

Yokogawa Performance Distillation Solutions

Differential Pressure, Coriolis Flowmeter, and Temperature

Yokogawa's OpreX Measurement solutions optimize the distillation process, improving quality control and reducing energy usage.

Distillation is one of the most energy intensive processes in a refinery. It can account for nearly 40 percent of energy consumption. Crude composition, ambient conditions, and aging equipment all impact distillation performance. For this reason, many operators err on the side of product quality at the expense of throughput and energy efficiency.

With accurate and reliable control measurements, however, refineries can better balance these aspects of distillation.



Figure 1 - Refinery Distillation Column

Refinery Distillation

- Flow rates are used for dynamic compensation in the column to optimize efficiency and balance production rates for component streams.
- Column pressure directly affects volatility of each component and can also affect product composition. Overpressure conditions can indicate serious issues.
- Reflux temperatures can be affected by changing ambient conditions and cause upsets in column operation, impacting and lowering throughput.
- Heater temperature monitoring is required to prevent unwanted chemical reactions and/or fouling.
- Column fluid levels are monitored to balance the flow of upward vapor and downward liquids. Disruptions to this equilibrium will lead to increased recycle of off-spec product, lower throughput, or in extreme cases, unit shutdown.

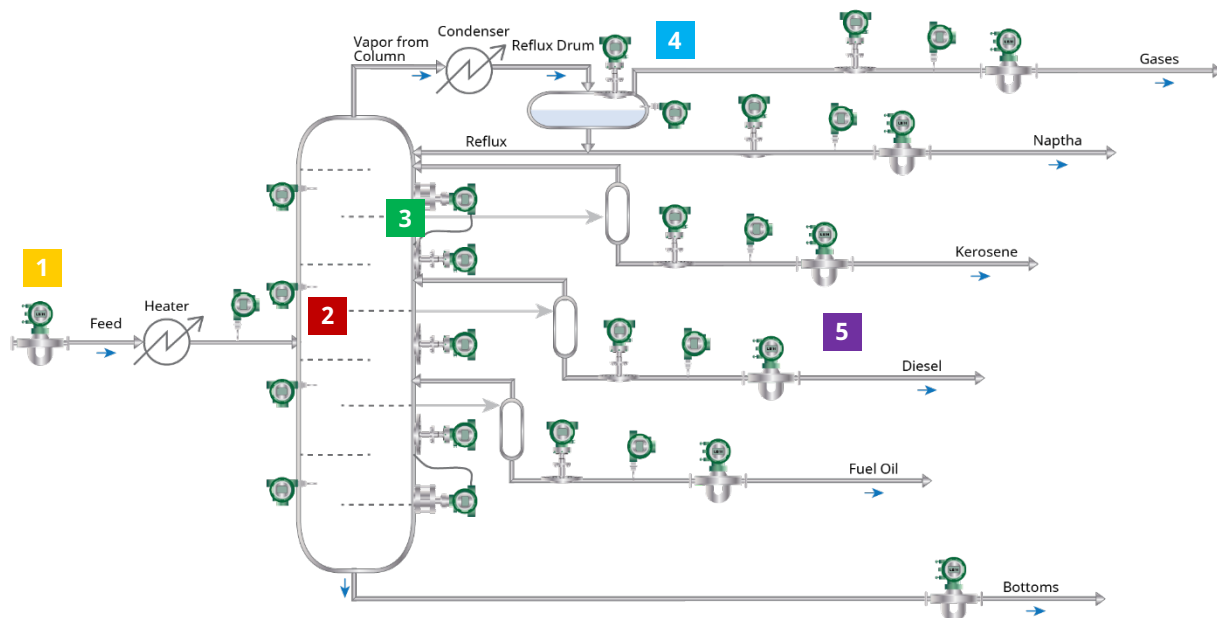


Figure 1 – Distillation Process

Resolving Pain Points

- 1 Feed Flow Measurement** – Variability in crude composition can upset column operations. Coriolis mass flow allows operators to adjust/balance feed flow to minimize the impact of variable crude.
- 2 Column Pressure and Temperature** – Whether using trays or a packed column, pressure and gradient temperature measurements ensure optimal performance and provide early indicators of upset. Accurate and reliable instrumentation help contain maintenance costs.
- 3 Column Level** – Traditional differential pressure solutions can be difficult to maintain and are often impacted by ambient temperature changes. Digital remote sensor solutions can be easily installed and have no capillary fill fluid, greatly improving measurement reliability and reducing maintenance.
- 4 Reflux Temperatures** – Changes in ambient conditions can lead to inaccuracies that impact product quality and potentially energy use. Sensor matching and sensor drift alerts ensure reliable and accurate measurements.
- 5 Component Stream Flow Measurements** – Hydrocarbon compositions will vary due to a number of factors. Accurate mass flow measurements are needed to ensure quality of refined products as well as prevent over refining, creating excess energy costs and reduced throughput.

Supporting Instruments



Differential Pressure Diaphragm Seal

- Unique compensation capillary method to help balance the volume and temperature of the fill fluids between high- and low-pressure side capillaries.
- Avoid re-zeroing and manual check requirements, reducing maintenance OPEX costs.
- Stable measurement leads to increased column performance, improved production management, and improved profitability.
- Reduce the risk of column upset and flooding.
- Reduce possible process downtime, excess recycle, environmental contamination incidents, and safety compliance.



ROTAMASS Supreme Coriolis Flowmeter

- Unique “box-in-box” design and Smart Power Management provide superior reliability under harsh environmental and process conditions.
- Tube Health Check function for meter verification without disturbing process measurements.
- Changes in fluid composition and fluid properties do not affect accuracy.
- No flow conditioning or straight runs required.
- Multiple variables (Q, Density, T) available in one device.
- Measures liquids, gases, or liquid-solid mixtures.
- No moving parts – Low cost of ownership, meter stability.



YTA Temperature Transmitter

- Rugged Construction with dual compartment housing increases transmitter life in harsh environments.
- SIL certification reduces the number of required transmitters in safety applications.
- Sensor Matching feature and custom Thermocouple tables improve measurement accuracy for best distillation performance.
- RTD and TC sensor diagnostics enable predictive maintenance and easy troubleshooting to reduce or eliminate unplanned downtime.

OpreX™ Yokogawa achieves operational excellence by providing products, services, and solutions based on the OpreX comprehensive brand that cover everything from business management to operations.

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YOKOGAWA ELECTRIC CORPORATION
World Headquarters
9-32, Nakacho 2-chome, Musashino-shi, Tokyo 180-8750, JAPAN

<http://www.yokogawa.com>



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