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Organic X Monitor *HC*

Continuous Detection of Volatile Organic Compounds

- Halogenated Hydrocarbons
- Fuels
- BTEX
- etc.

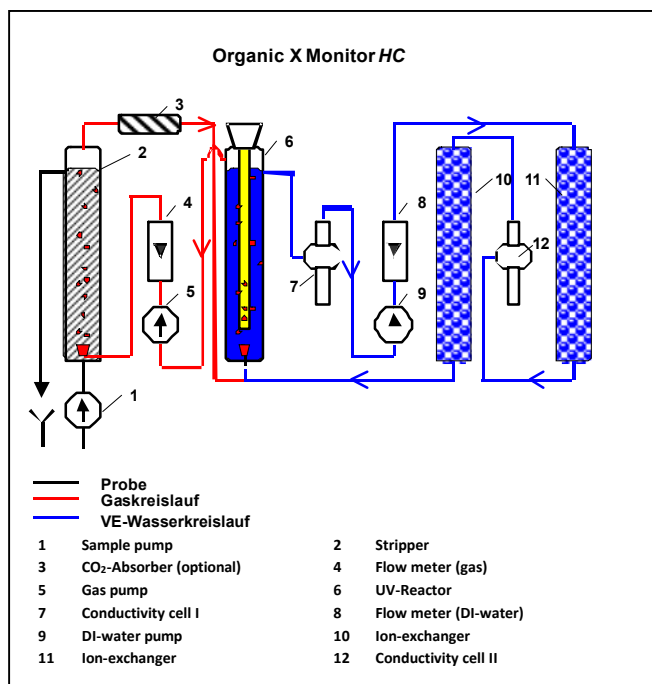
Organic X Monitor HC



One of the most frequent tasks in process and environmental monitoring is the detection of organic compounds in water. Aside from the total organic carbon (TOC) parameters like the dissolved (DOC) and volatile organic carbon (VOC) are measured.

The **Organic X Monitor HC** is designed to detect purgable (POC) or volatile organic compounds (VOC). The instrument proved to be very successful in various installations. Main advantages are the low detection limit, short response time and the low maintenance that is necessary to keep the system running. All work can be done by the user in a very short time.

During the development emphasis was laid on high flexibility in order to customize the system for many different applications. We deliver specially configured instruments that meet the requirements of the analytical tasks that are to be performed. Due to the modular configuration changes in configuration are easily realized.



Measuring principle

Volatile organic compounds like fuels, BTEX, volatile halogenated hydrocarbons etc. pose a considerable threat to the environment. Therefore, sensitive analytical instruments are required to detect these substances.

In the patented Degussa-method the volatile organic compounds are first stripped off the sample by a stream of pure air. The organic compounds are then dissolved in pure water and are decomposed by UV-irradiation. The conductivity of the resultant inorganic ionic species is measured.

CO₂ dissolved in the sample must be removed. This is performed by a CO₂ absorber. Alternatively, it's possible to adjust the sample to an alkaline pH in order to transform the carbonic acid into the complete ionic state. CO₂ cannot be stripped off then. Dependent on the sample characteristics it might be necessary to add reagents to prevent hydroxide precipitation.

If the sample to be monitored contains a high concentration of solids or other materials that might be troublesome if the sample is pumped to the analyser, a so called in-situ stripper can be installed. This stripper is installed directly into a tank, sewer, river or else. No sample pre-treatment or sample transport is necessary. The whole system needs only very little maintenance.

Due to the operational principle halogenated and other hetero-organic compounds are detected with higher sensitivity than other hydrocarbons. The following figure shows the conductivity - concentration curves for carbonic and hydrochloric acid. The conductivity of hydrochloric acid exceeds the value for carbonic acid by several times.



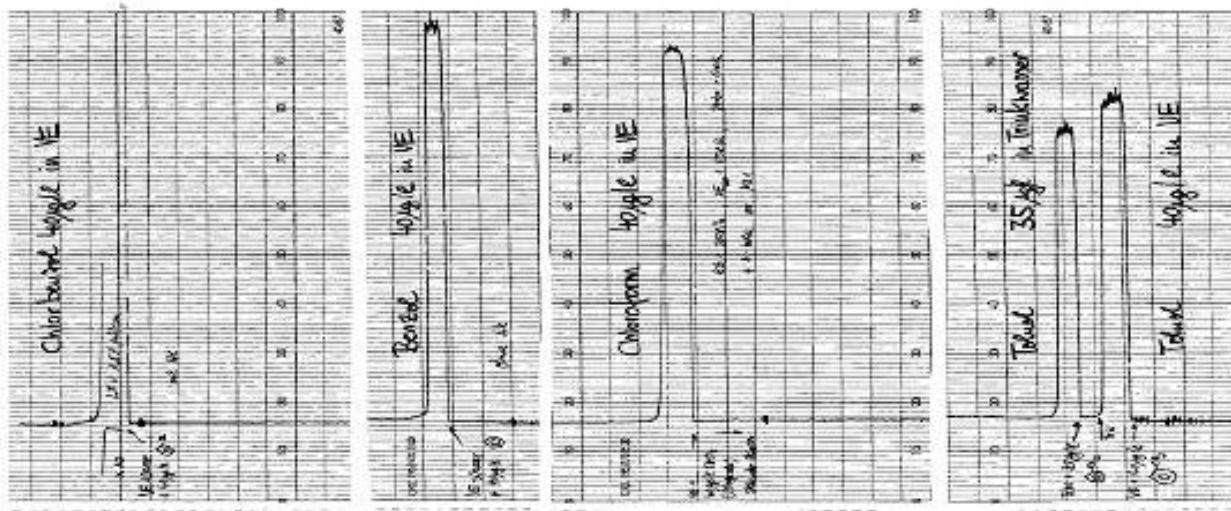
Therefore, the **Organic X Monitor HC** can be used very successfully as a highly sensitive monitor for halogenated volatile organic compounds.

The following table shows some examples of detectable compounds:

- Dichloromethane
- Chloroform
- Tetrachloromethane
- Dichloroethane
- Trichloroethane
- Tetrachloroethane
- Dichloroethene
- Trichloroethene
- Vinyl chloride
- Dichloropropane
- Chlorobenzene
- Hexane
- Benzene
- Xylene
- Toluene
- Fuels
- Methanol
- 2-Propanol
- Naphthalene
- Indene
- Styrene
- Butadiene
- etc.

For some compounds the **lower detection limit** is less than 1ppb!

The following graphs show some experiments performed with the **Organic X Monitor HC**. The instrument was used in the standard configuration. It was not optimized for short response times or low detection limits. The concentration for all substances was 40µg/l, the range for the chart recorder was set to 0 – 1 µS/cm.



Short response time and low detection limits

Depending on the configuration short response time of **< 60 sec.** and low detection limits of **< 1ppb** can be realized!

Reliability

All parts are chosen to ensure a maximum of reliability. The instrument as well as the analytical method is very robust. Up times better than 99.5 % is the rule!

Routine maintenance and replacement of defective parts is very easy and performed in a very short time. Maintenance is to be performed by the user himself. No factory maintenance or service contracts are necessary!

Flexibility

Due to the modular design the **Organic X Monitor HC** is easily modified to meet special requests.

For measurements at elevated sample temperatures a sample cooler has to be installed.

No reagents

The instrument uses UV-light only to digest organic compounds. No reagents are required!

Handling



General control, Parameter setting and the visualisation of measurement results, error messages as well as maintenance requests are displayed on 4"-touch panel with four functional keys. All menus are password protected to prevent unauthorized intervention. The screen displays measurement results numerically as well as graphically. For multiple channel instruments the values are displayed for each channel separately.

Data logging

Two different log files are used in the **Organic X Monitor HC**. Measurement results are stored continuously in user adjustable intervals. A second log file stores all interventions like calibrations as well as error messages whenever they occur.

The maximum number of data sets is 1.000 for both files. In case of overload the first datasets are overwritten.

Access to the memory is very easy by means of a RJ45-interface. All files are in CVS-format and can be opened by any spreadsheet software. No special software is necessary!

Communication

Standard communication with a PC is via Ethernet RJ45. This allows downloading of stored results. Other interfaces and protocols like Modbus or Profibus are available as options.

Options

The **Organic X Monitor HC** used a state of the art processor unit which offers a variety of options like additional in- and output modules, communication modules, displays etc. Therefore, customization is very easy.

Ion-selective measurements

If halogenated compounds are to be measured in the presence of other volatile compounds ion-selective electrodes instead of conductivity probes can be installed.

Process Analysers

Multiplexer

The optional multiplexer allows to monitor up to 8 sample streams with one instrument. Up to 8 4 – 20mA outputs are available. The results of all channels are displayed and stored in memory.

Explosion proofing

All our instruments can be configured for use in hazardous areas.

Maintenance

All functions are continuously controlled during operation. Any malfunction will trigger an alarm and a text message is displayed on the screen. Also all faults are stored in the memory of the instrument.

Critical parameters like UV-lamp live time and the quality of the DI-water cycle are continuously monitored. If maintenance is necessary a text message is displayed and a digital output is triggered (optional). This makes maintenance a lot easier!

All maintenance work can be done by the user himself! No special tools or knowledge is required!

Analog outputs

Up to 8 analog outputs (0/4 to 20 mA) are available. They are galvanically separated with a max. load of 500 Ohms.

Alarm contacts

System faults

In case of a malfunction a message is displayed on the screen and the contact switch triggered. This contact remains closed until the reset button is pressed. The alarm message is the result of one or more (and/or combination) of the following faults:

- Temperature in DI-water circuit > 30 ° C.
- Conductivity at cell II lower than pre-set value.
- Ion-selective probe signals out of range (optional).
- Flow rate of sample lower than pre-set value.
- Flow rate in DI-circuit lower than pre-set value.
- Flow rate in gas circuit lower than pre-set value.
- Power supply failure.

Maintenance request (optional)

A relays contact is triggered and a message is displayed on the screen if the lifetime of the UV-lamp is close to the maximum or the ion-exchange columns need to be replaced.

Threshold relays (optional)

A threshold relays can be installed to indicate results exceeding a preset value.

Applications

Most installed units of the **Organic X Monitor HC** are successfully used in monitoring waste water and cooling water monitoring in the chemical and petrochemical industry.

VOC in heavy polluted waste waters

Heavy polluted waste waters with high salt loads can be successfully monitored by applying the in-situ stripper. This stripper allows performing the stripping right in the sewer or tube without the need of any sample transportation! Pipe clogging, precipitation of salt etc. does not pose any problem. No sample pre-treatment is required!

Chlorinated compounds in cooling water (river water)



The redundant systems serve as watch dogs for the detection of leaks in the cooling system of a chemical production plant.

For this application in-situ-strippers are used to avoid sample pre-treatment. In this case the response time is longer but is still in the range of a few minutes.

The systems are calibrated in ranges of 0 - 2ppm and 0 - 10ppm. The analytes are various chlorinated compounds.

Drinking water

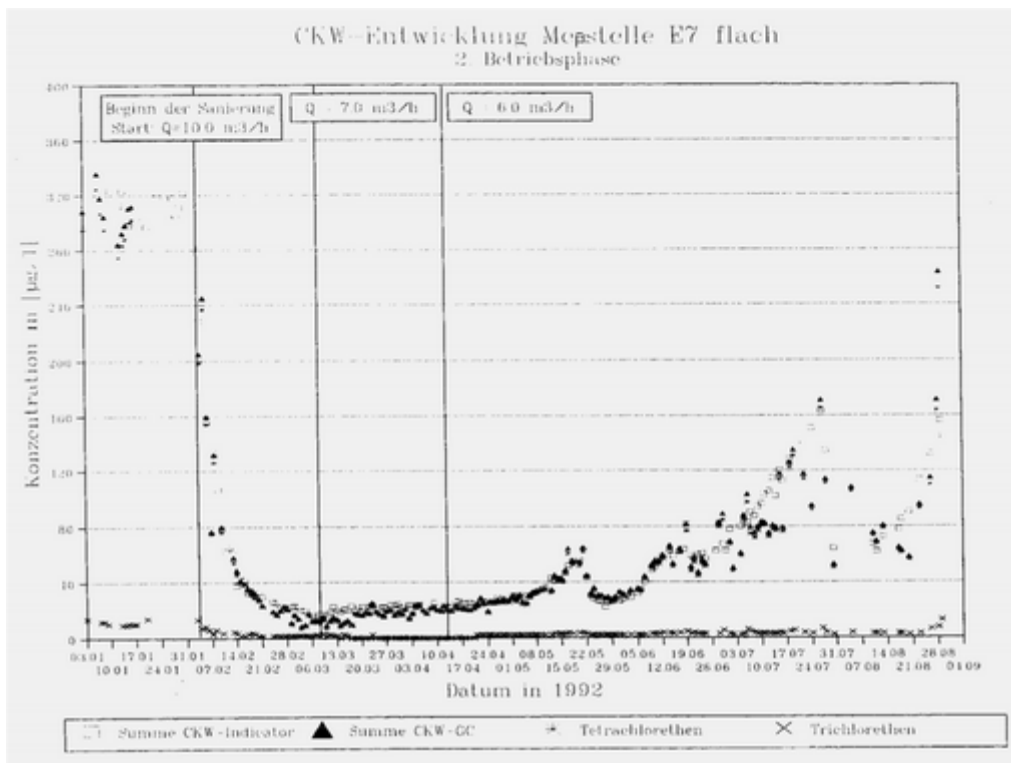
Because of the low detection limit of the instruments they can be used to detect halogenated volatile compounds in drinking water.

Online monitoring on a ground water remediation site for Tetrachloroethylene and Trichloroethylene

Rectangles mark the readings of the **Organic X Monitor HC**. The results of the GC-analysis are marked with a triangle.

The analysis results for Tetrachloroethylene and Trichloroethylene are marked with an X (Trichloroethylene) and * (Tetrachloroethylene).

The concentration range was approx. **4ppb - 330ppb** (sum of Tetrachloroethylene and Trichloroethylene concentration).



Specifications:

Analytical method:		Conductivity after UV-digestion Ion-selective (optional)
Range:		Dependant on configuration
Interval:		Continuous, T ₉₀ > 1 Min. < 5 Min.
Detection limit:	<i>Perchlorethylene</i>	0,5µg/l
	<i>Diesel</i>	10µg/l
	<i>Naphthalene</i>	20µg/l
Channels:		Max. 8
Sample:	<i>Pressure:</i>	0 bars, higher on request
	<i>Flow:</i>	12l/h
	<i>Temperature:</i>	> 0 - 30 °C (higher temperatures with optional sample cooler)
Detection system:		Conductivity meter Ion-selective (optional)
Alarms:		Threshold (optional) (potential free, NC/NO) System fault (potential free, NC/NO) Maintenance request (potential free, NC/NO) For remote control (potential free, optional)
Status signal:		(0)4 – 20mA, galvanically separated, max. 500 Ohm
Analog outputs:	<i>Max.8</i>	
Digital inputs:	<i>variable</i>	Start/Stop etc. (optional)
Communication:		Ethernet, Profibus (optional), Modbus (optional)
Ambient conditions:		Indoors
	<i>Rel. humidity:</i>	5 – 95% (not condensing)
	<i>Temperature:</i>	10 – 40 °C
Housing:		Wall mounting, steel, powder coated, IP55
Dimensions:		44 x 60 x 101 cm (DxWxH)
Wight:		±80 kg
Supply:	<i>Mains:</i>	230V +/-10%; 50Hz; 260 VA (others on request)
	<i>Instrument air:</i>	Dry oil free according to ISA-S7.0.01-1996 (optional for instrument purging in corrosive atmospheres)
	<i>Waste:</i>	Open sink

Errors and omissions accepted! Technical data are subject to change!

Vers. 02.03.2016