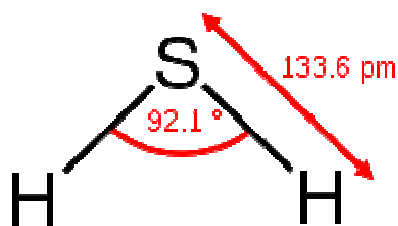


## BASE BA-H2SIC Online H2S In Crude Analyzer

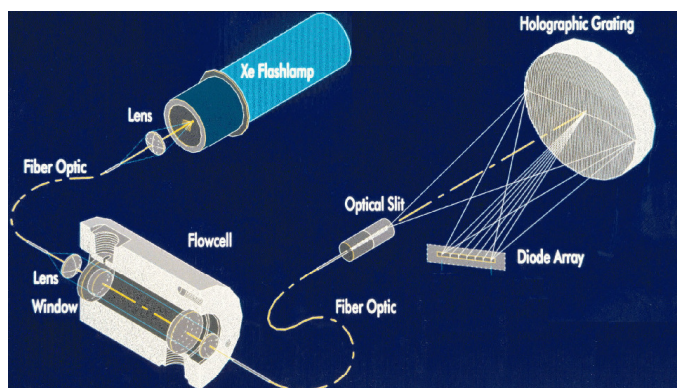


The BASE BA-H2SIC is part of the **BAGGI BASE®** Instrument Series. They are the result of combining the latest state-of-the-art-technology with over 50 years of industry experience.

The BA-H2SIC is an online analyzer for continuous, reliable and accurate measurement of the concentration of *Hydrogen sulphide* (H<sub>2</sub>S) in crude oil. It is available for operation in an explosive atmosphere (**ATEX**) environment. The sample stream is fed into a heated tube, filled internally with Rasching rings, that operates like a distillation column. The volatile components of the crude flows at the top of the column and are separated from the liquid phase. This

gaseous phase may contain, in addition to H<sub>2</sub>S, numerous other compounds such as mercaptans or aromatics. According to the application, the analysis of the gaseous phase is accomplished by an Ultraviolet Spectrophotometry analyzer (when the main component is H<sub>2</sub>S) or by a Gas Chromatograph (when many compounds are present). Both techniques allows great precision in the measurement.

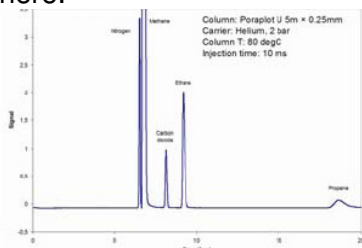
Accurate measurement of H<sub>2</sub>S is critical during the refining and processing of fuels and oils. For environmental reasons, and for its effect on quality, H<sub>2</sub>S content in hydrocarbons is rigorously controlled by both national and international regulations. In addition, maximum levels for sulfur content in fuels continue to be made even stricter, thus analytical instrumentation today plays an even more important role than ever before.



In *Spectrophotometry*, the measurement technique relies on the Beer-Lambert law. This one is a relationship that relates the absorption of electromagnetic waves energy to the properties of the material through which the waves are travelling. The material is introduced in a sample cell of specific optical path length. The UV energy is transmitted to the cell via an optical fiber cable, it passes through the cell space and the residual energy is transmitted to the measuring sensor by a second optical fiber. The lamp emits broadband energy in the Visible and Ultraviolet spectrum: this energy traverses the measurement cell, where the

gas sample is flowing. The energy that has not been absorbed is split by the holographic grating into narrow band streams, each one of them detected by a dedicated photodiode. The wavelengths corresponding to the maximum absorption are typical of each analyte. The amount of the absorbed energy is a known function of the analyte(s) concentration. Please refer to the diagram above.

In the well-known *Gas chromatography* technique, the gaseous compounds being analyzed interact with the walls of a column, which is coated with different stationary phases. This causes each compound to elute at a different time, known as the retention time of the compound. The comparison of retention times is what gives GC its analytical usefulness. A typical diagram showing the different elution times is given here.



The BA-H2SIC uses a micro chip technology Gas Chromatograph Analyzer, for fast and reliable gas analysis. It is designed for ease of use, reduced maintenance and low gas consumption in on-line applications. It is specially built for installation in areas with an explosive atmosphere.

The micro chip technology allows to create low cost Gas Chromatograph components (valves, injector, detector, column, flow system, heating, flow diagnostics) with low internal volume and low thermal mass. These micro

chip components are integrated in such a way that capillary connecting tubes are avoided and virtual zero dead volume connections are created.

The BASE® Series embedded computer is the heart of the system.

The computer collects the signals from the sensors and is in charge of:

- Controlling the measurement process (either UV spectrophotometry or GC analysis)
- Calculating the H2S concentration from the signals received by the sensors
- Transmitting the concentration value over 4...20 analog mA signals
- Actuating the output relays for indicating possible alarms
- Displaying the measurement data in a Graphical User Interface (GUI)
- Archiving the measurement data in Microsoft Office compatible format
- Interfacing the human operator for system configuration and alarm reporting

This figure shows the computer display together with the six functional keys.

As outlined, the BA-H2SIC is a complete solution built to operate in a potentially explosive atmosphere, due to the possible presence of gas. The ATEX protection is achieved by the pressurized enclosure method.

That is, all the devices that could be ignition sources are isolated within a pressurized enclosure filled with a protective gas (air or nitrogen).

The electrical signals and power are interconnected externally by means of appropriate junction boxes.

The related marking is typically the following:

**II 3 G Ex pz IIB T3 IP66**



The picture illustrates an AISI.316 stainless steel cabinet.

The window allows to visually check the BASE computer display.

Inlets and vents are provided for the nitrogen and the instrument air supply used to pressurize for ATEX protection.

Externally, on the right side are mounted:

- the air conditioner (optional) to keep the internal temperature at 20 °C
- the protective pressure indicator
- the junction box

The cabinet hosts the complete sampling system, the spectrophotometer or the gas chromatograph and the embedded computer.



The BAH2SIC offers the following main advantages:

- No lead waste disposal problems (in comparison with the lead acetate tape method)
- No radioactive license required (in comparison with the X-ray transmission method)
- Very accurate measurements down to 1 ppm (Part Per Million)
- Low maintenance: the Xenon flash lamp (UV source) features a guaranteed lifetime of 10<sup>9</sup> flashes
- Ease of use: the diagnostics are performed automatically by the BASE® computer and the operation is driven by a menu based graphical interface
- Remote diagnostics and remote operation capabilities
- The sample conditioning system can be designed according to Customer's requirements

Specifications	
<b>Measurement method</b>	Choice between Ultra Violet Spectroscopy and Gas Chromatography
<b>Range</b>	According to the model A typical range is from 0 to 100 ppm
<b>Accuracy - instrument</b>	+/- 1% Full Scale
<b>Accuracy - overall</b>	Function of the sample representativeness and of instrument calibration; optimized by BAGGI either by in-field survey or by sample laboratory analysis
<b>Response time</b>	Analysis in seconds
<b>GC detector</b>	Thermal Conductivity Detector (TCD) Other options (PID, FID) available upon request.
<b>GC carrier gas</b>	All four major carrier gasses: helium, hydrogen, nitrogen and argon
<b>Optical cell material</b>	316L Stainless Steel (Hastelloy upon request)
<b>Power</b>	100 – 240 VAC
<b>Analog outputs (4...20 mA)</b>	- H2S concentration (other outputs available upon request)
<b>Digital (relay) outputs</b>	- Fault - Operation - Enclosure pressure alarm - Enclosure temperature alarm - Lamp replacement (spectrophotometer)
<b>Additional input/output (activated according to the software packages installed)</b>	- Analog input: four inputs filtered with transient protection - Analog output: two isolated outputs, 4 – 20 mA (standard) - Analog output: three additional isolated outputs (optional) - Digital input: six digital inputs (optional) - Digital output: four additional relay signals (optional) - Serial line: RS-232/RS-422/RS-485 with Modbus/Profibus/FieldbusFoundationProtocol - Ethernet card: two 10/100 mbps with RJ-45 port - One integrated WiFi card 11 Mbit/s
<b>Services required</b>	- Instrument air (enclosure purging) - Nitrogen (enclosure purging)
<b>Environmental conditions</b>	From - 25 °C to +50 °C
<b>Enclosure protection</b>	IP66
<b>Compliances</b>	- EN 61326, EN 61010-1 - ATEX II 3 G Ex pz IIB T3

All the specifications subject to change without notice

For specific requirements, please contact the e-mail address below:

[baggi@baggi.com](mailto:baggi@baggi.com)

or visit the site:

<http://sensevolution.baggi.com>

