

Process and Air Monitoring

Online GC systems for continuous monitoring of organic compounds
in air and gaseous samples



For 35 years AMA Instruments has developed and manufactured analytical devices and accessories for trace level analysis of organic compounds by means of gas chromatography. The products are characterized by their analytical performance and reliability and are used world-wide for process and environmental monitoring applications as well as in modern laboratories.

Online gas chromatographs manufactured by AMA Instruments perform a wide range of applications, such as process and industrial applications, occupational health and safety monitoring or determination of hydrocarbons in ambient air. Various analyzer configurations enable the detection of concentrations ranging from several percent down to ppt-levels. Optional modules complement the instruments providing complete system solutions for industrial plants and monitoring stations.

To complement our GC monitoring systems, AMA Instruments also supplies sampling units, thermal desorbers and ancillary accessories for laboratory analysis of organic compounds in air and gaseous samples. Additionally we are able to offer reliable spare parts service as well as superior technical and application support based on our expertise in this field of applications.



CHC
MONITORING
PROCESS ANALYSIS
HYDROCARBONS
OZONE PRECURSORS
POLLUTION
SOLVENTS
GAS CHROMATOGRAPHY
OCCUPATIONAL SAFETY
AIR TOXICS
IMMISSION
INDUSTRY
BTEX
VOC

AMA Online Gas Chromatographs GC 4000 and GC 5000



Depending on the specific requirements and the type of application, various analyzer series are available for monitoring of organic compounds.

The GC 4000 series features an isothermal column oven. This analyzer series will always be the first choice for monitoring of a single component or just a few components, which can be easily separated in the chromatogram.

The GC 5000 series has especially been developed for demanding applications and incorporates a temperature programmable column oven, which allows for optimized chromatographic separation conditions. Various enrichment modules extend the range of monitoring applications even to concentration levels of just a few ppt.

Online GC systems of AMA Instruments have especially been developed for con-

tinuous operation under harsh ambient conditions, e.g. in industrial plants or monitoring stations.

The instruments are characterized by their rugged and easily accessible design as well as their superior operational safety.

Convenient handling and operation

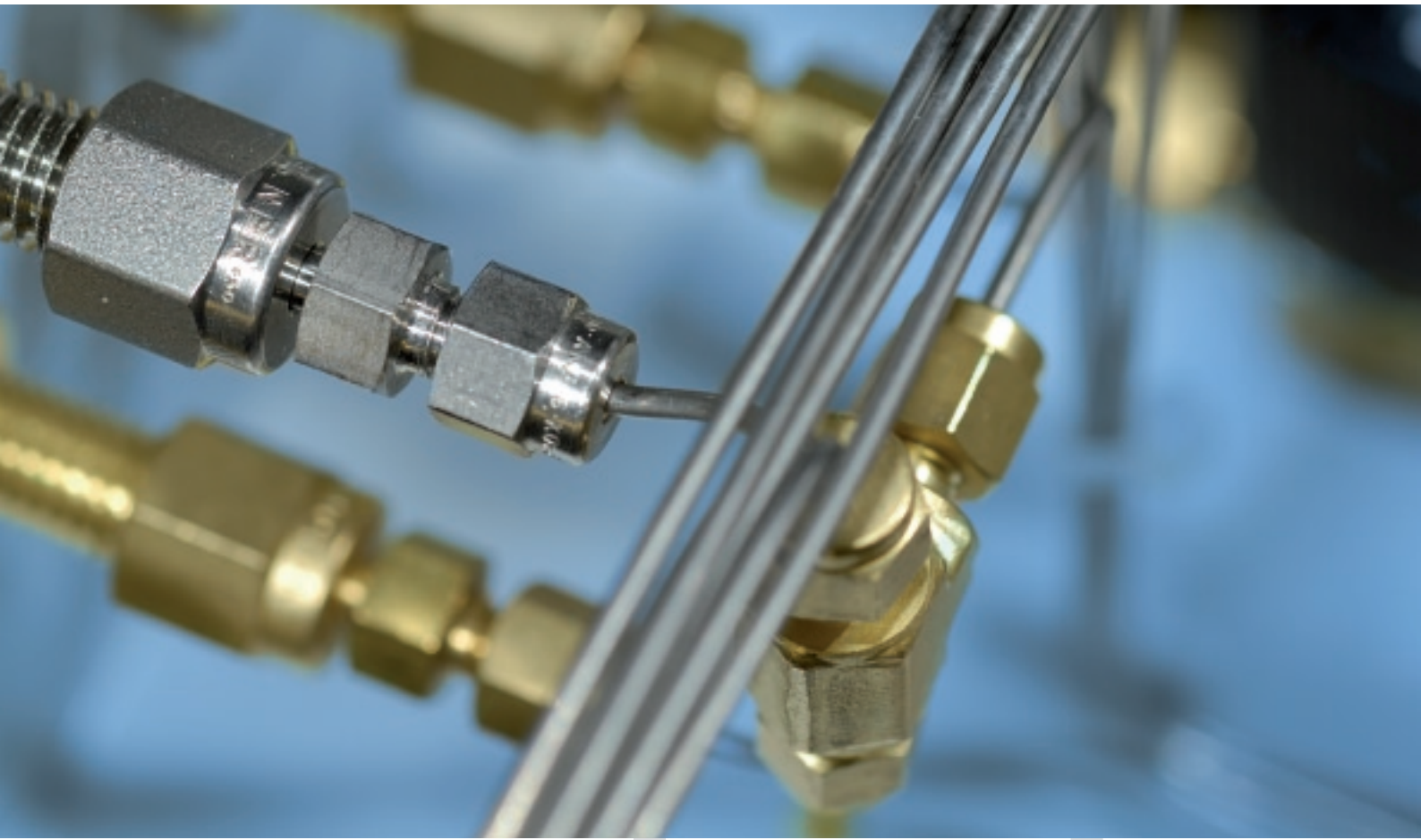
Each GC system features an integrated industrial PC, which allows for easy access to all important analyzer functions. The bright built-in LCD display continually indicates the actual operating status of the gas chromatograph. Optionally a display and control panel with intuitive touch screen operation is available.

The analyzer control software allows for protected access from any external PC via Ethernet or modem connection. This enables the operator to easily modify the instrument set-up or to observe important

functions of the gas chromatograph via remote control.

Superior operational safety

The control software continuously monitors all important parameters of the gas chromatograph. Any deviation from the normal operating status of the analyzer will be recorded and saved into a log file. In case of permanent malfunctions or a serious instrument failure an error message will be transmitted to the control room.



monitoring

Customized configuration for a wide range of applications

Differing applications ask for differing configurations of an analytical system in order to meet the specific requirements. Like a construction kit, our gas chromatographs can be configured individually for any field of use.

Detector

All analyzers of the GC 4000 and the GC 5000 series can use either a Flame Ionization Detector (FID) or a Photo Ionization Detector (PID).

The Flame Ionization Detector (FID) is well known for its versatility and provides a linear signal over a wide measuring range. This robust type of detector has proven to be extremely reliable over decades of practical use. Operation of the FID requires additional supply of hydrogen and combustion air.

The Photo Ionization Detector (PID) allows for sensitive detection of aromatic hydrocarbons and other organic compounds characterized by their low ionization potential. As this type of detector does not provide a linear output signal, calibration of the PID requires additional time and effort compared to a FID.

Calibration Gas Selector

This option allows for fully automated calibration or validation of the gas chromatograph during operation. Software controlled solenoid valves will switch as selected between the sample line and two additional gas lines e.g. for zero air and calibration gas.

Stripping Column Device

This option allows the retention and back-flushing of high boiling components and/or humidity in a pre-column in order to separate them from the compounds to be analyzed. This protects the analytical column and allows for short analysis cycles.

Enrichment Modules

For determination of organic compounds at extremely low concentration levels – e.g. for ambient air monitoring, purity control of industrial gases or occupational health and safety monitoring – the GC 5000 series can be provided with a single or dual stage enrichment module.

The peltier cooled single stage enrichment module allows for preconcentration of organic components using special adsorbent materials. Subsequently the sample will automatically be introduced by means of thermal desorption technique.

The dual stage enrichment module is specifically designed for determination of very volatile organic compounds. After preconcentration and subsequent release by thermal desorption, the components will be trapped in a second stage. Only now the sample will be transferred to the analytical column by rapid heating up of the focussing capillary in order to start the next analysis run.



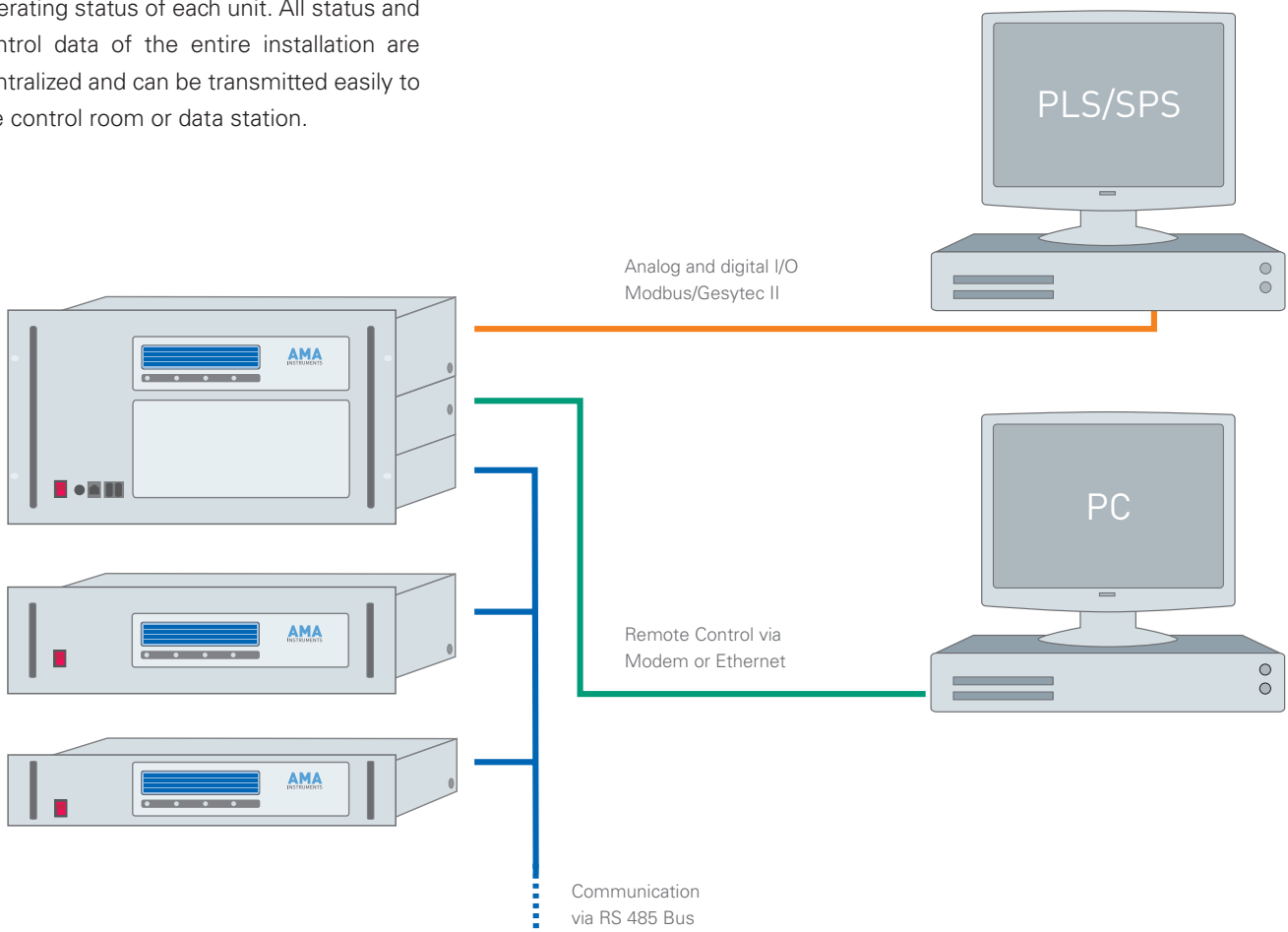
Complete solutions for GC monitoring systems

For the GC 4000 and GC 5000 series additional modules are available in order to complement the gas chromatographs providing complete monitoring solutions for a wide range of various applications.

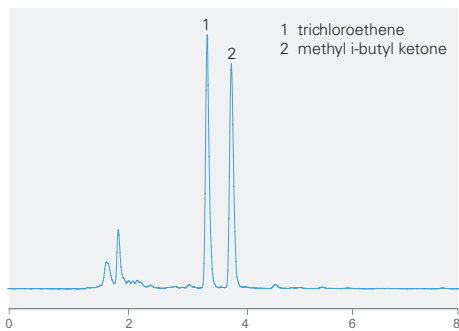
Each module features its own intelligent control electronics. The controllers of the various system units communicate via bus connection with the gas chromatograph. Thus, the analyzer serves as a master system controlling all functions of the various modules and observing continuously the operating status of each unit. All status and control data of the entire installation are centralized and can be transmitted easily to the control room or data station.

An Ethernet or modem line allows for remote access to the integrated computer of the GC master system.

Thus the operating status of any system module of the entire installation can be checked via remote control and the setup of each unit can be modified easily.



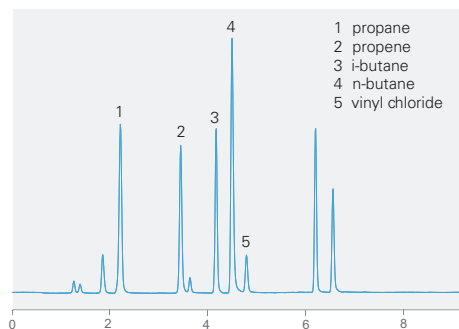
Fields of application for GC monitoring systems



Process and industrial applications

Online gas chromatographs are installed in all kind of industries mainly for process monitoring or emission control applications.

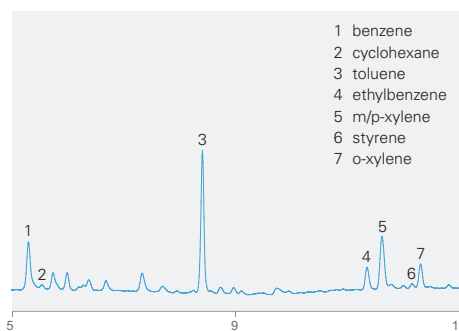
The example shows continuous monitoring of trichloroethylene and methyl i-butyl ketone in the exhaust air of an industrial plant using a GC 4000 analyzer. Both components are commonly used as organic solvents and can be easily separated even on isothermal conditions using a non-polar capillary column.



Occupational health and safety monitoring

For occupational safety reasons harmful and toxic organic compounds, such as epichlorohydrine or methylisocyanide, often have to be monitored at extremely low concentrations. Therefore, these kinds of application ask for excellent detection sensitivity of the analytical monitoring system.

The example shows a chromatogram recorded during monitoring of indoor air for vinyl chloride. Due to its carcinogenic nature, vinyl chloride is particularly injurious to human health. For this application the GC 5000 system is provided with a single stage enrichment module. Such a monitoring system allows for safe detection of vinyl chloride even at concentration levels in the ppt-range.



Environmental monitoring

Gas chromatographs are used for monitoring of aromatic hydrocarbons and other ozone precursors in ambient air in order to observe the compliance with environmental regulations.

The chromatogram shown was acquired with a GC 5000 BTX analyzer and gives an example for monitoring of benzene, toluene, ethyl benzene and xylene in ambient air. During the measuring cycle, benzene was present at a concentration level of $2 \mu\text{g}/\text{m}^3$ only. This detected concentration falls well below the legally permitted value according to the directives of the European Community.

Specific gas chromatographs for air monitoring applications

Especially for continuous monitoring of organic compounds for immission and emission control applications according to the directives 2000/69/EC and 2002/3/EC of the European Community, the guidelines VDI 2100 and the instructions of the Technical Assistance Document EPA/600-R-98/161 published by the US-EPA, two specifically configured models of the GC 5000 series are available.

GC 5000 BTX

The model GC 5000 BTX is a dedicated gas chromatograph for monitoring of benzene, toluene, ethylbenzene and xylene as well as other ozone precursors from C₄-C₁₂ in ambient air. As standard the instrument will be provided with a single stage enrichment module, which allows to detect concentration levels in the ppt-range.

GC 5000 VOC

This analyzer has been developed especially for monitoring of very volatile organic compounds and ozone precursors from C₁-C₆ in ambient air. The GC 5000 VOC features a dual stage enrichment module as well as a stripping column option in order to retain and back-flush humidity as well as high boiling components.

Other products of AMA Instruments

Complementary to our gas chromatographs for continuous monitoring applications AMA Instruments also offers a complete range of instruments and accessories for individual air and gas sampling and subsequent determination of organic compounds in the analytical laboratory.

Sampling Units

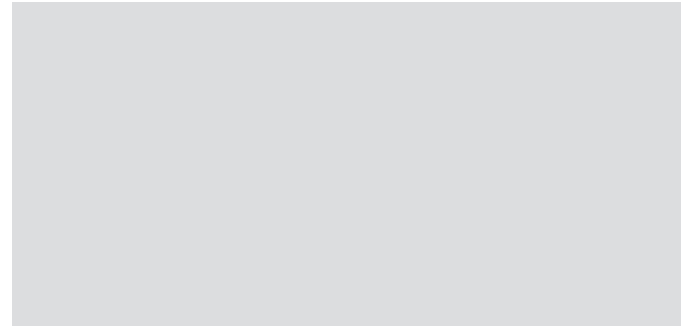
During air and gas sampling, organic compounds can be collected on special adsorbent materials for subsequent lab analysis. This application requires a precisely defined air or gas volume to be drawn through a sampling adsorbent tube. Especially for such applications we offer portable sampling units as well as all required accessories for air and gas sampling.

Thermal Desorbers

In modern laboratories, thermal desorption has become a well established sample introduction technique for GC analysis of organic compounds previously collected on sampling adsorbent tubes. Thermal desorbers of AMA Instruments will be the perfect complement to any laboratory GC or GC/MS system.



Your sales contact:



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