

**Hg- CEM**  
**2<sup>nd</sup> Generation Total Mercury CEM**  
**No Interferences -- No Wet Chemistry**

# Mercury CEM For The New Millennium



# Hg- CEM

## 2<sup>nd</sup> Generation Total Mercury CEM

### No Interferences -- No Wet Chemistry

#### Method of Detection

Using a unique thermocatalytic converter, all oxidized mercury compounds are converted to elemental Mercury within the probe. This stream is then passed through a gold trap amalgamation unit where only mercury is absorbed to remove interference from other compounds. Subsequently, the mercury is desorbed from the gold trap and measured in a UV atomic absorption photometer at 253.7 nm

#### No Interference, No Cross Sensitivities

SO<sub>2</sub>, NO<sub>x</sub> and other gaseous organic compounds (e.g. VOCs) cause a dramatic disturbance in the measuring signal since they also absorb at a wavelength of 253.7 nm. This results in spurious signals associated with traditional mercury analyzers. However in the Hg-CEM we use a Gold Trap Amalgamation unit and by selectively absorbing and desorbing Mercury we can eliminate interference from other compounds

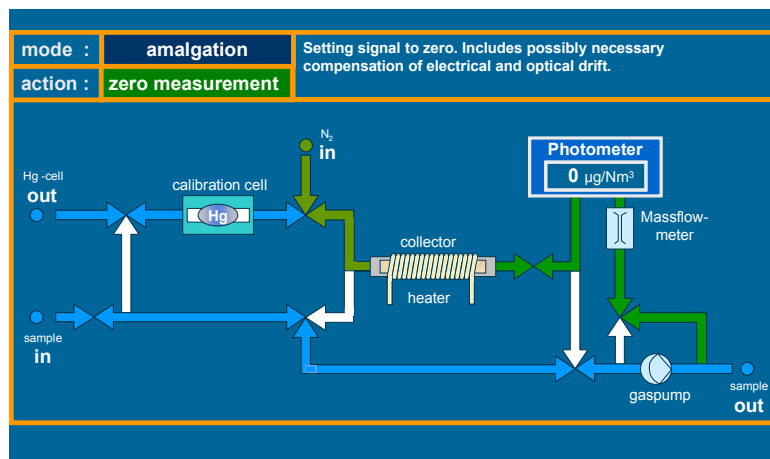
with metallic surfaces. In a few instances where it is strictly unavoidable, heated high-grade stainless steel is used. All fittings and tubings comprise of Teflon, Tygon, Quartz and glass. All surfaces coming in contact with ionic mercury are held at elevated temperatures.

#### Excellent Price to Performance Ration, Low Maintenance and Operating Costs

For the Hg-CEM we have put emphasis on a cleanly designed structure with minimum maintenance requirements. The design is modular so that individual components can be exchanged easily. The operating costs for the total life cycle of the instrument are extremely low.

#### Easy to Service and Repair

The entire system is functionally controlled by a microprocessor. All input is made through a water-



resistant front panel keyboard with user-programmable keys (“soft keys”). A large TFT color screen vividly displays all system variables and measured values. The system components are used in a “swing design” compartment and can be very easily accessed. The most important components are housed in two 19” rack-mounted units each 3 units high. Other components can be accessed from the back plate of the housing.

#### Selection of Optimum Materials of Construction to Minimize Memory and Hysteresis Effects

The choice of the materials of construction is crucial in the analysis of mercury. Thus we minimize the contact

#### Automatic Operation with Minimum Supervision and Remote Monitoring

The Hg-CEM executes an automatic zero point and a reference point procedure at preset intervals. Important

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process variables like flow rate, temperature and instrument drift are continuously monitored. In case of excessive deviations from set values, a status signal is activated to alarm the operator.

|                   |          |                               |              |
|-------------------|----------|-------------------------------|--------------|
| Hg-CEM            | S/N 102  | Main                          | Run Measure  |
| Measure Mode      | :        | Amalgation                    |              |
| Last Hg-Conc Mean | :        | 0.0 $\mu\text{g}/\text{m}^3$  |              |
| Hg-Conc Act       | :        | 0.0 $\mu\text{g}/\text{m}^3$  | Parameter    |
| Flow Act.         | :        | 0 ml/min                      | Mal-function |
| Flow Reg.         | :        | 350 ml/min                    | Service      |
| Last Zero         | :        | 14.2 $\mu\text{g}/\text{m}^3$ |              |
| Cycl. Time        | :        | 70 sec                        |              |
| & Stand by        |          |                               | ESC          |
| 1999-10-23        | 10:12:37 | Stand by                      |              |

#### Gold Trap Amalgamation Unit

This amalgamation unit consists of an integrated valve assembly, a gold trap and a calibration source for elemental mercury vapor. The valve assembly can be switched to a “continuous mode operation” in case of high mercury concentrations.

#### UV Photometer

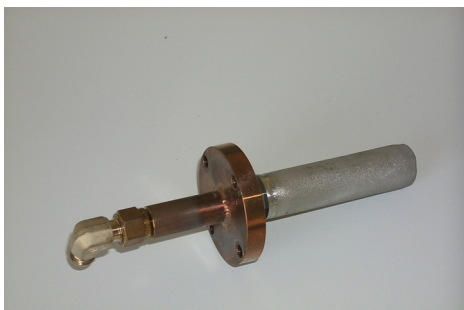
The UV Photometer used by the Hg-CEM system is a time tested instrument that has been ruggedized and field-proven. It consists of a fixed wavelength atomic absorption spectrometer at 253.7 nm wavelength. The photometer has a reference beam for lamp control and an

#### Sampling System (Probe and Heated Line)

The sample probe extracts 2 to 3 liters per minute and transports it through a heated sampling line at 200 °C. In order to prevent loss of mercury in the sampling line it is recommended that the line not exceed 150 feet.

#### Thermocatalytic Converter

This thermal catalyst causes the reduction of ionic mercury compounds to elemental mercury vapor. The thermocatalytic converter unit is integrated within the sampling probe and is easily accessible for maintenance. After the catalytic converter, Mercury exists only in the elemental form and hence drastically reducing MEMORY effects.



electrodeless low-pressure lamp with long service life (>20000 hours)

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#### Technical Specifications

|  |  |
|--|--|
| Mercury Detector                                 | Atomic absorption spectrometer with fixed wavelength at 253.7nm. UV photometer with reference beam for lamp control and electrodeless low-pressure lamp with long service life (>20000 hrs).   |
| Measuring Method                                 | Thermocatalytic conversion of mercury compounds to elemental mercury followed by gold trap amalgamation to remove interference from other species. No wet chemistry is involved in the process |
| Measuring Ranges                                 | 0 to 45 microgm/m <sup>3</sup> and 0 to 75 microgm/m <sup>3</sup>  |
| Resolution                                       | 0.1 microgm/m <sup>3</sup>   |
| Response Delay                                   | Adjustable depending upon gold trap amalgamation cycle time (minimum 90 seconds)   |
| Start-up Time                                    | 30 minutes   |
| Display of measured values on front screen       | Total mercury in microgm/m <sup>3</sup>  |
| Status Display                                   | Relay outputs: Operative, Maintenance, Malfunction --- remote monitoring possible through PC software  |
| Analog Output                                    | 4...20mA at 500 ohm load   |
| Digital Output                                   | RS-232   |
| Sample Gas Connection                            | Matched to customer needs (3/8" gas connector or PF36 thread connection - diameter 47mm etc)   |
| Sample Gas Supply Line                           | Heated sample line with Teflon tubing 3/8" OD, 1/4" ID and temperature approximately 200 °C. Maximum length of 150'.   |
| Sampling Probe                                   | Heated sampling probe with thermocatalytic converter using proprietary MERCAT <sup>®</sup> catalytic material  |
| Sample Gas Flow Rate                             | 120 to 180 liter per hour  |
| Power Supply                                     | 110 / 220 V, 50 / 60 Hz, 500 VA for Mercury CEM, 100 watts per meter of sampling line  |
| Dimension of Unit                                | 600 x 750 x 500 (Width x Height x Depth in mm)   |
| Weight   | 80 kg  |
| Interference                                     | No interference from SO <sub>2</sub> , NO <sub>x</sub> , VOC and other compounds through the use of the gold trap  |
| Zero Point                                       | Automatic control and correction of zero point --- manual correction possible  |
| Calibration                                      | Automatic and manual calibration using permeation device   |
| Permissible ambient temperature during operation | 5 to 35 °C   |
| Utilities Required                               | Nitrogen at flow rate of 6 liter per hour  |