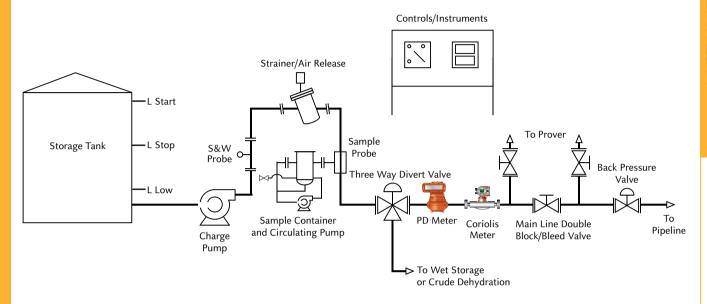
Oil and Gas Production Measurement Applicator

LACT Unit





Overview

LACT (Lease Automatic Custody Transfer) units are the final point of product transfer prior to pipeline transportation. Once the oil has been fully processed, it can be sold based on volume, oil grade, and quality. These three factors require that each parameter be considered in design and operation of the LACT unit. Since oil is sold as a net barrel there must be a meter to register volume and a device to measure temperature so the volume can be corrected back to a base temperature. The quality of the oil is determined by sampling at set intervals and analyzing the sample to determine API gravity and sediment and water (S&W) content. The corrected volume adjusted for S&W equate to what is called Merchantable Oil or Net Oil.

The operation is quite simple. Level controllers determine when to operate the charge pump to deliver to the pipeline. The sample probe takes the sample and transfers it to the sample container. Prior to the sample being removed, the circulating pump runs for a period of time to mix the sample and obtain a homogenous mixture. A strainer is installed with an air-release head at the highest point in the loop to protect all downstream equipment and vent any air or gas.

(Continued on next page)



Overview (Cont.)

The S&W probe is installed downstream of the strainer in the vertical pipe. This probe sends a signal to the monitor to alarm and activate the divert valve to cycle back to wet storage or to a crude dehydration facility if an unacceptable water content is detected. The meter registers volume and in the case of Coriolis meters, can output other variables. The prover connections are to determine meter factors under actual operating conditions and maintain stability of measurement over time. The back pressure valve is to prevent any remaining light hydrocarbons from flashing off and creating issues for the measurement and equipment.

Application Considerations

Considerations

LACT application considerations are aimed at primarily the product parameters such as: viscosity range, API gravity range, Sediment and Water (S&W) range, wax content, contaminates, corrosives, and deposits. Because this is a custody transfer application, the meters must be accurate and maintain accuracy over a wide variety of operating parameters. Any of the above parameters, if varied enough, may cause significant error in measurement or even damage to the meters. When selecting a meter, be sure to have representative samples of the product. Keep in mind, parameters will change depending on upstream process efficiencies which can be more frequent than desired. The meter technology that best handles change without an upset in measurement may be best suited.





Metering Technologies Review

Meter Selection Criteria

Accuracy

- · Repeatability (any given flow rate)
- · Linearity (over the given flow range)
- Stability (ability to reproduce repeatability and linearity over time)
- Provability (ability to prove meter performance and confidence level)

Product Characteristics

- · Viscosity range
- · API gravity range
- Percent water range
- Paraffin
- Contaminants
- Corrosiveness
- Deposits

Positive Displacement Meters

Advantages

- · High accuracy
- Low pressure drop
- · No flow conditioning
- · Ability to measure high viscosities
- · Can handle very low flows

Disadvantages

- Application range limited by meter internal clearances
- Susceptibility to damage by flow surges or gas slugs
- Susceptibility to corrosion and erosion



Smith Meter® SC13 Series



Coriolis Meters

Advantages

- Low maintenance minimally affected by abrasive and corrosive substances
- · Not susceptible to damage by gas slugging
- · Capability of registering near-zero flow rate
- · Minimally affected by viscosity changes
- Direct mass and density measurements (providing indirect volume measurement)
- · Flow conditioning is not normally required

Disadvantages

- Sensitivity to installation conditions, including shock and vibration
- · Accumulation of internal deposits can affect accuracy
- Sizes larger than six inches are not typically used for volumetric custody transfer applications
- Sometimes difficult to prove due to time lag of manufactured pulse output
- Meter requires periodic re-zeroing under pressure, with no flow
- · Needs back pressure control
- · High pressure drop



Proline® Promass F

FMCTechnologies

Typical Ancillary Devices

INVALCO Water and Oil Monitors

7300 Temperature Compensated Water Cut Monitor/Probe Designed to provide the highest possible sensitivity, resolution, and accuracy for water content determination in crude oil, other hydrocarbons, or other low dielectric liquids from a maximum of 25 percent of levels below 1,000 parts per million (ppm). In oil and gas (condensate) productions, water cut, and S&W measurements are significantly improved with the WCM 7300 Technology.

S&W Full Scale Range

0-25%

Field adjustable to 0-5%, 0-10%, etc.

Accuracy is defined as the variance observed between the 7300 reading and the water grindout of the oil.

Normal variances are:

±.05 from 0 to 5% water

± .1 from 5 to 10% water

± .15 from 10 to 15% water

 \pm .2 to .25 from 15 to 25% water



Model 4528 EZ Detector Model, 4728 BS&W Monitor and Model CX-645 Probe The INVALCO model 4728 BS&W Monitor, in conjunction with a Model 4528 EZ Detector and a model CX-645 Capacitance Probe, is a continuous online monitor of percent water in a flowing crude oil emulsion stream. This unit displays percent of water in various ranges from zero percent to five percent up to and including zero percent to 20 percent on a digital LCD indicator. In addition, the model 4728 provides a 4-20mA analog output proportional to input range, and a field adjusted, time delayed, limit relay for valve control or alarming.

S&W Range

o-5%, o-10%, and o-20% **Measurement Accuracy** ± 1.0% of full scale

We put you first. And keep you ahead. FMC Technologies, Inc. 500 North Sam Houston Parkway West, Suite 100 Houston, Texas 77067 +1 281 260 2190

1602 Wagner Avenue Erie, Pennsylvania 16510 +1 814 898 5000

INVALCO Cx-645 Probe with 4728 Monitor and 4528 Detector

INVALCO Series 500 Back Pressure Valves

The Series 504/507/510 Valves are perfect for maintaining back pressure on vent lines from separators, treaters, dehydrators, compressor stations, gas gathering systems, etc.

Series 504

2" FNPT

Spring Ranges - o to 100 psi

Series 507

2" and 3" grooved or 2" FNPT

Containment Pressure - 100 psi (all models)

Series 510

2", 3", 4", and 6" ANSI 150 lb. RF Flanges Containment Pressure - 100 psi



www.fmctechnologies.com/measurementsolutions