Crude Oil Metering using Inline Ultrasonic Flow Meters

Crude Oil metering is an important application for all the stages - right from extraction or production till refining. There are few measurement challenges - accuracy, repeatability, handling changing viscosities, turndown and cost. Inline Ultrasonic Flow metering technology offers a complete solution for Crude Oil Metering with the unique features those make this technology the most preferred one among all other flow metering technologies.

Crude Oil flow needs to be measured at various locations on its route from Extraction Well or production facility to a refinery. These locations are: after separators, inlet or outlet of cross-country pipe line, ship loading and unloading, inlet of refinery crude oil supply line, crude oil blending system, refinery internal circulation, inlet to production column and FCC feed.

KROHNE has thousands of installations worldwide of inline Multi-path Ultrasonic Flow Meters on all the above mentioned applications.

3 Beam, Inline Ultrasonic Flow Meter Model UFM3030. What makes Inline Ultrasonic Flow Metering the most suitable technology for Crude Oil Metering?

- Non intrusive in-line spool type Multi-Beam Design. Thus, no pressure drop across the meter.
- No moving parts. Thus, No wear and tear No pressure loss No clogging
- Fluid properties have no effect on meter performance. Thus, can be used for Multi-Viscosity and varying density Crude Oils.
- State-of-the-Art 3 Beam Design offers consistent performance even in dynamic flow profile conditions.
- High accuracy over wide measuring range
- High turndown ratio - Starts measuring from zero flow
- Bi-directional flow measurement
- Low cost of ownership
- Available in sizes from 1” to 80” so one type of meter for all line sizes.

Ultrasonic Flow Meters for Crude Oil Flow Metering at Various Applications

Pipeline Transportation and Storage - Crude Oil is transported from the production to intermediate storage and refineries. During further transportation, in case of emergencies there is a possibility of very high pressure in the line. Many times crude oil has high wax or paraffin content, varying viscosities are also a challenge for metering. Coagulation of this Wax on Flow meter walls and varying viscosities causes huge problems to mechanical meters.
These issues can be sorted out by High Pressure Ultrasonic Flow Meters with Heating Jacket which prevents wax coagulation on flow meter walls.

KROHNE High Pressure inline Ultrasonic flow meter with Heating Jacket. Installations at OIL, BRPL, NRL, IOCL etc.

**Offloading Crude Oil from Ships**
Crude oil is transported by ships from one location to another. The loading and offloading of crude oil at ports and refineries require accurate, repeatable and at times Custody Transfer Fiscal metering. Inline Ultrasonic Flow meters with all the advantages mentioned earlier offer the best solution.

Installation of Inline Ultrasonic Flow Meters on Crude Oil Ship offloading application on a jetty. References: MET Maatschap Europoort Terminal (j.v. Total & Ruhur Oil) Nereftco (joint venture BP & Texaco), The Netherlands.

**Inline Ultrasonic Flow Meters for Crude Oil Blending**
Many refineries buy crudes from different locations for refining. Crudes from different locations have different properties. These crude oils are blended in a particular proportion for the refinery to achieve process stability and desired quality of final hydrocarbon products. Inline Multi-path Ultrasonic Flow Metering Technology is the most preferred for this application because of the following advantages:

- Ability to deliver accurate measurement, with excellent repeatability despite varying viscosities and densities
- Large turndown even at high viscosity conditions
- The other benefits of online blending using Inline Ultrasonic Flow meters are:
  - Improved efficiency of blending activity.
  - Mixing tanks can be freed for storage.
  - Rapid production rate.
  - Reduced Cost.

**Ultrasonic Flow Meters for Custody Transfer Metering of Crude Oil**
KROHNE Inline Ultrasonic flow meters model Altosonic III and Altosonic V are NMi approved for Custody transfer metering. Custody Transfer metering is an application where accuracy and repeatability are the most crucial parameters. KROHNE inline ultrasonic flow meters handle multiple viscosity crude oils without any effect on accuracy and repeatability. The meters do not drift and thus, no recalibration is required for these meters. Bidirectional Custody Transfer metering, high rangeability, absolutely minimal maintenance requirement are few of the characteristics of the inline UFM that make it the perfect solution for Custody Transfer metering of Crude Oil. KROHNE provides a complete Custody Transfer metering solution as duty/master meter configuration. KROHNE not only supplies Custody Transfer meters but also supplies Custody Transfer Metering Skids or Systems along with the Prover, Autosampling and Supervisory Computer System as a complete end-to-end system.

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KROHNE flow meter based Custody transfer flow metering skid along with the Prover installed at HPCL and BPCL Mumbai.