Breakthrough Flowmeter Technology

Ultrasonic Flowmeter Range
IDEAL FOR:
- Drink dispensing
- Laboratory tests
- Cooling equipment
- Active flow alarms
- Semiconductor plant
- OEM applications
- Pilot plant
- Fuel cells
- Pharmaceutical
- Chemical & petrochemical
The Titan pedigree

With over 40 years experience in flowmeter innovation and manufacture, Titan’s company philosophy of “pushing the envelope by trying to do things a little different and better” has resulted in sales of over 700,000 products into 50 countries worldwide and a repeat purchase percentage of 95% – something which Company founder Trevor Forster is justly proud of.

Today Titan supplies innovative flow measurement solutions into a broad range of sectors, including medical, industrial, food & drink, laboratory and pharmaceutical. Its latest innovation, the Atrato flowmeter range, is set to challenge conventional flowmeter thinking the world over. The culmination of eight years research and development in collaboration with the Department of Process & Engineering at Cranfield University, it can handle low flows from laminar to turbulent and is largely immune from viscosity. It has excellent turndown, repeatability and linearity and can monitor flow over a range of 200:1. Accuracy is better than +/-1.0%.

The Atrato Flowmeter range

Utilising patented technology that enables it to operate with excellent accuracy over very wide flow ranges, across the whole span, the Atrato range of inline flowmeters is a genuine breakthrough in flowmeter technology. Its rugged, clean bore construction makes the Atrato ideal for a whole range of low flow applications and its USB port allows software connectivity at literally the touch of a button. Its signal processing system permits flow measurement across the whole Reynolds number range allowing both viscous and non-viscous products to be metered accurately.

FEATURES

- Choice of materials
- ±1.0% of reading
- ±0.1% repeatability
- 4 Flow ranges
- Pulse output
- USB interface
- 10/30 Bar rating
- Viton seals as std.
- Choice of end fittings
- 10-24 Vdc
- 60°C or 110°C Max
- Flow switch
- Rate & total option
- 200:1 turndown
- Non metallic options
- Analogue outputs
Atrato is a genuine step change in flowmeter technology
A powerful measuring system

The time of flight measuring system measures both the upstream and downstream flight times and half the difference is the velocity of the fluid. Our patented system measures these time differences to an accuracy of better than 250 picoseconds giving our excellent meter performance. As the pipe geometry is known the resulting pulse output is accurate for the volume passed. This performance is further enhanced by our primary signal to noise ratio which is typically 2000:1 and at times as high as 3000:1.

BENEFITS

- High reliability
- No moving parts
- Fast response
- Through bore design
- Easy to use
- OEM versions

Computer interface

The USB connection permits the user to directly monitor the rate and total on their laptop as well as altering some of the operating parameters such as the pulse resolution and units. If the rate and total or the analogue boards are used their programming and operation can be accessed directly. Inquire for details of data logging and operational statistical output possibilities.

Heritage

The development of the Atrato began in 2001 with a corporate decision to develop the best noninvasive small bore flow meter in the world as part of a long term strategic plan. One of the foremost fluid engineering establishments (The Cranfield Institute of Technology) was commissioned to develop the device along with Titan and this joint project has been continuous since that date. Titan have exclusive global rights for the technology which is subject to two granted patents and two more applications will be made in the near future.
Order Codes

Flow range
- 710 – 2 - 500 mL/min
- 720 – 0.01 - 1.7 L/min
- 740 – 0.02 - 5 L/min
- 760 – 0.1 - 20 L/min

‘O’ Ring material
- V – Viton®
- N – Nitrile
- E – EPDM
- S – Silicon
- K – Kalrez

End fittings
- 0 – 3/8” John Guest 10 bar
- 1 – 1/2” BSP PEEK 10 bar
- 2 – 1/2” NPT 316 St St 30 bar
- 3 – 1/2” BSP 316 St St 30 bar

Body material
- 0 – PEEK / 316 St St
- 1 – PEEK / Borosilicate glass

Electronics
- A – Analogue output
- D – Display & analogue output
- RA – 110°C Sensor remote electronics analogue output
- RD – 110°C Sensor remote electronics display & analogue output

E.G.
760 V 0 0 A

is a flow range of 0.1 to 20 L/Min, Viton® seal, 3/8” John Guest fitting, PEEK body with 316 stainless steel tube flowmeter with a 4 - 20mA analogue output.

Standard Materials of Construction
- Body and tube – PEEK / St St
- ‘O’ Ring seal – Viton®
- Output – Pulse
- End fittings – 1/2” BSP
How it works

The Atrato system uses the well proven time of flight measuring method which is far more reliable and accurate than Doppler shift measurement where reflected signals are required from irregularities in the liquid. The Atrato crystals are plain disks with a hole in the centre forming a washer, which are excited in such a way that they oscillate radially as opposed to the normal mode of excitement which is across the thickness of the ceramic. This strong radial signal sends symmetrical pulses directly into the tube.

Because of these annular ring crystals the sound travelling down the liquid can be considered as a plain wave. The signal to noise ratio is remarkable as there is little background noise and high signal strengths. At times the signal to noise ratio is as high as 3000:1. As the system is fully balanced at zero flows the two signals are identical and cancel each other out. This gives a very stable zero flow condition and is the basis of the Atrato’s high ratio between minimum and maximum flows. As the flow increases these signals go out of phase and we measure this phase shift to an accuracy equivalent to 250 picoseconds.

In addition, the sound waves travelling down the tube in the Atrato operating system are symmetrical and as a result any changes in the fluid’s velocity profile across the pipe diameter will be averaged out by the signal as it passes from the transmitter to the receiver. It is therefore irrelevant whether the fluid velocity profile is fully formed with turbulent flow or completely laminar with a classic parabolic profile. In practice this gives the Atrato an excellent immunity to Reynolds number changes and a good high viscosity performance.

<table>
<thead>
<tr>
<th>Model</th>
<th>Flow Range L/Min</th>
<th>Linearity % of reading</th>
<th>Maximum frequency Hz</th>
<th>Pulses per litre (factory setting)</th>
</tr>
</thead>
<tbody>
<tr>
<td>710</td>
<td>0.002 – 0.5</td>
<td>±1.0</td>
<td>1000</td>
<td>40000</td>
</tr>
<tr>
<td>720</td>
<td>0.07 – 1.7</td>
<td>±1.0</td>
<td>1000</td>
<td>10000</td>
</tr>
<tr>
<td>740</td>
<td>0.02 – 5.0</td>
<td>±1.0</td>
<td>1000</td>
<td>4000</td>
</tr>
<tr>
<td>760</td>
<td>0.1 – 20.0</td>
<td>±1.0</td>
<td>1000</td>
<td>1000</td>
</tr>
</tbody>
</table>
## Technical Specifications

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Linearity</strong></td>
<td>±1.0% of reading over flow range</td>
</tr>
</tbody>
</table>
| **Repeatability**      | ±0.1% from 25% to 100%  
                           | ±0.5% from 0 to 25% |
| **Housing**            | IP54 |
| **Temperature range**  | -10 to 60°C assembly with enclosed electronics  
                           | -10 to 110°C sensor only (for use with remote electronics)  
                           | -10 to 60°C remote electronics |
| **Fluid temperature range** | -10 to 60°C or -10 to 110°C with remote electronics |
| **Storage temperature**| -20 to 110°C |
| **Pressure rating**    | 10 bar standard, 30 bar with stainless steel end fittings |
| **Pulse output**       | PNP or NPN maximum frequency 1000 Hz |
| **Relay**              | 24 Vdc 500mA max non inductive |
| **PIN 8 Transistor output** | PNP 24 V @ 20mA maximum  
                           | Pull down resistor required (10K ohm) |
| **PIN 7 Transistor output** | NPN 24 V @ 20mA maximum  
                           | Pull up resistor required (10K ohm) |
| **LCD display**        | Reflective  
                           | 6 x 8mm high main characters  
                           | 2.5mm enunciators  
                           | Gal. cc. Kg. gms. Ltr. /min /Hr /Sec |
| **4 – 20mA output**    | into 250 ohm maximum  
                           | 14 bit resolution  
                           | ±0.1% linearity (plus flowmeter accuracy) |
| **0 – 10 Volt output** | 14 bit resolution (14 V dc min supply voltage)  
                           | ±0.1% linearity (plus flowmeter accuracy) |
| **0 – 5 Volt output**  | 12 bit resolution |
| **USB**                | TypeA connector Windows XP or later |
| **Wiring terminals**   | 1mm maximum |
| **Power supply**       | 10 – 24 Vdc (15 -24 Vdc for 4-20mA or 0-10 V) |
| **Power consumption**  | 110mA (plus analogue output current) |
| **Connections**        | 1/2” BSP male PEEK or 1/2” NPT or BSP 316 stainless steel.  
                           | 3/8” John Guest push-in |
| **Wetted materials**   | Peek, 316 stainless steel, Borosilicate glass  
                           | Choice of elastomers |