low-cost switch that mounts inside the meter's indicator and enables remote monitoring of either high or low set points. The switch is housed in the indicator, which is in a NEMA 4 enclosure with a plastic window; a glass window is available as an option. There is also an FM-approved, intrinsically safe arrangement with a power supply and an integral (to the power supply) relay available for Class I, II & III, Division 1 & 2 hazardous areas.

## Features

### Alarm Operation

The user can easily set the switching point by removing the indicator cover and moving the switch pointer tip (located in the slot) to the desired set point. Any value along the slot can be used as the desired set position. The placement of the pointer tip provides a local and visual indication of the set point. The disc mounted on the indicator needle actuates the limit switch within the housing. This compact, inexpensive switch gives a reliable high- or low-flow signal even under sudden flow surges. The alarm can be set to open or close on increasing or decreasing process flow.

## Technical Data

### Specifications

- Electrical Classification: NEMA 4 for General Purpose; Intrinsically Safe for Hazardous Areas  
 Class I, Div. 1 Haz Group A, B, C, D  
 Class II, Div. 1 Haz Group E, F, G  
 Class III, Div. 1 in accordance with Instruction Book Dwg. 520.209.130.040
- Supply Voltage:  
 NEMA 4 30 VDC or less  
 Intrinsically Safe 24 VDC, 120 VAC or 240 VAC (based on barrier selected)



*Integral flow switch  
(shown with cover removed)*

## Repeatability

Intrinsically Safe Alarm: ≤ .0004 in. of the set point.  
 General Purpose Alarm: ≤ .0002 in. of the set point.

## Ambient Operating Temperature

NEMA 4 -13 to 131° F  
 Intrinsically Safe -13 to 140° F

## Shipping Weights (lbs.)

### Meter with Indicator

Tube Size	NPT	Flanged
1/2"	8*	10*
1"	12*	15*
1 1/2"	20*	24*
2"	35*	40*

\*Add 8 lbs. for GP Flow Switch, 9 lbs. for HAZ. Flow Switch, and 4 lbs. for HAZ. Area Transmitter.

**Dimensions** – For complete dimensions, please refer to literature: WT.550.200.100.UA.CN and WT.550.200.108.UA.CN



*Armored Flowmeter with NPT connections  
and optional external flow switch*

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