

# MERCURY SAMPLING EQUIPMENT

Sorbent Trap Monitoring Systems for mercury (STM) are designed for continuous dual sampling of vapor-phase mercury emissions from stationary combustion sources and are designed specifically to satisfy the US EPA mandated compliance for MATs reporting. All Apex mercury products are manufactured in accordance with the U.S. EPA MATS published in 40 CFR, Part 60 & 63, Appendix A, Subpart UUUU.

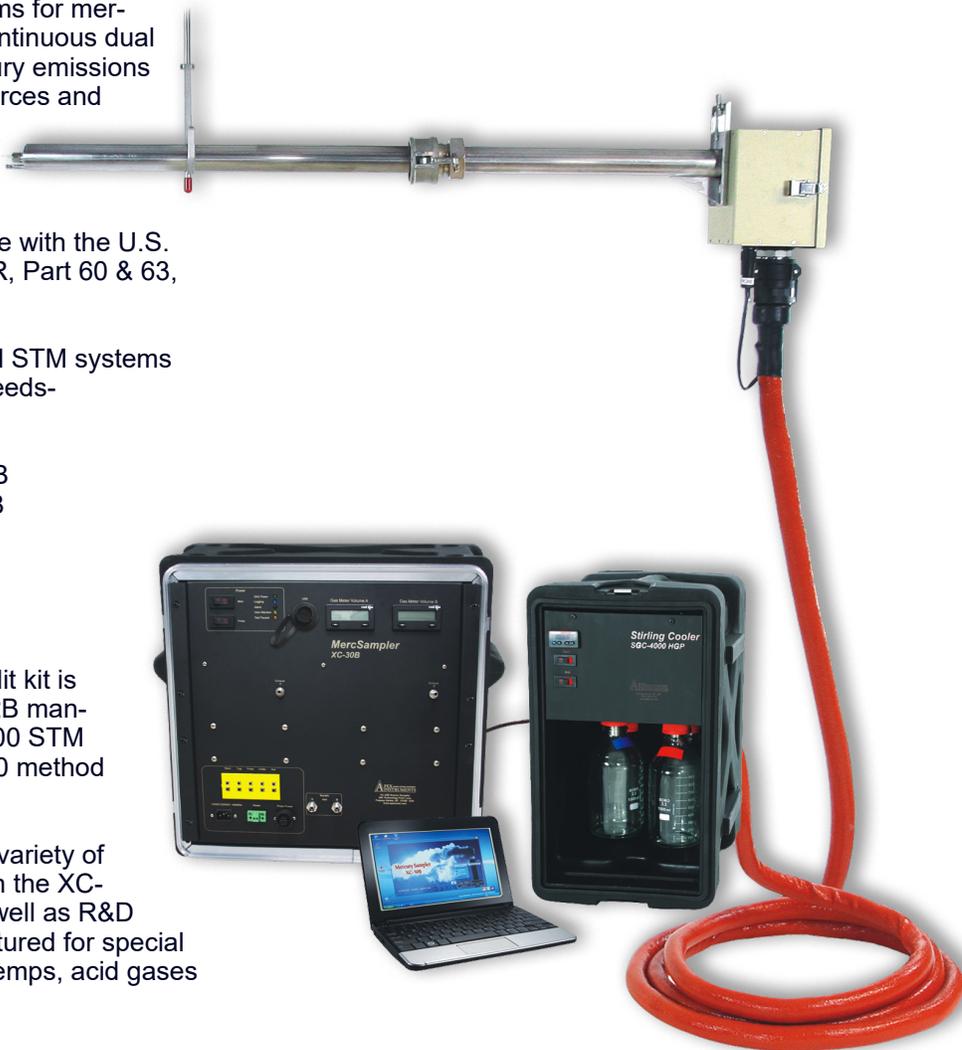
Apex Instruments offers several STM systems to meet your mercury testing needs-

**Automated STM Systems:**  
XC-6000EM for Method PS-12B  
STM-12B STM for Method -12B  
XC-30B STM for Method 30B

**Manual STM System:**  
XC-260 for Method 30B

The AK-STM-12B mercury Audit kit is manufactured to perform PS 12B mandated audits of both the XC-6000 STM system and the XC-30B/XC-260 method 30B RATA systems.

Apex Instruments also offers a variety of mercury sorbent traps for use in the XC-6000 and XC-30B systems as well as R&D traps. All traps can be manufactured for special stack conditions such as high temps, acid gases or wet stack applications.



## Method PS-12B



**XC-6000EM**

## Method 30B



**XC-30B**

## Sorbent Trap applications



**SORBENT TRAPS**

# MercSampler

## Sorbent Trap Monitoring System

The Automated STM-12B MercSampler for Sorbent Trap Monitoring Systems is designed for continuous dual sampling of vapor-phase mercury emissions from stationary combustion sources, in accordance with the U.S. EPA MATS published in 40 CFR, Part 60-63, Appendix A, Subpart UUUUU and Performance Specification 12B.



**Sorbent Traps**

**HVAC Unit**

**Stirling Gas Conditioner**

### Advantages of Sorbent Trap Monitoring

- Simple to Install and Operate
- Highly Accurate
- Very Low Detection Levels <math><0.5 \text{ ng/m}^3</math>
- Sample Captured Directly in the Stack
- Suitable for long term sampling
- NIST Traceable SRM for QA/QC
- No Calibration Gas Required
- Traps are Non-Hazardous, Easy to Ship to Lab

### MercSampler Firmware & Software

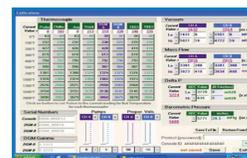
The MercSampler Automated Software works with a windows based platform and allows the operator to quickly set up test profiles, perform sample runs, sensor and gas meter calibrations, run quarterly audits and download test data at any time. The intuitive interface can be run from a local PC, Touch screen or remote network connection

The Apex Instruments engineered firmware has been designed to allow the unit to operate autonomously, while simultaneously receiving operating data from both analog and Modbus signal inputs.



#### Test Profile/ Configuration Set-up

Customize test setup with the user defined profiles and configurations.



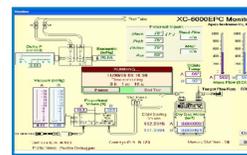
#### Calibration:

This application provides electronic documentation that is stored with each test run.



#### Leak Test:

Automated pre-test leak check with variable vacuum and an Automated post-test leak check.



#### Active Test Data:

Real-time Test Screen to see instantaneous data.



#### Alarm:

- Proportional Tolerance
- High Vacuum
- External Flow Signal Loss
- MODBUS Idle Time Out
- Thermocouple (Trap, Probe, Chiller)
- Return from Power Failure

For more information, contact us :

**Pacwill Environmental**  
905.563.9097

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## STM-12B MercSampler System Features:

### Heated Sample Probe



### Sample Lines

#### Sampling Unit

- Fully Automated Paired Sampling
- Proportional Flow Control
- Customer Configured Alarms
- Dual Gas Meters with Optical Encoders (1cc resolution)
- External Inputs: Stack Flow, Remote Pause, Moisture Analyzer

#### The Stirling cooler is a robust, closed, dual-channel gas conditioning system.

- Cools Gas to Constant Dew Point
- Removes Moisture & Acid Gases
- Uses Acid Scrubbing Sorbent

#### Heated Sample Probe

- Dual-Trap Probe
- Dual Zone Heater
- Insulated Junction Box
- Stack, Trap & Probe Thermocouples
- Hastelloy Alloy
- Cam-lock port connector

#### Heated Umbilical/Sample Line

- Heavy Duty, Lightweight
- Self-Regulated
- Replaceable Sample Lines
- Flexible, robust construction with High Temperature Jacket

#### Cabinets

- Powder Coated Aluminum
- Easy Access Doors
- Durable Compact Design
- Optional Heating & Cooling System

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## Mercury Sorbent Trap Sampling Unit

The **Apex Instruments STM-12B MercSampler** simplifies most sampling requirements by automating data acquisition, sample flow adjustments, leak checks, calculations, temperature control, and calibrations. Data is easily transferred to a Microsoft Windows based PC through Ethernet, USB or an optional Wireless Interface. The STM-12B MercSampler™ captures all data necessary for paired sorbent trap sampling in accordance with PS 12B. The sample flow rate is controlled proportionally to the stack flow rate and determines the standardized volume extracted through each sorbent trap. To collect the samples, two diaphragm vacuum pumps which work with the proportional valves and mass flow sensors, pull the samples through sorbent traps.



Sampling unit available with either a touch screen interface or Gas meter digital display. Both options have ethernet connectivity to a laptop and /or site DAS system connectivity through modbus

Condensation bottles that collect knockout moisture from the stack sample allows for accurate Method 4 to be performed without additional testing

### Specifications

#### Dry Gas Meters:

- Positive displacement type.
- 0.7 liter per revolution.
- Optical encoder sensor with quadrature pulse output.
- 8 digit LCD Display, 2 cc resolution.

#### Sample Pumps:

- BTC Diaphragm, Brushless Motor - 12 VDC, 20" Hg Vacuum, 10,000 hour MTBF, 3900 RPM, Max. PSIG 24".

#### Sample Flow Control:

- Stainless steel sample manifolds fitted with mass flow sensors, vacuum sensors, and proportional valves.
- Proportional or constant flow sampling.
- Mass Air Flow: proportional flow control, 100 to 2000 ccm, port style, manifold mount.
- Proportional Valve: Voltage Sensitive Orifice (VSO), 12 VDC.

#### Data Acquisition Control Board (DAC):

- Enhanced Flash 16 bit RISC based microcontrollers; main and Digital Signal Processing (DS). Real time clock with auto backup and write protection to external SRAM.
- High Speed 14bit A/D convertor with parallel DSP interface.
- SD Memory Card for data storage – stores up to 99 tests (30 day test runs). Embedded Ethernet Port with full TCP/IP Protocol and 256 bit encryption.

#### Thermocouple Multiplexer:

- Accepts Type K Thermocouple inputs; input protection includes gas discharge tubes for ESD and surge protection.
- 11 Pic Microcontrollers, 1 for each channel and MUX circuitry
- MUX Circuitry to receive multiple inputs and transmit selected output.
- 10 microcontrollers, one for each optically isolated channel.

#### Integrated Temperature Control:

- Designed into DAC for probe/trap heat control output via 25 amp SSR.

**Barometric Pressure:** 600 to 1100 mbar, 17.7 to 32.4"Hg, temperature compensated, amplified output.

**Vacuum:** 0 to 30" Hg, 0 to 101 kPa, 2% accuracy.

#### Communications:

- PC user interface via Ethernet, USB, or optional wireless router
- Remote access and control via onboard configurable router to owners Network Computer.
- TCP/IP MODBUS (ASCII or RTU) Communications to the DAHS.
- Interface to DAHS system via TCP/IP Modbus.

**Dimensions:** HxWxD 40" x 24" x 14.5"  
(35.6 cm x 48.3 cm x 39.4 cm).

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HVAC unit offers protection for electronic components against extreme ambient temperatures



NEW THINNER DESIGN for easier installation and wall mounting applications. Only 14.5" deep



NEMA enclosure to protect against environmental elements

Optional Stand

Designed with easy access to internal components for field service and maintenance.

### The SGC-12B Cooler with Stirling Thermodynamic Technology

The SGC-12B integrated cooler provides a dry sample for the gas meters and simultaneously collects the condensate for determining the stack moisture content. (Method 4) This gas cooler uses an industrial grade super efficient Free Piston Stirling Cooler (FPSC) for chilling the gas to a constant dew point. The module is hermetically sealed in stainless steel casing allowing for fast and easy installation and service.



**Free Piston Stirling Cooler**  
Compact hermetically sealed unit

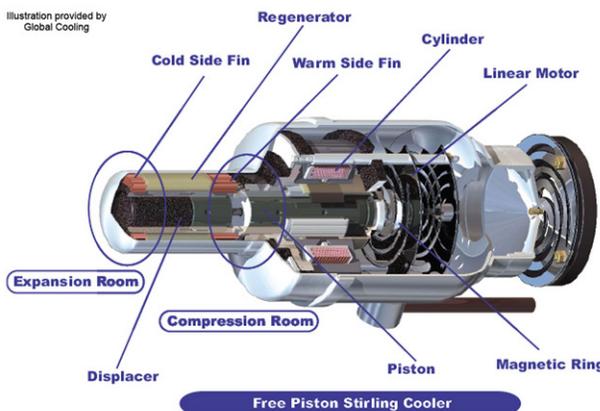
#### Features of the FPSC Stirling technology:

- Stirling thermodynamic cooling uses inert helium instead of refrigerants making them safer than tradition cooling technology
- Constant set temperature
- Integrated heater
- Free Piston Stirling Cooler (FPSC) technology has only two moving parts reducing the risk of failure
- Closed system, no condensate pump required. No refrigerant, eco friendly gas

#### Specifications

Digital Temperature Control:	+/- 1 °C, LED Display.
Cooling Capacity:	>40 watts
Condenser:	Hastelloy Alloy, 1" OD x 4" Active Zone Reverse Flow Anodized Aluminum.
Dual Path Cooling Block:	
Condensate Bottle:	1000 ml (plastic coated glass)
Acid Scrubber Cartridges:	2 each. ~750g Capacity.
Maximum Flow Rate:	2 lpm at 20% H <sub>2</sub> O Channel.
Freeze Protection:	80w Heater.

Illustration provided by Global Cooling



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## XC-6000EM MercSampler Sorbent Trap Sampling Console

The Apex Instruments XC-6000EM Merc-Sampler simplifies most sampling requirements by automating data acquisition, sample flow adjustments, leak checks, calculations, temperature control, and calibrations. Data is easily transferred to a Windows based PC through Ethernet and can be monitored remotely through modbus connectivity. The XC-6000EM MercSampler meter console captures all data necessary for paired sorbent trap sampling in accordance with PS 12B. The meter console controls the sample flow rate proportional to the stack flow rate and determines the standardized volume extracted through each sorbent trap. The XC-6000 firmware (embedded software) has been designed to utilize the technical features of the RISC based microchip microcontrollers which provide decision making as well as precise 'autonomous' control of the console while the laptop or PC is not connected.



XC-6000EM shown with SGC-4000HG in CR-20U cabinet

### XC-6000EM Console

Model	Description
XC-6000EM	120V/60Hz
XC-6000EMV	240V/50Hz

**Installation:** 19" Standard Rack Mount. Available 8U transport case, Shock Mount Rack or Weather Resistant Aluminum Cabinet Configurations.

### Features

- Customer-Friendly Software and Firmware
- Easy Data Export (Text and CSV files)
- Configurable System Alarms (Dry Contact Closure/Piezo Alert)
- Quarterly Audit Calibration Check (Optional Audit/Cal Kit)
- Remote Input for External Test Pause and Resume

### XC-6000EM Laptop

The MercSampler Console interfaces with Apex Intuitive software utilizing a Windows based PC / Laptop.



### Specifications

#### Dry Gas Meters:

- Model SK25EX series, positive displacement type.
- 0.7 liter per revolution.
- Optical encoder sensor with quadrature pulse output.
- 8 digit LCD Display, 2 cc resolution.

#### Sample Pumps:

- BTC Diaphragm, Brushless Motor - 12 Vdc, 20" Hg Vacuum, 10,000 hour MTBF, 3900 RPM, Max. PSIG 24".

#### Sample Flow Control:

- Stainless steel sample manifolds fitted with mass flow sensors, vacuum sensors, and proportional valves.
- Proportional or constant flow sampling.
- Mass Air Flow: proportional flow control, 100 to 2000 ccm, port style, manifold mount.
- Proportional Valve: Voltage Sensitive Orifice (VSO), 12 Vdc.

#### Data Acquisition Control Board (DAC):

- Enhanced Flash 16 bit RISC based microcontrollers; main and Digital Signal Processing (DS). Real time clock with auto backup and write protection to external SRAM.
- High Speed 14bit A/D convertor with parallel DSP interface.
- SD Memory Card for data storage – stores up to 99 tests (30 day test runs). Embedded Ethernet Port with full TCP/IP Protocol and 256 bit encryption.
- USB 2.0 Comm Input connection.

#### Thermocouple Multiplexer:

- Accepts Type K Thermocouple inputs; input protection includes gas discharge tubes for ESD and surge protection.
- 11 Pic Microcontrollers, 1 for each channel & MUX circuitry
- MUX Circuitry to receive multiple inputs and transmit selected output.
- 10 microcontrollers, one for each optically isolated channel.

#### Integrated Temperature Control:

- Designed into DAC for probe/trap heat control output via 25 amp SSR.

**Barometric Pressure:** 600 to 1100 mbar, 17.7 to 32.4"Hg, temperature compensated, amplified output.

**Vacuum:** 0 to 30" Hg, 0 to 101 kPa, 2% accuracy.

#### Communications:

- PC user interface via Ethernet
- Remote access and control via onboard configurable router to owners Network Computer.
- Optional TCP/IP MODBUS (ASCII or RTU) Communications to the DAS.
- Optional interface to DAS system via TCP/IP Modbus.

**Weight:** 34 lbs. (15.5 Kg).

**Dimensions:** HxWxD 14" x 19" x 15.5" (35.56 cm x 48.26 cm x 39.37 cm).

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