

Mercury

App K

APEX INSTRUMENTS, INC.

Appendix K Automated Mercury Source Sampler –
Model XC-6000EPC

Console Audit Manual

AUTOMATED MERCURY SOURCE SAMPLER

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XC-6000 Console Audit Quick Step Guide

This Quick Step Guide assumes the user is familiar with the Console Audit and XC-6000 Operations. Refer to the XC-6000 Operators Manual and this manual for details.

1. Prepare the XC-6000 for the audit by removing from the case, connecting lines etc.
2. Connect the AK-6000, or reference flow device (RFD), to the console and perform a 15 minute warm up.
3. Start the Console Audit application from the Config/Utils screen.
4. Enter Technicians name in the yellow box.
5. Enter the reference barometric pressure reading in the box and press next.
6. Enter model and serial number for the barometric and vacuum reference.
7. Connect AK-6000 to the XC-6000 Sample A in port. Close the Flow Control Valve by turning clockwise. Press Start Pump. Enter the Vacuum reading into the box. Press Next.
8. Connect AK-6000 to the XC-6000 Sample B in port. Close the Flow Control Valve by turning clockwise. Press Start Pump. Enter the Vacuum reading into the box. Press Next.
9. Enter the model and serial number of the thermometer.
10. Prepare ice bath and use thermometer to read temperature. Enter the temperature in the box.
11. Place both the DGM A & B TCs in the ice bath at the same time. When the temperature stabilizes press Next. Return the TCs to the DGMs.
12. Dip the end of the probe into the ice bath. When the temperature stabilizes press Next.
13. If using the AK-6000 check the box that says "Use Chiller Input for RFD temperature.
14. Connect the TC pig tail to the Chiller port on the back of the XC-6000 and place the end in the ice bath. When the temperature stabilizes press Next.
 - a. If using a Hardigg Storm Case, gray portable unit. Unplug the TC from the Chiller and plug it into the TC Y adapter. Plug the TC pigtail into the Y adapter. The male plug is not used. Place the TC pig tail in the ice bath. When the temperature stabilizes press Next.
15. Plug the TC from the AK-6000 into the chiller port on the back of the console.
 - a. If using a Hardigg Storm Case, gray portable unit. Unplug the TC pig tail from the Y adapter. Plug the TC from the AK-6000 into the TC Y adapter.
16. Enter the model and serial number for the AK-6000 or RFD in the box.
17. Connect the AK-6000 to the Sample A in port on the back of the XC-6000
18. Open the Flow Control by turning the valve counterclockwise. Press the Re-set button to zero the AK-6000 totalizer.
19. Enter the Gamma of the RFD, Flow rate and Volume to test. Enter starting value of RFD. Press Next.
20. When finished enter the ending value from the RFD and press Next.
21. Connect the AK-6000 to the Sample B in port on the back of the XC-6000. Press the Re-set button to zero the AK-6000 totalizer.
22. Enter the RFD starting value and press Next.
23. When finished enter the ending value and press Next.
24. Press the Print button and print, or create a PDF file, of the Audit Report.
25. Press Done to close the Console Audit application.

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XC-6000 Console Audit Procedure

This procedure assumes the user is familiar with the basic operation of the Apex Instruments MercSampler XC-6000. If necessary please refer to the XC-6000 User Manual for additional information on connections and operations.

This document, and screen shots in this manual, is based on version 90122-99 software and firmware. If your unit has an earlier version please contact Apex Instruments, Inc. to obtain the latest version.

Since the XC-6000 console will be open during the Console Audit procedure this is a good time to visually inspect the interior of the console and perform any software or firmware upgrades. The latest version can be obtained by calling Apex Instruments at (800)882-3214 or e-mail support@apexinst.com.

Equipment needed:

XC-6000 System including: Console, Gas Sample Conditioner, Probe and Sample Lines
PC / Laptop running Apex XC-6000 Console application
Printer or PDF Printer connected to the PC (PDF printer S/W located on the XC-6000 CD)
Communication cable (USB or Ethernet)

AK-6000 MercSampler Audit Kit

-or-

Barometer read in inches Hg. (NIST Traceable)

Thermometer read in deg. F (NIST Traceable)

Vacuum Gauge read in inches Hg.

Volumetric standard (wet test meter or dry gas meter) (NIST Traceable)

Thermocouple Pig Tail with male Type K connector

Thermocouple Y (2 Male and 1 Female) adaptor Type K

Ice / water bath (for verifying thermocouples)

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The AK-6000 MercSampler Audit kit includes:

Volumetric standard (15 point calibrated DGM with built in temperature output) (NIST Traceable)

Barometer read in inches Hg. (NIST Traceable)

Thermocouple Simulator

Digital Thermometer read in deg. F (NIST Traceable)

Vacuum Gauge read in inches Hg.

Thermocouple Pig Tail with male Type K connector and TC Y Adapter

Wide Mouth Vacuum Bottle for Ice / water bath (for verifying thermocouples)

Portable carrying case



Figure 1
Volumetric and Vacuum standard
DGM-SK25SRD



Figure 2
Barometric
Reference BAR-4198



Figure 3
Digital Thermometer DPT-168-NIST



Figure 4
Thermocouple Simulator
M5C-520



Figure 5
Wide Mouth Vacuum Bottle
AK-6TH16



Figure 6
TC Connectors
TCA-6YHG TCA-36HG

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Audit Setup:

Refer to the XC-6000 User Manual if needed. The manual is located on the PC hard drive in the folder C:\Apex Documentation or from the Main Screen of the XC-6000 application.

Depending on the type of enclosure the XC-6000 is mounted in it may be necessary to remove the XC-6000 from its enclosure.

Open the XC-6000 console by removing the screws from the top of the chassis.

Users with XC-6000 portable units (Hardigg Storm Case) gain access by turning the 2 release screws counter clockwise at the top of the front panel and swinging the panel down.

Connect the console, gas conditioner, and probe. Do not turn on the probe heater (switch on the front panel should be off), the Heated sample line (the AUX switch on the Gas conditioner front panel should be off) or the gas conditioner. Only connect the Stack thermocouple. Sample lines, pitot lines and other thermocouples do not need to be connected.

Collect the AK-6000 Audit kit, and ancillary items. Fill the Vacuum bottle with ice and water.

If this is a new AK-6000 Audit kit the Reference Barometer may need to be adjusted. See the section Set up and Calibration of Barometer.

The AK-6000 comes from the factory with a Quick Connect on the sample line. If the XC-6000 does not have Quick Connects on the Sample A and Sample B In ports remove the Quick Connect from the AK-6000 sample line, or temporarily install a Quick Connect on the Sample A & B In ports.

Power on the XC-6000 console and start the XC-6000 application on the PC.

Connect the PC to the console by pressing the "Connect" button on the XC-6000 Main screen.

Ensure that the XC-6000 Time and Date are correct and the clock is running.

Verify the Windows default printer is setup and available. Apex provides a PDF generator that can be used to create a PDF file of the Console Audit Results. This can be located in the c:\Apex Utilities directory.

Connect the AK-6000 to the XC-6000 Sample A in port. Make sure the AK-6000 flow control is in the open position by turning the Flow Control Knob fully counterclockwise.

Set up a 15 min constant flow rate test at a typical console flow rate to warm up the XC-6000 and AK-6000. Check the Bypass boxes on the Pre Leak Test screen, Set Probe screen and Post Leak Test screen as these are not needed for warm up.

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When the warm up is complete access the Config/Utils screen by pressing the button on the Main Screen.



Figure 7
XC-6000 Main Screen

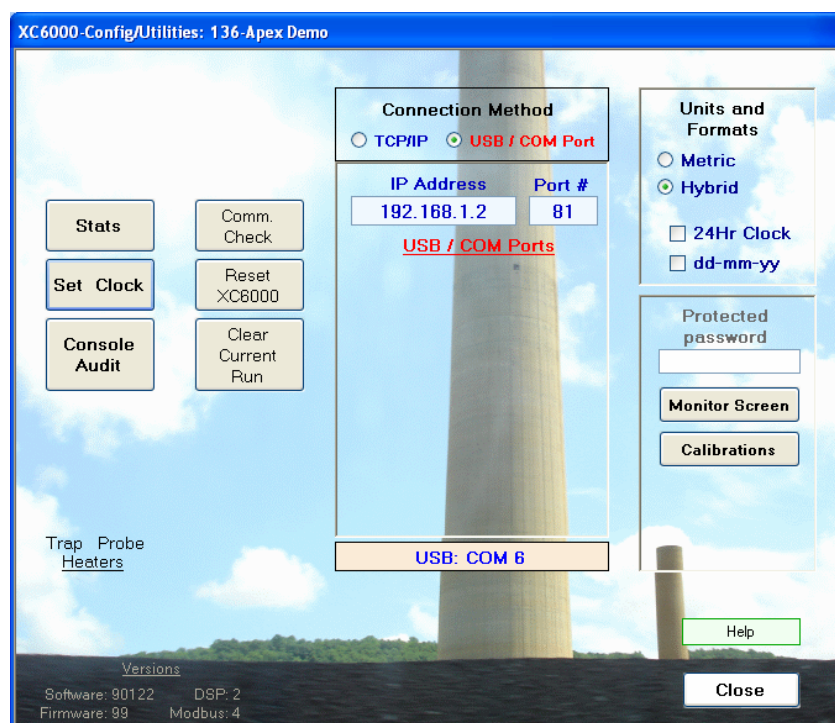


Figure 8
Config/Utils Screen

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Starting the Console Audit:

Prior to beginning the Console Audit the XC-6000 and the Reference Flow Device should be warmed up. Connect the sample line of the AK-6000, or Reference Flow Device, to the Sample A in line. Setup a test run for at least 15 minutes and let it complete (Pre and Post Leak Tests may be bypassed). See the XC-6000 Operators Manual for test setup if needed.

Open the Console Audit screen by pressing the "Console Audit" button on the left side of the Config / Utilities screen.

Enter the name of the auditor in the yellow text box.

XC6000 Audit - Console Sr# XC6KEPC-025

Audit By: **Apex Calibration Technician** Date: 07/12/08 Ver.:80711-94

Barometer (inHg)

Notes on Barometric Ref. and Vacuum Gauge Model/Serial #

*RFD - Reference Flow Device: this can be a Wet Test Meter or Certified Dry Gas Meter.

Figure 9
Console Audit Screen

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Barometric Pressure Test:

If the Barometric test fails the Console Audit will fail and must be re-run.

Enter the Barometric pressure from your traceable barometer in inHg, xx.xx, or mmHg if configured for Metric, and press the “Next” button.

If the Barometric test passes the following screen is displayed. Enter the information for your reference Barometer and vacuum device in the box provided.

The screenshot shows a software interface for an audit. At the top, it says "XC6000 Audit - Console Sr# XC6KEPC-025". Below this, there are fields for "Audit By:" (filled with "Apex Calibration Technician"), "Date:" (filled with "07/12/08"), and "Ver.:" (filled with "80711-94"). The main section has a light blue background. It displays "Barometer (inHg)" with a value of "29.75" and a status of "PASSED". To the right, it says "Vacuum (inHg) Reference" with a "Side A" button and a "Start Pump" button. Below this, there is a text box for "Notes on Barometric Ref. and Vacuum Gauge Model/Serial #". The notes contain: "Barometric reference BAR-DA833 SN 1234" and "Vacuum reference DGM-SK25SRD SN 1234". There are also "Side A" and "Side B" buttons. A red instruction box says: "Connect the Vacuum Gauge to the Sample_A_In port and press the [Start Pump] button to continue." At the bottom, there is a footer with a note: "*RFD - Reference Flow Device: this can be a Wet Test Meter or Certified Dry Gas Meter." and two buttons: "Print" and "Cancel Audit".

Figure 10
Barometric Test Pass

If the barometric test fails you may continue the Console Audit to determine if there are any other areas out of calibration or end the Console Audit and correct each item as they are discovered.

See the section How to correct Out of Tolerance or Failed sections in the Console Audit at the end of this document.

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Vacuum Sensor Test:

Connect the AK-6000 Audit Kit sample line, or your vacuum gauge, to the A Sample In port on the back of the XC-6000 Console. **Close the flow valve on the AK-6000 by turning clockwise.**

Press the “Start Pump” button and wait for the vacuum gauge to stabilize. Lightly tap the vacuum gauge to set reading. Enter the value into the Side A reference box and Press “Stop Pump”.

A message of PASSED or Out of Tolerance will be displayed.

Move the AK-6000 sample line, or vacuum gauge, to the B Sample In port on the back of the XC-6000 console.

Press the “Start Pump button” and wait for the vacuum gauge to stabilize. Lightly tap the vacuum gauge to set reading. Enter the value into the Side B reference box and Press “Stop Pump”.

A message of PASSED or Out of Tolerance will be displayed.

If Out of Tolerance you can continue the Console Audit. See the section at the end of this document on how to resolve Out of Tolerance or Failed Console Audit items.

Open the Flow Control on the front of the AK-6000 by turning counter-clockwise.

The screenshot displays the 'XC6000 Audit - Console Sr# XC6KEPC-025' interface. At the top, it shows 'Audit By: Apex Calibration Technician', 'Date: 07/12/08', and 'Ver.: 90711-94'. The main section is divided into two parts: 'Barometer (inHg)' and 'Vacuum (inHg)'. The 'Barometer' section shows a reading of 29.75, a reference of 29.76, and a status of 'PASSED'. The 'Vacuum' section shows readings for 'Side A' (20.5) and 'Side B' (21), both with reference values of 20.72 and 21.21 respectively, and both marked as 'PASSED'. Below these, there are sections for 'Thermocouples (F)' and 'Ice Bath Temperature'. The 'Thermocouples' section shows readings for 'DGM A' (84.4) and 'DGM B' (84.9), with a 'Next' button. The 'Ice Bath Temperature' section has a yellow box for 'Stack' and 'Chiller' temperatures. A red text box at the bottom provides instructions: 'Please remove the Thermocouples from both Dry Gas Meters (DGMs) and place them in the ice bath and wait for the temperatures to stabilize. Read the temperature on the reference thermometer and record it in the yellow text box, then press the [Next] button to continue.' At the very bottom, there is a footer with a note about the Reference Flow Device (RFD) and two buttons: 'Print' and 'Cancel Audit'.

XC6000 Audit - Console Sr# XC6KEPC-025			
Audit By: Apex Calibration Technician		Date: 07/12/08	Ver.: 90711-94
Barometer (inHg)	29.75	29.76	PASSED
Notes on Barometric Ref. and Vacuum Gauge Model/Serial #			
Barometric reference BAR-DA833 SN 1234			
Vacuum reference DGM-SK25SRD SN 1234			
Vacuum (inHg)	Reference	Console	
Side A	20.5	20.72	PASSED
Side B	21	21.21	PASSED
Thermocouples (F)		Ice Bath Temperature	
DGM A	84.4	Stack	Chiller
DGM B	84.9		
Next			
Thermometer Model/Serial # and Notes			
Please remove the Thermocouples from both Dry Gas Meters (DGMs) and place them in the ice bath and wait for the temperatures to stabilize. Read the temperature on the reference thermometer and record it in the yellow text box, then press the [Next] button to continue.			
*RFD - Reference Flow Device: this can be a Wet Test Meter or Certified Dry Gas Meter.			
		Print	Cancel Audit

Figure 11
Vacuum Sensor Test Passed

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Thermocouple Test:

Enter the information for the traceable thermometer in the space provided.

Prepare an Ice Water bath by filling the vacuum bottle with a mixture of ice and water. Use the traceable thermometer to measure the temperature of the ice bath and enter the value in the yellow box next to Ice Bath Temperature.

Remove the DGM thermocouples from the DGM fittings. Please note which thermocouple is removed from which meter. Users with XC-6000 portable units (Hardigg Storm Case) must pull the DGM thermocouple wires out the top wire grommet.



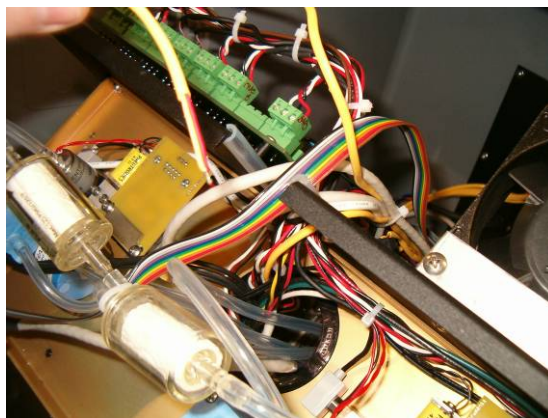
XC-6000 DGM Thermocouple



XC-6000 DGM Thermocouple Removed



XC-6000 Portable Case DGM Thermocouple



Portable Case DGM Thermocouple Removed

Place **BOTH** DGM thermocouples and the traceable thermometer in the ice bath. Watch the thermocouple readings on the audit screen until **BOTH** DGM temperatures stabilize. When the DGM temperatures have stabilized press the "Next" button.

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If the XC-6000 DGM thermocouples are within tolerance, the screen will show "PASSED". If the DGM thermocouples are out of tolerance a message box will be displayed and the screen will display "FAIL". Press the "OK" button to continue.

See the section at the end of this document on how to resolve Out of Tolerance or Failed Console Audit items.

Replace the DGM thermocouples into the DGMs taking care to place the A TC into DGM A and the B TC into DGM B.

XC6000 Audit - Console Sr# XC6KEPC-020

Audit By: Apex Calibration Technician

Date: 07/12/08 Ver.:80711-94

Barometer (inHg) 30.08 **PASSED**

Vacuum (inHg) Reference Console

Notes on Barometric Ref. and Vacuum Gauge Model/Serial #

Barometric reference BAR-DA833 SN 1234
Vacuum reference DGM-SK25SRD SN 1234

Side A 21.10 **PASSED**

Side B 21.59 **PASSED**

Thermocouples (F) Ice Bath Temperature

DGM A 34.8 **PASSED**

DGM B 34.4 **PASSED**

Stack Chiller

32.8

Thermometer Model/Serial # and Notes
DPT-168-NIST Thermometer SN 1234

Now dip the STACK TC located at the end of the probe into the reference Ice Bath and wait until the temperature has stabilized. Then press the [Next] button to continue.

*RFD - Reference Flow Device: this can be a
Wet Test Meter or Certified Dry Gas Meter.

Figure 12
DGM Thermocouple Test PASSED

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At the end of the probe is the Stack thermocouple. Now dip the end of the probe into the ice bath. When the temperature stabilizes Press "Next."



Figure 13
Stack Thermocouple



Figure 14
Stack Thermocouple in Ice Bath

A message box will be displayed providing information when using the AK-6000 Audit Kit. This will be explained in the next section. Press the "OK" button to continue.



Figure 15
Message Box

If the stack thermocouple is within tolerance the screen will show "PASSED" If the thermocouple is not in tolerance "Out of Tolerance" will be displayed. See the section at the end of this document on how to resolve Out of Tolerance or Failed Console Audit items.

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XC6000 Audit - Console Sr# XC6KEPC-020

Audit By:
Date: 07/12/08 Ver.:80711-94

Barometer (inHg) 30.08 **PASSED**

Vacuum (inHg) Reference Console

Notes on Barometric Ref. and Vacuum Gauge Model/Serial #
 Barometric reference BAR-DA833 SN 1234
 Vacuum reference DGM-SK25SRD SN 1234

<u>Side A</u>	21.12	21.10	PASSED
<u>Side B</u>	21.6	21.59	PASSED

Thermocouples (F)

Ice Bath Temperature

Thermometer Model/Serial # and Notes

DGM A 34.8 **PASSED**
DGM B 34.4 **PASSED**

Stack 33.9 **PASSED**
Chiller 82.8

☐ Use Chiller TC input for RFD* temperature

Please connect the Cal-kit TC connector (or TC pigtail) to the CHILLER Thermocouple port on the back of the XC6000. Then place the other end of the TC in the same reference Ice Bath. Once the temperature has stabilized, press the [Next] button to continue.

*RFD - Reference Flow Device: this can be a Wet Test Meter or Certified Dry Gas Meter.

Figure 16
Stack Thermocouple Test PASSED

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If using the AK-6000 for the “Reference Flow Device” (RFD) click the check box “Use Chiller TC Input for RFD Temperature.” This allows the XC-6000 Console Audit application to read the AK-6000 internal RFD temperature. If not using the AK-6000 leave the check box empty.

When using the Chiller TC for RFD temperature the Chiller TC Sensor test must pass.

Plug the Thermocouple Pig Tail into the Chiller port on the back of the XC-6000.

If using the Hardigg Storm case (Gray Portable Case) unplug the TC from the chiller and plug it into the TC Y adapter female plug. Plug the TC pig tail into the other female plug on the Y adapter. **The male plug on the Y adapter is not used. Do not plug it into the chiller.**



Figure 17
Rear View of Chiller

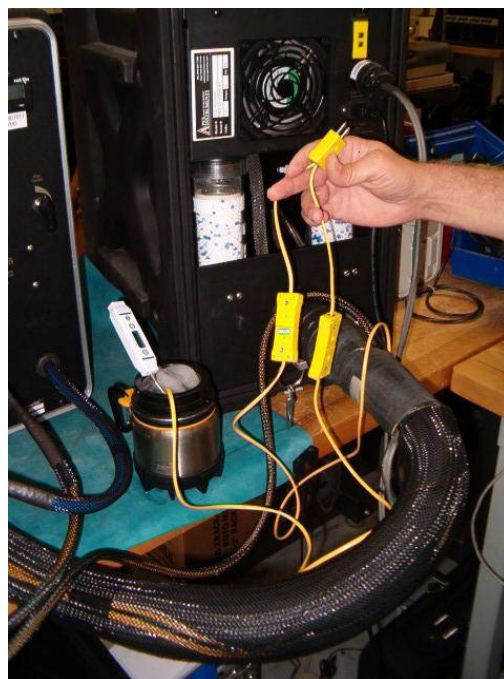


Figure 18
Pig Tail and TC Y Adapter

Place the end of the TC pigtail into the ice bath. When the temperature has stabilized press the "Next" button. If the chiller thermocouple is within tolerance the screen will show “PASSED” and a message box will be displayed with instructions to connect the RFD to the Sample A in port on the back panel of the XC-6000.



Figure 19
Connect Sample Line Message

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XC6000 Audit - Console Sr# XC6KEPC-020					
Audit By: <u>Apex Calibration Technician</u>			Date: 07/12/08 Ver.:80711-94		
Barometer (inHg) <input type="text" value="30.1"/> 30.11 PASSED		Vacuum (inHg) Reference Console			
Notes on Barometric Ref. and Vacuum Gauge Model/Serial # Barometric reference BAR-DA833 SN 1234 Vacuum reference DGM-SK25SRD SN 1234		<u>Side A</u> <input type="text" value="21.12"/> 21.10 PASSED			
		<u>Side B</u> <input type="text" value="21.6"/> 21.59 PASSED			
Thermocouples (F)		Ice Bath Temperature <input type="text" value="34"/>		Thermometer Model/Serial # and Notes DPT-168-NIST Thermometer SN 1234	
<u>DGM A</u> 34.8 PASSED		<u>Stack</u> 33.9 PASSED		<u>Chiller</u> 34.9 PASSED	
<u>DGM B</u> 34.4 PASSED		<input checked="" type="checkbox"/> Use Chiller TC input for RFD* temperature			
*RFD Model/Serial #: <input type="text" value=""/>					
DGM_A Serial #: 8002530		Start		Notes	
*RFD (Gamma): <input type="text" value=""/>		*RFD (L): <input type="text" value=""/>		<input type="text"/>	
Flow Rate (Lpm): <input type="text" value=""/>		*RFD Temp. (F): <input type="text" value="36.0"/>			
Vol. To Test (L): <input type="text" value=""/>		DGM_A Temp(F): 87.2 Console Encoder (L): 0.000			
Calibrated Gamma: .995		Audit Gamma: -?-		Diff: -?-	
<input type="button" value="Next"/>					
Please fill in all of the yellow text boxes, then press [Next] to continue.					
*RFD - Reference Flow Device: this can be a Wet Test Meter or Certified Dry Gas Meter.					
				<input type="button" value="Print"/>	
				<input type="button" value="Cancel Audit"/>	

Figure 20
TC Chiller Port Test Passed

If the thermocouple is not in tolerance “Out of Tolerance” or “FAIL” will be displayed. See the section at the end of this document on how to resolve Out of Tolerance or Failed Console Audit items.

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Dry Gas Meter Audit:

Unplug the Thermocouple Pig Tail and plug the RFD Thermocouple into the Chiller jack on the back of the XC-6000 console. Also connect the RFD to the Sample_A_IN port on the back of the XC-6000 console. Then press the “OK” button to continue.

If using the Harding Storm case (Gray Portable Case) unplug the TC Pig Tail and plug the RFD TC into the female plug on the TC Y adapter. **The male plug on the Y adapter is not used. Do not plug it into the chiller.** Then press the “OK” button to continue.



Figure 21
AK-6000 and TC Y Adapter

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Enter the model and serial number of the Reference Flow Device (RFD) into the space provided.

Connect the AK-6000 sample line to the Sample A In port and the AK-6000 thermocouple connector into the Chiller jack on the back of the console if not already done. If using a RFD connect the sample line to the Sample A In port on the back of the console.

If using the Harding Storm case (Gray Portable Case) connect the AK-6000 sample line to the Sample A In port and the AK-6000 thermocouple connector into the TC female plug on the TC Y adapter. **The male plug on the Y adapter is not used. Do not plug it into the chiller.**

Make sure the Flow Control on the AK-6000 is open by turning counter-clockwise.

Make sure the RFD temperature is reading a valid value, close to ambient, and not still in the Ice Bath or 0° F(open connection)

Enter the AK-6000/RFD Gamma, test flow rate in L/min and test volume in L into the boxes provided. Apex Instruments recommends a minimum of 5L for test volume and a flow rate that is the average used in normal operation.

Press the reset on the totalizer on the AK-6000 to reset the counter to zero and enter the number 0 into the RFD start box. The AK-6000 will automatically enter the RFD starting temperature. If not using the AK-6000 enter the starting value, in liters, and the temperature, in °F of the RFD.

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Audit

XC6000 Audit - Console Sr# XC6KEPC-136

Audit By: Apex Calibration Technician Date: 05/12/09

Barometer (inHg) 29.84 29.84 **PASSED** **Vacuum** (inHg) Reference Console

Notes on Barometric Ref. and Vacuum Gauge Model/Serial #

Barometric reference BAR-DA833 SN 1234
Vacuum reference DGM-SK25SRD SN 1234

Side A 21.7 21.92 **PASSED**
Side B 21.4 21.39 **PASSED**

Thermocouples (F) Ice Bath Temperature 33 Thermometer Model/Serial # and Notes

DGM A 32.7 **PASSED** Stack 33.7 **PASSED** Chiller 32.7 **PASSED**
DGM B 37.0 **PASSED** Stack 33.7 **PASSED** Chiller 32.7 **PASSED**

☒ Use Chiller TC input for RFD* temperature

*RFD Model/Serial #: AK-6000 0901076

DGM_A Serial #: 8004539 Start

*RFD (Gamma): 1 *RFD (L): 0
Flow Rate (Lpm): .5 *RFD Temp. (F): 60.0
Vol. To Test (L): 5 DGM_A Temp (F): 76.3 Console Encoder (L): 0.000

Calibrated Gamma: **0.9803** Audit Gamma: **-?-** Diff: **-?-** **Next**

Please fill in all of the yellow text boxes, then press [Next] to continue.

Tuesday - May 12, 2009 02:01:41 PM

*RFD - Reference Flow Device: this can be a Wet Test Meter or Certified Dry Gas Meter. Ver.: 90122-99

Help **Print** **Cancel Audit**

Figure 22
DGM A Test Setup

Press “Next” the XC-6000 pumps will start and the status of the test will be displayed. When the test volume has been reached the pumps will automatically stop.

When the test volume is reached enter the reading from the AK-6000 totalizer into the RFD End box and Press “Next” If not using the AK-6000 enter the ending value, in liters, and the temperature, in °F of the RFD and Press “Next”.

If the Calibrated Gamma and the Audited Gamma are within $\pm 5\%$ the test will pass and a message box will be displayed instructing the user to connect the AK-6000/RFD to the Sample_B_In port on the back of the XC-6000 console.

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Connect the AK-6000/RFD to the Sample_B_In port on the back of the XC-6000 console. Press the “OK” button to continue.

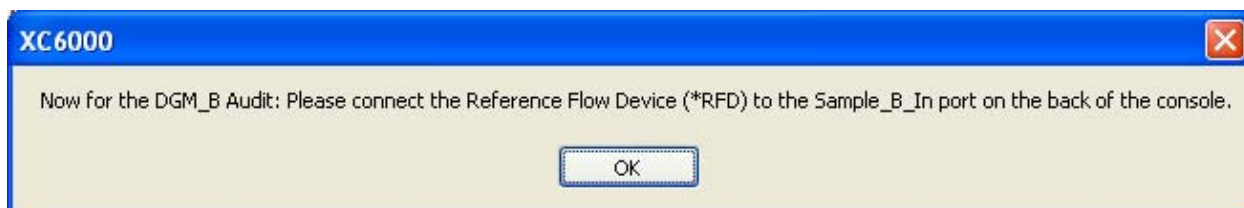


Figure 23
DGM_A PASSED and Connect the RFD to Sample_B_In

The image shows the "Audit" window for the XC6000 console. The title bar says "Audit". The main content area is titled "XC6000 Audit - Console Sr# XC6KEPC-136". It contains several sections for data entry and results.

Audit By: Apex Calibration Technician **Date:** 05/12/09

Barometer (inHg) 29.84 29.84 **PASSED** **Vacuum (inHg)** Reference Console
Side A 21.7 21.92 **PASSED**
Side B 21.4 21.39 **PASSED**

Notes on Barometric Ref. and Vacuum Gauge Model/Serial #
Barometric reference BAR-DA833 SN 1234
Vacuum reference DGM-SK25SRD SN 1234

Thermocouples (F) Ice Bath Temperature 33 Thermometer Model/Serial # and Notes
DGM A 32.7 **PASSED** *Stack* *Chiller*
DGM B 37.0 **PASSED 33.7 32.7
PASSED **PASSED**
☒ Use Chiller TC input for RFD* temperature**

*RFD Model/Serial #: AK-6000 0901076

DGM_A Serial #: 8004539 **Start** **End** **Compute** **Notes** **Redo A**
*RFD (Gamma): 1 *RFD (L): 0 5.0 5.0000
Flow Rate (Lpm): .5 *RFD Temp. (F): 69.5 74.2 71.8
Vol. To Test (L): 5 DGM_A Temp(F): 77.4 Console Encoder (L): 5.013
Calibrated Gamma: 0.9803 Audit Gamma: 1.0079 Diff: -2.8% **PASSED**

DGM_B Serial #: 8004540 **Start** **Notes** **Redo B**
*RFD (Gamma): 1 *RFD (L): 74.2
Flow Rate (Lpm): .5 *RFD Temp. (F): 74.2
Vol. To Test (L): 5 DGM_B Temp(F): 76.8 Console Encoder (L): 0.000
Calibrated Gamma: 0.9822 Audit Gamma: -?- Diff: -?- **Next**

Please fill in all of the yellow text boxes, then press [Next] to continue.

Tuesday - May 12, 2009 02:13:01 PM

*RFD - Reference Flow Device: this can be a Wet Test Meter or Certified Dry Gas Meter. Ver.: 90122-99

Help Print Cancel Audit

Figure 24
DGM A Audit PASSED

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If the test exceeds the limit the test will fail. To re-run the DGM-A test press the “Re-Do” button and enter the required information.

See the section at the end of this document on how to resolve Out of Tolerance or Failed Console Audit items.

DGM B

If using the AK-6000 connect the AK-6000 sample line to the Sample B In port. If using a RFD connect the sample line to the Sample B In port on the back of the console if not already done.

The AK-6000/RFD Gamma, test flow rate in L/min and test volume in L will be automatically filled in based on the information already entered. These values can be changed if desired.

Press the reset on the totalizer on the AK-6000 to reset the counter to zero and enter the number 0 into the RFD start box. The AK-6000 will automatically enter the RFD starting temperature.

If not using the AK-6000 enter the starting value, in liters, and the temperature, in F of the RFD.

Press “Next” and the XC-6000 pumps will start and the status of the test will be displayed. When the test volume has been reached the pumps will stop.

When the test volume is reached enter the reading from the AK-6000 totalizer into the RFD End box and press the “Next” button to continue. If not using the AK-6000 enter the ending value, in liters, and the temperature, in F of the RFD and press the “Next” button to continue.

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Audit									
XC6000 Audit - Console Sr# XC6KEPC-136									
Audit By: <u>Apex Calibration Technician</u>						Date: 05/12/09			
Barometer (inHg)		<u>29.84</u>	29.83	PASSED		Vacuum (inHg)		Reference	Console
Notes on Barometric Ref. and Vacuum Gauge Model/Serial #						<u>Side A</u>		<u>21.7</u>	21.92 PASSED
Barometric reference BAR-DA833 SN 1234 Vacuum reference DGM-SK25SRD SN 1234						<u>Side B</u>		<u>21.4</u>	21.39 PASSED
Thermocouples (F)		Ice Bath Temperature <u>33</u>			Thermometer Model/Serial # and Notes				
<u>DGM A</u>	32.7	PASSED		<u>Stack</u>	DPT-168-NIST Thermometer SN 1234				
<u>DGM B</u>	37.0	PASSED		<u>Chiller</u>					
				33.7	32.7				
				PASSED	PASSED				
<input checked="" type="checkbox"/> Use Chiller TC input for RFD* temperature									
*RFD Model/Serial #: <u>AK-6000 0901076</u>									
DGM_A	Serial #: 8004539	Start	End	Compute	Notes	Redo A			
*RFD (Gamma):	<u>1</u>	*RFD (L):	<u>0</u>	<u>5.0</u>	5.0000				
Flow Rate (Lpm):	<u>5</u>	*RFD Temp. (F):	<u>69.5</u>	<u>74.2</u>	71.8				
Vol. To Test (L):	<u>5</u>	DGM_A Temp(F): 77.4		Console Encoder (L): 5.013					
Calibrated Gamma: 0.9803		Audit Gamma: 1.0079		Diff: -2.8%		PASSED			
DGM_B	Serial #: 8004540	Start	End			Notes	Redo B		
*RFD (Gamma):	<u>1</u>	*RFD (L):	<u>0</u>	<u>5.01</u>					
Flow Rate (Lpm):	<u>5</u>	*RFD Temp. (F):	<u>74.2</u>	<u>74.7</u>					
Vol. To Test (L):	<u>5</u>	DGM_B Temp(F): 78.9		Console Encoder (L): 5.011					
Calibrated Gamma: 0.9822		Audit Gamma: -?-		Diff: -?-		Next			
Enter the Ending volume and current temperature for the Reference Flow Device (*RFD).									
Tuesday - May 12, 2009 02:40:28 PM									
*RFD - Reference Flow Device: this can be a Wet Test Meter or Certified Dry Gas Meter.								Ver.: 90122-99	
Help				Print		Cancel Audit			

Figure 25
DGM B Enter Ending Values

If the Calibrated Gamma and the Audited Gamma are within $\pm 5\%$ the test will pass. If the test exceeds the limit the test will fail.

Audit									
XC6000 Audit - Console Sr# XC6KEPC-136									
Audit By: Apex Calibration Technician						Date: 05/12/09			
Barometer (inHg)		29.84 29.83 PASSED		Vacuum (inHg)		Reference		Console	
Notes on Barometric Ref. and Vacuum Gauge Model/Serial #				<u>Side A</u>		21.7		21.92 PASSED	
Barometric reference BAR-DA833 SN 1234				<u>Side B</u>		21.4		21.39 PASSED	
Vacuum reference DGM-SK25SRD SN 1234									
Thermocouples (F)			Ice Bath Temperature			33			
<u>DGM A</u> 32.7 PASSED			<u>Stack</u>			<u>Chiller</u>			
<u>DGM B</u> 37.0 PASSED			33.7 PASSED			32.7 PASSED			
<input checked="" type="checkbox"/> Use Chiller TC input for RFD* temperature						Thermometer Model/Serial # and Notes			
						DPT-168-NIST Thermometer SN 1234			
*RFD Model/Serial #: AK-6000 0901076									
DGM_A Serial #: 8004539		Start		End		Compute		Notes	
*RFD (Gamma): 1		*RFD (L): 0		5.0		5.0000		Redo A	
Flow Rate (Lpm): 5		*RFD Temp. (F): 69.5		74.2		71.8			
Vol. To Test (L): 5		DGM_A Temp(F): 77.4		Console Encoder (L): 5.013					
Calibrated Gamma: 0.9803		Audit Gamma: 1.0079		Diff: -2.8%		PASSED			
DGM_B Serial #: 8004540		Start		End		Compute		Notes	
*RFD (Gamma): 1		*RFD (L): 0		5.01		5.0100		Redo B	
Flow Rate (Lpm): 5		*RFD Temp. (F): 74.2		74.7		74.4			
Vol. To Test (L): 5		DGM_B Temp(F): 78.9		Console Encoder (L): 5.011					
Calibrated Gamma: 0.9822		Audit Gamma: 1.0082		Diff: -2.6%		PASSED			
**** Console Audit PASSED **** Tuesday - May 12, 2009 02:41:00 PM									
*RFD - Reference Flow Device: this can be a Wet Test Meter or Certified Dry Gas Meter.									
Help					Print Done!				
Ver.: 90122-99									

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Printing the Console Audit:

When the Console Audit is complete a message at the bottom of the screen will display Console Audit Passed with the current date and time.

If the Console Audit failed the message Failed will be displayed.

XC6000 Audit - Console Sr# XC6KEPC-025
Audit By: Apex Calibration Technician Date: 07/03/08

Barometer (inHg) 29.79 PASSED Vacuum (inHg) Reference Console
Side A 29.3 21.01 PASSED
Side B 21 21.50 PASSED

Notes on Barometric Ref. and Vacuum Gauge Model/Serial #
Barometric reference DGM-SK255RD SN 1234
Vacuum reference DGM-SK255RD SN 1234

Thermocouples (F) Ice Bath Temperature 31.9 Thermometer Model/Serial # and Notes
DGM_A 31.2 PASSED Chiller Stack Axx OPT1000PST SN 1234
DGM_B 31.7 PASSED 32.1 PASSED 31.9 PASSED
Use TC Axx input for T1FD Temperature

T1FD Model/Serial #: T1FD reference DGM-SK255RD SN 1234

DGM_A Serial # 8002562 Start End Compute Notes
T1FD (Gamma) 77.1 76.6 76.8
Flow Rate (gpm) 5 T1FD Temp (F) 77.1 76.6 77.1
Vol. To Test (L) 5 DGM_A Temp (F) 79.0 Console Encoder (L) 5.027
Calibrated Gamma: 8990 Audit Gamma: 0.8687 Cnt: 3.0% PASSED

DGM_B Serial # 8002510 Start End Compute Notes
T1FD (Gamma) 77.1 76.6 77.1
Flow Rate (gpm) 5 T1FD Temp (F) 77.1 76.6 77.1
Vol. To Test (L) 5 DGM_B Temp (F) 79.6 Console Encoder (L) 5.016
Calibrated Gamma: 8986 Audit Gamma: 0.8634 Cnt: 3.3% PASSED

*** Console Audit PASS *** Thursday - Jul 3, 2008 09:23:15 AM
T1FD - Reference Flow Device: this can be a
Veto Test Meter or Certified Dry Gas Meter

Print Done!

Press the print button and the Console Audit will be printed to the Windows default printer. If you are using a PDF printer a dialog box will open. Enter a file name and select a location to save the Console Audit then Press Save.

Save As

Save in: Audit Procedure

Audit Report document

File name: Unit 025 Console Audit 7-3-08

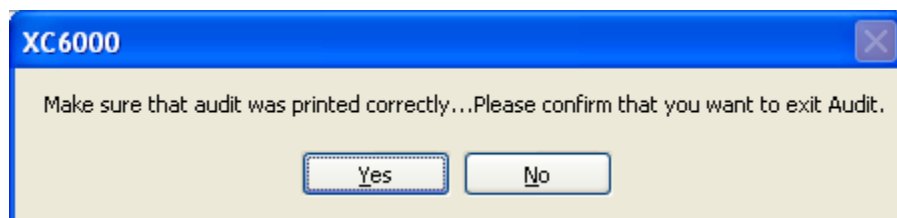
Save as type: PDF Files (*.pdf)

Save Cancel

Move up to CutePDF Pro and get advanced control over your PDF documents.
Easily merge & split PDFs, add security, digital signature, stamps, bookmarks or
header/footer, make booklets, n-Up, save PDF forms, scan to PDF and more!
<http://www.CutePDF.com>

Verify your Console Audit printed correctly. Press the “Done” button and a confirmation box will be displayed. Press the “Yes” button to exit or No to go back to the Console Audit screen to re-print the Console Audit Report.

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AUTOMATED MERCURY SOURCE SAMPLER

How to correct Out of Tolerance or Failed sections in the Console Audit:

If it is required to recalibrate the XC-6000 to factory specifications contact your Apex Instruments Account Representative or refer to the XC-6000 Calibration Manual.

Barometric Test: If the Barometric test fails the XC-6000 fails the Console Audit and should not be used until recalibrated to factory specifications.

DGM TC Test: If the DGM TC test fails the XC-6000 fails the Console Audit and should not be used until recalibrated to factory specifications.

DGM Volume: If the DGM Volumetric test fails the XC-6000 fails the Console Audit and should not be used until recalibrated to factory specifications.

Vacuum Test: If the Vacuum test results are Out of Tolerance the XC-6000 will pass the Console Audit but should be recalibrated.

Chiller TC Test: If the Chiller TC test results are Out of Tolerance the XC-6000 will pass the Console Audit and can continue to be used, but the RFD temperature must be measured with a NIST traceable thermometer capable of reading a Type K thermocouple (chromel / alumel.) The audit will fail if the DGM and RFD temperatures are out of tolerance.

Stack TC Test: If the Stack TC test results are Out of Tolerance the XC-6000 will pass the Console Audit and can continue to be used.

Field re-calibration of the Barometric Sensor, Vacuum Sensors and Thermocouple Sensors is an easy task and can be done with the components of the AK-6000 Audit Kit. Please contact Apex Instruments Inc. for details if your unit requires recalibration in the field.

DGM re-calibration may be performed in the field but requires equipment not included in the standard AK-6000 Audit kit. Please contact Apex Instruments, Inc. to determine whether your unit must return to the factory for recalibration.

Refer to the XC-6000 calibration documents for further information or contact Apex Instruments for support.

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Set up and Calibration of Barometer.

For additional information please refer to the provided manual.

- 1) Set date and time
 - a. Press the Time button to enter the Time mode.
 - b. Press and hold the time button for 2 seconds. The EU or US will begin to flash
 - c. If the unit is flashing EU press the + or - buttons until US is displayed.
 - d. Press the time button and the month starts flashing.
 - e. Use + and - keys to select the current month.
 - f. Press the Time button and the day starts flashing.
 - g. Use the + and – button to select the current day.
 - h. Press the Time button and the 12-hour or 24-hour starts flashing.
 - i. Use the + and – button to select the 12/24 hour format.
 - j. Press the Time button and the hour starts flashing.
 - k. Use the + and – button to select the current hour.
 - l. Press the Time button and the minute starts flashing.
 - m. Use the + and – button to select the current minute.
 - n. Press the Time button to exit.
- 2) Set Temp units to F
 - a. Press the Time button to enter Time mode
 - b. Press and hold the + and – buttons at the same time for 2 seconds. The Temperature units will toggle between C and F.
- 3) Set barometer to inHG
 - a. Press the BARO button to enter the barometer mode.
 - b. Press and hold the + and – buttons simultaneously for 2 seconds
 - c. Unit will beep. Repeat b until the display shows inHg.
- 4) Set altitude to feet
 - a. Press the ALT button to enter the altimeter mode.
 - b. Press and hold the + and – buttons at the same time for 2 seconds.
 - c. Unit will toggle between meters and feet.
- 5) Set barometer
 - a. Calculate the current barometric by obtaining the local barometric pressure which is adjusted to sea level.
 - b. Adjust barometric pressure to compensate for altitude. Station Pressure = local pressure – (altitude in feet X .001) Example local barometric pressure reported at the airport is 30.04 and the XC-6000 is at 600' above sea level. Station Pressure would be 29.44= 30.04-(600 X .001)
 - c. Press the BARO button to enter the barometric mode.
 - d. Press the BARO and TIME buttons simultaneously for 2 seconds.
 - e. The barometric pressure will start to flash.
 - f. Use the + and – button to enter the correct barometric pressure.
 - g. Press the BARO button to exit.
- 6) Leave the unit in BARO mode.