

Interface Detection and Level Control in Separators

Background

Separators are processing units that are used to separate water (aqueous phase) and an immiscible (nonmixing) liquid (non aqueous phase). Separators are used in a variety of industries:

- chemical processing (separation of aqueous and non-aqueous solutions).
- secondary oil production (water recovery).
- environmental (recovery of grossly contaminated water).

Separators are charged with the mixture which is allowed to separate into two phases, the aqueous (water or water solution) and the non-aqueous (oil, fuel, organic solvent, or solution). Depending upon the density of the non-aqueous component relative to water, the mixture will either float to the top of the water (the usual case) or precipitate to the bottom. The separated components are simply pumped or allowed to drain from the separator.

The Measurement

The use of conductivity is based on the simple principle that most aqueous solutions are good conductors of electricity, while, with few exceptions, non-aqueous solutions do not appreciably conduct electricity. A conductivity measurement can be used to signal the presence of the aqueous or non-aqueous phase. As water accumulates in a separator, a conductivity sensor mounted above the inlet to the outlet can sense the presence of the aqueous phase due to the increase in conductivity. The conductivity transmitter will represent this increased conductivity using the 4–20 mA current output or digitally for HART or Foundation Fieldbus devices. The discharge valve can be opened on a signal from the DCS or PLC and closed once the conductivity drops back to zero. Since the non aqueous solutions, especially oils, can coat the metal electrode surfaces of standard conductivity sensors, only toroidal sensors should be used. In general, any insertion or submersion toroidal sensor will perform well; however, the Model 228 Submersion / Insertion sensor may be preferred for its ease of mounting. If the non-aqueous phase is extremely viscous or contains a high

concentration of suspended solids, the Model 226 Submersion / Insertion sensor is the best choice, due to its large bore and greater resistance to fouling. Figure 1 illustrates the role of conductivity measurement in a separator.

Instrumentation

1066 Conductivity Transmitter

- Intuitive menu screens with advanced diagnostics and help screens
- SMART Enabled - automatic calibration with SMART pH sensors
- Easy-to-use simplified startup and menu structure
- Digital communications - HART® version 7 and FOUNDATION® fieldbus communication protocols
- Two 4–20 mA CURRENT OUTPUTS are standard



226 Submersion/Insertion Toroidal Conductivity Sensor

- Suitable for high solids, low conductivity applications.
- Made of chemically-resistant PEEK (polyetheretherketone).
- Large 1.87 " bore construction minimizes fouling errors.

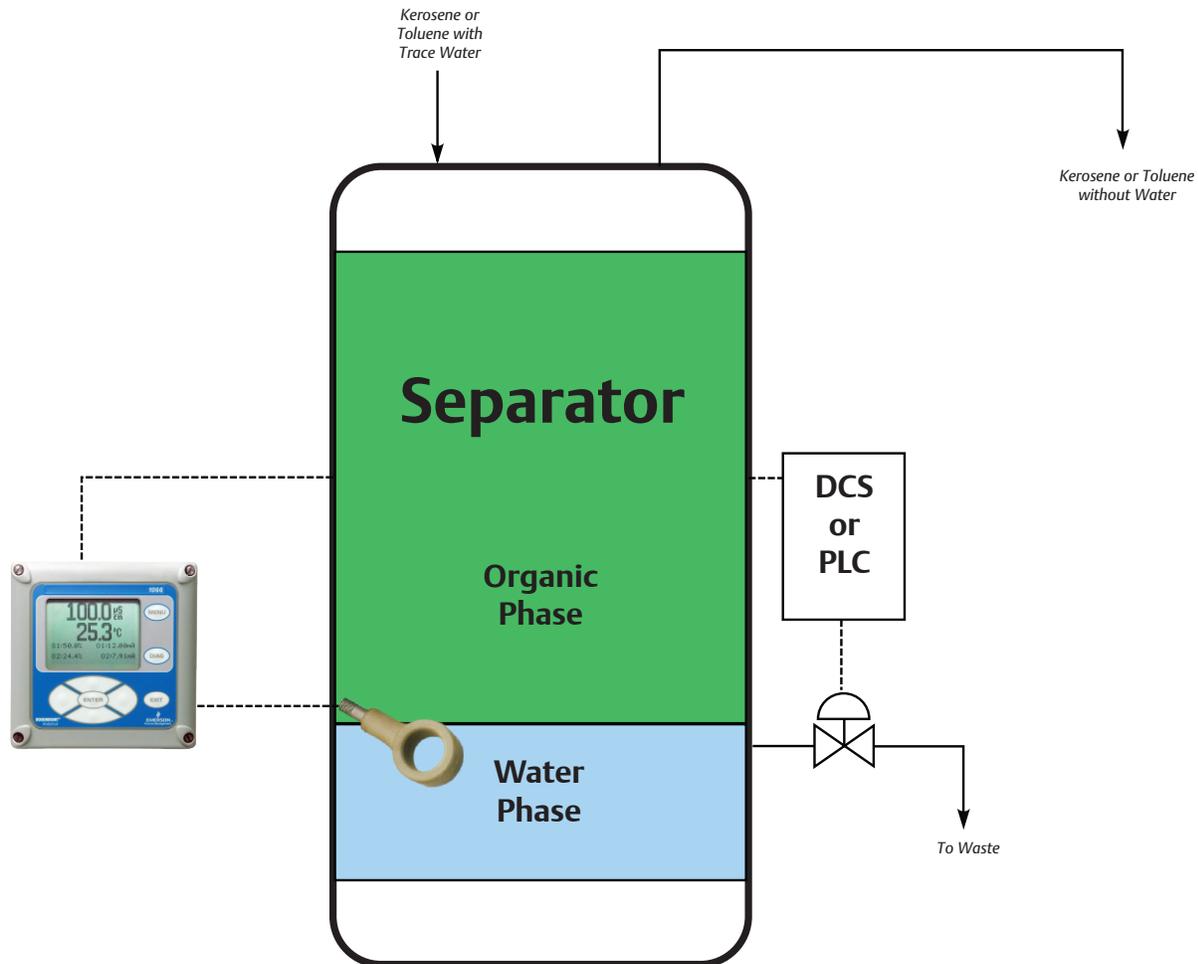


228 Submersion/Insertion Toroidal Conductivity Sensor

- Suitable for high temperature, chemically corrosive solutions.
- Choice of PEEK or Tefzel construction.



Figure 1 - Example of Conductivity Use in a Separator for Interface Detection



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Emerson Process Management

Rosemount Analytical Inc.
2400 Barranca Parkway
Irvine, CA 92606 USA
T (949) 747 8500
F (949) 474 7250
liquid.csc@emerson.com

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