Water Technologies

Wallace & Tiernan® Series 55-200 Armored Flowmeter

SIEMENS

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 200°F for gas; 1500 psi and 400°F for liquids.

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.

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.

Key Benefits:

- Economical metering and service
- Higher capacities then 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

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.PS, which is a detailed listing of meter compatibility with a wide range of fluids.

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
Standard (Q_S)	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

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 F_T

$$F_G = \sqrt{Sp.Gr.}$$

Table C - Operating Pressure Correction F_P

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

Table D - Operating Temperature Correction F_T

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

Table E - Unit Conversion F_U

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).

Equivalent Flow Rate	=	Desired Flow Rate	x	Correction Factors
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 ÷ S_L	=	GAL/MIN
KG/MIN	x	.2641 ÷ S_L	=	GAL/MIN

Table H - Liquid Specific Gravity Correction Equation

$$F_E = \sqrt{Sp.G_R.}$$

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		

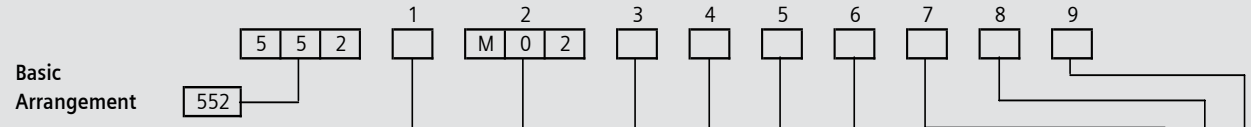
Note: To determine Fe for specific gravities not shown in Table F, use liquid-specific gravity correction equation.

Table I - Capacity Codes

Code	Connection Size	Air (SCFM)	Water (GPM)	Pressure Drop (in H_2O)	Viscosity Ceiling (cSt)	Process Limits*			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 Flanged: 150 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		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		316SS
17		76		15					Polypropylene
18			75	85	18				316SS
21	2″	150		18					Polypropylene
22			130	100	65				316SS
23	½″	1.3		10			Buna-N O-rings 200°F		TFE
24		2.6		11					TFE
25		7.0		12					TFE
26		10		20			Viton O-rings 400°F		TFE
27	1″	15		10					TFE
28		27		12					TFE
29		54		18			EPR O-rings 250°F		TFE
30	1½″	100		16					TFE
31	2″	190		20					TFE

*** Pressure and Temperature limits should not be exceeded.**

Table J - Ordering Procedures for Tubes and Floats



Basic Arrangement

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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
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 Fow Switch.*

Dial Calibration

Gas	
Code	**Description**
B	Direct Reading (Optional)
D	Percent % (Standard)
Liquid	
Code	**Description**
I	Direct Reading (Optional)
P	Percent % (Standard)
U	In 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 Wallace & Tiernan® 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 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
- WT.550.200.114.UA.CN

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.

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 literaure:

- WT.550.200.102.UA.CN
- WT.550.200.104.UA.CN
- WT.550.200.110.UA.CN
- WT.550.200.112.UA.CN

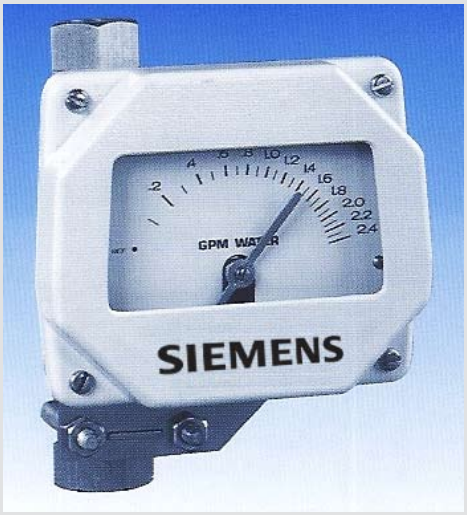
INTEGRAL FLOW SWITCH

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)

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
½"	8*	10*
1"	12*	15*
1½"	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
WT.550.200.108.UA.CN

Siemens
Water Technologies
1901 West Garden Road
Vineland, NJ 08360
www.usfilter.com
wtus.water@siemens.com

Lit. No.: WT.550.200.000.UA.PS.0806
Tel: 856.507.9000
Fax: 856.507.4125