

Thermo Scientific Mercury Freedom System

Complete, integrated mercury emissions monitoring solution

The Thermo Scientific™ Mercury Freedom System offers high measurement sensitivity, fast response times and robust operation in harsh environments.

- TUV Approved* in accordance with EN15267-1, EN15267-2, EN15267-3 and EN14181 requirements
- Complete integrated solution comprised of an analyzer, calibrator, probe controller, probe/converter and umbilical (sample lines)
- iSeries platform advantages provide ease of use and extensive diagnostics Large, installed base; 500+ systems installed globally

* TUV approved for 0-30 ug/m³ range for power and incinerators in Europe.

Complete Integrated Solution

The Thermo Scientific Mercury Freedom System is a complete, integrated solution that includes a probe and internal converter at the stack, plus control, analysis, and calibration modules.

The simple design results in maximum ease of use, operating costs, high reliability, and easy maintenance.



iSeries Platform Advantage

The Mercury Freedom System offers an easy to use, highly reliable interface and all iSeries components are easily accessible for maintenance or quick change-out.

Model 80i Mercury Analyzer

- Advanced cold vapor atomic fluorescence analysis
- Detection limits down to 1 ng/m³ allow high sample dilution (typically 40:1) reducing moisture and heat requirements.

Model 81i Mercury Calibrators

- Vapor generator (elemental mercury) performs standard calibration upstream of the inertial filter.
- Peltier cooler vapor pressure control and mass flow control regulate mercury output for maximum accuracy.

Model 82i Probe Controller

- Connects to probe through an umbilical
- Automates and controls key system functions

Model 83i Probe

- Consists of a dilution probe and proprietary dry Hg converter

- Specifically designed to dilute and transport mercury emissions from environments with high dust, temperature and moisture
- Automated blow-back clears the filter for trouble-free continuous operation
- Includes mercuric chloride generator to perform system integrity tests

Model 84i Hg Permeation Source

- Supplies a repeatable concentration of elemental mercury generated from a permeation device
- Confirms the reliability of the Model 81i Mercury Calibrator output in accord with EPA requirements

Rack Cabinet with HVAC

- 19" rack cabinet with front/back doors
- IP 55 Standard 42 U height:..... 2000 mm
- Width:..... 600 mm
- Depth:..... 1000 mm
- Standard weight:860 lbs /390 kg

* Includes all internal components
(Rack cabinet not shown in photo.)



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| Measured component | Hg ^T (total mercury) and/or Hg ⁰ (elemental mercury) |
| Available speciation | Hg ⁰ , Hg ⁺ and Hg ^T (elemental, ionic and total mercury) |
| Measuring Principle | CVAF (Cold Vapor Atomic Fluorescence) |
| Certification Range | 81i L 0-1-2-5-10-20 ug/m ³ 81i Standard 0-5 -10-20-30-40 ug/m ³ 81i H 0-20-30-50-300 ug/m ³ |
| Detection limit | 0.11 µg/m ³ |
| Zero drift | < 3% of upper limit of certification range/month |
| Span drift | < 3% of upper limit of certification range/month |
| Response time | < 200 s (90% FS) |
| Operating temperature | |
| Probe | 20 °C – +50 °C |
| Cabinet | +15 °C – +40 °C |
| Enclosure rating | |
| Probe | IP66 (outdoor) |
| Cabinet | IP41 (indoor) |
| Dimensions | |
| Probe | 480 × 820 × 220 mm (hwd) (without stinger) |
| Cabinet | 1,778 × 711 × 914 mm (hwd) |
| Weight | |
| Probe | 75 kg (with stinger) |
| Cabinet | 200 kg |
| Utilities required | |
| Power | 3,600 Watt (including 10 meter sample line) 220 VAC & 120 VAC (North America) 230 VAC (International) |
| Instrument air | 6.8 m ³ /hr @ 6 barg |
| Certification | EN15267-1, EN15267-2, EN15267-3, EN14181 (in accordance with IED 2010/75/EU and 13 and 17 BlmSchV) |
| Electrical safety | CE |
| Calibration | Internal vapor generator for elemental mercury (model 81i) |

Probe with Inertial Filter

A high-velocity gas flow (20 to 30 m/s) will develop axially through the porous filter tube. A clean sample flow will develop radially through the porous tube wall at a very low face velocity (0.015 m/s), passing into the housing annulus and out the sample tube. The high flow inertial filter developed for this probe has proven to work in tough stack and process environments.

Dry Hg Converter in Stack

Operating at 760 °C, the converter disassociates the salts and oxides of mercury to give elemental mercury. This, along with the elemental mercury already passing through, gives the total mercury of the sample. No wet chemistry or water supply required.

Direct Measurement CVAF

The Model 80i Analyzer is based on the principle that Hg atoms absorb ultraviolet (UV) light at 254 nm, become excited, then decay back to the ground energy state, emitting (fluorescing) UV light at the same wavelength. CVAF is a measuring principle with high sensitivity and no cross-sensitivity from SO₂.

Low Temperature Sample Line

As oxides of mercury are already converted into elemental mercury in the probe only elemental mercury is transported in the Hg^T line (total mercury line). Sample transport occurs at a very low pressure of 0.1 bar with a dilution ratio typically 40:1. Extensive testing has proven that a temperature of 70 °C is sufficient for sample transport without any issues.

Speciation of Hg⁰ and Hg^T

The Mercury Freedom system has the capability to measure both Hg⁰ and Hg^T individually, which is essential for optimal Process Control.

To maintain optimal product performance, you need immediate access to experts worldwide, as well as priority status when your air quality equipment needs repair or replacement. We offer comprehensive, flexible support solutions for all phases of the product life cycle. Through predictable, fixed-cost pricing, our services help protect the return on investment and total cost of ownership of your Thermo Scientific air quality products.

For more information, visit our website at thermoscientific.com/mercury

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This product is manufactured in a plant whose quality management system is ISO 9001 certified.

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