High Sensitivity Monitoring System for Concentration Measurements in Industrial Gas, Natural Gas and Biogas
**Hilase - Quality Control Instrument**

The Hilase is a reliable and virtually maintenance free Process Analyser for the measurement of H$_2$S, H$_2$O, CO$_2$, CH$_4$, C$_2$H$_6$, COS, Ammonia, etc in a range from low ppm to high % levels.

Reliable H$_2$S, H$_2$O and CO$_2$ measurements are critical in many industries to control gas treatment, protect process equipment and pipelines and supply a good quality gas to your customers.

The Hilase is a big step forward as it offers a combination of features not available with any other technology. No moving parts, no costly parts subject to wear, full separation of photo acoustic measuring cell and electronics, heated cell option, fast 30 seconds response time, stable calibration, more then 90% self diagnostics, robust design, easy installation, a 6 months maintenance interval, ATEX zone 1 certification and >99.8% availability.

In contaminated gas streams the photo acoustic cell is far less sensitive to fouling than an optical detection method.

Where you need to protect your and your customer’s installation against H$_2$S, H$_2$O, CO$_2$, etc you can rely on the Hilase in combination with Hobré Instruments’ proven sampling system designs.

**Technology**

The analysis is based on photo acoustic technology, whereby the different compounds are excited by Tuneable Diode Laser (TDL) and detected by a microphone. The TDL wavelength is tuned to the absorption line of the measured component and its background.

This technology utilizes all the benefits of high resolution and thus very specific, virtually interference free excitation of TDL, combined with a robust photo acoustic detection principle. By modulating the laser with a frequency equal to the resonance frequency of the acoustic cell, a sound signal is generated. This sound signal is measured by a sensitive microphone and provides a linear response over a wide concentration range.

As the Hilase does not use optical detection, the analysis is insensitive to contamination or fouling.

The 6 months maintenance interval in combination with a 1.5 hour warm-up time the analyzer provides a high availability. The >90% self diagnostics results in improved reliability. Multiple photo acoustic cells and/or dual lasers in a single analyser allow simultaneous analysis of different components (e.g. H$_2$S; H$_2$O; CO$_2$; CH$_4$ etc.) and multi-stream monitoring (e.g. before and after separators).

**Typical Hilase Applications**

- H$_2$S monitoring before and after scavenger dosing
- H$_2$S in Crude Oil
- H$_2$S levels in head space of storage tanks
- H$_2$S and H$_2$O in Natural Gases and LPG’s
- H$_2$S in production and test separators
- H$_2$S and H$_2$O in recycle gas
- H$_2$S and CO$_2$ in (amine) absorbers
- H$_2$S in Refinery fuel and flare gases
Operation, Service and Maintenance

This robust analyser is suitable for outdoor installation in a harsh industrial environment where minimal maintenance and minimal operator interventions are required. The stable calibration factors require only a single point calibration verification every 6-12 months. A calibration verification for H₂S is performed on only one span gas that can be different from the gas to be measured (e.g., CH₄). The analyser does not have moving parts nor require consumables. The photo acoustic cell is completely separated from the electronics; this means the unit does not have to be switched off during maintenance and a hot work permit is not required to access the intrinsic safe photo acoustic cell(s). The photo acoustic cell can be heated-up to 80°C, allowing wet gas analysis without cooling and/or separation. The Hilase analyser is designed and proven to have the lowest possible costs of ownership. This is possible by not having moving parts; low installation costs; no other utilities then power; 6-12 months maintenance interval and >10 years laser lifetime.

HSE Aspects

The low sample flow (0.1 - 0.5 l/min) and photo acoustic cell pressure (atmospheric or 1.5 barg) allow venting to flare to avoid venting of greenhouse or toxic gases to the atmosphere.

Liquid Applications

The Hilase technology is suitable for gas phase measurements. For measurement in a liquid stream, a stripping system in combination with the Hilase analyzer is required. The design of a stripping system is application dependent. Stripping systems can be supplied for crude oil, glycol, water and others applications.

Sampling Systems for H₂S and H₂O Analysis

H₂S and H₂O are reactive components often present in low ppm levels. The value of the analyser results only in a benefit when it is used with a well designed sample conditioning system. Hobré Instruments has over 30 years experience in the design and supply of such systems. Our designs are application specific based on the gas composition and phase diagrams of the process fluids. Process Upset conditions will be considered in our designs.

Typical Gas Analysis Systems can Include:

- Diagnostics of critical functions, automatic system validation and/or calibration
- Proprietary Multiphobic membrane filtration resulting in long maintenance interval and lowest level of liquid carry over.
- Flow Impact Probe for representative sampling, fast response time and minimum liquid carry over.

For those applications we can turn your application challenges into a working solution.
## Features and Benefits Hilase Analyser

<table>
<thead>
<tr>
<th>Features</th>
<th>Benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Repeatability ($H_2S$) ± 0.3 ppm or 1% of reading (whichever is greater) over multiple decades</td>
<td>Very wide dynamic range. No new calibration required for range change</td>
</tr>
<tr>
<td>High resolution excitation by Tuneable Diode Laser (TDL)</td>
<td>Very selective and accurate analysis. Relative in-sensitive to interference by other components. By tuning the laser on/off the peak, continuous background correction is performed.</td>
</tr>
<tr>
<td>Acoustic detection system</td>
<td>Virtually insensitive to window fouling. Reduced maintenance and increased availability.</td>
</tr>
<tr>
<td>Multiple flow cells possible in one analyser</td>
<td>Simultaneous Multiple Stream analysis without stream switching. Space and cost saving.</td>
</tr>
<tr>
<td>Horizontal mounted photo acoustic cell</td>
<td>Less risk of contaminate deposit on windows in case of liquid carry-over.</td>
</tr>
<tr>
<td>Up to three different lasers possible in one analyser</td>
<td>Simultaneous Multiple Component analysis e.g. $H_2S$, $H_2O$ and $CO_2$ analysis in natural gas. Space and cost saving.</td>
</tr>
<tr>
<td>No moving parts</td>
<td>Virtually maintenance free. Maintenance intervals &gt; 6 months.</td>
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<tr>
<td>EExd enclosure; suitable for zone 1</td>
<td>Low installation cost. No need for purge gases.</td>
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<tr>
<td>Optional high temperature cell (80ºC)</td>
<td>Suitable for direct analysis of wet gas.</td>
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<tr>
<td>Suitable to operate at 1.5 barg with low flow (0.1 – 0.5 l/min) through photo acoustic cell</td>
<td>Venting to flare possible.</td>
</tr>
<tr>
<td>Virtually drift free technology</td>
<td>Yearly calibration verification is sufficient.</td>
</tr>
<tr>
<td>Continuous matrix correction for low level (0-100 ppm) $H_2S$ measurement</td>
<td>No risk of valve leakage, no scrubber required. Reliable alarm during process upsets.</td>
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<tr>
<td>Fast start-up after cold start (90 minutes)</td>
<td>High analyser availability.</td>
</tr>
<tr>
<td>Different outputs: 4 - 20 mA; PC interface; Modbus; Common Fault Alarm</td>
<td>Very flexible, simple interfacing.</td>
</tr>
<tr>
<td>Fast response time and user selectable moving average time</td>
<td>Fast response on concentration changes and increased accuracy. Average override if last value exceed user selectable limit.</td>
</tr>
<tr>
<td>Complete separation between sample wetted parts and electronics enclosure</td>
<td>Elimination risk of damage in case of gas carry-over. No hot work permit necessary for access to sample wetted parts.</td>
</tr>
<tr>
<td>&gt; 90% self diagnostics</td>
<td>High reliability.</td>
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# Specifications Hilase Analyser

## Measuring Principle
- **Excitation**: Tuneable Diode Laser (TDL)
- **Detection**: Photo acoustic

## Analytical Performance

<table>
<thead>
<tr>
<th>Compound</th>
<th>Measuring Range</th>
<th>Repeatability</th>
</tr>
</thead>
<tbody>
<tr>
<td>H&lt;SUB&gt;2&lt;/SUB&gt;S</td>
<td>Min 5.0 ppm Max 100%</td>
<td>± 0.3 ppm or ±1% of reading</td>
</tr>
<tr>
<td>H₂O</td>
<td>Min 0.1 ppm Max 100%</td>
<td>± 0.1 ppm or ±1% of reading</td>
</tr>
<tr>
<td>CH₄, C₂H₆, CO₂, Ammonia</td>
<td>Depends on application</td>
<td>±100 ppm or ±0.5% of reading</td>
</tr>
</tbody>
</table>

- **Response time**: ± 30 seconds <sup>3</sup> on step changes. Moving average over user adjustable period.
- **Number of process streams**: Up to 4
- **Number of Tunable Diode Lasers simultaneous**: Up to 3
- **Calibration**: On 1 span gas. Bi-annual verification recommended. Calibration can be performed by customer analyser technician. Traceable calibration certificate optional.

## Gas Handling
- **Connections**: 6 mm Hy-lok.
- **Wetted materials**: Stainless Steel 316. Other materials upon request.
- **Sample cell gas pressure**: 1.5 barg maximum.
- **Gas flow rate to photoacoustic cell**: 0.1 – 0.5 Nl/min.

## Area Classification
- **Exd enclosure**: ATEX II 2G IIB+H2 T3-T6 (T-rating application dependent).

## Communication
- **Analog outputs**: 2x 4-20 mA maximum
- **Digital data communications**: PC Interface; RS 232 / 422 / 485; Modbus RS485 RTU; Common Fault Alarm. Others upon request.

## Ambient Conditions & Utilities
- **Ambient temperature**: -20°C up to + 45 °C (others upon request).
- **Gas temperature**: Up to 50°C as a standard. Optional up to 80°C.
- **Power**: 100-240 VAC, 45-65Hz (1,9 A – 0,8 A).
- **Stabilisation time after cold start**: 90 minutes typically.

## Dimensions
- **Dimensions**: 60 x 70 x 40 cm (HxWxD).
- **Weight**: ± 100 kg.

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1) For other compounds consult Hobré Instruments. 2) For other ranges consult Hobré Instruments. 3) Application dependent

Note: Above are approximate specifications. Exact specifications will vary depending on application, installation and operating environment. Hobré Instruments bv reserves the right to change design or technical data without notice.
Hobré Instruments manufactures a range of analysers and systems for quality measurements in the gas and oil production. Natural gas systems include $H_2S$, $CO_2$, $H_2S$, Sulfur and full composition analysers. Other analyser technologies manufactured by Hobré Instruments BV are:
Fast responding Wobbe / Heating value analysers
Energy Dispersive XRF analysis for Sulphur and other elemental analysis from ppm to percent levels.
For applications in the oil and gas industry Hobré Instruments can offer complete solutions including technologies such as Process Gas Chromatographs, physical property analysers, oxygen, $H_2S$ / $SO_2$, ratio oil in water, water in oil, etc. Please consult us for your specific requirements. We have a long experience in supplying complete analyser solutions worldwide. Our Engineering and service team features a team of knowledgeable and experienced engineers that design and construct analysers, pre-conditioning systems, sample conditioning systems, sample recovery systems and complete analyser system packages for a broad range of gas and liquid applications.

We work in close relation and cooperation with the end user/contractor and analyser manufacturer to come to the best solution in compliance with the relevant standards and classifications. Our qualified and experienced service engineers support our customers around the world. With this group of well trained engineers we offer: corrective and preventive maintenance, start-ups, commissioning, site surveys, training, and Factory and Site Acceptance Testing for onshore or offshore analyser applications. A strategic level of spare parts is kept to support products delivered and to keep delivery times for spare parts and consumables as short as possible to minimise down time of your analysers.

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Hobré Services
- Feasibility study
- Front-end engineering, design, construction, testing and supply of Analyser Packages
- Project management
- Documentation
- Commissioning, SAT, start-up, and training
- Maintenance and repair
- Spare parts supply