

TELEDYNE **ANALYTICAL INSTRUMENTS**

In situ API Gravity Transmitter

Teledyne has developed a new Attenuated Total Reflectance (ATR) in situ probe for applications in which the concentration and extinction coefficients are too high for normal spectroscopic work. The advantage of this probe is that it works insitu and under extreme process conditions. One application of this probe (and associated electronics) is to determine the amount of the heaviest component of crude oil, Asphaltene. The deposition of asphaltic material from crude oil is a well characterized operational problem associated with the production and refining of crude oil. The details of asphaltene characterization, deposition, and deposition inhibition have been reported in numerous references.

Defining the Problem

Asphaltene content in heavy hydrocarbon oils is not only an indication of combustibility and storage stability of heavy hydrocarbon oils, but is also an important factor greatly influencing catalytic activity in a direct desulfurization process. Therefore, it is required to carry out determination of asphaltene content in heavy hydrocarbon oils rapidly and precisely from consideration of product and process control.

Reliably predicting the concentrations of heavy HC in a crude oil stream and designing a monitoring system that will deliver a chemical (solvent) to eliminate a deposit free environment in pipes is the goal of our control strategy.

The Teledyne Solution

The API Gravity monitor / controller reliably predicts the API Gravity in a crude oil sample. This allows our customers to implement a control strategy that monitors the amount of soluble heavy hydrocarbons in the crude oil and proportionally deliver a chemical (solvent) to eliminate deposit formation in pipes.

Benefits of the API Gravity Probe are;

- Elimination of lengthy laboratory methods to determine the API Gravity in crude oil
- In situ measurements of heavy HC in real time mode
- Validation of chemical additive effectiveness
- Elimination of costly shut downs because of Asphaltene precipitation in pipelines
- Provides numeric results rather than subjective evaluation of visual samples

The API Gravity unit can be used in

- Off shore platforms
- Blending stations
- Pipelines
- API Gravity
- Refineries
- Crude viscosity blending
- Weight % oil
- HC survey tool

Transmitter

Teledyne utilizes a low cost transmitter that generates a signal from our detector board and uses it to monitor the amount of heavy aromatic HC in the crude oil stream. This reading is based on the amount of optical attenuation from the API Gravity probe.

API Gravity Probe*

Teledyne's Gravity Probe is a fiber optic in situ probe (patent pending) that senses the amount of heavy hydrocarbons in a crude oil stream. In addition to monitoring the optical absorbance, the probe can be supplied with the ability to measure the fluorescence.



Model 53T API Transmitter



Model 3503 API Gravity Probe, 12" and 24" versions



In situ API Gravity Transmitter

PRODUCT SPECIFICATIONS

Model 53T API Transmitter

Transmitter

Measured parameter: API Gravity
 Resolution: 0.25%
 Temperature range: -40 to +300° C
 Pressure range: ±10,000 psig
 Response time: < 5 sec
 Maximum Zero shift: 0.05 mv (over +20 to +40° C)
 Long term output drift: < 2% signal loss / month
 Repeatability: 1% of range
 Range: 0 - 10%

User Display & Control

Type of display: LED display
 Display: 3-1/2 digits in user defined engineering units

Electrical

Power requirement: 24 VDC (9-32 VDC) or 110 / 220 VAC; 50 / 60 Hz with power supply
 Power consumption: 0.48 Watts
 Analog outputs: 4-20mA isolated
 Analog loop resistance: 500 Ohms, maximum @ 24V
 Alarms: 4-SPDT Form C relay, 10 amp @ 250 VAC
 Certifications: CSA, CE, UL

Mechanical

Analyzer weight: 5 lbs
 Enclosure construction: NEMA 4X, Polycarbonate enclosure with viewing window
 Enclosure size: 14" H x 12" W x 7" D

Front Surface Fluorescence Probe

Materials: 316 SS or Hastelloy C
 Temperature rating: 315.5° C (600° F)
 Pressure rating: 10,000 psig
 Expected probe life: 25 years
 Probe options: 6, 12, or 24" length
 Automatic retractor for calibration and cleaning
 Temperature measurement
 Pressure measurement
 Calibration options: Automatic span filter
 Manual span filter

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Warranty

Instrument is warranted for 1 year against defects in material or workmanship. NOTE: Specifications and features will vary with application. The above are established and validated during design, but are not to be construed as test criteria for every product. All specifications and features are subject to change without notice.

