Continuous Emission Monitoring Systems (CEMS)

Utilising Extractive Dilution Probe Technology

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ECOTECH’s Dilution Extractive Continuous Emission Monitoring System (CEMS) is the result of more than 40 years of experience in the field. It is designed to provide superior emissions monitoring data and to minimise time and money spent on maintenance and calibration.

ECOTECH has been designing, supplying and maintaining the highest quality emission monitoring systems for a variety of applications since the early 1980s. Our systems are used by smelting, power generation, refining, steel, chemical and minerals processing industries worldwide.

ECOTECH’s Dilution Extractive CEMS utilises extractive dilution probe technology, ensuring consistent reliability, repeatability and precise measurement. This method is widely used for continuous emissions monitoring of SO$_2$ and Nitrogen Oxides (NO$_x$), CO, H$_2$S and NH$_3$. The dilution probe can also be combined with a zirconium oxide sensor for the continuous measurement of O$_2$. The extractive dilution system can be configured as a mobile or fixed installation. ECOTECH combines the dilution extractive technology with its proven Serinus® ambient gas analyser range for accurate, real-time monitoring.

ECOTECH’s Dilution Extractive CEMS consistently provides real-time data to demonstrate compliance with standards set by emission regulators and pollution control authorities.

All analysers in the system are connected digitally to ECOTECH’s data acquisition system, enabling remote communications, diagnostics, troubleshooting and operation of the system. The software seamlessly integrates with the CEMS to manage data collection, perform correction calculations, calibrate analysers, generate alarms and generate reports.
ECOTECH’s Continuous Emission Monitoring System measures high concentrations of gas at the point of emission, namely from a chimney or stack. These gases may include $\text{SO}_2$, $\text{NO}_x$, $\text{CO}$, $\text{H}_2\text{S}$ and $\text{NH}_3$, monitored using specially designed gas analysers.

Industries and environmental agencies use these measurements, often coupled with ambient and background measurements, to give them accurate information about emission levels and a better understanding of how emissions might affect the environment and local community.

**WHAT ARE THE ADVANTAGES OF ECOTECH’S EXTRACTIVE DILUTION CEMS?**

- Dynamic calibration is easily achieved with the help of calibration gas cylinders
- Dilution probe technology requires no additional calculations for reporting on wet basis
- Dilution technology system calibrates the entire sampling system rather than just parts of the system
- The simple system design has less components with high system uptime
- Reduces maintenance/operational cost due to fewer mechanical components, for example, chiller with additional maintenance requirements and consumables
- No power required for heating of sample probe and sample lines, reducing overall operating and capital costs
- Ability to accurately measure very soluble gases such $\text{NH}_3$, $\text{HCl}$ and $\text{HF}$
- Uses US EPA & MCERTS reference method analysers
- Can be expanded to incorporate additional analysers
- Instrument enclosure can be installed long distances from the monitoring location utilising umbilical cables
- A wide variety of shelters are available to house the system, including industrial enclosures, weather proof stations and large containers.

**WHAT MAKES ECOTECH’S CEMS SUPERIOR?**

Each ECOTECH CEMS is custom designed and purpose-built to suit the individual needs of our customers and their specific applications. ECOTECH invests heavily in research and development and manufactures the majority of the components and analysers that make up the CEMS. This allows ECOTECH to offer an unparalleled level of product knowledge and support.

ECOTECH holds ISO 9001 certification together with NATA (National Association of Testing Authorities) ISO/IEC 17025 accreditation for the maintenance and operation of emissions monitoring stations. ECOTECH provides in-depth customised training designed to help operate, maintain and calibrate their CEMS with maximum efficiency.

The use of extractive dilution probe technology in the system makes maintenance easy. When it is time to change the filter cartridge, the dilution probe body is easily removed by means of quick connection clips, without the need to remove the probe by dismantling the flange connection.
ECOTECH’s Product Portfolio for CEMS

Serinus® 30
CARBON MONOXIDE ANALYSER
The Serinus® 30 carbon monoxide (CO) analyser uses proven non-dispersive infrared (NDIR) sensor gas filter correlation technology to measure CO in ambient air/undiluted measurement range (LDL < 40 ppb, range 0 to 200 ppm).

Serinus® 30H
CARBON MONOXIDE ANALYSER – HIGH LEVEL
Based on the Serinus® 30 carbon monoxide (CO) analyser, the Serinus® 30H measures higher levels of CO in ambient air/undiluted measurement range.

Serinus® 40
OXIDES OF NITROGEN ANALYSER
The Serinus® 40 oxides of nitrogen (NO\textsubscript{x}) analyser uses proven chemiluminescence technology to measure NO, NO\textsubscript{2} and NO\textsubscript{x} in ambient air/undiluted measurement range (LDL < 0.4 ppb, range 0 to 20 ppm).

Serinus® 40H
OXIDES OF NITROGEN ANALYSER – HIGH LEVEL
The Serinus® 40H oxides of nitrogen (NO\textsubscript{x}) analyser uses microprocessor control and chemiluminescence detection to measure high concentration nitric oxide (NO), total oxides of nitrogen (NO\textsubscript{x}), and nitrogen dioxide (NO\textsubscript{2}). The Serinus 40H measures NO and NO\textsubscript{2} in the range 0 to 1000 ppm and NO\textsubscript{2} in the range 0 to 150 ppm.
Serinus® 50

SULFUR DIOXIDE ANALYSER
The Serinus® 50 sulfur dioxide (SO₂) analyser uses proven pulsed UV fluorescent radiation technology to measure SO₂ in ambient air/undiluted measurement range (LDL < 0.3 ppb, range 0 to 20 ppm).

Serinus® 51

SULFUR DIOXIDE & HYDROGEN SULFIDE ANALYSER
The Serinus® 51 sulfur dioxide & hydrogen sulfide (SO₂, H₂S) analyser combines pulsed fluorescence detection with an internal catalytic converter to sequentially measure H₂S and SO₂ in the range of 0-2 / 0-20 ppm respectively, with a detection limit of 0.3 ppb.

Serinus® 57

TOTAL REDUCED SULFUR ANALYSER
The Serinus® 57 total reduced sulfur (TRS) analyser uses proven UV fluorescent radiation technology and a thermal converter to measure TRS in ambient air/undiluted measurement range (LDL < 0.3 ppb, range 0 to 10 ppm).

Serinus® 60

NITROGEN DIOXIDE ANALYSER
The Serinus® 60 nitrogen dioxide (NO₂) analyser uses Cavity Attenuated Phase Shift (CAPS) technology, allowing direct measurement of NO₂ rather than an indirect calculation from a chemiluminescence analyser. Using a modulated blue LED light source, the detector measures the phase shift attributable to the level of NO₂ in the measurement cell over an average path length of several kilometers. No converter, no high vacuum, no ozone and no chemical reactions are required. The Serinus® 60 is ideal for high speed measurement of NO₂ in traffic tunnel vent stacks.
MODEL 8302

DILUTION PROBE CONTROLLER & PUMP MODULE

MODEL 8302 by ECOTECH integrates with source emission monitoring systems and common dilution probes. It is designed for unattended operation, featuring an automatic restart function in case of power failure or loss of instrument air. MODEL 8302:

• Controls probe temperature
• Draws sample gas from the dilution probe
• Provides a visual indication of measurement parameters.

AIR 1000

ZERO AIR PURIFICATION SYSTEM

AIR 1000 by ECOTECH is a specialised plant instrument air cleanup system. It is designed to remove contaminants such as SO₂, NOₓ, CO, oils and particulates from plant instrument air and lower its dew point to less than –15 ºC. The resultant ‘zero air’ can then be used in the ECOTECH CEMS or for instrument calibration.

Stack Gas Dilution Probe

ECOTECH supplied out-of-stack dilution probes, used together with stack gas analysers, are easy to install, maintain and can be used in high temperatures (up to 1800 ºC). The dilution part is mounted by using special quick clamps for easy dismantling for filter checks and replacement.
## ECOTECH Serinus® CEM Gas Analysers

### Comparison Overview

<table>
<thead>
<tr>
<th>ECOTECH GAS ANALYSER</th>
<th>GAS</th>
<th>RANGE</th>
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<tbody>
<tr>
<td>Serinus® 30</td>
<td>CO</td>
<td>0 to 200 ppm</td>
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<tr>
<td>Serinus® 30H</td>
<td>CO (HIGH LEVEL)</td>
<td>0 to 5000 ppm</td>
</tr>
<tr>
<td>Serinus® 40</td>
<td>NO, NO₂ and NOₓ</td>
<td>NO: 0 to 20 ppm</td>
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<td></td>
<td></td>
<td>NO₂: 0 to 3 ppm</td>
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<td></td>
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<td>NOₓ: 0 to 20 ppm</td>
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<tr>
<td>Serinus® 40H</td>
<td>NO, NO₂ and NOₓ (HIGH LEVEL)</td>
<td>NO: 0 to 1000 ppm</td>
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<td>NO₂: 0 to 150 ppm</td>
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<tr>
<td>Serinus® 50</td>
<td>SO₂</td>
<td>0 to 20 ppm</td>
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<tr>
<td>Serinus® 51</td>
<td>SO₂, H₂S</td>
<td>SO₂: 0 to 20 ppm</td>
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<td></td>
<td></td>
<td>H₂S: 0 to 2 ppm</td>
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<tr>
<td>Serinus® 57</td>
<td>TRS</td>
<td>0 to 10 ppm</td>
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**NOTE:** Concentration range shown is applicable to instrument performance without dilution in ambient air. When utilizing a dilution system, the analyser measurement ranges are expanded up to 100 x higher.

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### APPLICATIONS

- Power Generation Plants
- Cement Manufacturing Plants
- Pharmaceutical
- General Industrial Plants
- Chemicals
- Refineries and Petrochemicals Plants
- Pulp and Paper Plants
- Waste Incinerators
- Metals Plants and Smelters
- Turbines and Boilers.
The Extractive Dilution Method

How it works
Software & Hardware Solutions

**WINAQMS™ DATA ACQUISITION & CONTROL SYSTEM**

WinAQMS™ is a software and hardware solution for data collection and control of ambient air and emission monitoring applications. The Windows based system provides full control over an entire monitoring station, enabling readings to be recorded, automatic calibrations to be performed and system errors to be monitored.

**AMS™ ASSET MANAGEMENT SYSTEM**

Designed to meet the unique operator requirements of complex monitoring networks with tens or hundreds of individual pieces of environmental monitoring equipment, AMS™ provides a critical tool to manage maintenance scheduling down to task level as well as a central point where all relevant calibration and equipment maintenance records can be stored. This greatly facilitates any internal or external audit process and improves access to records for data validation.

**AIRODIS™ DATA COLLECTION, VALIDATION & REPORTING**

Airodis™ is an environmental data management software package that automates the process of retrieving data from multiple data loggers allowing users to validate data and generate a wide range of reports. Airodis™ is designed to easily manage valuable data and maximise user productivity while ensuring accuracy and traceability.
**ECOTECH SERINUS® GAS ANALYSER RANGE APPROVALS INCLUDE:**

- US EPA approval (EQOA-0809-187)
- EN approval TÜV (936/21221977/C)
- EN approval MCERTS (MC100165/06)
- Australian/New Zealand Standards  
  - AS/NZ 3580.4.1  
  - AS/NZ 3580.5.1  
  - AS/NZ 3580.7.1
- Russian approval (56053-13).

**KEY FEATURES OF ECOTECH’S CONTINUOUS EMISSION MONITORING SYSTEM INCLUDE:**

- Temperature controlled critical orifice dilution
- Dilution lowering of sample dew point avoids loss of gas due to condensation, negating the use of heated sample lines
- Calibration of complete system using probe dilution principles
- Adjustable probe length to ensure representative samples extraction
- Linear dynamic measuring ranges from <1 ppm to >2000 ppm
- In-situ oxygen measurement (optional).
ABOUT ECOTECH: Problem solved
Problem solving is in our DNA. For over 40 years ECOTECH has pioneered innovative solutions in environmental monitoring for air, water, gas, blast, particulate and dust. Headquartered in Australia, we now operate in more than 80 countries, manage over 440 real-time environmental monitoring sites and are certified to internationally recognised quality standards. ECOTECH is part of the ACOEM Group.

ABOUT ACOEM: Reduce your environmental impact
In today’s fast-moving world, the environment is increasingly impacted. The ACOEM Group is committed to sustainable development and help companies and public authorities limit their environmental impact. Across the world, ACOEM’s 670 employees innovate in the measurement, analysis and control of all environmental parameters through the 01dB, ECOTECH, ONEPROD, FIXTURLASER, MEAX and METRAVIB brands. For more information visit acoemgroup.com.