Critical Data. Real Time.

Fractionation

Introduction

Fractionation is the most widespread method for separating a hydrocarbon stream into its various components, which can then be sold to chemical plants, refineries and other industrial facilities. The quality of the hydrocarbons produced is highly influenced by the level of process control available to the unit operators and engineers.

Process Control: How Fast is Fast?

Process control is maximized with information. How quickly can you know what is happening in your process? What can happen in your process?

A fractionation tower operates best when the optimum temperature is reached. This vaporizes most completely every component that is not desired in the bottoms, and maximizes the concentration in the bottoms stream of all desired hydrocarbons. If your tower is not at the right temperature, you will still have unwanted hydrocarbons in your bottoms stream. For example, a de-ethanizer is tasked with removing as much ethane as possible from a liquid stream. The boiling point of ethane is -88.6 degC. It is normally a gas, but a hydrocarbon stream is not just ethane so you cannot operate at that temperature. It is a wide mix of hydrocarbons that all affect the optimum operating temperature of the fractionation tower.

How do you remove the ethane? The right temperature must be maintained to promote as much vaporization of the ethane into the overheads stream as possible. How do you know the right temperature? The composition of the overheads and the bottoms needs to be analyzed. By analyzing the composition of the two outlets of the tower, you can determine how effective your temperature profile is. Make a change in temperature, then evaluate the effectiveness of your change. Is there more or less ethane in the bottoms product after your change? The faster you can perform the analysis, the closer your operating temperature will get to optimal.

Solutions

Fast analysis of your inlet, overheads and bottoms stream is the solution to process control. The faster you can see a change, the tighter control you will have over your process. Impediments to tight control can include slow response time on your process analysis, the thermal mass of your tower and reactants affecting temperature changes, as well as unstable flow rates.

Fast process control due to real time analysis can also decrease plant upsets as well. The less time between analyses, the faster you will be alerted to swings and disruptions.

What's the Bottom Line?

What does tighter process control give you? Why do we want to optimize our separations? Product quality. The tighter our process control, the higher quality product we produce. This makes the plant more money, and also protects the plant. The JP3 Verax analyzer provides such real-time analyses for all gas and liquid hydrocarbon streams in a fractionation plant.

The bottom line is that a higher quality product is worth more money. Blending operations such as ethane/propane blending depend on the ethane and propane having a certain purity level to diminish off specification blending due to undetected impurities. Know what you are paying for, and your blend will be of higher quality as well.

Fractionation towers do not like to see impurities on the inlet. That means the previous tower has to do its job well. Too many impurities throw the tower into upset. Avoid that by improving the control of your towers, separators and stabilizers.

Verax 75M (shown with one probe set)

Results…fast!

What is your uptime? How often are you actually analyzing a hydrocarbon stream? If you are blind for 5 minutes or more between analyses, you can easily miss a process excursion. The Verax 75 typically operates with a 30 second response time per stream, with some variability based on your specific application.

Maintenance

The Verax 75 eliminates all sample conditioning, vaporization and recovery systems by using a probe set directly into your process stream. 80-90% of all analyzer failures are sample system related. Remove the sample system, vaporizer and sample lines and your maintenance burden in terms of time and money drops significantly. Eliminate cold spots in sample lines by eliminating the sample lines. Eliminate plugged filters and malfunctioning pumps by eliminating the filters and pumps.

Summary

The JP3 Verax is a quantum leap forward in both principle and application. Removing as many variables as possible from the analysis equation results in a solution that delivers more actionable information faster to the customer. Safety is also enhanced, as no corrosive, hazardous or combustible gases are transported to an enclosure or analyzer house. The bottom line also benefits from low to no maintenance costs and negligible infrastructure and utility costs.

SPECIFICATIONS	
Fluid Streams (Max 8 per Analyzer)	Type: natural gas, NGLs, LPG, condensate, crude oil; Phase: liquid or gas
Composition & Property Analyses	C1-C6+ Mol% ±0.5% repeatability ; RVP & TVP ±0.5 psi ; API Gravity or BTU ±0.5% repeatability
Moisture(H2O)	>1%
Carbondioxide (CO2)	>1%
Sample System	None
Calibration Gas	None
Verification Fluid	Varies by application
Line Pressure	0-1500 psig
Line Temperature	-10°to 150°F
Line Flow Rate	1.0 gpm minimum; no maximum
Response Time	10-30 seconds per analysis point
Detection Method	NIR spectroscopy with inline optical probes
ELECTRICAL	
Input Power	3.5A @ 24VDC standard; 100-240 VAC optional
Communications	TCP/IP, MODBUS TCP and Serial (others available upon request)
Outputs	8 solid state relays for process control; 2 analog 4-20 mA /0-10 VDC outputs standard; configurable alarms/controls
PHYSICAL	
Enclosures	NEMA 4X IP 67 powder coated aluminum
Dimensions	Top Control Panel: 24”W x 30”H x 10”D; Bottom Control Panel: 24”W x 24”H x 10”D
Weight	Combined Top & Bottom Control Panels:90 lbs.; Probe Assembly: 5 lbs.
Ambient	-20°to 50°C (-4°to 122°F). No environmental control required; sunshade required if >90°F
Classification	Control Panel with Z-Purge: Class 1 Div2; Control Panel without Purge: General Purpose; Probe Assembly: Intrinsically Safe /Class 1 Div1

4109 Todd Lane, Suite 200
Austin, Texas 78744
www.jp3measurement.com

For more information:
512.537.8450
sales@jp3measurement.com

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