TECHNICAL SPECIFICATIONS

Gas Detection

TS DATA SHEETS

- GD -

Continuing development sometimes necessitates specification changes without notice

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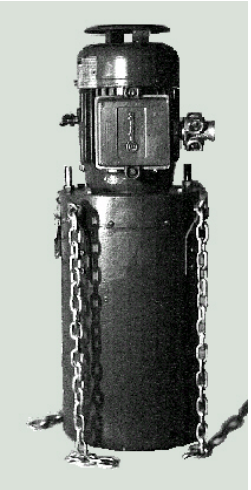
MUD DEGASSER

(gas trap)



Mechanical working mud degasser with accessoires For gas analysis instruments

- **Mud degasser with external condensation trap and gas drying**
- **Constant volume degasser**
- **Gas line with internal condensation trap and "gas mouse" for taking gas samples for laboratory analysis**
- **Gases necessary to supply the gas analysis instruments (hydrogen and compressed air)**

- Continuously working gas trap for degassing of drilling mud
- Optimal degassing due to extension of the mud surface
- Independent from different heights of the mud surface

Principle of operation

The gas trap is a standard element for gas monitoring. The gas which is solved in the mud is continuously released by whirling up with an electrical impeller and the related extension of the mud surface. The released gas is cleaned by condensation traps, checked for toxic gases (H_2S and then drawn to the different gas measurement devices (one or more) inside the unit.

Maintenance

Check several times per shift degasser level in mud flow; check once per shift gas line air tightness, condensation separator (fluid levels of bottles) and moisture indication; during each trip or once a week purge moisture from gas line, clean degasser tank interior, inspect agitator (impeller) for wear and check transit time.

Equipment

The degasser equipment includes:
Degasser with motor protection switch and mounting frame. Gas cleaning equipment, gas line, gas supply for measurement devices (H_2), moisture indicator, optional hydrogen sulphide detector, optional gas sampling equipment for external analysis.

Technical Specifications

		Mud degasser
▪ **Type or model**		Induction motor with motor protection switch (0,89 A)
▪ **Certified for hazardous areas**		EEX e II T1-T4
▪ **Certificate of conformity**		PTB Nr. Ex-95.D.3601
▪ **Supply voltage**		380 V ... 420 V AC / 50 Hz / 250 W (also 60 Hz are possible)
▪ **Weight**	**Degasser**	15 kg
	Mounting frame	10 kg
▪ **Size**	**Degasser**	H = 600 mm Ø = 190 mm
	Mounting frame	H 600 x B 500 x L 700 mm
▪ **Installation point**		As near as possible to the bell nipple; in case of open mud circulation as near as possible to the borehole.

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HYDROGEN GENERATOR

Hydrogen Gas Source for Gas Detection and Analysis Equipment

A hydrogen generator with all the advantages of an independent hydrogen supply for use with the gas chromatograph or total gas detection equipment.

- Developed as an alternative to the customary usage of hydrogen gas bottles, when a continuous supply of hydrogen at the well site is not possible
- Guaranteed highest possible operational safety standards
- Equipped with an automatic control system, which stops the generator immediately if a malfunction should occur
- The small contained voluime (< 50 cc) makes the hydrogen generator safe for operation in spaces where cylinder hydrogen is restricted

Principles of Operation

An electrolysis cell with a special membrane separates hydrogen and oxygen produced by water electrolysis.

Care and Maintenance

The hydrogen generator requires little or no maintenance
The operator must regularly control the operational status of the generator. The condition of the silica gel in the desiccation column must be controlled on a daily base.

De-ionised water should be added when required. The alarm system should be checked biannually.
If the hydrogen generator is not in use the user has to take care that the electrolysis cell is all the time wet and the storage temperature is > 0 °C.

Supplied Consumable Material

Drying or desiccating agent (silica gel) and de-ionised water.

Technical Data

	Hydrogen Generator
▪ **H_2- Operating pressure**	Max 7 bars
▪ **H_2- Volume of production**	100 ml/min
▪ **H_2- Internal hydrogen volume**	Maximum 50 cc
▪ **Electrolyte**	De-ionised water with a salinity of < 1 µScm at 20° C
▪ **Operational control**	Automatic
▪ **Operation temperature**	10 to 40 °C
▪ **Electrical supply**	230 V AC / 50/60 Hz / 70 VA
▪ **Weight**	16 Kg
▪ **Dimensions**	H 395 x W 220 x L 380 mm
▪ **Installation**	In the rack of the field laboratory or stand alone

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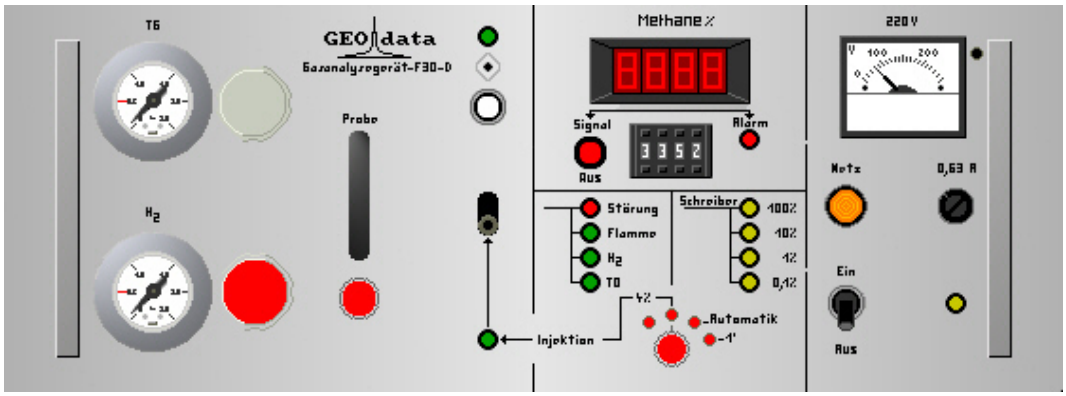
GAS CHROMATOGRAPH

(C_1 – nC_5)



Gas Chromatograph with Flame-Ionisation-Detector (FID) for continuous and selective detection of hydrocarbons (C_1 – nC_5) in drilling mud

Field proven 2 column chromatograph with high resolution and short analysis cycle. Designed for fast and reliable field evaluation of reservoirs and drilling monitoring.

- Automatic analysis of C_1 to nC_5 Hydrocarbons
- High stability and precision
- Connectable with internal and external alarms

Description

The FID-gas-chromatograph is the essential tool of the gas measurements during hydrocarbon exploration or production drilling. The FID-gas-chromatograph either can be used stand alone or connected with the Drilling Monitoring System (DMS software) of GEO-data. Sampling and selective analysis of C1 - nC5 hydrocarbons are automated. Internal and external alarms with individual limits can be activated.

Maintenance

Several times per shift check gas flow (5l/hr), H_2 pressure (value indicated on panel), pressure of carrier gas (value indicated on panel) and internal condensation trap; once per week or whenever required calibrate with test gas

Data recording

The powerful DMS software of GEO-data records, visualises and displays data on different locations at the well site. The DMS software allows fast interpretations like gas ratio diagrams in real time.
For the stand alone device the results will be put out on a chart recorder.

Technical specifications

	Chromatograph (FID)
▪ **Range of measure**	10 ppm – 100 %
▪ **Resolution**	0,001 % (10 ppm)
▪ **Detection limit**	10 ppm
▪ **Linearity**	the whole range (10 ppm – 100%)
▪ **Zero reset**	Automatically
▪ **Change of detection range**	Automatically
▪ **Control of function**	Automatically
▪ **Sample flow rate**	8 l/h (max. 20 l/h)
▪ **Consumption of H_2**	Approx. 3 l/h
▪ **Consumption of carrier gas**	Compressed air approx. 20 l/h
▪ **Signal output**	4 – 20 mA
▪ **Supply voltage**	240 V AC / 50 Hz / 70 VA
▪ **Weight**	15 kg
▪ **Size**	H 180 x B 480 x L 420 mm / 19“ x 4HE
▪ **Necessary accessories**	Air compressor with hoses, safe H_2 generator or H_2 gas bottle
▪ **Installation**	19“ plug-in unit in instrument rack; can also be employed as stand-alone device

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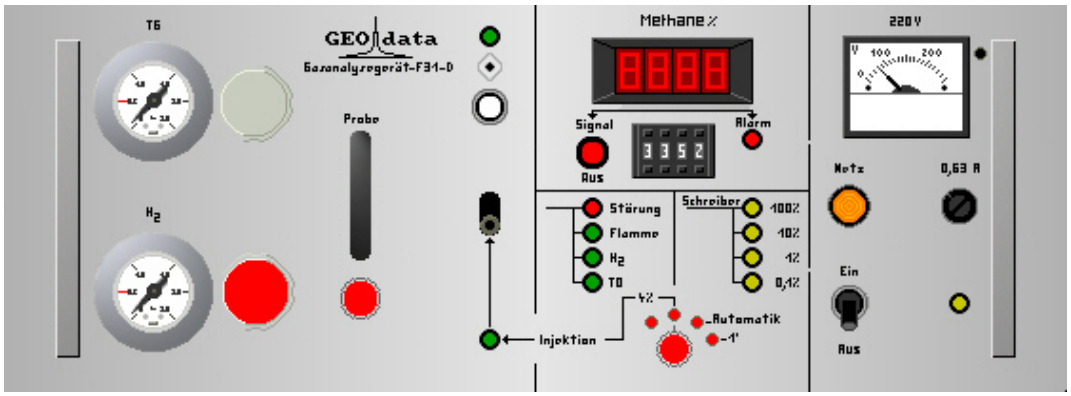
TOTAL GAS CHROMATOGRAPH

(Total Hydrocarbons)

Gas Detector FID-31D



Flame ionisation detector (FID) for continuous selective measurement of Hydrocarbon gases released by the drilling fluid

A field proven gas chromatograph with a high degree of sensitivity of measurement and short analysis time. Developed for a fast and reliable reservoir assessment as well as for gas detection during periods of high penetration rates.

- Automatic analysis of the total hydrocarbon gas content measured in methane equivalent
- No known cross reaction measurement with other gases
- Excellent stability and accuracy of measurement
- Control of internal and external alarm systems

Description

The FID total gas detector is an important component of the gas detection systems. It can be used as an individual detection system or in combination with the GEO-data GmbH Drilling Monitoring System (DMS). The selective analysis of the gases released from the drilling fluid by the de-gasser is fully automatic. Internal and external alarm systems (both acoustic and visual) can be controlled by the definition of threshold values for all the measured hydrocarbon components.

Care and Maintenance

After an initial calibration and adjustment of the correct sample volume intake, no further maintenance is necessary.
A routine calibration check using test gas samples of specific concentration should be carried out on a weekly basis, or as required, (e.g. before entering a potential reservoir).

Data Output

The recording, visual presentation and output of the gas analysis data is achieved in combination with the computer supported DMS system. If an individual detector is used then the gas analysis data can be presented on a separate single channel chart recorder.

Technical Data

	Total gas Detector (FID)
▪ **Measurement range**	10 ppm - 1,000,000 ppm (0.001 - 100%)
▪ **Accuracy of measurement**	10 ppm (0.001 %)
▪ **Measurement deviation**	< 5 % at full scale deflection
▪ **Zero point resetting**	Automatic
▪ **Measuring range selection**	Automatic
▪ **Operational control**	Automatic
▪ **Sample volume**	8 l/hr (maximum. 20 l/hr)
▪ **Flame gas / consumption**	Hydrogen / approximately 3 l/hr
▪ **Carrier gas / Consumption**	Compressed air / approximately 20 l/hr
▪ **Signal range**	4 – 20 mA
▪ **Electrical supply**	230 V AC / 50 Hz / 70 VA
▪ **Weight**	15 kg
▪ **Dimensions**	H 180 x W 480 x L 420 mm / 19“ x 4HU
▪ **Required accessories**	Hydrogen gas supply from either a gas bottle or a hydrogen generator. Air Compressor
▪ **Installation**	Field laboratory; 19” Insert panel in the DMS instrument panel or table operated

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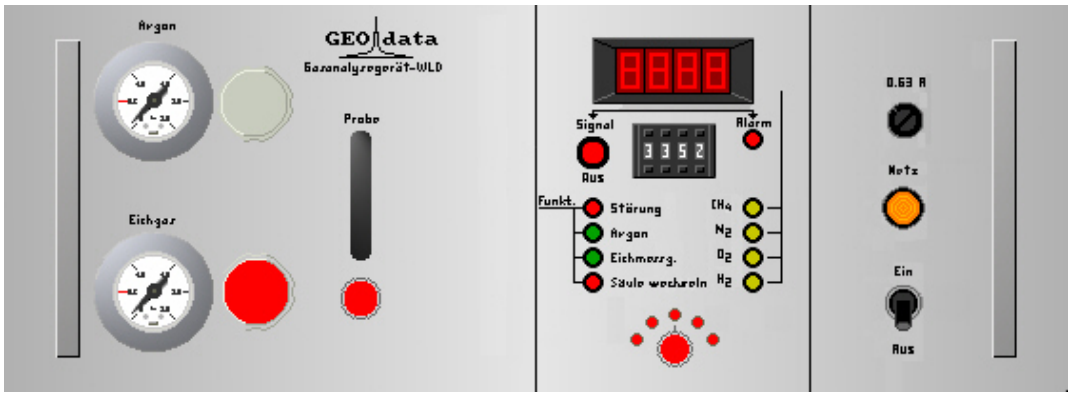
H_2 / N_2 / O_2 DETECTOR

Gas Detector TCD



Gas analysis equipment for continuous measurement of hydrogen, nitrogen and oxygen gases released by the drilling fluid.

A thermal conductivity instrument with a separating column for continuous documentation of the free nitrogen and or oxygen in the drilling fluid. Increases in the nitrogen content can indicate the influx of nitrogen from the formation.

- Automatic analysis of the gases released from the drilling fluid
- Control of internal and external alarm systems

Description

The gas analysis instrument is a useful component of the gas detection systems. It can be used as an individual detection system or in combination with the GEO-data GmbH Drilling Monitoring System (DMS). The selective analysis of the gases released from the drilling fluid by the de-gasser is fully automatic. Internal and external alarm systems (both acoustic and visual) can be controlled by the definition of threshold values for the gas measured by the detector.

Care and Maintenance

After an initial calibration and adjustment of the correct sample volume intake, no further maintenance is necessary. A routine calibration check using test gas samples of specific concentration should be carried out on a weekly basis, or as required, (e.g. before entering a potential reservoir).

Data Output

The recording, visual presentation and output of the gas analysis data is achieved in combination with the computer supported DMS system.
If an individual detector is used then the gas analysis data can be presented on a separate single channel chart recorder.

Technical Data

	H_2 / N_2 / O_2 Detector
▪ **Meaurement range** **Hydrogen**	0 – 50 %
Nitrogen	0 – 50 %
Oxygen	0 – 100 %
▪ **Accuracy of measurement**	0,01 %
▪ **Measurement deviation**	< 1 %
▪ **Zero point resetting**	Automatic
▪ **Measuring range selection**	Automatic
▪ **Operational control**	Automatic
▪ Calibration	Automatic
▪ **Sample volume**	8 l/hr (maximum 20 l/hr)
▪ **Carrier gas / consumption**	Argon / approximately 0,05 l/hr
▪ **Calibration gas / Consumption**	Hydrogen - Argon Mixture / approximately 0,25 l/h
▪ **Signal range**	4 – 20 mA
▪ **Electrical supply**	230 V AC / 50 Hz / 30 VA
▪ **Weight**	14 kg
▪ **Dimensions**	H 180 x W 480 x L 420 mm / 19“ x 4HU
▪ **Required accessories**	Argon and calibration gas supply from gas bottles or hydrogen generator
▪ **Installation**	Field Laboratory: 19” Insert panel in the DMS instrument panel or table operated

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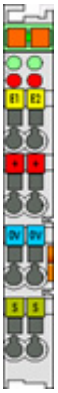
H_2S DETECTOR

Gas safety detection equipment

Barrier Amplifier

Encoder Interface



Gas Detector for Continuously Monitoring Hydrogen Sulphide Gas in the Atmosphere

A field proven diffusion detector with a quick reaction time and low drift, developed as a reliable safety instrument for the detection of dangerous gas concentrations at the well site.

- Continuous measurement of the hydrogen sulphide gas concentration
- Digital sensor display allows the direct reading of current gas values
- Fast sensor exchange as a result of “Plug & Play Sensor Technology”
- Excellent stability and accuracy of measurement
- Self testing systems monitor the functioning of the sensor and transmitter
- Variable alarm value input, internal and external alarm system control
- The system can be extended to include up to 8 independently functioning sensors

Description

The H2S detector, a monitoring device in the gas safety detection equipment can be used either as an individual detection system or in combination with the GEO-data GmbH Drilling Monitoring System (DMS). The evaluation electronic system is designed to allow for up to a maximum of eight independently functioning sensors. A comprehensive monitoring of all hazardous areas is therefore guaranteed. Internal and external alarm systems (both acoustic and visual) can be controlled by the definition of threshold values for the gas measured by the detector.

Care and Maintenance

The pre-calibrated H2S sensor requires little maintenance. The open port on the weatherproof cap should be inspected regularly. The sensor calibration should be periodically checked with test gas. If the results are unsatisfactory, then the sensor should be re-calibrated.

Data Output

The recording, visual presentation and output of the gas analysis data is achieved in combination with the computer supported DMS system. If an individual detector is used then the gas analysis data can be presented on a separate single channel chart recorder.

Technical Data

	H_2S-Sensor with Transmitter
▪ **Model or type**	3 electrode electrochemical sensor
▪ **Safety protection**	Intrinsically safe according to EEx ia IIC T4
▪ **Certificate of conformity**	DMT 01 ATEX E 045 X, DMT 01 ATEX E 045, BVS 92.C.2066
▪ **Standard range of measurement**	0 – 50ppm or 0 – 500ppm
▪ **Accuracy of measurement**	1ppm
▪ **Measurement deviation**	± 4 %
▪ **Operating temperature**	-40° C ... +65° C
▪ **Signal range**	4 – 20mA
▪ **Electrical supply**	24 V DC
▪ **Installation**	In selected hazardous areas, the sensor and transmitter form one unit
	Ex-Barrier Amplifier with BUS System
▪ **Type or model**	Barrier Amplifier EEx ia IIC
▪ **Certificate of conformity**	TÜV 99 ATEX 1499 X
▪ **Signal output**	4 – 20mA
▪ **Supply voltage**	24 V DC
▪ **Bus System:**	Field bus independent connectors
	Evaluation and Electrical Supply Unit
▪ **Electrical supply**	230 V AC / 50 Hz / 20 VA
▪ **Weight**	Maximum 6.5 kg
▪ **Dimensions**	H 135 x W 480 x L 420 mm / 19“ x 3HU
▪ **Installation**	Field Laboratory: Instrument panel or stand alone

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O_2 / CO DETECTOR

Gas safety detection equipment

Gas Detector for Continuously Monitoring of oxygen or carbon monoxide in the atmosphere.

Gas detector for the continuous monitoring of oxygen or carbon monoxide in the atmosphere.

- Continuous measurement of the oxygen or carbon monoxide concentration
- Fast sensor exchange of the “plug in” sensors
- Variable alarm value input, internal and external alarm system control

Description

The O_2 / CO detector, a monitoring device in the gas safety detection equipment can be used either as an individual detection system or in combination with the GEO-data GmbH Drilling Monitoring System (DMS). The evaluation electronic system is designed to allow for up to a maximum of eight independently functioning sensors. A comprehensive monitoring of all endangered areas is therefore guaranteed. Internal and external alarm systems (both acoustic and visual) can be controlled by the definition of threshold values for the gas measured by the detector.

Care and Maintenance

The pre-calibrated O_2/CO sensor requires little maintenance. The sensor must not be allowed to become excessively soiled. The filter should be regularly checked for dirt and corrosion and changed when necessary. The sensor calibration should be periodically checked with test gas. If the results are unsatisfactory, then the sensor should be re-calibrated

Data Output

The recording, visual presentation and output of the gas analysis data is achieved in combination with the computer supported DMS system. If an individual detector is used then the gas analysis data can be presented on a separate single channel chart recorder

Technical Data

	O_2 Detector	CO-Detector
Model or type	Diffusion detector with an electrochemical cell	
Safety protection	Ex sd3n G5	
Certificate of conformity	PTB Nr III B/E 30157	
Standard range of measurement	0 – 25 %	0 – 500 ppm
Accuracy of measurement	0,1 %	10 ppm
Measurement deviation	± 1 %	± 50 ppm
Operating temperature	-15 °C ... +40 °C	
Signal range	24 V DC	

Transmitter

Safety protection	(Ex) sd2 G5
Certificate of conformity	PTB Nr. III B/E 30238B
Signal range	4 – 20 mA
Electrical supply	24 V DC
Installation	In selected hazard areas. The sensor and transmitter form one unit

Ex-Barrier Amplifier with BUS System

Type or model	Barrier Amplifier EEx ia IIC
Certificate of conformity	TÜV 99 ATEX 1499 X
Signal output	4 – 20mA
Supply voltage	24 V DC
Bus System:	Field bus independent connectors

Evaluation and Electrical Supply Unit

Electrical supply	230 V AC / 50 Hz / 20 VA
Weight	Maximum. 6.5 Kg
Dimensions	H 135 x W 480 x L 420 mm / 19“ x 3HU
Installation	Field Laboratory: 19” Insert panel in the DMS instrument panel or table operated

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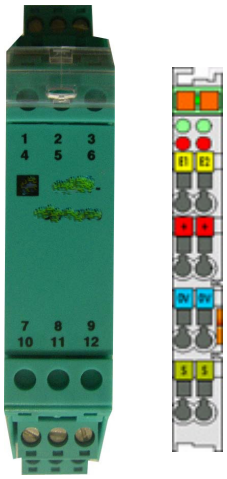
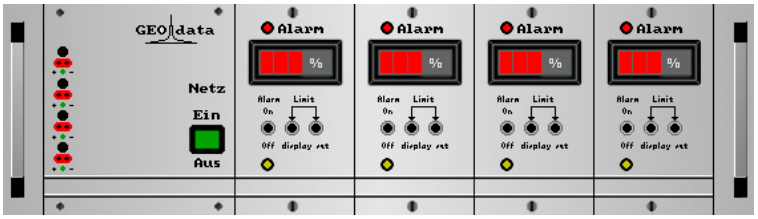
LEL - DETECTOR

(Lower Explosion Level)
Gas safety detection equipment





Gas Detector for Continuously Monitoring Explosive Gasses in the Atmosphere.

A robust and dependable diffusion detector with a quick reaction time, developed as an efficient, reliable safety instrument for the detection of hazardous gas concentrations at the well site.

- Continuous monitoring of the “lower explosion level” (refers to a concentration level of 4.4% Methane)
- Digital sensor display permits direct reading of the current gas values
- Fast exchange of pre-calibrated sensors without turning off power
- Excellent stability and accuracy of measurement through automatic compensation for climatic influences such as temperature, humidity and pressure.
- Variable alarm value input, internal and external alarm system control
- Extendable to include up to 8 independently functioning sensors

Description

The LEL detector is used solely as a monitoring device in the Gas Safety Detection System at the well site. It can be used either as an individual detection system or in combination with the GEO-data GmbH Drilling Monitoring System (DMS). The evaluation electronic system is designed to allow for up to a maximum of eight independently functioning sensors. A comprehensive monitoring of all endangered areas is therefore guaranteed. Internal and external alarm systems (both acoustic and visual) can be controlled by the definition of threshold values for the measured methane gas

Care and Maintenance

The pre-calibrated LEL sensor requires little maintenance. The sensor must not be allowed to become excessively soiled. The filter should be regularly checked for dirt and corrosion and changed when necessary. The sensor calibration should be periodically checked with test gas. If the results are unsatisfactory, then the sensor should be re-calibrated.

Data Output

The recording, visual presentation and output of the gas analysis data is achieved in combination with the computer supported DMS system. If an individual detector is used then the gas analysis data can be presented on a separate single channel chart recorder.

Technical Data

	LEL Detector	Transmitter
▪ **Model or type**	Diffusion detector with an electrochemical cell	Not applicable
▪ **Safety protection**	Intrinsically safe according to Ex ia s IIC T5	EEX em ia IIC T5
▪ **Certificate of conformity**	BASEEFA Nr. Ex92Y2156X	BASEEFA Nr. Ex91C2345
▪ **Standard range of measurement**	0 – 100% (corresponding to 0 – 4.4% Methane)	Not applicable
▪ **Accuracy of measurement**	0.1 %	Not applicable
▪ **Measurement deviation**	± 5 % LEL	Not applicable
▪ **Operating temperature**	-40 °C ... +55 °C	Not applicable
▪ **Signal range**	24 V DC	4 – 20 mA
▪ **Electrical supply**	Not applicable	24 V DC
▪ **Installation**	In selected hazardous areas, the sensor and transmitter form one unit	

	Ex-Barrier Amplifier with BUS System
▪ **Type or model**	Barrier Amplifier EEx ia IIC
▪ **Certificate of conformity**	TÜV 99 ATEX 1499 X
▪ **Signal output**	4 – 20mA
▪ **Supply voltage**	24 V DC
▪ **Bus System:**	Field bus independent connectors

	Evaluation and Electrical Supply Unit
▪ **Electrical supply**	230 V AC / 50 Hz / 20 VA
▪ **Weight**	Max 6.5 Kg
▪ **Dimensions**	H 135 x W 480 x L 420 mm / 19“ x 3HU
▪ **Installation**	Field Laboratory: Instrument panel or Stand-Alone

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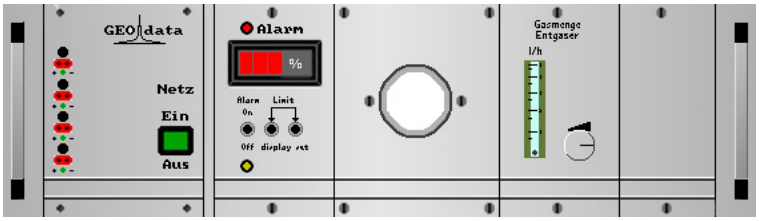
TOTAL GAS DETECTOR

(Total Hydrocarbons)

Gas safety detection instrument I-03S

Barrier Amplifier

Encoder Interface



Infra Red Gas Detector for Continuously Monitoring Hydrocarbon Gasses Released by the Drilling Fluid. Certified for Potentially Explosive Atmospheres.

Infra red gas detector for the continuous monitoring of hydrocarbon gas released from the drilling fluid and certified for potentially explosive atmospheres..

- “Flow through” housing for fast detection and analysis.
- Excellent stability and accuracy of measurement through self compensating optic systems.
- Highest possible reliability from internal error diagnostics and the suppression of false alarms.
- Variable alarm value input, internal and external alarm system control

Description

The total gas detector is an important component of the gas detection systems. It can be used either as an individual detection system or in combination with the GEO-data GmbH Drilling Monitoring System (DMS). The **detector** is located **in the Ex-Zone** and integrated into the gas sampling system located below the flow line. An **evaluation instrument** located **outside** the Ex-Zone allows the regulation and adjustment of internal and external alarm systems (both acoustic and visual). It is controlled by the definition of threshold values for the measured hydrocarbon gasses.

Care and Maintenance

The pre-calibrated TG detector sensor requires little maintenance. A visual inspection of the water separation and desiccation systems with integrated moisture sensors should be carried out on a regular basis. The sensor calibration should be periodically checked with test gas. If the results are unsatisfactory, then the sensor should be re-calibrated.

Data Output

The recording, visual presentation and output of the gas analysis data is achieved in combination with the computer supported DMS system. If an individual detector is used then the gas analysis data can be presented on a separate single channel chart recorder

Technical Data

Total Gas Detector	
▪ **Model or type**	Infra-red gas detector
▪ **Safety protection**	EEx d IIC
▪ **Certificate of conformity**	BAS No. Ex95C1028X, BAS99ATEX2259X71
▪ **Standard range of measurement**	0–100 % Methane - cross reaction readings with some hydrocarbons*)
▪ **Accuracy of measurement**	0.1%
▪ **Measurement deviation**	< ± 1% at zero deflection, < 4% at full scale deflection
▪ **Operating temperature**	-40 °C ... +65 °C
▪ **Signal range**	4 – 20 mA
▪ **Electrical supply to sensor**	24 V DC
▪ **Installation**	In the gas sample lines
Ex-Barrier Amplifier with BUS System	
▪ **Type or model**	Barrier Amplifier EEx ia IIC
▪ **Certificate of conformity**	TÜV 99 ATEX 1499 X
▪ **Signal output**	4 – 20mA
▪ **Supply voltage**	24 V DC
▪ **Bus System:**	Field bus independent connectors
Evaluation and Electrical Supply Unit	
▪ **Electrical supply**	230 V AC / 50/60 Hz
▪ **Weight**	Approx. 8 kg
▪ **Dimensions**	H 135 x W 480 x L 410 mm / 19“ x 3HU
▪ **Installation**	Field Laboratory: Instrument panel or Stand-Alone

*) Since the detector is calibrated using Methane (100% Methane is the equivalent full-scale deflection), it is possible that the presence of heavier hydrocarbons will cause the display to show apparent values greater than 100% (volume). This is due to the differences in the sensitivity of the detector caused by the presence of the heavier hydrocarbons.

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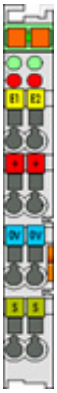
LEL - DETECTOR

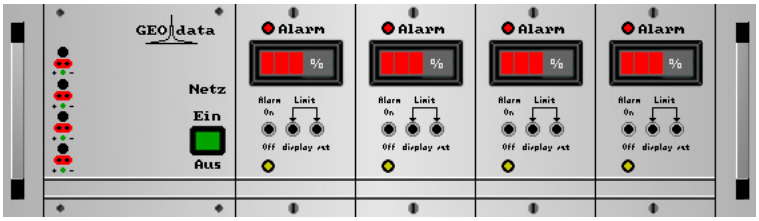
(Lower Explosion Level)

Gas safety detection instrument I-03S

Barrier Amplifier

Encoder Interface





Infra Red Gas Detector for Continuously Monitoring Hydrocarbon Gasses in the Atmosphere. Certified for Potentially Explosive Atmospheres

A fast and reliable gas detector for Ex-proof zones, developed for an efficient, reliable safety instrument for hazardous gas monitoring.

- Continuous monitoring of the “lower explosion level” (refers to a concentration level of 4.4% Methane)
- Fast reaction time and long life
- Excellent stability and accuracy of measurement through self compensating optic systems.
- Highest possible reliability from internal error diagnostics and the suppression of false alarms
- Variable alarm value input, internal and external alarm system control
- Extendable to include up to 8 independently functioning sensors

Description

The LEL detector is used solely as a monitoring device in the gas safety detection equipment at the well site. It can be used either as an individual detection system or in combination with the GEO-data GmbH Drilling Monitoring System (DMS). The **diffusion gas detector** is located **within the Ex-Zone** at locations such as the flow line or rig floor. An **evaluation instrument** located **outside the Ex-Zone** is designed to allow for up to a maximum of eight independently functioning sensors. Internal and external alarm systems (both acoustic and visual) can be controlled by the definition of threshold values for all the measured hydrocarbon components.

Care and Maintenance

The pre-calibrated LEL detector sensor requires little or no maintenance. Occasional cleaning of the sensor housing may be necessary. The sensor calibration should be periodically checked with test gas. If the results are unsatisfactory, then the sensor should be re-calibrated.

Data Output

The recording, visual presentation and output of the gas analysis data is achieved in combination with the computer supported DMS system. If an individual detector is used then the gas analysis data can be presented on a separate single channel chart recorder.

Technische Informationen

LEL Detector	
▪ **Model or type**	Infra-red diffusion gas detector
▪ **Safety protection**	EEx d IIC
▪ **Certificate of conformity**	BAS No. Ex95C1028X, BAS99ATEX2259X71
▪ **Standard range of measurement**	0 – 100% LEL (corresponding to 0 - 4.4% Methane) cross reaction measurement with forms of hydrocarbons *)
▪ **Accuracy of measurement**	0.1 %
▪ **Measurement deviation**	± 2 % LEL
▪ **Operating temperature**	-40 °C ... +65 °C
▪ **Signal range**	4 – 20 mA
▪ **Electrical supply to sensor**	24 V DC
▪ **Installation**	In potentially hazardous areas
Ex-Barrier Amplifier with BUS System	
▪ **Type or model**	Barrier Amplifier EEx ia IIC
▪ **Certificate of conformity**	TÜV 99 ATEX 1499 X
▪ **Signal output**	4 – 20mA
▪ **Supply voltage**	24 V DC
▪ **Bus System:**	Field bus independent connectors
Evaluation and Electrical Supply Unit	
▪ **Electrical supply**	230 V AC / 50/60 Hz
▪ **Weight**	Approx. 8 Kg
▪ **Dimensions**	H 135 x W 480 x L 410 mm / 19“ x 3HU
▪ **Installation**	Field Laboratory: Instrument panel or Stand-Alone

*) Since the detector is calibrated using Methane (100% Methane is the equivalent full-scale deflection), it is possible that the presence of heavier hydrocarbons may cause the display to show apparent values greater than 100% (volume). This is due to the differences in the sensitivity of the detector caused by the presence of the heavier hydrocarbons.

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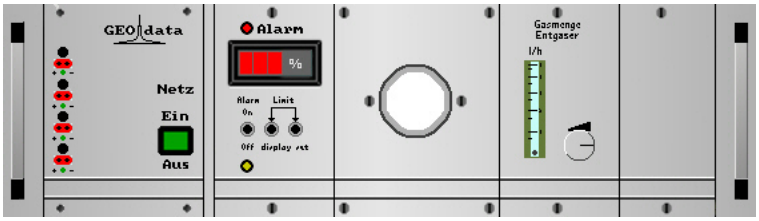
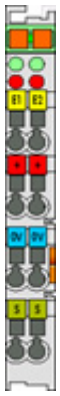
CO_2 - DETECTOR

Gas safety detection instrument I-03S



Barrier Amplifier

Encoder Interface



Infra Red Gas Detector for Continuously Monitoring Carbon Dioxide Gas in the Drilling Fluid. Certified for potentially explosive atmospheres

A fast and reliable gas detector for Ex-proof zones, developed for an efficient, reliable safety instrument for hazardous gas monitoring.

- “Flow through” housing for fast detection and analysis.
- Excellent stability and accuracy of measurement through self compensating optic systems.
- Highest possible reliability from internal error diagnostics and the suppression of false alarms.
- Variable alarm value input, internal and external alarm system control

Description

The CO2 detector, a monitoring device in the gas safety detection equipment can be used either as an individual detection system or in combination with the GEO-data GmbH Drilling Monitoring System (DMS). The **detector** is located **in the Ex-Zone** and integrated into the gas sampling system located in the flow line. An **evaluation instrument** located **outside the Ex-Zone** allows the regulation and adjustment of internal and external alarm systems (both acoustic and visual). It is controlled by the definition of threshold values for the measured hydrocarbon gasses.

Care and Maintenance

The pre-calibrated LEL detector sensor requires little or no maintenance. A visual inspection of the water separation and desiccation systems with integrated moisture sensors should be carried out on a regular basis. The sensor calibration should be periodically checked with test gas. If the results are unsatisfactory, then the sensor should be re-calibrated.

Data Output

The recording, visual presentation and output of the gas analysis data is achieved in combination with the computer supported DMS system. If an individual detector is used then the gas analysis data can be presented on a separate single channel chart recorder.

Technical Specifications

CO_2-Detector	
▪ **Model or type**	Infra-red diffusion gas detector
▪ **Safety protection**	EEx d IIC
▪ **Certificate of conformity**	BAS No. Ex95C1028X, BAS99ATEX2259X71
▪ **Standard range of measurement**	0 – 2 % CO_2 – cross reaction measurement with carbon disulphide (CS_2) possible.
▪ **Accuracy of measurement**	0.1 %
▪ **Measurement deviation**	± 1 %
▪ **Operating temperature**	-40 °C ... +50 °C
▪ **Signal range**	4 – 20 mA
▪ **Electrical supply to sensor**	24 V DC
▪ **Installation**	In the gas sample lines
Ex-Barrier Amplifier with BUS System	
▪ **Type or model**	Barrier Amplifier EEx ia IIC
▪ **Certificate of conformity**	TÜV 99 ATEX 1499 X
▪ **Signal output**	4 – 20mA
▪ **Supply voltage**	24 V DC
▪ **Bus System:**	Field bus independent connectors
Evaluation and Electrical Supply Unit	
▪ **Electrical supply**	230 V AC / 50/60 Hz
▪ **Weight**	Approx. 8 Kg
▪ **Dimensions**	H 135 x W 480 x L 410 mm / 19“ x 3HU
▪ **Installation**	Field Laboratory: Instrument panel or table operated

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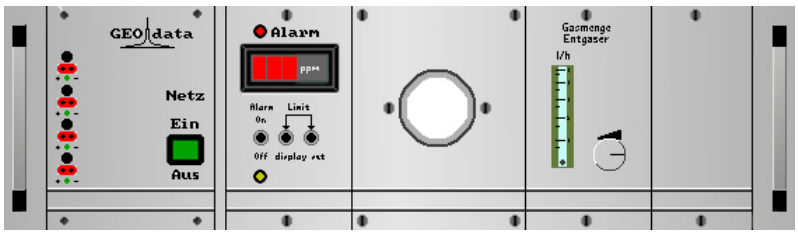
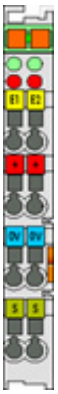
TOTAL GAS DETECTOR

(Total Hydrocarbons)

Gas Measuring Instrument I-03



Encoder
Interface



Continuous Detection of Total Hydrocarbons in the Drilling Fluid by an Infra Red Detector

Reliable and robust gas detector with short response time, high accuracy and long term stability

- Continuous detection of total hydrocarbons
- Sensor display for actual readings
- Low drift and high accuracy by automatic temperature compensation
- User selectable high/low alarms; output on internal and external acoustical and/or optical alarms

Description

The Total Gas Detector is another integral part of GEO-data's gas detection system. It can be used either stand-alone or connected to GEO-data's DMS (Drill Monitoring System). The sampling and continuous total gas analysis is fully automated. User definable internal and external high/low alarms can be set and put out by optical and/or acoustical alarm systems.

Maintenance

The total gas sensor is supplied fully tested and calibrated.

The operational warm-up time is about 1 minute and the device reaches its full specification after 30 minutes.

Although the dual wavelength sensor is inherently stable, it should be checked with test gas once a week and should be calibrated in case of inaccuracy.

Data output

The powerful DMS software records, visualizes and displays data on different locations on the well site.

The results of the stand-alone device will be put out on a chart recorder.

Technical Specifications

	Total Gas Detector
Type	Infrared Absorption
Measuring Range	0 ... 100 %
Detection limit	0,1 %
Resolution	0,1 %
Linearity	If > 0,6 %
Accuracy	± 2 % of full scale
Repeatability	± 2 % of full scale (over 12 months)
Response time	T90=10 sec.
Sample flow rate	8 l/h
Operating temperature	0° C ... +45° C
Sensor Input Voltage	24 V DC
Output	0 – 20 mA
Voltage Supply	230 V AC / 50/60 Hz
Alarm	User selectable high/low alarms
Calibration	Normally Methane, other Hydrocarbons possible
	Ex-Barrier Amplifier with BUS System
Type or model	Barrier Amplifier EEx ia IIC
Certificate of conformity	TÜV 99 ATEX 1499 X
Signal output	4 – 20mA
Supply voltage	24 V DC
Bus System:	Field bus independent connectors
	Dimensions and Installation
Weight	appr. 4 kg
Dimensions	H 180 x B 480 x L 420 mm / 19" x 4HE
Installation	Field Laboratory: Instrument panel or Stand-Alone

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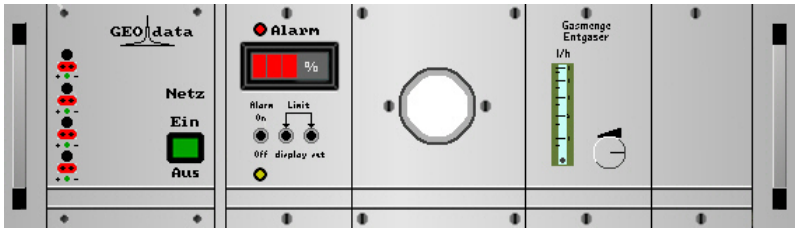
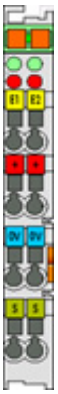
CO_2 - DETECTOR

Gas Detector I-03



Encoder Interface



Infra Red Gas Detector for Continuously Monitoring Carbon Dioxide Gas Released by the Drilling Fluid.

A robust and dependable diffusion detector with a quick reaction time, high accuracy of measurement and long-term stability.

- Continuous monitoring of Carbon Dioxide concentration up to 30%.
- Digital sensor display allows the direct reading of the current gas values
- Excellent stability and accuracy of measurement by automatic compensation of external influences, such as temperature and other contaminants.
- Variable alarm value input, internal and external alarm system control

Description

The CO_2 detector, a monitoring device in the gas safety detection equipment can be used either as an individual detection system or in combination with the GEO-data GmbH Drilling Monitoring System (DMS). The detector is located in the Ex-Zone and integrated into the gas sampling system located below the flow line. An evaluation instrument located outside the Ex-Zone allows the regulation and adjustment of internal and external alarm systems (both acoustic and visual). It is controlled by the definition of threshold values for the measured gas.

Care and Maintenance

The pre-calibrated CO_2 detector sensor requires little or no maintenance. After switching on the instrument, it requires a warm-up phase of 30 minutes before the detector is fully operational. The sensor calibration should be periodically checked with test gas. If the results are unsatisfactory, then the sensor should be re-calibrated.

Data Output

The recording, visual presentation and output of the gas analysis data is achieved in combination with the computer supported DMS system. If an individual detector is used then the gas analysis data can be presented on a separate single channel chart recorder.

Technical Data

	CO_2-Detector
Model or type	Infra-red gas detector
Standard range of measurement	0 – 30%
Accuracy of measurement	0.1%
Measurement deviation	± 2% of the full scale deflection value
Stability	± 2% of the full scale deflection value over 12 months
Reaction time	10 Sec
Sample gas volume	8 l/hr
Operating temperature	0 °C ... +45 °C
Signal range	24 V DC
Electrical supply	0 – 20mA
Mains supply	230 V AC / 50/60 Hz
Alarm	Individually adjustable threshold values
	Ex-Barrier Amplifier with BUS System
Type or model	Barrier Amplifier EEx ia IIC
Certificate of conformity	TÜV 99 ATEX 1499 X
Signal output	4 – 20mA
Supply voltage	24 V DC
Bus System:	Field bus independent connectors
	Dimensions and Installation
Weight	Approx. 4 Kg
Dimensions	H 180 x W 480 x L 420 mm / 19“ x 4HU
Installation	Field Laboratory: Instrument panel or Stand-Alone

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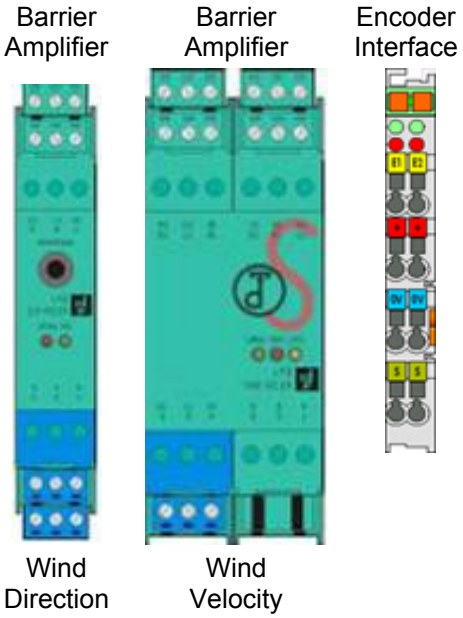
ANEMOMETER



Measurement of Wind Direction and Wind Velocity

A reliable Anemometer continuously measures all data digitally.

- Continuous measurement of wind direction and wind velocity.
- Data recorded to GEO-data's powerful Drill Monitoring System or to a chart recorder.
- Visualisation of all data either numerically or graphically at any location on the well site.
- Operable as a stand-alone instrument.

Description

The wind speed sensor with three cups has a diameter of 215 mm. The speed of rotation of the sensor varies according to the wind velocity. Resulting from its construction, the measurement remains linear over a wide range.
The vane is rotated parallel to the current wind direction by the wind. Due to the special construction, the fan reacts by the lowest motion of air.
Alarms with individual limits can be activated.

Principles of measurement

Wind direction: The wind vane has a slider which contacts to a ring shaped potentiometer. Changes in wind direction produce different resistance values, which are associated directly with the wind direction measured.

Wind speed: The rotary motion is measures by an extremely low friction element. The measured value is converted to an electronic signal.

The electronic signals from both devices are converted to analogue signals by a converter located outside of the hazardous area.

Maintenance

Normally no maintenance is necessary. Visual function checks should be carried out at regular intervals.

Data recording

Data from the Sensor is sent via analogue frequency converter to GEO-data's DMS software. The powerful DMS software records, visualises and displays data on different locations at the well site. For the stand-alone device, the results can be printed a chart recorder or printer.

Technical Specifications

	Anemometer	
▪ **Model**	Unheated Anemometer	
▪ **Installation point**	Within hazardous areas	
▪ **Certified for hazardous areas**	Intrinsically safe to EEX ia II C	
▪ **Certificate of Conformity**	Measuring device: PTB Nr. Ex- 83/2022 X	
▪ **Certificate of Conformity**	Amplifier 1: PTB Nr. Ex- 89.C.2145	
▪ **Certificate of Conformity**	Amplifier 2: BAS 00ATEX 7171X	
▪ **Range of Measurement**	Wind direction 0° to 360°	Wind velocity 0 to 60 m/s
▪ **Accuracy**	Wind direction ± 1,0 %	Wind velocity ± 0,3%
▪ **Resolution**	Wind direction 2.5 °	Wind velocity 0.1 m/s
▪ **Operating temperature**	- 30 ° C ... + 70 ° C (if no icing occurs)	
▪ **Voltage supply**	12 V	
	Ex-Barrier Amplifier with BUS System	
▪	**Wind Direction**	**Wind Velocity**
▪ **Type or model**	Barrier Amplifier - EEx iaj IIC	Barrier Amplifier - EEx ia IIC
▪ **Certificate of conformity:**	BAS 00 ATEX 7171 X	TÜV 99 ATEX 1499 X
▪ **Signal output :**	4 – 20 mA	4 – 20 mA
▪ **Supply voltage:**	24 V DC	24 V DC
▪ **Bus System:**	Field bus independant connectors	

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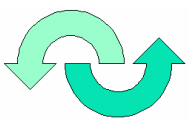

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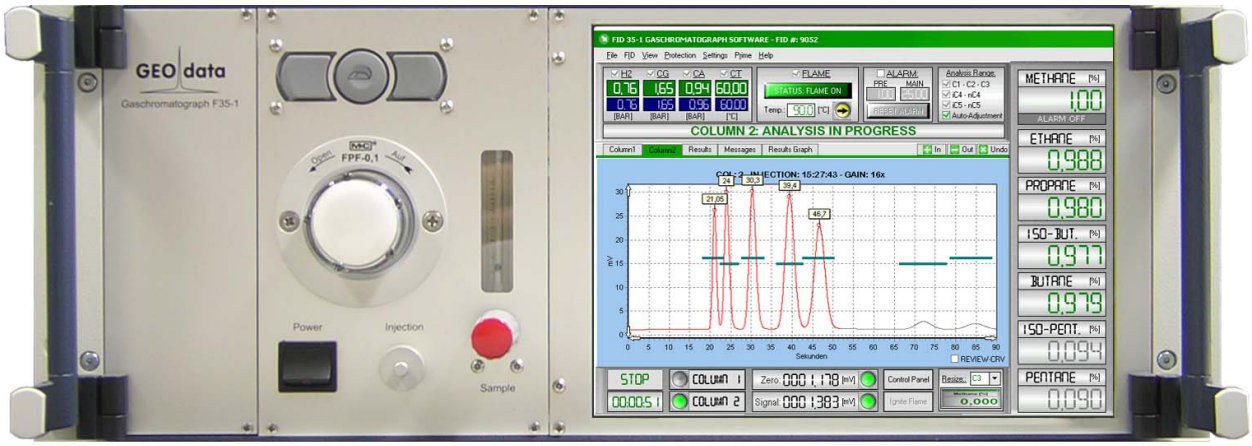
FAST GAS CHROMATOGRAPH

Detects Methane (CH_4) to normal Pentane (nC_5)



Fast Gas Chromatograph with Flame-Ionisation-Detector (FID) for continuous and selective detection of Hydrocarbons (C_1 – i + nC_5) in gas from the drilling fluid

A Temperature controlled dual column, single FID chromatograph with integrated software for peak identification and chromatogram storage; Constant flow vacuum pump; Manual sample injection possible. High resolution and short analysis cycle (C_1-C_3 < 30 seconds, C_1-C_5 < 90 seconds including back flush). Designed in connection with special gas trap motor in order to guarantee the reliable field evaluation of hydro-carbons released from the drilling fluid in a harsh environment.

- Analysis of C_1 to nC_5 Hydrocarbons
- Stand alone operation possible
- High stability and precision
- Connectable with internal and external alarms

C1/C2 ratio better than 1:800

Description

The gas chromatograph is an essential tool for gas measurements during hydrocarbon exploration or production drilling. The FID Gas Chromatograph can be used either as a stand alone or connected with the GEO-data Drilling Monitoring System. Sampling and selective analysis of C1 - nC5 hydrocarbons are fully automated. Internal and external alarms with individual limits can be set.

Maintenance

Check sample gas flow, H_2 pressure (displayed value), CG pressure (displayed value) and internal condensation trap several times per shift

Calibrate with test gas once a week or when required

Selectivity

The employment of and FID guarantees no interference from gases such as O2, N2, H2S, CO2 etc.

Data recording

GEO-data's powerful DMS software records, visualises and displays data on different locations at the well site. The DMS software allows fast interpretations like gas ratio diagrams in real time.

For the stand alone device the results are shown 10.4" display and stored on a 40 GB hard drive.

Technical Specifications

	Fast Gas Chromatograph (FID)
Detector	Single FID with 2 backflushing columns
Measuring Range	0.001% (10 ppm) to 100.0% (1,000,000 ppm)
Accuracy / Minimum Detection	10 ppm (0.001%) / 10 ppm for C1 to nC4
Linearity	Linear from 0 to 100%
Function Control	Automatic using integrated software control
Complete Cycle Time	Up to 90 seconds with a C1/C2 ratio better than 1/800 depending on sample composition. Faster cycle times with reduced C1/C2 ratio available on request
Flame Gas / Consumption	Hydrogen / 2.7 l/h (45 ml/min)
Carrier Gas / Consumption	Compressed Air / 30 l/h (500 ml/min)
Sample Flow Rate	8 l/h (135 ml/min)
Data Output	RS232 / LPT1 / USB / Ethernet capability
Operation	Button Mouse
Display	TFT 10.4" LCD 800x600
Data Storage Capacity	40GB Internal HDD
Power Supply	230VAC / 50 or 60Hz / 55 to 75 VA
Dimensions	H180 x W480 x L580 mm (19" x 4HU)
Weight	16 Kg
Alarms	External alarms steered by FID Software
Operation temperature	4°C to 40°C
Column/Chamber Temperatures	60°C / ± 100°C
Internal Alarms	Flame Off, Temperature and Pressure
Required Accessories	Air Compressor, H2 Supply, GEO-data Gas Trap. For optimum results we recommend the usage of the GEO-data gas trap with the F35

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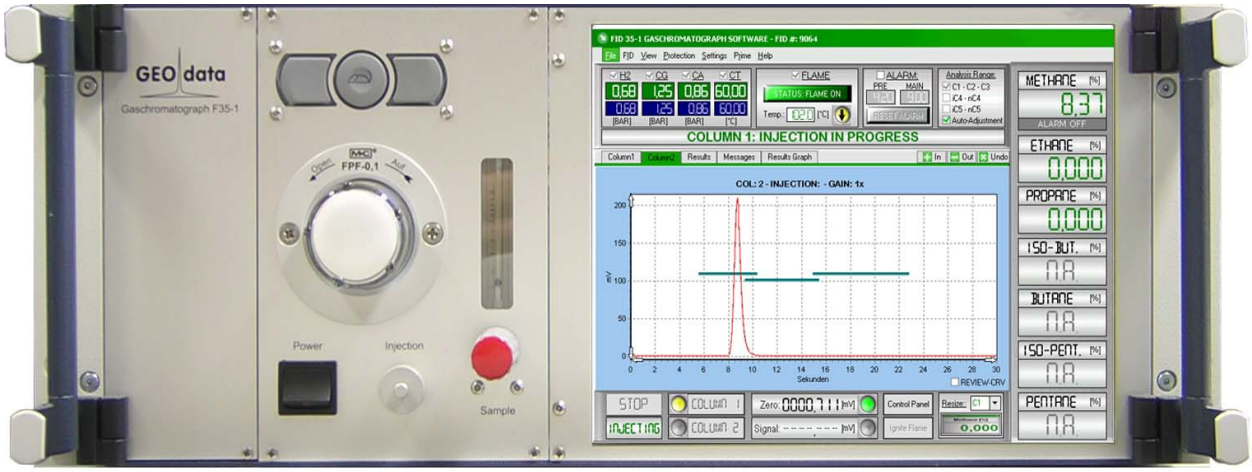
METHANE DETECTOR



Fast Methane Detector with Flame-Ionisation-Detector (FID) for continuous measurement of Methane in gas from the drilling fluid

A Temperature controlled dual column, single FID chromatograph with integrated software for peak identification and chromatogram storage; Constant flow vacuum pump; Manual sample injection possible. High resolution and short analysis cycle (C_1 < 8 seconds, Cycle time < 12 seconds including back flush). Designed in connection with special gas trap motor in order to guarantee the reliable measurement of Methane released from the drilling fluid in a harsh environment.

- Analysis of Methane several times per minute
- Stand alone operation possible
- High stability and precision
- Connectable with internal and external alarms
- Fast and reliable Methane detection

Description

The FID Methane Detector is an essential tool for gas measurements during hydrocarbon exploration or production drilling. The FID Methane Detector can be used either as a stand alone or connected with the GEO-data Drilling Monitoring System. Sampling and analysis of Methane is fully automated. Internal and external alarms with individual limits can be set.

Maintenance

Check sample gas flow, H_2 pressure (displayed value), CG pressure (displayed value) and internal condensation trap several times per shift.

Calibrate with test gas once a week or when required

Selectivity

The employment of a Methane Detector guarantees no interference from gases such as O2, N2, H2S, CO2 etc.

Data recording

GEO-data's powerful DMS software records, visualises and displays data on different locations at the well site. The DMS software allows fast interpretations like gas ratio diagrams in real time.

For the stand alone device the results are shown 10.4" display and stored on a 40 GB hard drive.

Technical Specifications

	Fast Methane Detector (FID)
▪ **Detector**	Single FID with 2 backflushing columns
▪ **Measuring Range**	0.001% (10 ppm) to 100.0% (1,000,000 ppm)
▪ **Accuracy / Minimum Detection**	10 ppm (0.001%) / 10 ppm for C1 to nC4
▪ **Linearity**	Linear from 0 to 100%
▪ **Function Control**	Automatic using integrated software control
▪ **Cycle Time / Cycle Rate**	7.5 seconds / 4 to 5 times per minute
▪ **Flame Gas / Consumption**	Hydrogen / 2.7 l/h (45 ml/min)
▪ **Carrier Gas / Consumption**	Compressed Air / 30 l/h (500 ml/min)
▪ **Sample Flow Rate**	8 l/h (135 ml/min)
▪ **Data Output**	RS232 / LPT1 / USB / Ethernet capability
▪ **Operation**	Button Mouse
▪ **Display**	TFT 10.4" LCD 800x600
▪ **Data Storage Capacity**	40GB Internal HDD
▪ **Power Supply**	230VAC / 50 or 60Hz / 55 to 75 VA
▪ **Dimensions**	H180 x W480 x L580 mm (19" x 4HU)
▪ **Weight**	16 Kg
▪ **Alarms**	External alarms steered by Detector software
▪ **Column/Chamber Temperatures**	60°C / ± 100°C
▪ **Internal Alarms**	Flame Off, Temperature and Pressure
▪ **Required Accessories**	Air Compressor, H2 Supply, GEO-data Gas Trap. For optimum results we recommend the usage of the GEO-data gas trap with the F35

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