TECHNICAL NOTES

Flow Monitoring Tips

Intell-i-Watch

Flow Monitoring

This paper establishes typical recommended points of interest in choosing and implementing a flowmeter in your process. It is important to maintain reliable flow measurement and so you should investigate to the degree that you understand which meter fits your needs and budget. This paper is not an end all guide, but provides some basic detail and familiarization of the subject matter as your starting point.

Measuring water and oil flow ensures that the fluid is flowing within your specified process rate and total.

To get familiar with the instruments and processes involved in flow monitoring we provide the following points of interest to give you the basics on the subject matter.

Flowmeter Types

Many types of flowmeter designs can be employed, the following are a few.

- Differential pressure
- Turbine
- Paddlewheel
- Ultrasonic
- Single/multi-jet
- Volumetric
- Vortex
- Magmeter.
- Mass flow

Open Channel Monitoring

In addition to flowmeters, another type of monitoring is open-channel, where you need to measure flow in an open trench, culvert, creek or other form of channel. This can be accomplished with the use of a hydraulic structure such as parshall flume or weir system and a single point level to flow measurement via ultrasonic or radar sensor.

Meters can be flanged spool style, insertion style
Many meters can be purchased with local, remote or no displays and a variety of output types for connection to the Intell-i-Watch monitor.

Magmeter
with display



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Equations
While we have a variety of flowmeters that automatically calculate flow measurement it may be educational to understand the calculations that make up the measurement.

To calculate volumetric flow in a pipe:
- The basic equation is Q = V * A where Q is the volumetric liquid flow rate, V is fluid velocity and A is the cross-sectional area of the pipe. Volumetric flow is calculated by multiplying the speed of the liquid by the area of pipe the liquid flows through.

To calculate mass flow in a pipe
- Density has to be accounted for. The equation for mass flow is M = Q x D, where D is density. The volumetric flow is multiplied by fluid density to provide a weight or mass of fluid passing through the pipe.

The online resource https://www.1728.org/flowrate.htm can help you calculate to find the particular solutions based on the application parameters.

Applying the meter
To install the meter properly, you will find the following are typically required by the manufacturer to the meter is installed properly:
- Inlet distance from pumps, valves, fittings and other inline devices requires a certain number of pipe diameters between the meter inlet and upstream devices.
- Outlet distance from pumps, valves, fittings and other inline devices requires a certain number of pipe diameters between the meter outlet and downstream devices.
- Installation connection can be ANSI flanged or FNPT thread
- Output to monitor can be pulse or 4-20mA

Flowmeters as an investment
Flow meters are a great investment for any industrial manufacturing or production plant. They provide consistent and accurate measurements with easy-to-read displays and can easily be interfaced with the Intell-i-Watch to gain more datalogging, analytical, alarming and networked functions.

By paying close attention to fluid flows you can predict and verify consumption, discharge, leakage and loss as well as other parameters that raise your in-plant efficiencies and reduce waste and cost and this can be done automatically when our monitoring technologies and meters are applied correctly.

Maintenance
While flow meters are great tools, they must be correctly set up and maintained. If the flow meter is not properly calibrated, it won't provide accurate readings. To retain accuracy, run periodic tests and check diagnostics often so that you know your meters are functioning properly.

Additional thoughts
Although flowmeters may be simple devices there may be the need for accessories such as cables, fittings flow elements, gaskets, liner types and other items that may be needed for a properly installed meter. Study the subject matter and contact Pan America Environmental with any questions you may have for integration with our Intell-i-Watch systems.

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