

Series 3300 Speciating Mercury CEM – Overview



Manufactured under US and foreign patents
and patents pending

The **Tekran[®] Series 3300 Speciating Mercury Continuous Emissions Monitor (CEM)** is a significant advance over existing mercury CEM systems. Several innovations, combined with tried and tested techniques, have produced a system with superior characteristics. *(The design aspects that make possible each feature are listed in parentheses.)*

- High sensitivity: MDL for $\text{Hg}^{\text{T}} < 0.05 \text{ ug/m}^3$ *(Use of atomic fluorescence (AF) mercury analyzer)*
- Speciates mercury into total (Hg^{T}) and elemental (Hg^0) fractions *(Dual channel conditioner with selective scrubbing)*
- Insensitive to the presence of SO_2 , NO_x , CO, HCl, and all other common combustion by-products in any concentrations likely to be encountered in any combustion process *(Dilution, thermal conversion & scrubbing. Use of AF for analysis instead of AA)*
- Unaffected by particulate matter in sample stream *(Use of inertial filter and automated blowback)*
- No chemical reagents required *(Combination of dilution, unique thermal converter, and scrubber design)*
- Rapid response time to changes in concentration *(Dilution at sampling point, high flow rate delivery to conditioner, low dead volume scrubber)*
- Freedom from speciation artefacts *(Coated inertial filter and probe material, precise temperature control of all elements in sampling path, rapid delivery of diluted sample through heated sample line)*
- Advanced QA/QC. Automatic through-probe single or multi-point calibrations, standard additions (spikes) and filter blowbacks.
- High reliability. The system can operate unattended for extended periods.

Applications

- Coal fired power plants
- Waste incinerators
- Other industrial sources
- Speciation studies
- Bench scale testing
- Mercury removal process monitoring

Sampling Probe

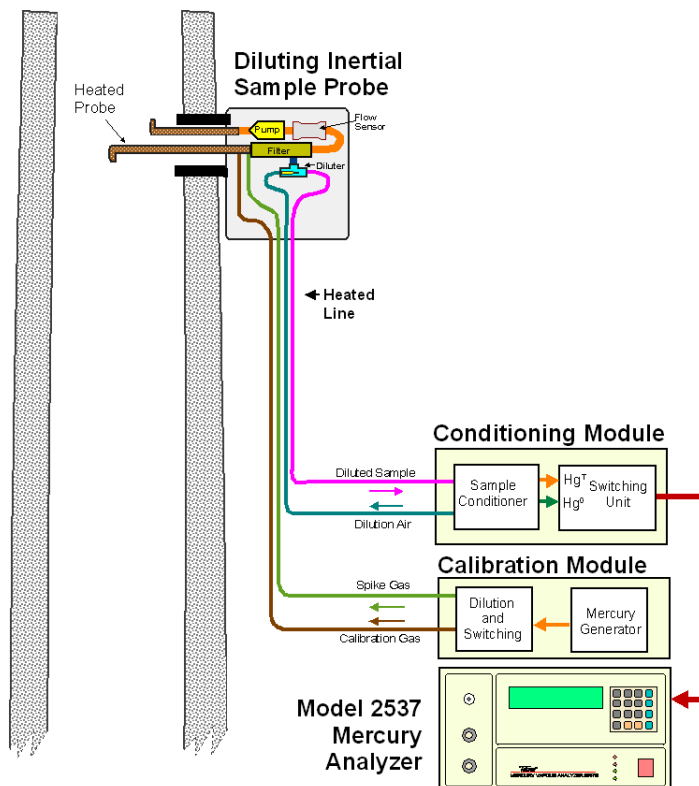
The *Series 3300* CEM system uses a stack mounted high flow rate inertial probe to minimize mercury measurement artefacts due to filtering. The sample is then diluted and sent at a high rate through a heated line to a conditioning module. The probe is capable of performing automated filter blowback, multi-point calibrations, and standard additions of mercury into the sample matrix. Probe temperatures, flow rates and pressures are monitored and telemetered to the system controller via a datacom link.

Conditioner

The conditioning module speciates the mercury into elemental and ionic (water soluble) forms. It does not use chemical reagents or solid sorbents.

The diluted sample is split into two streams. In the first stream, a thermal conditioner unit converts all mercury forms present in the sample into elemental form. Recombination is avoided by the quantitative removal of HCl and other gases by Tekran's patented thermal conditioner/scrubber system.

The second pathway removes ionic (water soluble) mercury, leaving only the elemental mercury to pass through to the converter. This stream is then subjected to additional conditioning to remove acid gases and excess humidity from the sample. Ionic mercury is determined by difference.



Mercury Analyzer

The two conditioned streams are analyzed using a Tekran *Model 2537* mercury vapor analyzer. This analyzer is in wide use all over the world and has demonstrated its accuracy, stability and reliability under the most remote and rugged conditions imaginable. The analyzer uses gold preconcentration combined with atomic fluorescence detection. Atomic fluorescence has a wide range of advantages over older atomic absorption technologies.

Calibrator

A calibration source allows both multi-point calibrations and standard additions to be automatically initiated. Both these operations are performed through the entire CEM path, including all probe filters. The calibration unit generates concentrations of mercury by using a NIST traceable temperature controlled saturated mercury vapor source. Precision mass flow controllers are used to dilute the output of this source to the desired value. The unit is capable of continuously generating large flow rates of calibration gas at no ongoing cost - unlike expensive mercury calibration gas cylinders.

Control System

The computer provides full control of each module within the system. Industry standard MODBUS-RTU protocol is used to monitor and control each unit. All temperatures, flows and pressures are displayed by the application program and may be set by authorized users. The system features remote operation and problem diagnosis, either via a modem and telephone line or through the Internet.