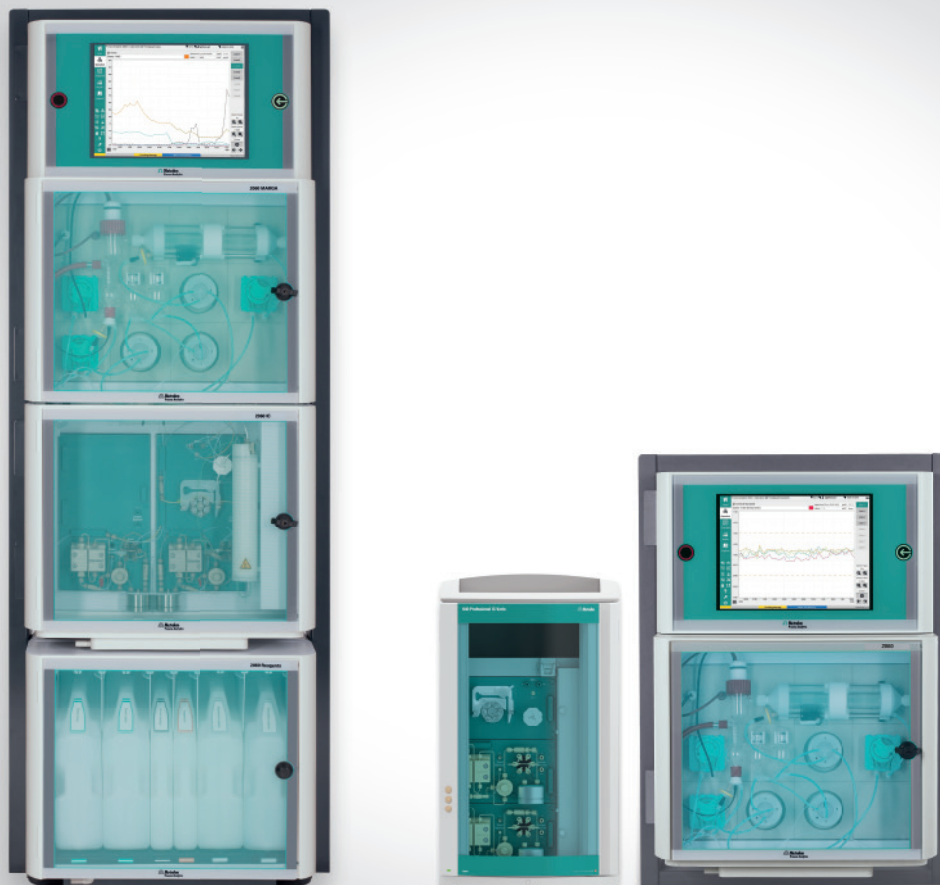


2060 MARGA Monitor for AeRosols and Gases in ambient Air



Continuous Measurements of Aerosols and Gases

Ambient air quality: Critical for our health and the environment

According to the World Health Organization 91% of the world population lives in places where the WHO air quality guidelines levels are not met. Ambient air (outdoor air pollution) in both cities and rural areas was estimated to cause 4.2 million premature deaths worldwide in 2016.

When considering the effects of aerosols on health and the environment, it is necessary to understand how they are formed from their precursor gases and how their concentration and composition vary with diurnal and seasonal cycles.

Continuous measurements of aerosols are required with sufficient time resolution so that the various aerosol formation processes can be clarified.

Monitor ambient air continuously to simultaneously quantify aerosols and gases

The new 2060 MARGA from Metrohm Process Analytics offers sampling of gases and aerosols from the same air mass. These are separated from each other by selectively dissolving them in water. The resulting solutions are then analyzed via ion chromatography with conductivity detection. Separating gases from aerosols allows the detection of important precursor gases and the subsequent inorganic ionic species found in the aerosols.

Gases	Aerosols
• HCl	• Cl ⁻
• HNO ₃	• NO ₃ ⁻
• HONO	• SO ₄ ²⁻
• SO ₂	• NH ₄ ⁺
• NH ₃	• Na ⁺
	• K ⁺
	• Ca ²⁺
	• Mg ²⁺

Gas and aerosol sampling from the same air mass

Wet Rotating Denuder (WRD)

The WRD consists of two concentric glass tubes, forming an annulus which is constantly fed with dilute aqueous H₂O₂ solution. As these tubes rotate, a continuous liquid film forms on the inside of the outer cylinder and the outside of the inner cylinder. Ambient air is drawn in and, due to high diffusion coefficients, close to 100% of acid gases and ammonia are stripped from the air mass. The resulting solution of gases is continuously sampled.



Wet Rotating Denuder (WRD) of the 2060 MARGA.

Due to velocity of the air within the WRD and also the design creating laminar flow, aerosols and particulates pass through to the Steam-Jet Aerosol Collector (SJAC).

Steam-Jet Aerosol Collector (SJAC)

After the WRD, the ambient air, stripped of its gaseous water soluble components, enters the SJAC. Supersaturated steam is introduced causing the aerosols to grow into larger, heavier droplets. Further on the air passes through a cyclone, collecting the particles in water by inertial separation. The resulting solution of dissolved inorganic ionic aerosol species is continuously sampled at the bottom of the SJAC for analysis by ion chromatography along with the sample from the WRD.



Steam-Jet Aerosol Collector (SJAC) of the 2060 MARGA.

2060 MARGA – Fully-automated analysis 24/7

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Based on the all-new 2060 online analysis platform from Metrohm Process Analytics, the 2060 MARGA can operate for **up to 1 month unattended** at a remote site.

2060 MARGA M (Monitoring)

The 2060 MARGA M is ideal for routine monitoring at a permanent site. Everything is packed into a single instrument, with separate subcabinets for the sample collection wet part, ion analysis cabinet with two IC channels with column oven for anion and cation determinations, plus reagent containers with level sensors.



The 2060 user interface displays trend graphs, program progress and clear messages when user intervention is required. All data relevant to the measurements can be consulted on the touch screen or remotely with a suitable application.

Results are stored in an onboard database, with various options for the transmission of «live» data to a central data platform.

2060 MARGA R (Research)

A flexible version, ideal for research applications, features the 2060 user interface and sample collection wet part.



Sample analysis is carried out on a stand-alone Metrohm 940 Professional IC Vario TWO/SeS/PP, including sequential suppression for the anion analysis channel. Installed on-site for a limited time campaign, the 2060 MARGA R works unattended in the same way as the 2060 MARGA M. When not required for field use, the 940 ion chromatograph can be put to work in the laboratory, using an external PC and MagIC Net, to run any of the multitude of applications available from Metrohm.

Key Features

- All new hardware, optimized for reliable operation and easy maintenance
- Built-in Metrohm ion analysis excellence with latest hardware and MagIC Net software
- Operation via full color touchscreen, with possibility of complete remote access
- No need to calibrate as an internal standard is measured with every sample
- Safe shutdown in the case of power failure
- All versions supplied with standard validated application for ambient air monitoring
- Detection limits without pre-concentration of $0.1 \mu\text{g}/\text{m}^3$ achievable
- Analysis method can be adapted to determine MSA, oxalate, amines, or organic acids
- Option for sample rates of 0.5 or $1.0 \text{ m}^3/\text{hr.}$, with self-cleaning critical orifice to regulate flow
- Possibility to add external sample changer to collect excess sample for further analysis

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