



TOTAL DISSOLVEDSULPHIDE IN WATER ANALYSER H₂S, HS⁻ WATERSULF™ SERIES

TYPICAL APPLICATIONS

- Amines in water
- Salty water
- Other water applications
- Water condensates
- Geothermal steams

SPECIAL FEATURES

- In situ or extractive measurement
- Low detection limit
- True T.D.S. measurement
- Long life sensor
- Low maintenance
- Short response time
- Direct reading in mg/l or PPM/W
- Interference free

OPERATING PRINCIPLE

The WATERSULF™ Series analyser is dedicated to the measurement of dissolved sulphides in water up to pH 8.5.

- The concentration of Sulphides in water depends on the sample pH.
- Between 0 and 6 the H₂S is at the maximum concentration.
- Between 6 and 8.5 the H₂S concentration decreases.
- Between 8.5 and 11 no H₂S is present in the water.
- Above 11 S²⁻ concentration increases.
- Between 4 and 8.5 the HS⁻ increases.
- Between 8.5 and 11.5 the HS⁻ is at the maximum concentration.
- Above 11.5 the HS⁻ concentration decreases.
- At neutral pH (7) only H₂S and HS⁻ are present.

The measurement principle is based on a variation of HENRY's law : the weight of any gas dissolved in a definite volume of liquid is proportional to the partial pressure the gas exerts above the liquid at a constant temperature.

The WATERSULF™ analyser incorporates :

- an electrochemical sensor for sulphide (H₂S)
- a pH sensor (For calculation)
- a temperature sensor (For calculation)
- a pressure sensor (For alarm only)

The sensors are connected to microprocessed electronics, which deliver a true concentration of T.D.S. calculated in relationship with the pH and temperature.

HOW IT WORKS

The H₂S sensor is immersed in the water. The sensor is equipped with a propriarity membrane. Due to the partial pressure effect, the membrane is only pervious to gases. No liquids, ions or solids can penetrate the sensing part.

The sensor contains a buffer solution with a redox catalyst and 3 electrodes. A defined polarization voltage is applied to the electrodes in order to give a well defined concentration ratio of the oxidized/reduced redox catalyst. The H₂S reacts, first chemically in presence of the redox catalyst to form a reaction product. Then, the electrochemical oxidation of the reaction product takes place at the measuring electrode.

Due to the polarization voltage effect, the system can adjust the concentration ratio. The resulting current is proportional to the dissolved molecular amount of H₂S present in the sample.

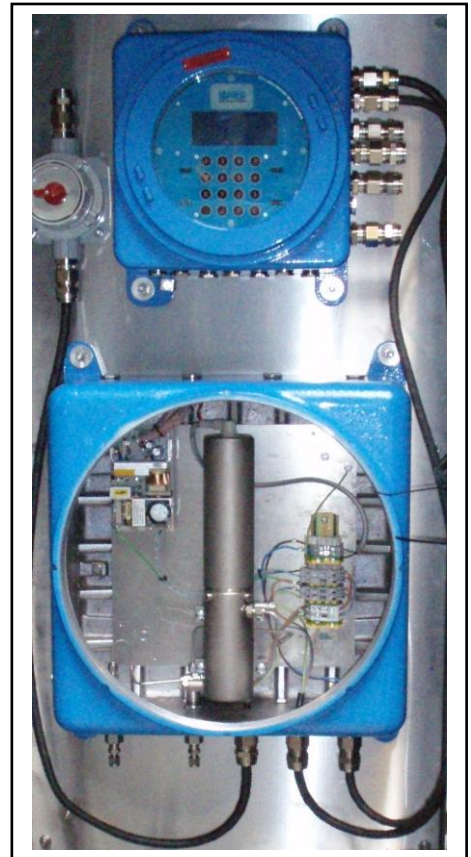
The pH pressure and temperature sensors are also immersed in the water and deliver signals to the electronic module, which calculates the H₂S + HS⁻ concentration on a real time basis.

AVAILABLE MODELS

- | | |
|-------------------|---|
| ⇒ WATERSULF™ 1000 | Panel Mounting, Safe area installation. |
| ⇒ WATERSULF™ 3000 | Ex proof Probe, ATEX certified for hazardous area installation.
Electronic module 19" rack safe area installation. |
| ⇒ WATERSULF™ 4000 | Probe and electronic module, Ex proof ATEX certified for hazardous area installation. |
| ⇒ WATERSULF™ 5000 | Portable battery powered system, safe area installation. |

OPTIONS

- ◆ MODBUS protocol
- ◆ Remote control via Ethernet
- ◆ Sampling system
- ◆ Calibration system
- ◆ Standing frame
- ◆ For other options, consult factory



STANDARD SPECIFICATIONS

Measuring principle	:	Henry's Law. Detection of H ₂ S / Sulphides using an electrochemical cell in relationship with pH and temperature.
Measuring ranges	:	0.01-3 or 0.05-10 or 0.5-50 mg/l (<i>to be stated</i>). Other ranges, consult factory.
Range unit	:	Mg/l or PPM by weight (<i>to be stated</i> .)
Detection limit	:	0.01 mg/l approx.
Response time	:	Less than 5s full scale (sample system excluded).
Resolution	:	1µg/l (<i>depending on the range</i> .)
Linearity	:	± 2% of the calibration full scale.
Reproducibility	:	± 1% of the calibration full scale.
Accuracy	:	± 2% of the instant value.
Cross sensitivity	:	None for the following components (% vol) : - CO ₂ max 25.38 - H ₂ max 0.544 - CH ₄ max 5.78 - NH ₃ max 1000 PPM - CO max 92 PPM - CS ₂ max 5 - Organic solvents max 20 - Acetic acid max 1 mole/l - Salt - HCN Yes for SO ₂ 100 PPM equal 1 PPM H ₂ S.
pH range	:	0 – 8.5 (<i>above on request</i>)
Temperature	:	0 – 30°C (<i>above on request</i>)
Pressure	:	0 – 10 barg (<i>above on request</i>)
Area classification	:	General purpose for WATERSULF™ 1000 and 5000 Ex II 2G / Eexd II CT 6 ATEX certified. For –20°C up to +40°C for WATERSULF™ 3000 and 4000.
Distance between probe and electronics	:	1500m
RFI protection	:	I.E.C. 8013 Level 3
Sizes / Weights	:	Depending on the model. Refer to related schematics.

A – Detection probe module, equipped with 4 sensors


1. - H₂S / Sulphides : Principle : Electrochemical (Amperometric) Resolution : Less than ± 0.1% Response time : Less than 1s Accuracy : ± 2% of the instant value Temperature range : 0 - +30°C Bursting pressure : 10 barg max. pH range : 0 – 8.5 (<i>above on request</i>) Shaft material : Titanium Sensitive tip : Glass Polarization : Built in electronic board Sensor life : 9 – 12 months (<i>depending on the application</i>)		3. - Pressure Principle : Piezo resistive Measuring range : 0 – 10 barg Bursting pressure : 15 barg Response time : 150 ms Repeatability : ± 0.1% of full scale Hysteresis : ± 0.1% of full scale Accuracy : ± 0.1% on –5° up o +35°C Temperature compensation : Yes on given range Housing material : Stainless steel Sensor life : 24–36 months (<i>depending on the application</i>)	
2. - pH Principle : Single rod electrode Measuring range : 0- 9 pH Accuracy : 0.05 pH Response time : Approx. 1s Bursting pressure : 15 barg. Shaft material : Transparent plastic Thread material : Stainless steel or titanium (<i>on request</i>) Sensor life : 12–24 months (<i>depending on the application</i>)		4. - Temperature Principle : 4 wire technique platinum resistor (Pt 100) Measuring range : -2 up to +30°C Response time : Approx. 1s Repeatability : ± 0.001°C Accuracy : ± 0.01°C Bursting pressure : 15 barg. Material : Platinum, ceramic, titanium Sensor life : 24–36 months (<i>depending on the application</i>)	

Probe power supply	:	15VDC 35mA from the electronic module (galvanically isolated)
Probe electronics	:	One PCB including : DC – DC converter - RS 232 driver Micro controller - 4 channel 20 bit ADC Temperature bridge - Pressure amplifier H ₂ S amplifier - pH amplifier One PCB for single core transmission cable (FSK module)
Output signal	:	RS 232 1200 Baud/s galvanically isolated
Connector	:	Water proof.
Probe diameter	:	48 mm
Length	:	440 mm
Connections	:	2 ½" threads or flanges (<i>to be stated</i>) for general purpose in situ probe. ¼" NPT Female for ATEX version with Ex proof box and sample chamber.

B – Electronic Module

Power supply	:	85 – 265 VAC 47 / 444 Hz 12VDC for Model WATERSULF™ 5000
Display	:	LCD alphanumeric. H ₂ S/ HS ⁻ /, pH, T, P are displayed
Keyboard	:	16 Keys, TOUCHSENSE™ type
Process alarm	:	1 programmable with built in keyboard. Potential free relay contacts 3A 220V in N.O. or N.C. (<i>to be stated</i>). Relay coil normally de-energised or energised (<i>to be stated</i>).
Fail alarm	:	1 potential free relay contacts 3A 220V in N.O. or N.C. (<i>to be stated</i>). Relay coil normally energised (as Standard)
Analog outputs	:	4-20 mA self powered, isolated, 600 ohms max. loop load (4 outputs available).
Digital output	:	RS 232 / 485.
Remote communication	:	ETHERNET

In our continuing research and development, we reserve the right to make any model revisions and specification changes without prior notice.

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