

CMS5000

Monitoring System
for Water Analysis

Unattended, On-Site VOC Water Monitoring

The **INFICON CMS5000 Monitoring System** is a self-contained system utilizing **GC (Gas Chromatograph) technology for continuous, unattended remote monitoring of water.**

CMS5000 performs complex analyses under the most demanding conditions. The programmable CMS IQ software allows you to manage the sample collection and analysis sequence, or you can simply use one of the included default methods. The analytical data is representative of actual water conditions at the time of sampling—providing the answers you need to make better and faster decisions about potentially critical issues. Concentrations can be accurately measured and reported in minutes.

CONTINUOUS ON-LINE MONITORING

Building upon the success of its predecessor the CMS200 Chemical Monitoring System, the CMS5000 was designed to require virtually no operator involvement following initial installation and setup. Volatile Organic Compounds (VOCs) and Toxic Industrial Chemicals (TICs) in water streams are collected and analyzed on-site for continuous on-line monitoring of multiple chemicals in a single run. CMS5000 also provides the capability to automatically upload analysis results after every run via FTP to virtually anywhere in the world. The user can also remotely access the system to view data or select an alternate method. On-site system integration is managed utilizing a wireless communication port, Ethernet communication, Input/Output (I/O) and Modbus over TCP/IP. Analyses are also maintained on the instrument's internal storage as required by the application.

ADVANCED TECHNOLOGY YIELDS QUALITY WATER ANALYSIS



CMS5000 rapidly analyzes VOCs in water using a modified EPA purge and trap concentrator protocol. The state-of-the-art SituProbe™ purges VOCs from water and collects them on a concentrator prior to GC analysis. There is no need for sample pre-treatment or filtration. Since the water condition does not affect the system's

The unique SituProbe purge and trap design facilitates continuous water stream monitoring.

FEATURES AT A GLANCE

- Continuous unattended monitoring using onboard default methods
- Low consumable load
- Robust, reliable design
- Minimal maintenance
- Can be configured for air monitoring
- Simple operation requires no formal training

APPLICATIONS

- Drinking water distribution systems
- Water source and water distribution protection
- Wastewater discharge compliance
- Groundwater remediation
- Process water quality monitoring

performance, even turbid samples can be analyzed with ease. The robust CMS5000 was designed with years of reliable operation in mind. The wall-mounted NEMA-4x type enclosure is air and water tight. The front panel screen displays status in real time.

SENSITIVE DETECTION TO PARTS-PER-TRILLION

The Micro Argon Ionization Detector (MAID) provides sensitive detection of organic compounds having an ionization potential of 11.7 eV or below. These compounds include halomethanes and haloethanes, which are sometimes difficult to detect by other common field detectors. The CMS5000 Monitoring System can even detect these hydrocarbons down to parts-per-trillion (ppt) levels. The 60 component Restek® MegaMix was analyzed on the CMS5000 with column temperature programming to demonstrate the resolution and overall chromatography capability of the system. The chromatogram and analysis parameters are shown in Figure 1.

LOW MAINTENANCE / LOW CONSUMABLE REQUIREMENT

The accompanying documentation allows the end-user to easily perform CMS5000 initial installation which includes Argon hook-up, plumbing connection, calibration, method set-up and sequenced analysis initiation. End user training is not required for continuous monitoring when utilizing the default methods. An onboard permeation tube is utilized as a check standard, and has a life span of approximately eight years. The Argon consumption is also very low and a 1.6 M external Argon cylinder will last nearly a year, application dependant. Aside from rinsing sediment build up from the water collection vessel, virtually no other maintenance is required.

STABLE OPERATION

A study during an extended period of operation using a CMS5000 with a daily check standard performance verification found very stable retention times. The largest retention time shifts (± 1 second) were found with late eluting compounds. In addition, with CMS5000 peak areas were found to remain stable.

BASED ON US EPA METHODOLOGY

CMS5000 is specifically designed for identification and simultaneous measurement of purgeable volatile organic compounds (VOCs) in finished drinking water, raw source water,

or drinking water in any treatment stage. The installed capillary column was selected based on US EPA Method 505.5, and was designed to be application specific for VOC separation based on its unique selectivity for VOC pollutants. As a result, operators have the ability to quantify all compounds listed in the method.

ONBOARD CALIBRATION

In order to document instrument stability during extended periods of operation lasting weeks or even months, an onboard permeation tube is utilized as a check standard. This long lifespan technology will compensate for seasonal water temperature changes and normal detector sensitivity fluctuations. Changes in one or more of these parameters may serve as an early warning indicator that preventive maintenance is needed so that data quality is kept within acceptable limits.

EASILY CONVERTS TO AN AIR MONITORING SYSTEM

Through a simple modification of the sampling vessel, the CMS5000 can be used for air analysis. Using the sample pump to draw air into the system, volatile organic compounds (VOCs) are collected onto a concentrator, analyzed, and quantified using gas chromatography with a Micro Argon Ionization Detector (MAID). The CMS5000 for air monitoring can detect analytes from ppb to ppt range.

The 60 component Restek MegaMix was analyzed on the CMS5000 with column temperature programming to demonstrate the resolution and overall chromatography capability of the system. The chromatogram and analysis parameters are shown below.

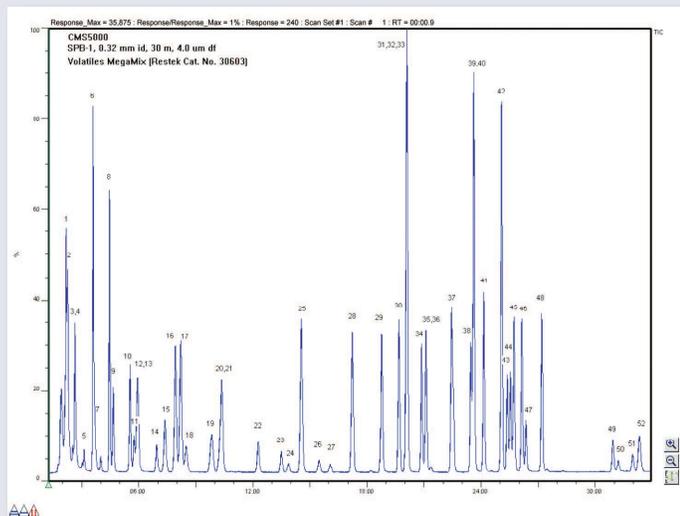


Figure 1: 1 ppb Restek MegaMix (Cat. #30603) in DI water (25.1°C); ConcFill: 2 min; Temperature Profile: 50°C (hold 8 min) to 80°C at 4°C/min, to 200°C at 6°C/min (hold 4.5 min)

1. chloromethane
2. vinyl chloride
3. bromomethane
4. chloroethane
5. trichlorofluoromethane (CFC-11)
6. 1,1-dichloroethene
7. methylene chloride
8. trans-1,2-dichloroethene
9. 1,1-dichloroethane
10. cis-1,2-dichloroethene
11. bromochloromethane
12. chloroform
13. 2,2-dichloropropane
14. 1,2-dichloroethane
15. 1,1,1-trichloroethane
16. 1,1-dichloropropene
17. benzene
18. carbon tetrachloride
19. 1,2-dichloropropane
20. trichloroethene
21. bromodichloromethane
22. cis-1,3-dichloropropene
23. trans-1,3-dichloropropene
24. 1,1,2-trichloroethane
25. toluene
26. dibromochloromethane
27. 1,2-dibromoethane (EDB)
28. tetrachloroethene
29. chlorobenzene
30. ethylbenzene
31. p-xylene
32. m-xylene
33. bromoform
34. styrene
35. o-xylene
36. 1,1,2,2-tetrachloroethane
37. isopropylbenzene (cumene)
38. 2-chlorotoluene
39. 4-chlorotoluene
40. propylbenzene
41. 1,3,5-trimethylbenzene
42. 1,2,4-trimethylbenzene
43. 1,3-dichlorobenzene
44. 1,4-dichlorobenzene
45. sec-butylbenzene
46. 4-isopropyltoluene (p-cymene)
47. 1,2-dichlorobenzene
48. n-butylbenzene
49. 1,2,4-trichlorobenzene
50. naphthalene
51. 1,2,3-trichlorobenzene
52. hexachloro-1,3-butadiene

SPECIFICATIONS	
Gas Chromatograph	
GC Column	DB-1, 0.32 mm ID, 30 m, 4.0 µm df or equivalent
Valves	Stainless Steel body / Teflon diaphragm
Heated Zones – Maximum Temperature	Three independent heated zones - Column 225°C - Valves 60°C - Detector oven 110°C
Temperature Programmable Column Module	55 to 200°C
Carrier Gas	Argon 99.999% @ 414-689 kPa (60-100 psi)
Variable Column Pressure Control	Regulator pre-set to 90 psi
Sample Inlet	Continuous water monitoring SituProbe (dynamic purge and trap)
Concentrator	Tri-Bed
Micro Argon Ionization Detector (MAID)	
Sensitivity	0.5 ppb benzene in water, s/n >200:1 0.5 ppb MTBE in water, s/n >15:1
Ionization Source	Ni-63 2.4 mCi
Repeatability	5 replicates of 1 ppb benzene: RSD calculated <5%
Temperature	110°C (maximum)
Dynamic Range	3 decades
Detection Limit	ppb to ppt for most analytes
Communication	
Computer / Data	Internal Intel® Pentium® processor
Integration	TCP/IP based USB for local diagnostics I/O Relay Contacts Modbus over TCP/IP
FTP	Configurable for automated data upload
Storage	160 GB (minimum) hard drive
System Status	Status table for system operating changes
Data Results	Text file with compound retention time, quantitation, time/date for all targeted compounds including method parameters, and system status
Wireless Connectivity	802.11 B/G
Touch Screen	6.5 in. VGA color display with touch screen
Physical Operating Requirements	
Size	16.9 in. x 32.7 in. x 10.2 in. (43 cm x 83 cm x 26 cm)
Weight	55.1 lb. (25 kg)
Power Requirement	Universal 100-240 V (ac) 200 watts maximum
Temperature	5 to 45°C
Relative Humidity	5 to 95%
Analysis & Protocols	
Integrated Performance Standard	Toluene Permeation Tube for check standard calibration
Detectable Compounds	Volatile organic compounds (e.g., halogenated, aliphatic, and aromatic hydrocarbons)
Acceptance Protocol	Initial setup with water purge method
Data Analysis	Automatic peak detection and area integration for known compounds

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