



## IMMISSIONS AND EMISSIONS CONTROL Online gas chromatograph – GC 5000 BTX

### Especially developed for monitoring of air pollutants

The GC 5000 BTX has been developed for the continuous monitoring of emission and immission levels of organic pollutants in ambient air in the range of  $C_4$ - $C_{12}$ . The instrument is characterized by its compact design and its outstanding detection sensitivity in the ppt range.

The analyzer can be used for the legally obliged monitoring of benzene in ambient air according to the guideline 2000/69/EC of the European parliament and the council from November 16<sup>th</sup> 2000. At the same time often concentrations of other aromatic hydrocarbons like toluene, ethylbenzene and xylene are monitored as well.

According to the EU guideline 2002/3/EC from February 12<sup>th</sup> 2002, the VDI guideline 2100 and the guidelines of the Technical Assistance Document EPA/600-R-98/161 of the American environmental protection agency EPA from September 30<sup>th</sup> 1998 the analysis system is also suitable for the continuous monitoring of ozone precursors in the range of  $C_4$ - $C_{12}$ .

A system for continuous monitoring of the complete range of ozone precursor from  $C_2$ - $C_{12}$  can be configured by combining the GC 5000 BTX and the GC 5000 VOC.

### **Impressive analytical capabilities**

The GC 5000 BTX features unmatched analytical performance and excellent detection sensitivity combined with a rugged design, which is crucial for unattended and continuous operation.

Fully automated air sampling is performed using a low-maintenance membrane pump. In sampling mode the organic compounds will be pre-concentrated on a single-stage enrichment module. Subsequently the components to be analyzed will be transferred to the separation column by means of thermal desorption technique. In this way detection limits for benzene of  $\leq 30$  ppt will be achieved.

The air volume will be measured precisely using a thermal mass flow sensor and refers directly to the standard conditions. This allows for highly reproducible air sampling even in case of fluctuations in atmospheric pressure and ambient temperature.

The temperature controlled air bath oven for temperatures up to 210°C and programmable temperature gradients up to 25°C/min eliminates the need of a pre-column option for back-flushing of high boiling components in order to prevent contamination of the analytical column. This avoids increased cost and eliminates an additional source for instrument failures.

Fast heating-up rates and high oven temperatures furthermore allow for increased length of the analytical column providing improved peak separation efficiency without compromising extended cycle times. This allows for definite peak identification, eliminates errors and guarantees for transmission of correct data in continuous operation mode.

A display and control panel will optionally be available and allows for intuitive touch screen operation providing direct access to all maintenance and diagnostic functions. All parameters and analytical methods can be edited in a convenient manner. The actual operating status of the analyzer as well as chromatograms and results will be displayed on the colour screen.

### **Reliable operation in monitoring stations**

The online gas chromatograph GC 5000 BTX has especially been developed to be installed in monitoring stations or mobile labs for continuous monitoring of emission and immission levels. The analyzer and the software are designed for stable and reliable operation without any human intervention.

The powerful analyzer software allows controlling and observing the instrument remotely via Ethernet or modem communications. Furthermore data and status messages can be transmitted via serial communications using common standard protocols.

All system parameters will be observed continuously. Any deviation from normal operation will be recorded and stored into a log file. In case of serious malfunctions or instrument failures immediately an error message will be transmitted. Therefore the gas chromatograph meets the highest demands for safe and unattended operation.

To ascertain proper analyzer operation, each controller as well as the operating system and the software will continuously be observed. In case of a system crash the computer will automatically reboot and the gas chromatograph starts in a self-acting manner the next analysis cycle.

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### Range of applications

- Ambient air monitoring, immissions and emissions control
- Aromatic hydrocarbons (BTEX, styrene, trimethylbenzene, ethyltoluene, ...)
- Aliphatic hydrocarbons (1,3-butadiene, methylcyclopentane, methylhexane, ...)
- Chlorinated hydrocarbons (vinyl chloride, trichloroethene, tetrachloroethene, ...)

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### TECHNICAL DATA

#### General

Enclosure	19" plug-in case
Height	6 height units
Depth	600 mm
Weight	appr. 33 kg
Mounting	designed for cabinet/rack mounting, telescopic slide mounting recommended
Ambient temperature	0°C to 40°C
Humidity	5% to 95% relative humidity, non-condensing
EMC	CE-marking, conformity with EMC-guideline 89/336/EEC

#### Instrument supply

Power supply	220-250 VAC, 110-120 VAC (optional)
Line frequency	50-60 Hz
Power consumption	max. 800 Watt
Carrier gas	N <sub>2</sub> , GC Grade, min. 3 bar
Supply gases	Combustion air, GC Grade, min. 3 bar (for FID only) H <sub>2</sub> , GC Grade, min. 3 bar (for FID only)
Supply connections	1/8" bulkhead union
Pressure control	Integrated pressure regulators, electronic readout of carrier gas pressure, manometers for indication of supply gas pressures (for FID only)

#### Sampling

Sampling	Low-maintenance membrane pump for automated air sampling
Volume measurement	MFC with thermal flow sensor for precise measurement and control of sample volume irrespective of fluctuations in atmospheric pressure and temperature
Sampling time	0-99 min (adjustable)
Flow rate	2-50 sccm/min (adjustable)
Sample volume	Typical 200-800 sccm (adjustable)

#### Enrichment

Enrichment module	Single-stage enrichment module with integrated thermal desorption unit for pre-concentration of organic components $\geq C_4$
Enrichment temperature	Typical 30°C (adjustable)
Desorption temperature	Max. 350°C (adjustable)
Heating-up rate	Up to 40°C/s providing high-speed sample introduction, which results in optimized peak separation

#### Valve oven

Oven liner	Stainless steel
Internal dimensions	H 210 mm x D 80 mm x W 55 mm
Heated valve block	Temperature controlled, adjustable from 30-150°C
Sample valve	6-Port VALCO valve, electrically actuated

#### Column oven

Oven liner	Stainless steel
Internal dimensions	H 55 mm x W 210 mm x D 210 mm
Analytical column	Fused silica capillary, length 30 m
Heating	Forced air
Temperature range	40 °C to 210 °C
Temperature control	Closed loop PID, setpoint resolution 1 °C
Temperature program	3 linear heating ramps, 4 isothermal holds
Heating rate	1 °C/min to 25 °C/min, setpoint resolution 1°C/min
Oven cooling	Fast cooling down time due to forced air cooling

#### Detector (select one type)

FID	<b>FID – Flame Ionization Detector</b> <ul style="list-style-type: none"><li>▪ Stable signal output due to temperature controlled detector block</li><li>▪ Make-up gas connection provides enhanced detection sensitivity</li><li>▪ Linearity of the FID &gt; 10<sup>7</sup></li><li>▪ Amplifier output 0-5 VDC</li><li>▪ Requires H<sub>2</sub> and combustion air supply</li></ul>
PID	<b>PID – Photo Ionization Detector</b> <ul style="list-style-type: none"><li>▪ Electrode-less, radio frequency excited UV lamp provides increased UV intensity and extended lifetime of lamp</li><li>▪ Stable signal output due to temperature controlled detector block</li><li>▪ Amplifier output 0-5 VDC</li></ul>

#### Communication

Communication ports	Ethernet, RS232 / RS485, 4 x USB, PS2, VGA
Protocols	GESYTEC II, other protocols on request

#### Options

- Display and control panel with intuitive touch-screen operation
- Various I/O modules with analog output and digital I/O
- Calibration gas selector (sample, Cal1, Cal2)
- Combustion air supply for FID (dry-running compressor with exchangeable charcoal filter)