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Application Note

HYGROPHIL F 5673

Process Trace Moisture Analyzer for
Naphtha and Hydrogen Feed for Isomerization

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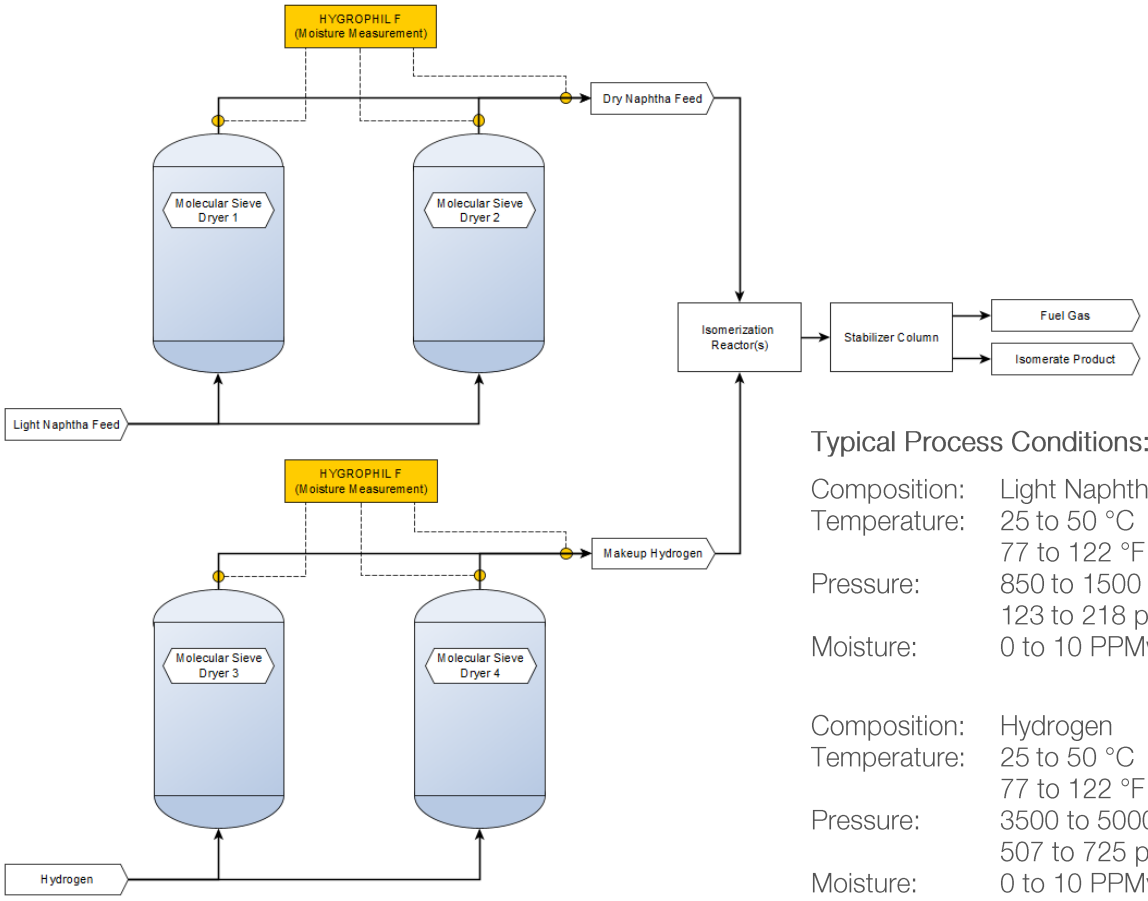
APPLICATION NOTE

Protect your catalyst and safe energy with an reliable process trace moisture analyzer.

Isomerization is the process in which light straight chain paraffin's of low RON (research octane number) are transformed with catalyst into branched chains with the same carbon number but a high octane number.
The Pentane/Hexane isomerization processes increase the octane of light gasoline.

The moisture measurement in this application is typically installed after the dehydration units. The light naphtha feed consisting of Hexanes and Propane must be dried down to approx. 5 PPM. The hydrogen makup gas also requires a dehydration to approx. 5 PPM
It is a typical drier application with two or more dehydration vessels per stream.

The C5/C6 light naphtha feed and the makeup-gas must be dehydrated because water is a poison to the catalyst and shorten its lifetime.



Typical Process Conditions:

Composition:	Light Naphtha
Temperature:	25 to 50 °C 77 to 122 °F
Pressure:	850 to 1500 kPa_g 123 to 218 psig
Moisture:	0 to 10 PPMw

Composition:	Hydrogen
Temperature:	25 to 50 °C 77 to 122 °F
Pressure:	3500 to 5000 kPa_g 507 to 725 psig
Moisture:	0 to 10 PPMv

Figure 1: Schematic of a simplified Feed Dryer Setup for Isomerization

The dried Naphtha and Hydrogen Makeup are combined, heated and sent to the reactors. Usually there are two reactors in series where the C5 is converted to isopentanes and C6 to dimethyl butanes. The reactor effluent is sent to the product stabilizers. The isomerate is then sent to the gasoline blending system.

Monitoring of the moisture after the dehydration helps to protect the catalyst. Process optimization for energy saving is possible when the regeneration cycle is on a need basis instead of fixed regeneration cycles.

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The BARTEC BENKE HYGROPHIL F is a multi channel trace moisture analyzer with a extremely robust but accurate moisture sensor. The sensor calibration is optionally validated by an independent and accredited laboratory. Inline or at-line installations are possible with sensor retraction armature or customized sample conditioning systems.

The HYGROPHIL F is designed for the needs of the oil, gas and chemical industry.

The core element of the moisture sensor is an optical thin film element made of silicon dioxide and zirconium dioxide. The microporous stack of alternating high and low refracting optical layers is forming a Fabry-Pérot Interferometer with a distinctive and reliably detectable reflection minimum in the spectral range around 820 nm.
Selective to water, molecules can diffuse into the porous Fabry-Pérot element, which then performs a shift of the reflection minimum in proportion to the actual water vapour pressure. The spectral shift is detected and evaluated with a compact high-resolution polychromator, which is located in the evaluation unit together with the light emitting diode. The interconnecting fiber optic cable can be up to 800 m long because of the detection of an optical minimum instead of an intensity change.

The evaluation unit processes and calculates the present dew point temperature as well as other units such as water vapour pressure, parts per million, mg/m³ and further more. Several analog outputs, MODBUS, PROFIBUS RTU and via TCP/IP as well as relay contacts are equipped as standard for interconnection to the control system.

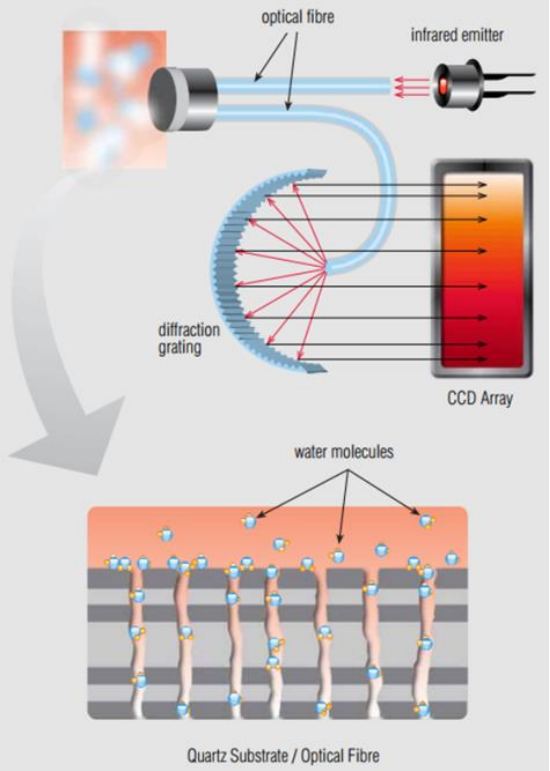

Figure 2: Schematic of the Measurement Principle

Thousands of installations worldwide prove the advantages of this measurement principle:

- Robust sensor construction for outstanding long-term stability
- Sensor validation at process conditions by accredited and independent laboratory on request
- Easy sensor cleaning and almost no maintenance required
- In-line installation with sensor retraction armature possible (fast response and emission-free)
- Flexible on-line solutions with customized sample conditioning systems
- Certified for safe operation in hazardous area (ATEX, IECEx, CSA, TR CU)

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