ultra-trace mercury analysis
The most sensitive mercury system available today.

The Tekran® Series 2600 offers unparalleled performance and flexibility for those who require truly sensitive total mercury analysis. The system can implement a wide range of different analytical techniques, depending on the requirements of your particular application. Unlike conventional systems, the Series 2600 is available in a wide range of configurations, with options to suit your budget. The system can perform virtually any type of ultra-trace total mercury analysis. The Series 2600 allows easy migration from a starter system to a fully automated, high throughput configuration.

**Highlights**

- Sensitivity measured in parts per quadrillion. Typical MDL: <0.05 ppt¹
- Atomic Fluorescence based: Greater sensitivity, selectivity and dynamic range than AA based systems
- Unprecedented modularity and flexibility

**Typical Applications**

**Total Mercury in Liquids**

- Automated analysis of aqueous samples
  - Dual stage gold preconcentration
  - Single stage gold preconcentration
  - Direct reading
- May be used with stannous chloride or sodium borohydride reductant

**Mercury in Gases**

- Automated analysis of adsorbent sample cartridges using dual stage preconcentration with thermal desorption

**Typical Full Flow Diagram**

Automated liquid analysis using dual stage gold preconcentration.

(US EPA Method 1631)

¹ Dual stage preconcentration. Analysis conducted in clean room with controlled blanks. Sample aliquot: 30 ml.
The combination of dual stage preconcentration and atomic fluorescence detection provides the most sensitive, selective and resilient mercury analysis available today. After passing through the gas/liquid phase separator, the carrier gas is passed through a desiccant dryer and on to a gold coated sample collection cartridge. This cartridge is then thermally desorbed onto an analytical gold trap. This dual stage preconcentration method eliminates virtually all interfering compounds, ensuring excellent analytical results.

The solenoid valve V2 ensures precise loading of the first cartridge. Valve V1 vents effluent during loading, eliminating contamination of downstream components.

Peak obtained from 0.5 ppt standard using gold preconcentration.

The Model 2600, without any of the liquid handling components, can be used for gas analysis. Sample cartridges are inserted and the entire thermal desorption process is performed automatically. The arrangement shown is optimized for gas analysis and allows the field cartridge to be changed while the analytical trap is still being analysed.

The solenoids vent cartridge effluent during preheating to eliminate downstream contamination.

Peak from gas sample with 1.7 ng/m³ of mercury (50 L integrated sample).
Preconcentrator / Detector

The Tekran® Model 2600 is the most sensitive and flexible atomic fluorescence mercury analytical unit available today. The wide range of options available allows a system to be configured to suit virtually any application and budget.

**Ultra-Sensitive Atomic Fluorescence Detector**
- Based on the Tekran tried and proven Cold Vapor Atomic Fluorescence Spectrophotometer (CVAFS) elemental mercury detector
- Very high sensitivity, (MDL < 0.1 pg)
- Wide dynamic range (>10^5)
- Inherently linear
- Superior selectivity

**Full Featured Dual Stage Preconcentrator**
- Individual cooling fans for rapid cycle times
- Continuously variable heater power prevents condensation and allows precleaning of cartridges
- Heating stations can be populated with virtually any type of preconcentration cartridge:
  - Pure gold, gold coated sand, coated silica-gel, coated glass beads, etc.

**Multiple Scrubber / Dryer Options**
- Desiccant dryer/acid gas scrubber cartridge (eg: sodalime)
- Perma Pure® diffusion dryer

**Flow Control Solenoid Valves**
- Multi-function all Teflon solenoid valves:
  - Provide precise analytical loadings
  - Ensure clean sample is sent to the detector by venting flows during preclean operations
  - Separate flow paths to allow overlapped adsorption and desorption operations
- Only the gas phase is switched by the solenoids
  - Eliminates contamination and carry over problems inherent in switching liquid sample streams
- Prevents valve damage caused by crystallization of reductant within valve body

**Hi-Resolution Data Capture**
- 24 bit A/D convertor ensures accurate measurement of both large and small peaks

**Flexible Flow Path Configuration**
- All flow path components are made of Teflon®.
- Convenient push-on fittings allow easy component replacement and flow path changes.

**Mass Flow Controller**
- Optional precision mass flow controller may be used to set critical analytical flows
- Flow rates may be automatically programmed over the course of each analysis

**Ball Flow Controllers**
- Up to three ball meters with manual adjustment valves may be configured on the front panel
- Interchangeable tube sets allow full scale flows of 50, 100, 200, or 500 ml/min, 1, 2 or 5 l/min

**Communications**
- All system functions (including the autosampler) are performed through a single serial port
- A notebook PC may serve as the controller for portable applications

**External Event Control**
- Two opto-isolated external outputs can control external equipment

**High Efficiency Phase Separator**
- Removable center rod for easy cleaning
- Low dead volume
- High efficiency

**Model 2600 Modularity**

- Low cost version for use with external Model 2500 detector
- Full configuration with internal AF detector, mass flow controller, and two ball flowmeters
- Version with internal detector and two ball flowmeters (no MFC)
Peristaltic Pump Module

The addition of the Model 2610 Pump Module creates a complete atomic fluorescence analyzer for mercury in aqueous samples. This combination allows you to analyze background levels in virtually any type of liquid sample. The Pump Module fits directly beneath the Model 2600 and the two together require only 9” of bench space.

Wash Pump
- Provides continuous source of DI water for the wash station on the Automatic Sample Changer
- Two channel peristaltic, fixed speed
- Automatic shutoff after run is complete

Automatic Sample Changer

The Model 2620 Automatic Sample Changer (Auto Sampler), is a practical, cost effective solution for laboratories with large numbers of samples to run. The addition of our Tekran-MDS data handling system creates a fully automated, high throughput mercury analysis system. For the first time, users have the ability to accurately perform ultra-trace mercury analysis in the parts per quadrillion range, without user intervention.

Easy Integration
- Connects directly to the Model 2600
- Does not require a second serial port on your PC

Wash Station
- Glass recirculating wash station provides continuous rinsing of sample probe
- Provides clean deionized water for system flushing between samples
- May be operated in either recirculating or single pass mode

Racks
- Auto sampler holds up to four individual rack modules
- Usable with a wide range of industry standard rack types
- Different rack types may be mixed within a single run
- Two typical rack types are shown below.

<table>
<thead>
<tr>
<th>Rack code</th>
<th>Positions per rack</th>
<th>Total positions</th>
<th>Volume (ml)</th>
<th>Material</th>
</tr>
</thead>
<tbody>
<tr>
<td>22</td>
<td>44</td>
<td>176</td>
<td>30</td>
<td>Borosilicate glass</td>
</tr>
<tr>
<td>112</td>
<td>12</td>
<td>48</td>
<td>60</td>
<td>Teflon</td>
</tr>
</tbody>
</table>

Control Software

The Tekran Mercury Data System (Tekran-MDS) is a full featured Windows® based application that provides all control, display and data reduction functions for the system.

Simple Data Entry
- Samples and standards are entered into a run worksheet. Detailed information for each sample is available in a single sample spreadsheet.

Fully Programmable Sample Cycle
- Convenient editor allows full user control of analytical cycle, including:
  - Pump speed, carrier flow rate, wash pump, solenoid activations, heater power levels, cooling fans, peak acquisition, autosampler operations

Peak Integration
- Detector output for each run is automatically captured and integrated
- Manual reintegration is possible using graphical user interface

Calibration
- Multi-point least squares fit
- Variety of curve fitting options
- Export of analytical results to your own QA/QC packages or LIMS

Reporting
- Report formats may be user configured
- Easy export to other applications
### Series 2600

**SPECIFICATIONS**

<table>
<thead>
<tr>
<th>Model 2600</th>
<th>Control Unit</th>
<th>Model 2610</th>
<th>Pump Module</th>
<th>Model 2620</th>
<th>Automatic Sampler</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Detector</strong></td>
<td></td>
<td><strong>Main Pump</strong></td>
<td></td>
<td><strong>Sampler Unit</strong></td>
<td></td>
</tr>
<tr>
<td>Type: Atomic fluorescence, 253.7 nm</td>
<td></td>
<td>Type: 5 channel peristaltic</td>
<td></td>
<td>Type: XYZ 3 axis with four stationary rack modules</td>
<td></td>
</tr>
<tr>
<td>Sensitivity: &lt; 0.1 pg</td>
<td></td>
<td>Speed: 0 - 200 rpm</td>
<td></td>
<td>Capacity: Code 112 - 48 positions (60 ml)</td>
<td></td>
</tr>
<tr>
<td>Warm up Time: &lt; 10 min</td>
<td></td>
<td>Regulation: closed loop optical tachometer</td>
<td></td>
<td>Code 22 - 176 positions (30 ml)</td>
<td></td>
</tr>
<tr>
<td><strong>Preconcentrator</strong></td>
<td></td>
<td>Control: local or computer (continuously variable)</td>
<td></td>
<td>(Other rack and tube types available)</td>
<td></td>
</tr>
<tr>
<td><strong>Flow Regulation</strong></td>
<td></td>
<td><strong>Wash Pump</strong></td>
<td></td>
<td><strong>Positioning</strong></td>
<td></td>
</tr>
<tr>
<td>Mass Flow Meter: 1 max.</td>
<td></td>
<td>Type: 2 channel peristaltic</td>
<td></td>
<td>Accuracy: +/- 1 mm in XYZ dimensions</td>
<td></td>
</tr>
<tr>
<td>Ball Flow Meter: 3 max.</td>
<td></td>
<td>Speed: 100 rpm, fixed</td>
<td></td>
<td>Repeatability: +/- 0.25 mm in XYZ dimensions</td>
<td></td>
</tr>
<tr>
<td><strong>Dimensions</strong></td>
<td></td>
<td>Control: local or computer</td>
<td></td>
<td><strong>Working Area</strong></td>
<td></td>
</tr>
<tr>
<td>Width: 9” (230 mm)</td>
<td></td>
<td></td>
<td></td>
<td>X: 13” (33 cm); Y: 9.5” (24.1 cm)</td>
<td></td>
</tr>
<tr>
<td>Height: 12” (300 mm)</td>
<td></td>
<td></td>
<td></td>
<td><strong>Dimensions</strong></td>
<td></td>
</tr>
<tr>
<td>Depth: 17” (430 mm)</td>
<td></td>
<td></td>
<td></td>
<td>Width: 21” (535 mm)</td>
<td></td>
</tr>
<tr>
<td><strong>Weight</strong></td>
<td></td>
<td></td>
<td></td>
<td>Depth: 17” (430 mm)</td>
<td></td>
</tr>
<tr>
<td>Instrument: 30 lb (14 kg)</td>
<td></td>
<td></td>
<td></td>
<td>Height: 14.6” (371 mm)</td>
<td></td>
</tr>
<tr>
<td>Shipping: 45 lb (20 kg)</td>
<td></td>
<td></td>
<td></td>
<td>Height with arm: 22” (560 mm)</td>
<td></td>
</tr>
<tr>
<td><strong>Power Requirements</strong></td>
<td></td>
<td></td>
<td></td>
<td><strong>Weight</strong></td>
<td></td>
</tr>
<tr>
<td>100-120, 220-240 VAC, 50-60 Hz., 200 VA max.</td>
<td></td>
<td></td>
<td></td>
<td>Instrument: 38 lb (17 kg)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Shipping: 49 lb (22 kg)</td>
<td></td>
</tr>
</tbody>
</table>

**Model 2610**

**Pump Module**

- **Main Pump**
  - Type: 5 channel peristaltic
  - Speed: 0 - 200 rpm
  - Regulation: closed loop optical tachometer
  - Control: local or computer (continuously variable)

**Model 2620**

**Automatic Sampler**

- **Sampler Unit**
  - Type: XYZ 3 axis with four stationary rack modules
  - Capacity: Code 112 - 48 positions (60 ml)
  - Code 22 - 176 positions (30 ml)
  - (Other rack and tube types available)
  - Control: Serial RS-232.
  - Probe Rinse: Dedicated recirculating DI water rinse station.
  - Arm Speed: X: 25.15 cm/sec; Y: 25.25 cm/sec; Z: 2.0, 3.0, 6.2, 12.7, or 24.7 cm/sec

**Positioning**

- Accuracy: +/- 1 mm in XYZ dimensions
- Repeatability: +/- 0.25 mm in XYZ dimensions

**Working Area**

- X: 13” (33 cm); Y: 9.5” (24.1 cm)

**Dimensions**

- Width: 21” (535 mm)
- Depth: 17” (430 mm)
- Height: 14.6” (371 mm)
- Height with arm: 22” (560 mm)

**Weight**

- Instrument: 38 lb (17 kg)
- Shipping: 49 lb (22 kg)

**Power Requirements**

- 100-120, 220-240 VAC, 50-60 Hz., 75 VA max.

_Fore more information contact:_

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