APPLICATION NOTE

Water & Wastewater

Flow measurement of wastewater in an open channel

- Continuous radar level measurement for the calculation of wastewater quantities at the inlet of a wastewater treatment plant
- Cost-effective alternative to ultrasonic level measurement in a venturi channel
- Reliable inlet flow measurement for balancing the inlet and outlet of wastewater

1. Background

A French sewage treatment plant is fed via a mixed sewer system with wastewater loads from municipal wastewater and rainwater. In order to measure the flow rate in the open channel, the operator uses level measurement as a common method. This involves measuring the height of the liquid as it passes through a measuring channel (Venturi flume) or over a weir. These specially developed channel shapes characterize the flow of water so that the flow rate can be calculated from the water level.

2. Measurement requirements

The flow rate is measured at various points of the channel. This allows the operator to calculate the inlet and outlet of the treatment plant which serves as a basis for optimizing the system and setting operating costs and tariffs.

So far, the liquid level in these open channels was measured by ultrasonic level measurement. This technology was found to be unreliable in case of deposit, foam and agitated product surface. In addition, the frequent cleaning of the device made it expensive on the long-term.

The plant operator was looking for a more reliable and accurate level measuring instrument, easy to install, operate and maintenance-free.

Venturi channel

KROHNE

3. KROHNE solution

KROHNE delivered an OPTIWAVE 1400 radar level transmitter with polypropylene (PP) Drop antenna and orientable (45°) bracket. Suspended above the open channel, this non-contact FMCW-radar continuously measures the liquid level.

With its small beam angle of just 8° the radar level transmitter is perfectly designed for wastewater applications with open channels. The device features a stainless steel housing and is flood-proof (IP68 / NEMA XP).

The DTM of the device offers a large selection of flow channel types, all matching international standards. Installation and setup are straightforward and secure. The operator just selected the suitable flow channel shape and entered the dimensions. Based on this information, the radar is able to convert level into flow.

OPTIWAVE 1400 suspended above the open channel

4. Customer benefits

The OPTIWAVE 1400 provides the customer with an undisturbed flow measurement at the plant inlet. Thanks to FMCW-technology and the small beam angle of the Drop antenna, the radar provides continuous, reliable and accurate measuring values despite the moving product surface. The values are sent to a PLC (programmable logic controller) via 4...20 output and further processed in the control room to calculate the in- and outlet of the treatment plant and optimize plant operation.

As compared to ultrasonic level technology, the operator benefits from a maintenance-free alternative that is less susceptible to faulty measurements and more cost-efficient over the total operating time. Installation was secure and uncomplicated. The customer could quickly access the DTM of the device via PACTware™ and select the corresponding channel type.

5. Product used

OPTIWAVE 1400 C

- 24 GHz Radar (FMCW) level transmitter for liquids in the water and wastewater industry
- Continuous, non-contact level measurement in open channels and venturis, tanks, pumping stations etc.
- Narrow beam angle (8°) for a sharp focus on the medium
- PP Drop antenna insensitive to condensation or deposits
- Robust stainless steel design, waterproof (IP68 / NEMA 4X/6)
- 2-wire, loop-powered, with HART®7
- Measuring range: up to 20 m / 66 ft

Contact

Would you like further information about these or other applications?
Do you require technical advice for your application?
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