

Model 1130 Mercury Speciation Unit (Patented)

Rev. 041514

Overview

The **Tekran® Model 1130 Mercury Speciation Unit** allows the **Model 2537 Mercury Vapor Analyzer** to simultaneously monitor both *elemental* and *reactive gaseous mercury* (RGM) species in ambient air. Although the majority of atmospheric mercury is present in elemental form, differentiation is important due to the greater local impact of reactive (ionic) forms. (Reactive mercury has much higher wet and dry deposition rates than does elemental.) Speciation is of particular interest close to industrial sources such as waste incinerators which may discharge the majority of their mercury emissions in ionic (Hg^{2+}) form, in particular mercuric chloride. (HgCl_2)



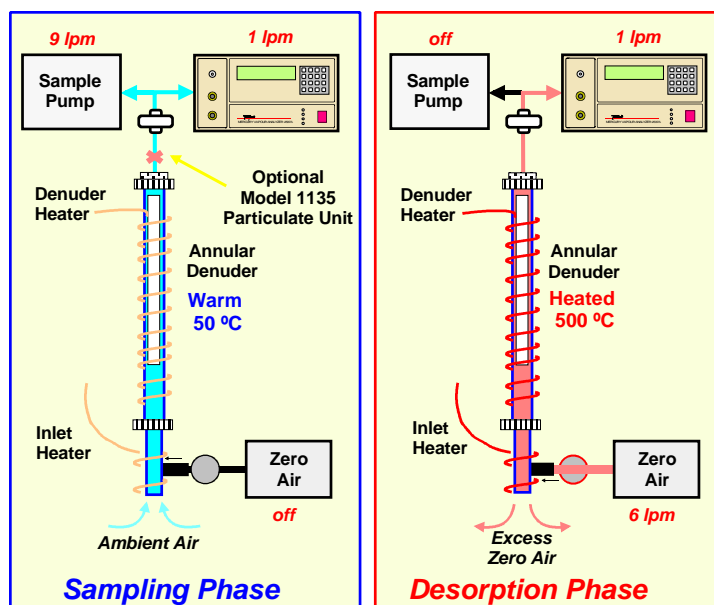
System Expansion

The system is capable of operating in conjunction with the **Model 1135 Particulate Mercury Unit**. This module mounts directly above the **Model 1130** and provides the additional ability to measure fine fraction (< 2.5 micron) *particulate bound* mercury simultaneously with the *elemental* and *reactive* forms.

The **Model 1130** generates mercury free air (Zero Air) for use in the system by passing ambient air through a series of mercury scrubbing filters. Recent research has demonstrated that the moisture in the air can have a negative impact on zero air quality and overall instrument performance. To overcome this issue, Tekran developed the **Model 1102 Air Dryer** to supply the Zero Air generation system with a constant supply of moisture-free air.

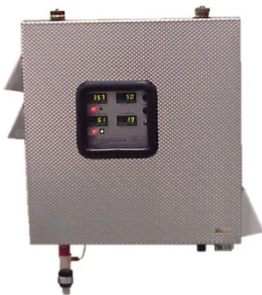
Principles of Operation

The **Model 1130** uses a process developed and patented by Tekran. A specially coated annular denuder captures reactive mercury while allowing elemental mercury to pass through. During the sampling (adsorption) phase, the **Model 2537** provides real time measurement of *elemental* mercury. During the analysis (desorption) phase, the denuder is flooded with Zero Air and heated. The captured reactive mercury is thermally desorbed and reduced to elemental form. The **Model 2537** detects this eluted mercury, providing a measurement of total *reactive* mercury captured during the previous sampling period. The desorption process also regenerates the denuder coating. After cooling, the denuder is ready for another cycle. All timing parameters on the **Model 1130** are programmable, allowing automatic RGM readings to be taken at user specified intervals. (From 30 minutes to 6 hours)



Denuder Module

The denuder module is located out of doors, eliminating the problems inherent in transporting reactive mercury. The module is insulated and temperature controlled to allow stable year round operation.



Heated Line

A heated line is used to minimize losses while carrying sample air and zero air between the various system components. The heated line also eliminates potential for condensation in the line and keeps the sample line clean by preventing surface adsorption of organic compounds present in ambient air.

Annular Denuder

The regenerable annular denuder can be periodically recoated, as required. Field replacement of the denuder is simple and does not require tools. The denuder can be rinsed using deionized water and recoated in the field. Alternatively, additional denuders may be supplied with the sampler to allow exchange in the field with subsequent recoating in your lab.

Pump Module

The pump module generates the additional flow required to increase loadings on the denuder. A closed loop controller using a pump and mass flow meter guarantees accurate flow rates. The



same pump and MFM combination is used during the analysis phase to generate the zero air required for desorption. The pump module also provides the zero air required by the instrument during CLEAN and CALIBRATION cycles, thereby eliminating the need for a separate pressurized zero air cylinder and regulator.

Controller

The control unit allows timed and event driven control of the various instrument functions required for the **Model 1130**. It is fully synchronized with the operations of the **Model 2537** analyzer. All **Model 1130** sample and desorb cycle timings are fully programmable. **Model 2537** routine calibrations are initiated by this unit to ensure that calibrations do not disrupt desorption operations. The control module is also capable of managing the analysis sequence of the **Model 1135** particulate unit.