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PRODUCT SPECIFICATIONS

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.

Features

- 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

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 80*i* Mercury Analyzer

- Advanced cold vapor atomic fluorescence analysis.
- Detection limits down to 1 ng/m^3 allow high sample dilution reducing moisture and heat requirements.

Model 81*i* Mercury Calibrators

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

Thermo Scientific™
Mercury Freedom System

Probe Controller

Available Options: Model 82*i* or 200LS Probe Controller

- Controller connects by an umbilical to the stack probe and mercury converter.
- Automates key system functions as well as confirming auto dilution.

Probe/Converter

Available options: Model 83*i*, 85 Probe or EPM 302 with converter

- Wet basis measurement using dilution extractive technology in a dilution probe combined with a proprietary dry converter.
- Specifically designed to monitor mercury emissions from environments with high dust, temperature and moisture.
- Automated blow-back clears the filter for trouble-free continuous operation.

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Thermo Scientific Mercury Freedom System

Specifications	
Measured component	Hg^T (total mercury) and/or Hg^0 (elemental mercury)
Available speciation	Hg^0, $Hg2^+$ and Hg^T (elemental, ionic and total mercury)
Measuring Principle	CVAF (Cold Vapor Atomic Fluorescence)
Certification Range	81*i* L 0-1-2-5-10-20 ug/m^3 81*i* Standard 0-5 -10-20-30-40 ug/m^3 81*i* H 0-20-30-50-300 ug/m^3
Detection limit	0.01 ug/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 Cabinet	 20°C – +50°C 5°C – 40°C
Enclosure rating Probe Cabinet	 IP66 (outdoor) IP41 (indoor)
Dimensions Probe Cabinet	 480 × 820 × 220 mm (hwd) (without stinger) 1,778 × 711 × 914 mm (hwd)
Weight Probe Cabinet	 75 kg (with stinger) 200 kg
Utilities required Power Instrument air	 3,600 Watt (including 10 meter sample line) 220 VAC & 120 VAC (North America) 230 VAC (International) 6.8 m^3/hr @ 6 bar
Electrical safety	CE
Calibration	Internal vapor generator for elemental mercury (model 81*i*)

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 products.

Fast Loop Probe and Inertial Filter with 83i
A high-velocity gas flow (20 to 30 m/s) will develop axially through the porous filter tube. From this mainstream flow, 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.

Dry Converter at Stack
Operating at 760 °C, the converter disassociates the salts and oxides of mercury to give elemental mercury. This, along with the elemental already passing through, gives the total mercury of the sample. Avoid potential loss of oxidized mercury in sample line. 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 SO_2.

Low temperature Sample Line
As oxides of mercury are already converted into elemental mercury in the probe only elemental mercury is transported. Sample transport occurs at very low pressure (0.1 bar), and samples are diluted at 30. Extensive testing has proven that a temperature of 70°C is sufficient for sample transport without any issues.

Speciation of Hg0 and Hg2$^+$
The Mercury Freedom system has the capability to measure besides HgT both Hg0 and Hg2$^+$ individually, which is essential for optimal Process Control.

Wet basis measurement
Dilution extractive technology means moisture does not need to be removed from the sample. The extracted sample passes consecutively through a filter, and a glass or quartz critical orifice before the sample effectively gets diluted with air. It works on low extraction flow rates, hence minimizes the complexity of the system with EPM 302, 83i or 85 Probe.

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