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PRESS ANNOUNCEMENT

Measuring Changing Flow Rates – the Challenges of Pulsating Flow

Pulsating flow systems can be seen in process applications where the velocity profile of the flow undergoes dramatic cycling changes as compared to normal steady flow conditions. Such conditions are common in blood flow monitoring, medical, and chemical dosing systems where peristaltic or diaphragm pumps are used.

Following **Titan Enterprises'** published technical paper that discussed how to mitigate the effects of variation in flow velocity, here we look at the types of flow meter systems that give the best results with pulsing flow rates.

Neil Hannay, Titan's Senior R&D Engineer, says: "Pulsations in a flow line are commonly caused by the pumping element: diaphragm, peristaltic, solenoid or piston pumps can all induce significant pressure and flow pulses." Neil continues: "If this pulsation rate is not taken into account, errors in flow measurement will be seen. This can be most erroneous with electronic flowmeters as aliasing can occur."

Compensating for Pulsating Flow

Few flow meters can measure these fluctuations accurately so removing the pulsations as near to the pump as possible is recommended to achieve the best results. Using advanced electronics, Titan's **Atrato®** and **Metraflow®** ultrasonic flowmeters are able to accurately measure pulsating liquid flow that is less than 10Hz. To accurately measure pulsating flows

above this frequency, inline pulse dampening is required to improve the effectiveness of the flow system. If it is not practical to install a damper, a length of flexible hose may reduce the undesirable effects of pulsations.

How Different Types of Flow Meters Compare when Faced with Pulsating Flow Conditions

Flow Meter Type	Effect of Pulsating Flow Conditions
Mechanical Flow Meters	Variable area flow meters are likely to be unreadable as the float will bob up and down with the flow.
Low Inertia Turbine Flow Meters	The lower mass of the turbine flow sensors will allow the meter to accelerate and decelerate quickly. Titan's 800 series turbine has a step start-up time of less than 20 milliseconds and over a period of time will quite successfully give a reasonably accurate total.
Positive Displacement Flow Meters	Positive Displacement (PD) flow meters such as Titan's Oval Gear range, will give accurate readings as they take discrete pockets of liquid and transfer them through the meter. Care should be taken with some types of PD meters as hydraulic shock can damage the unit.
Coriolis Flow Meters	Coriolis meters are typically tolerant to pulsations as they measure the mass of the product passing through the device.
Vortex Shedding Flow Meters	Flow pulses in line will often render vortex shedding meters highly unreliable in pulsating flow conditions.
Ultrasonic & Electromagnetic Flow Meters	Most Ultrasonic and Electromagnetic flowmeters have a set cycle time and should this coincide (alias) with the flow pulsations, errors will be recorded.

Conclusions:

Pulsating flow is always challenging to measure accurately. However, with consideration of the system design and flowmeter performance characteristics, successful flow measurement is possible.

Read the Pulsating Flow technical article in full. Visit Titan Enterprises' website for further information on the Atrato® and Metraflow® range of ultrasonic flowmeters or contact Titan Enterprises on +44 (0)1935 812790 or sales@flowmeters.co.uk.

Drawing upon over 40-years of flowmeter innovation - Titan Enterprises Ltd is a leading manufacturer of high-performance flow measurement solutions, including the Atrato ultrasonic flowmeter, Oval Gear flowmeters, low flow Turbine flow meters and a flow instrument range. Titan's company philosophy of "pushing the envelope by trying to do things a little different and better" has resulted in sales of over 2 million flowmeters and components into 50 countries worldwide and a repeat purchase percentage of 95%. All flow meters produced by Titan Enterprises are designed and manufactured to ISO9001 and calibrated to an uncertainty of ±0.25%.

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