

### Metal Tube VA Gas or Liquid

#### METAL TUBE VA FLOWMETER TYPE GMT

GMT metal tube flowmeters are variable area meters of totally welded stainless steel construction. Liquid or Gas flowing up the tapered flowtube lifts the float to an equilibrium position, dependent on flow rate, and a magnetically coupled pointer indicates this flow on an external scale. The large meter indication is easily visible at a distance, with the pointer moving over a 150° scale. Each scale is produced specifically for the fluid involved and process conditions expected: several flow ranges are available for meters of each standard line size. All gas flow meters are supplied with an integral piston damper to smooth out flow pulsations.

Installation is simple, in a vertical section of flow line: meters can be supplied with DIN, ANSI or other standard flanges, or BSPP or NPT screwed connections.

The robust construction with no glands or seals to leak means the meters are suitable for high pressure applications, or extremes of temperature. The Standard GMT is totally self contained and needs no external power.

Alternative materials are available to special order – for example Hastelloy or Monel wetted parts, PTFE lined versions. For lower cost, Brass or Stainless steel bodied meters ½" – 2" in size are available with screwed connections. The indicator can be provided with one or two flow alarm sensors, adjustable over the meter operating range. Full electronic transmission and totalisation is also available, using the "VAMPIRE" electronic module.

Metal tube meters are ideal for arduous industrial service as an alternative to large glass tube flowmeters. They have particular advantages, where fluids are opaque or staining, or to provide higher safety and security for dangerous or toxic fluids.

#### FEATURES

- ½" – 4" line sizes
- No power required
- Clearly visible meter
- Scaled for process fluids
- Easy installation – flanged or screwed
- No glands or seals
- Robust, simple construction
- Pulsation damper on gas meters

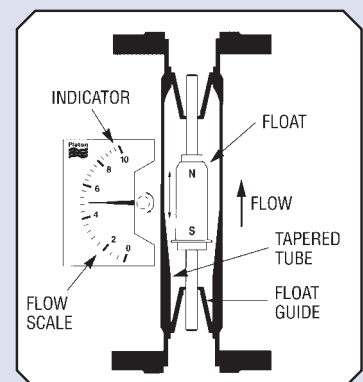


#### PRINCIPLE OF OPERATION

The metering element consists of a precision machined tapered tube and a float. The height to which the float rises in the taper is determined by the gap at which upward flow force and float weight are balanced.

A permanent magnet encapsulated within the stainless steel float drives the external magnetically coupled pointer. Float movement is related to flow rate, and the indicator scale is marked in the correct units of flow for the process conditions.

The standard unit requires no electrical power. Because the measuring element is a sharp edged disc, the meter is relatively insensitive to viscosity changes in the fluid, and to pipe bends in external pipework. The only moving part in the flow is the float, which is retained in place by float guides at either end of the meter.



## SPECIFICATION

<b>Flanged flow tube</b>	316 Stainless steel, all welded construction
<b>Flanges</b>	DIN PN16 (BS4504) or ANSI 150 standard. Other flanges to order
<b>Line Sizes</b>	15, 25, 50, 80, 100mm
<b>Pressure</b>	To flange rating, 100 bar max
<b>Screwed flow tube</b>	Brass or 316 Stainless steel
<b>Connections</b>	½", 1" or 2" BSPP or NPT standard
<b>Pressure</b>	75 bar max GMTB (Brass) 100 bar max GMTS (Stainless)
<b>Float</b>	316 Stainless steel PVC float on low pressure drop option units
<b>Pulsation damper</b>	All gas flowmeters have a dashpot damper built-in

<b>Indicator housing</b>	Polyester coated aluminium alloy, with UV stable polycarbonate face
<b>Protection</b>	IP65
<b>Scale length</b>	Typically 100mm, 150 degrees
<b>Scales</b>	Produced to order to suit process fluid and conditions. Air and water flow ranges quoted opposite
<b>Turndown</b>	Typically 10:1
<b>Accuracy</b>	± 2% FSD
<b>Hysteresis</b>	± 0.5% FSD
<b>Fluid temperature</b>	200°C max (higher to special order)
<b>Response time</b>	Less than 0.5 secs
<b>Flow direction</b>	Vertically upwards
<b>Surface Finish</b>	1.6µm

## ORDER CODE

Model Number **GMT - - 3 1 4 G** - (Example is 2" GMT, Flanged PN16, ranged 20-180m<sup>3</sup>/h Air)

GMT family

### Model type

No digit Flanged stainless  
**B** Brass body screwed  
**S** Stainless body screwed

### Electronic outputs

#### No digit Standard indicator

**A** Single flow alarm  
**AA** Dual flow alarm  
**XA** AC powered transmitter  
**XD** CENELEC Approved Loop powered transmitter

### Flow pipe size

**1** 15mm or ½"  
**2** 25mm or 1"  
**3** 50mm or 2"  
**4** 80mm or 3"  
**5** 100mm or 4"

### Fluid

**G** = Gas  
**L** = Liquid

Digit to identify specified Flow Range (See Table on next page)

### End Connections

**1** Flanged DIN PN16  
**2** Flanged ANSI 150lb  
**3** Flanged DIN PN40  
**4** Flanged ANSI 300lb  
**5** Screwed BSPP female  
**6** Screwed NPT female

### TO ORDER

Specify process conditions at measurement point (fluid type, density/SG, viscosity, temperature and pressure) plus operational flow range and units

Note: Not all options available together.

## FLOW RANGES

STANDARD UNITS					LOW DP GAS UNITS			
Size/Model	Flow Digit	Water (20°C)	Air at ATP (m³/hr)	Max DP (mbar)	Flow Digit	Air (ATP) m³/hr	Natural Gas (ATP) (m³/hr)	Max DP (mbar)
15mm (GMT1)	1	20 - 160 l/h	0.5 - 5.0	15	A	0.3 - 3	0.4 - 3.5	7
	2	20 - 250 l/h	0.5 - 7.5	30	B	0.4 - 4	0.5 - 5	10
	3	40 - 400 l/h	1.2 - 12	20	C	0.5 - 7	1.0 - 9	7
	4	60 - 600 l/h	2.0 - 18	35	D	1.0 - 9	1.0 - 12	10
25mm (GMT2)	1	0.1 - 1.0 m³/h	3.0 - 30	15	A	1.5 - 15	2 - 20	8
	2	0.2 - 1.6 m³/h	4.0 - 50	30	B	3 - 23	4 - 30	9
	3	0.2 - 2.5 m³/h	10 - 75	35	C	4 - 36	5 - 45	8
	4	0.4 - 4.0 m³/h	12 - 120	80	D	5 - 50	6 - 60	9
	5	0.6 - 6.0 m³/h	20 - 200	160				
	6	1.0 - 10.0 m³/h	40 - 360	400				
50mm (GMT3)	1	0.6 - 6 m³/h	20 - 180	30				
	2	1.0 - 10 m³/h	30 - 300	40				
	3	2.0 - 16 m³/h	60 - 600	80				
	4	2.0 - 25 m³/h	100 - 1000	190				
80mm (GMT4)	1	2.0 - 25 m³/h	N/A	140				
	2	3.0 - 40 m³/h	N/A	220				
	3	6.0 - 60 m³/h	N/A	525				
100mm (GMT5)	1	10 - 100 m³/h	N/A	440				

### NOTES:

- Units will be scaled and calibrated for customers specific process conditions, which may differ from those tabulated (See overleaf).
- Typical maximum liquid viscosity is 50cP, lower for the highest flow ranges and small sizes.
- Screwed 1" units are not available for Flow Digit 6.

## OPTIONS

### 1. Oxygen Service

Standard units cleaned to required specification. Special units available with Brass internal construction.

### 2. Alarm Output

Sensor NAMUR type SJ2-N to DIN 19234

Approval EEx ia IIC T6

Single or dual alarms can be fitted to a GMT flowmeter: the sensor requires a suitable control room interface. Please ask for separate data sheet.

### 3. Electronic Output

All GMT flow tube sensors can be fitted with "VAMPIRE" micro based electronic transmitter and flow indicator units. Please see Data Sheet DS1225.

### 4. Alternative body Materials/Designs

The PTFE lined meter option is used for corrosive chemicals. Float, guides and flange raised face are PTFE or ceramic.

The hygienic option with crevice free construction is polished to 0.4-0.8µm finish and fitted with Triclover connections.

Also Triclover, RJT, DIN 11851, SMS connections can be fitted to Std flanged body.



Refer to DS1221 for Screwed GMT datasheet.

## ALTERNATIVE FLUIDS

Approximate flow ranges for alternative process fluids and gas pressures can be calculated using the following formulae. For a full calculation please contact our Sales Team.

### 1. Gases at pressure or temperature

For Air or gas flows where the pressure in the line on the discharge side of the flowmeter is not atmospheric (1.013 bar), multiply the flow range at ATP quoted in the table by a factor calculated as the square root of the pressure (in bar abs) divided by 1.013.

$$\text{Air flow in process} = \sqrt{\frac{P(\text{abs})}{1.013}} \times \text{Air flow in table}$$

For temperature changes

$$\text{Air flow at T} = \sqrt{\frac{293}{T(\text{K})}} \times \text{Air flow in table}$$

### 2. Alternative gases

For gases other than Air, find the Relative Density (RD) of the gas compared to Air, and divide the flow range quoted for Air in the table by the square root of the Relative Density.

$$\text{Gas flow range} = \text{Air flow in table} \times \frac{1}{\sqrt{\text{RD}}}$$

Examples of RD figures for some gases are as follows:

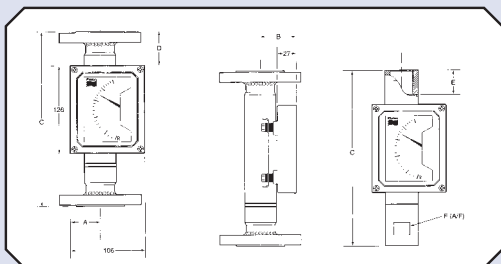
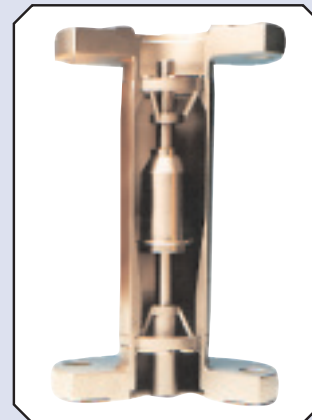
Acetylene	0.898	Carbon dioxide	1.520	Nitrogen	0.968
Argon	1.380	Hydrogen	0.070	Oxygen	1.105
Butane	2.007	Natural Gas	0.608	Propane	1.522

### 3. Alternative Liquids

For non viscous liquids other than Water, the main correction arises from the density/SG. For the process liquid flow range multiply the Water flow range from the table by a factor D from below.

SG	0.6	0.7	0.8	0.9	1.0	1.1	1.2	1.3	1.4
D	1.328	1.221	1.134	1.062	1.000	0.947	0.900	0.858	0.821

For a liquid of 1.2 SG, the GMT411L flowmeter would have a full scale flow of 25 x 0.9 ie. 22.5 m<sup>3</sup>/hr: the scale would be drawn 2 – 23 typically. Actual scale used would be rounded up, for example 2 – 23 in this case.



## DIMENSIONS

Pipe Bore	15	25	50	80	100
A	51	45	42	42	39
B	48	51	66	87	100
C	250	250	250	300	400
D	51	49	49	75	113
E	26	34	27	N/A	N/A
F	27	41	60	N/A	N/A

## INSTALLATION

- All VA meters are designed for vertical installations, with flow upwards. It is necessary to have 5 straight pipe diameters upstream and 2 straight pipe diameters downstream. Bends in two planes should be avoided.
- The upstream and downstream pipe bores should suit the nominal size of the instrument, if possible.
- Ensure that no ferromagnetic material is situated within 100mm of the indicator.
- Before installing the meter, the pipeline should be flushed to remove any foreign matter, or swarf, likely to collect on the float unit and magnet.
- For ultimate protection a filter should be fitted upstream of the meter to remove large particles.



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CERTIFICATE NO. 22358