Conductivity Measurement for Interface Detection in Separators

Process

A separator is a vessel used to separate water (also called the aqueous phase) from another immiscible liquid (also called the organic or non-aqueous phase). Separators are used in a variety of industries including chemical processing, oil production, and wastewater treatment.

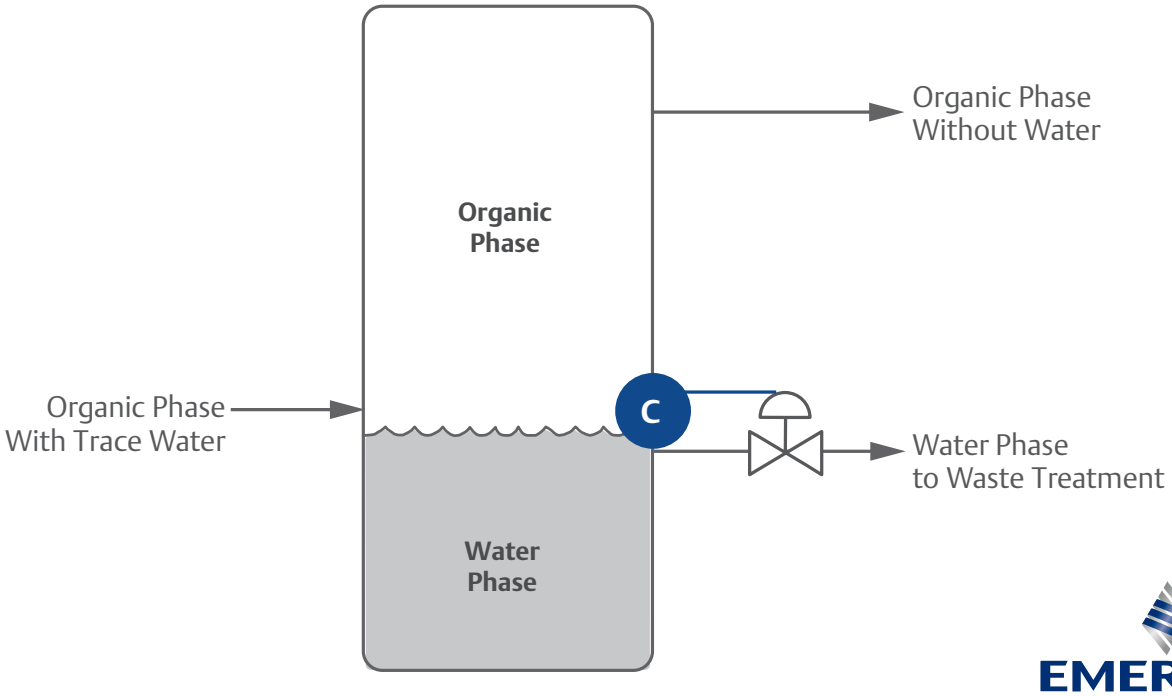
As a liquid mixture is added to a separator, the mixture gradually separates into two distinct phases due to the immiscibility of the mixture components. Because the densities of the phases are different, one phase rises to the top of the separator and the other (typically the aqueous phase) falls to the bottom. The two separated phases are then pumped out or allowed to drain from the separator.

Conductivity Measurement

One of the critical process parameters in separators is the level of the interface between the two phases. Conductivity sensors are a convenient way to monitor the level of the interface because the two phases usually differ sharply in conductivity, with the aqueous phase having high conductivity and the non-aqueous phase having low conductivity. A conductivity sensor mounted on the side of the separator can be used to determine which phase is present at that point in the vessel.

Figure 1 illustrates the role of conductivity measurement in a separator. As water accumulates in the vessel, a conductivity sensor mounted above the water drain outlet can sense the presence of the water and trigger discharge of the water phase by opening a valve. As water drains, the sensor can detect the falling interface based on the presence of the non-aqueous phase and can close the valve to prevent the non-aqueous phase from accidentally being drained.

Figure 1 - Role of Conductivity Measurement in a Separator



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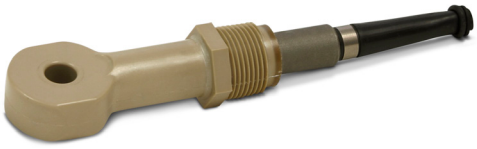
The Emerson Solution

A common challenge with conductivity sensors in separators is that the non-aqueous phase often contains oils or suspended solids that coat the metal electrode surfaces on standard conductivity sensors, resulting in an inaccurate and unresponsive measurement.

The Rosemount™ 228 Toroidal Conductivity Sensor is the right choice for most separator applications because its electrodeless design provides an accurate and reliable measurement even as the sensor becomes coated by oils or suspended solids in the process. If the non-aqueous phase is extremely viscous or contains a high concentration of suspended solids, the Rosemount 226 Toroidal Conductivity Sensor should be considered because its large bore size provides even greater resistance to fouling. All Rosemount conductivity sensors are compatible with all Rosemount Liquid Analysis transmitters, including the Rosemount 56 Dual Channel Transmitter which offers two sensor inputs, a large full color display, and relay and proportional-integral-derivative (PID) outputs that can be programmed for separator process control.



Rosemount 228 Toroidal Conductivity Sensor

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