



**INSTRUMENTS**

# **Operator's Manual SM-2001U & SM-2003U Single Module Calibration Stations**

**Part Number: 71-0130RK**

**Revision: B**

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## Warranty

RKI Instruments, Inc., warrants gas alarm equipment sold by us to be free from defects in materials and workmanship, and performance for a period of one year from date of shipment from RKI Instruments, Inc. Any parts found defective within that period will be repaired or replaced, at our option, free of charge. This warranty does not apply to those items which by their nature are subject to deterioration or consumption in normal service, and which must be cleaned, repaired, or replaced on a routine basis. Examples of such items are:

Absorbent cartridges	Batteries
Pump diaphragms and valves	Filter elements
Fuses	

Warranty is voided by abuse including mechanical damage, alteration, rough handling, or repairs procedures not in accordance with the instruction manual. This warranty indicates the full extent of our liability, and we are not responsible for removal or replacement costs, local repair costs, transportation costs, or contingent expenses incurred without our prior approval.

THIS WARRANTY IS EXPRESSLY IN LIEU OF ANY AND ALL OTHER WARRANTIES AND REPRESENTATIONS, EXPRESSED OR IMPLIED, AND ALL OTHER OBLIGATIONS OR LIABILITIES ON THE PART OF RKI INSTRUMENTS, INC., INCLUDING BUT NOT LIMITED TO THE WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. IN NO EVENT SHALL RKI INSTRUMENTS, INC., BE LIABLE FOR INDIRECT, INCIDENTAL, OR CONSEQUENTIAL LOSS OR DAMAGE OF ANY KIND CONNECTED WITH THE USE OF ITS PRODUCTS OR FAILURE OF ITS PRODUCTS TO FUNCTION OR OPERATE PROPERLY.

This warranty covers instruments and parts sold to users only by authorized distributors, dealers, and representatives as appointed by RKI Instruments, Inc.

We do not assume indemnification for any accident or damage caused by the operation of this gas monitor and our warranty is limited to replacement of parts or our complete goods.

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**CAUTION:** *Read and understand this manual before using the SM-2001U or the SM-2003U. Also read and understand the operator’s manual for the instrument you will use, the GX-2001 or GX-2003, with you calibration station.*

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# Chapter 1: Introduction

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## Overview

This chapter briefly describes the SM-2001U and SM-2003U Single Module Calibration Stations and the Single Module Data View Software. This chapter also describes the *SM-2001U & SM-2003U Single Module Calibration Stations Operator's Manual* (this document). Table 1 at the end of this chapter lists the specifications for the calibration stations.

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## About the SM-2001U & SM-2003U

The SM-2001U and SM-2003U single module calibration stations are advanced reliable systems that provide charging, calibration, bump testing, and calibration and bump test records for the GX-2001 and GX-2003 gas detectors. They are designed to save the records to a USB flash drive. The Single Module Data Viewer Software can then be used with a Windows-based personal computer to retrieve calibration and bump test data files from the USB flash drive or from the computer's hard drive if the files have been transferred to the hard drive from the flash drive.

The purpose of this manual is to explain how to set up and use the SM-2001U and SM-2003U and the Single Module Data Viewer Software. You will learn how to:

- install and launch the software
- install the hardware
- perform a bump test
- perform a calibration
- save calibration and bump test records to a USB flash drive
- view, print, and export calibration and bump test records
- use the SM-2001U and SM-2003U to charge an instrument

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**CAUTION:** *The GX-2001 and GX-2003 detect oxygen deficiency and elevated levels of oxygen, combustible gases, carbon monoxide, and hydrogen sulfide, all of which can be dangerous or life threatening. When using the GX-2001 and GX-2003, you must follow the instructions and warnings in the Operator's Manual for each instrument to assure proper and safe operation of the unit and to minimize the risk of personal injury.*

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**CAUTION:** *The operator of this instrument is advised that if the equipment is used in a manner not specified in this manual, the protection provided by the equipment may be impaired.*

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## System Requirements

To use the Single Module Data Viewer Software, your personal computer must meet the following requirements:

- **Operating Systems:** Windows<sup>®</sup> 2000, Windows<sup>®</sup> XP.
- **Processor:** IBM<sup>®</sup> compatible PC running Pentium<sup>®</sup> 2 processor or equivalent minimum
- **Memory:** 32 MB RAM minimum
- **Hard Disk Space:** 32 MB minimum
- **CD-ROM Drive**
- **Available USB port**

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## Specifications

**Table 1: SM-2001U & SM-2003U Specifications**

Input Power	100 VAC - 240 VAC, 50/60 Hz, 10 VA <i>NOTE: The power cable supplied with the SM-2001U and SM-2003U as standard is for 115 VAC power.</i>
Environmental Conditions	<ul style="list-style-type: none"><li>• For Indoor Use Only</li><li>• -10° C to 40° C, below 80% Relative Humidity, Non-Condensing</li></ul>
Applicable Instruments	<ul style="list-style-type: none"><li>• SM-2001U: GX-2001</li><li>• SM-2003U: GX-2003</li></ul>
Memory Capacity	64 KB
Maximum Record Size	256 bytes
Maximum Number of Records Saved	200
Number of Calibration Gas Cylinders	One cylinder per bump test or calibration
Standard Accessories	<ul style="list-style-type: none"><li>• AC Power Cord</li><li>• USB Flash Drive</li><li>• Single Module Data Viewer Software</li><li>• Inlet Air Filter</li><li>• Instruction Manual</li></ul>

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## About this Manual

The *SM-2001U & SM-2003U Single Module Calibration Stations Operator's Manual* uses the following conventions for notes, cautions, and warnings.

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**NOTE:** Describes additional or critical information.

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**CAUTION:** *Describes potential damage to equipment.*

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**WARNING:** *Describes potential danger that can result in injury or death.*

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## Chapter 2: Description

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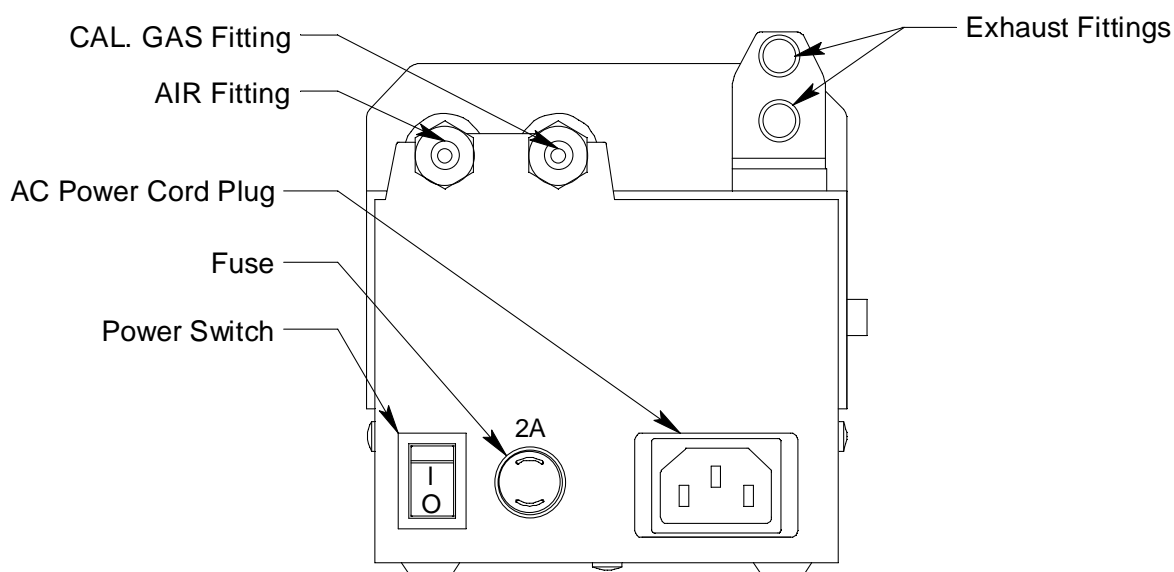
### Overview

This section describes the SM-2001U and SM-2003U single module calibration stations. They are designed to be used on a table top and consist of the back panel, control panel, status LEDs, USB port, and instrument connections.

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### Back Panel

The back panels of both types of calibration stations are identical. The back panel is shown in Figure 1 below. It includes the power switch, fuse, power cord plug, sample fittings, and air filter.



**Figure 1: SM-2001U & SM-2003U back panel**

### Power Switch

The power switch is a rocker switch located in the lower left corner of the back panel. The calibration station is on when the upper half of the switch, the “1” position”, is pressed in, and off when the lower half of the switch, the “0” position, is pressed in.

## Fuse & Power Cord Plug

A fuse holder is located to the right of the power switch. The fuse holder consists of a panel mounting socket and a quarter turn fuse holder. The fuse is a 2 amp, 5 mm x 20 mm fuse. A recessed 3-pin plug for the 115 VAC power cord is located to the right of the fuse holder.

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**NOTE:** Although the SM-2001U and SM-2003U can operate from 100 VAC - 240 VAC, the power cord supplied with the calibration stations is a 115 VAC power cord. If you wish to power a calibration station from 220 VAC, you will need to provide an appropriate plug-in power cord.

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## Gas Sample Fittings/Air filter/Exhaust Tube

Four sample fittings are located on the back of each calibration station. The AIR fitting is in upper left corner and draws air into the station. A particle filter with a short length of tubing is supplied with each calibration station for installation to the AIR fitting to keep particulate contamination out of the calibration station. The CAL. GAS fitting is next to the AIR fitting and is used to connect the station to a calibration gas cylinder. Both the AIR and CAL. GAS fittings accept 3/16" ID tubing.

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**NOTE:** The SM-2001U and SM-2003U are originally shipped with a cylindrical air filter. If a replacement filter is needed, the 33-0165RK disk filter is recommended.

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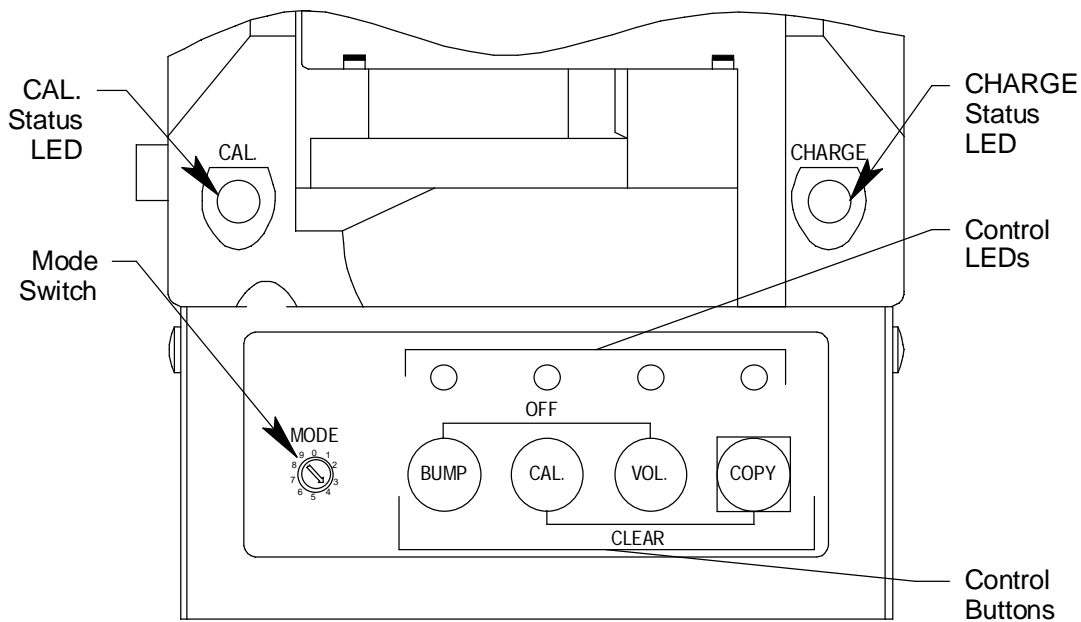
A two port exhaust fitting is located in the upper right corner of the back panel. It allows routing of the exhausted calibration gas to a convenient exhaust location. The bottom port is plugged with a push-on plug that is supplied with the calibration station and the top port is used for tubing connection. This port accepts 5/16" ID tubing. A 10 foot long 5/16" ID tube is included with the calibration station for routing of the exhaust.

Even though the exhaust gas can be routed to an area to be safely dispersed, the docking station should still be installed in a well ventilated area.

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## Control Panel, Status LEDs & USB Port

The control panel and status LEDs are the same for both types of calibration stations. The control panel is used to setup and operate the calibration stations. It is located at the front of the calibration stations. It includes the MODE rotary switch, control buttons, and the control button LEDs. The CAL. and CHARGE status LEDs are located on the top front of the calibration stations.



**Figure 2: Control Panel & Status LEDs**

### MODE Rotary Switch

The MODE rotary switch is located on the left end of the control panel. It is a 10 position rotary switch whose positions are labelled 0 -9. Each position defines the value of various bump test parameters. See “Setting the MODE Switch” on page 18 for a complete description of the parameters and settings.

## Control Buttons & LEDs

Four control buttons are located to the right of the MODE switch. From left to right they are BUMP, CAL., VOL., and COPY. Above each button is a control button LED that indicates the status of the function controlled by the button.

**Table 2: Control Button Functions**

<b>Control Button</b>	<b>Control Button Function(s)</b>	<b>Control Button LED Function(s)</b>
BUMP	<ul style="list-style-type: none"> <li>• Initiates a bump test</li> <li>• Cancels a bump test</li> <li>• Turns instrument off (when used with VOL. button)</li> </ul>	Indicates status of a bump test in progress
CAL.	<ul style="list-style-type: none"> <li>• Initiates a calibration</li> <li>• Cancels a calibration</li> <li>• Clears data from station memory (when used with COPY button)</li> </ul>	Indicates status of a calibration in progress
VOL.	<ul style="list-style-type: none"> <li>• Functional only in the SM-2003U</li> <li>• Toggles bump test and calibration functions between %volume methane only and all other active channels</li> <li>• Turns off instrument (when used with BUMP button)</li> </ul>	Indicates whether %volume only operation is activated
COPY	<ul style="list-style-type: none"> <li>• Copies data to USB flash drive.</li> <li>• Clears data from station memory (when used with CAL button)</li> </ul>	<ul style="list-style-type: none"> <li>• Indicates amount of calibration station memory used</li> <li>• Indicates status of copying function</li> <li>• Indicates the result of a copy operation</li> </ul>

## Status LEDs

Two status LEDs are located on the top front of the calibration stations. The CAL. status LED is on the left side of the station and indicates the status and result of a bump test or calibration. The CHARGE status LED is on the right side of the station and functions as a pilot LED, a system failure LED, and a charge indication LED.

## USB Port

A USB port is located on the front right of the calibration station below the COPY button. The port can be used to save calibration and bump test data to a USB flash drive.

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**NOTE:** The SM-2001U & SM2003U do not support connection of a computer to the USB port, only a USB flash drive.

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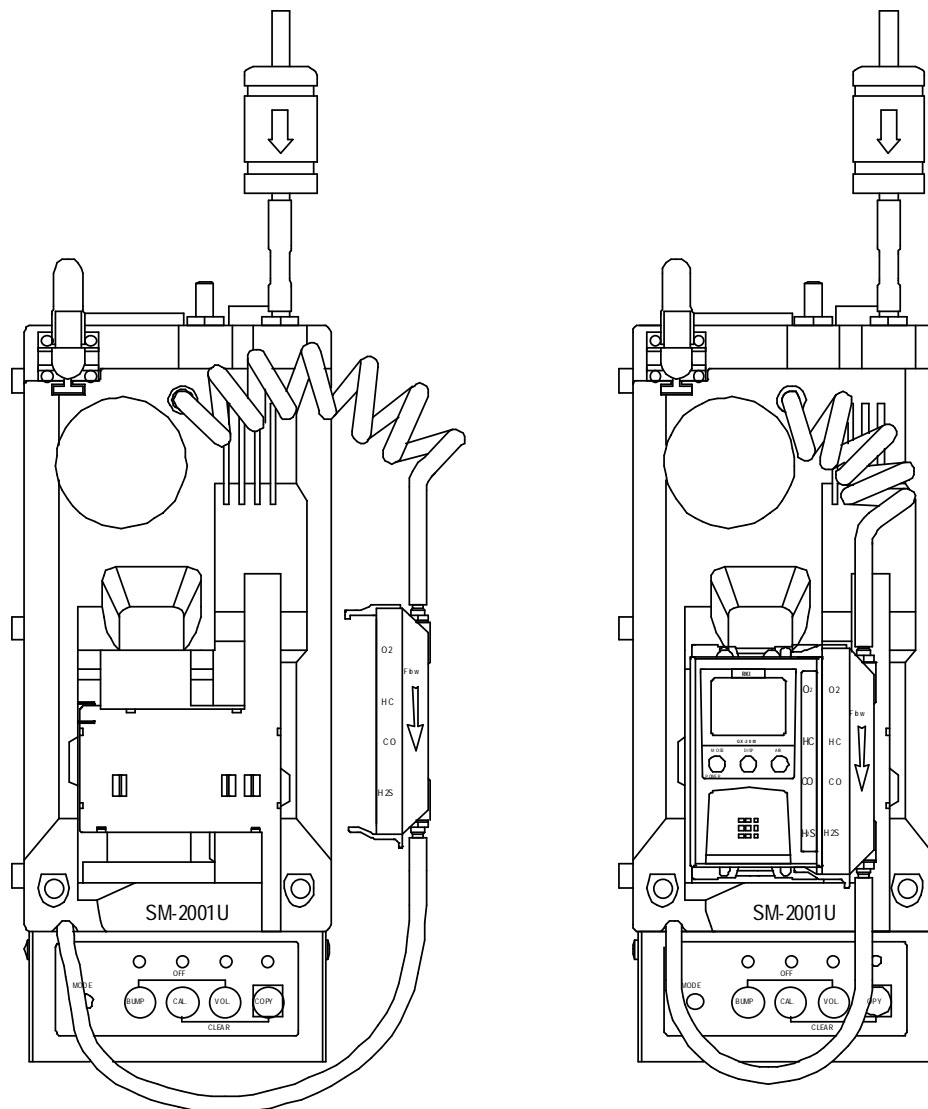
## SM-2001U Instrument Connections

The GX-2001 fits into the SM-2001U as shown in Figure 3 below. The calibration station includes a snap-on sample adapter for the GX-2001. The exhaust port of the adapter is connected to a port on the front left of the module by a short tube and the adapter's inlet port is connected to a port on the top rear of the module by a coiled tube. The sample adapter snaps onto the sensor side of the GX-2001 before the GX-2001 is installed into the calibration station.

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**NOTE:** The SM-2001U is shipped with the sample adapter disassembled from the calibration station. See "Parts Assembly" on page 16 for installation instructions.

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**Figure 3: SM-2001U Instrument Connections**

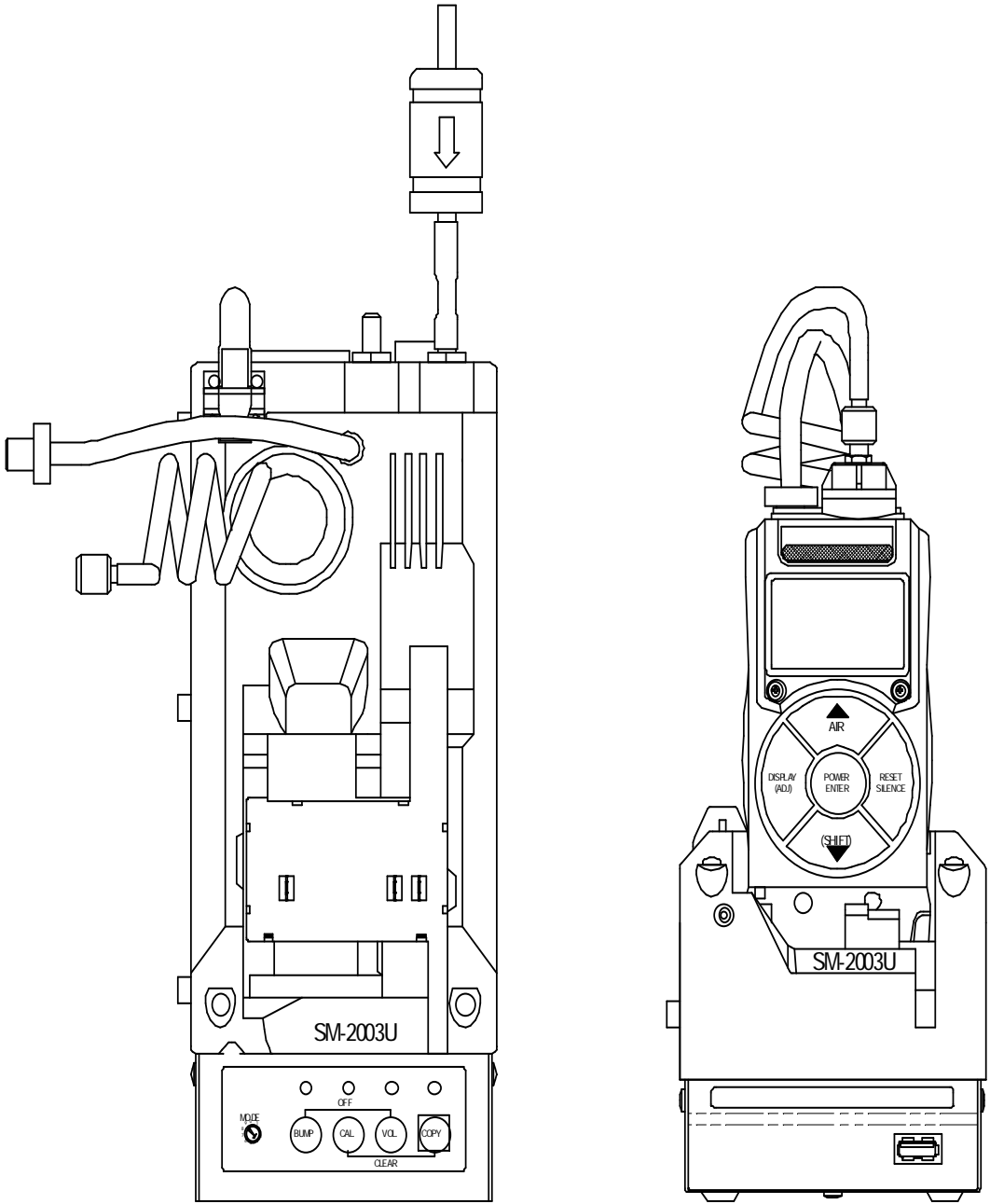
## **SM-2003U Instrument Connections**

The GX-2003 fits into the SM-2003U as shown in Figure 4 below. A coiled black tube with a plastic push-on fitting resides in a recess in the left rear corner of the top of the module. The coiled tube routes gas to the GX-2003 and extends to connect to the GX-2003's inlet fitting. A straight green tube comes out of the top of the module to the right of the coiled tube and also has a plastic push-on fitting on its end. The fitting on this tube is pushed onto the GX-2003 exhaust fitting and routes gas away from the GX-2003.

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**NOTE:** The SM-2003U is shipped with the green tube disassembled from the calibration station. See “Parts Assembly” on page 16 for assembly instructions.

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**Figure 4: SM-2003U Instrument Connections**

# Chapter 3: Hardware Setup and Software Installation

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## Overview

There are two parts to preparing the SM-2001U and SM-2003U for use: hardware setup and software installation. This chapter describes how to setup the SM-2001U and SM-2003U hardware. It also describes how to install the Single Module Data Viewer Software on a Windows based personal computer.

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## Hardware Setup

The hardware setup consists of some parts assembly, connecting calibration gas, and setting the MODE switch to the position that corresponds the desired bump test parameter settings.

### Parts Assembly

Some assembly is required before the SM-2001U or SM-2003U can be used. Perform the following assembly before attempting to use a calibration station.

1. If you have an SM-2001U, install the instrument sample adapter. Push the coiled end of the tubing onto the onto the recessed stub located at the rear top of the calibration station and the straight end of the tubing onto the recessed stub located on the upper left front of the calibration station.

If you have an SM-2003U, install the green tube with the plastic push-on fitting. Push the open end of the tube onto the recessed stub located on the top rear of the calibration station.

2. Install the air filter. Push the open end of the tube on the filter onto the AIR fitting on the back of the calibration station.
3. If it is not already installed, install the exhaust plug on the bottom exhaust port. It is a black rubber plug that fits over the port.
4. Plug the power cord into the power cord connector on the back of the calibration station.



## Connecting an Exhaust Tube

The top exhaust fitting port is used to route exhaust away from the calibration station. Install the 5/16" ID flexible tube that is included with the calibration station on the top exhaust fitting port and route the tube to an area where the calibration gas can be safely exhausted.

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**CAUTION:** *The maximum recommended length for the exhaust tube is 10 feet. Do not use more than 10 feet of tubing or tubing with an ID of less than 5/16" for the exhaust tube or the bump test and calibration accuracy will be adversely affected. The tube that is shipped with the Docking station has an ID of 5/16" and is 10 feet long.*

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## Connecting Calibration Gas

The CAL. GAS fitting on the back of the calibration station is designed to be used with a calibration gas cylinder that is fitted with a demand flow regulator. The AIR fitting may be used with a demand flow regulator and a cylinder of zero emissions air, but this is not normally necessary since the calibration station will generally be in a fresh air area.

The type of calibration gas cylinder used depends on the gas sensors installed in the GX-2001 or GX-2003 being used with the calibration station. Typically a 4-gas mix will be used if the instrument being used with the calibration station is a 4-gas unit. If a GX-2003 that is a 5-sensor unit is being used, a 100% volume methane cylinder will also be needed. Use Table 3 below as a guide in determining which and how many calibration gas cylinders are appropriate for your system.

**Table 3: Recommended Gas Cylinders**

Typical Instrument Types	Recommended Calibration Gas Cylinder(s)
<b><u>GX-2001</u></b> LEL/Oxy/H2S/CO	4-gas mix with CH4/Oxy/H2S/CO
<b><u>GX-2001</u></b> LEL/Oxy/CO	3-gas mix with CH4/Oxy/CO

**Table 3: Recommended Gas Cylinders**

Typical Instrument Types	Recommended Calibration Gas Cylinder(s)
<b>GX-2001</b> LEL/Oxy/H2S	4-gas mix with CH4/Oxy/H2S/CO
<b>GX-2003</b> GX-2003: LEL/Oxy H2S/CO	4-gas mix with CH4/Oxy/H2S/CO
<b>GX-2003</b> %Vol CH4/LEL CH4/Oxy/H2S/ CO	<ul style="list-style-type: none"> <li>• 4-gas mix with CH4/Oxy/H2S/CO</li> <li>• 100% Volume CH4</li> </ul>
<b>GX-2003</b> %Vol CH4/LEL CH4/Oxy/CO	<ul style="list-style-type: none"> <li>• 3-gas mix with CH4/Oxy/CO</li> <li>• 100% Volume CH4</li> </ul>
<b>GX-2003</b> LEL/Oxy/CO	3-gas mix with CH4/Oxy/CO
<b>GX-2003</b> LEL/Oxy/H2S	4-gas mix with CH4/Oxy/H2S/CO

To connect calibration gas to the SM-2001U or SM-2003U do the following:

1. If the area around the calibration station is not considered a fresh air area (an area free of combustible and toxic gases and of normal oxygen content, 20.9%) install a tube not longer than 10 feet on the filter attached to the AIR fitting on the back of the docking station and route it to a fresh air area or connect a cylinder of zero air to the fitting using a demand flow regulator.
2. Install the demand flow regulator on the calibration gas cylinder.
3. Connect the demand flow regulator to the CAL. GAS port using sample tubing.

### **Setting the MODE Switch**

The MODE switch can be used to lengthen or shorten the bump test time by shortening or lengthening the calibration gas application time. It can also be used to set the calibration station to automatically perform a calibration if the instrument fails a bump test. Since shortening the time

that calibration gas is applied during a bump test, the shorter the bump test time, the larger bump test tolerance used to determine whether a bump test failed or passed. The MODE switch sets the value of the following bump test parameters:

- Air Purge Time

This is the length of time that a calibration station will draw air through the AIR fitting on the back of the station to an instrument installed in it. Air is drawn during a bump test or calibration before an air adjust operation and to purge calibration gas from the system after calibration gas has been drawn through the CAL GAS fitting on the back of the station. This parameter is fixed at 30 seconds for all switch settings

- Gas Exposure Time

This is the length of time that a calibration station will draw calibration gas through the CAL GAS fitting on the back of the station during a bump test or calibration.

- Bump Test Tolerance

The bump test tolerance determines how close the instrument gas reading must be to the calibration gas concentration for each channel during a bump test in order to pass the bump test. It is defined as a percentage of the calibration gas concentration. The amount that the instrument gas reading differs from the calibration gas concentration must be equal to or less than this percentage of the calibration gas concentration. For example, if the tolerance is set to 50%, and the %LEL calibration gas concentration is 50% LEL, then the bump test gas reading for the LEL channel on the instrument must be  $50\% \text{LEL} \pm 25\% \text{LEL}$ .

- Automatic Calibration

This parameter is set to on or off. If it is set to on, then the calibration station will automatically perform a calibration if a bump test fails.

The parameter settings for each MODE switch position are shown in Table 4 below.

**Table 4: MODE Switch Parameter Settings**

Switch Position	Air Purge Time	Gas Exposure Time	Tolerance	Auto. Cal.
0	30 seconds	30 seconds	± 50%	Off
1		45 Seconds	± 20%	
2			± 30%	
3			± 50%	
4		90 seconds	± 10%	On
5		30 seconds	± 50%	
6		45 seconds	± 20%	
7			± 30%	
8		90 seconds	± 10%	
9	60 seconds	± 20%		

Set the MODE switch to the position that corresponds to the desired parameter settings using a small flat blade screwdriver.

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## Installing the Single Module Data Viewer Software

1. Launch Windows<sup>®</sup>.
2. Exit from all applications and open windows.
3. Insert the Single Module Data Viewer Software Installation CD into your computer's CD-ROM drive.
4. The Single Module Data Viewer InstallShield Wizard comes up to guide you through installation. Click **Next** to proceed to the License Agreement window.
5. Read the license agreement and click the agreement acceptance selection box, then click **Next** to proceed to the Customer Information window.
6. Enter a user name and organization and select if you want to install the program for all users on the computer or just for your user account, then click **Next** to proceed to the Destination Folder window.
7. The default installation folder (C:\Program Files\Single Module Data Viewer\) is displayed. If you want to install the software in the default folder continue with step 8. If you want to install the software in a different location, click **Change** and choose a new installation folder now and then continue with step 8.
8. Click **Next** to proceed to the Ready to Install the Program window.
9. Review the installation settings. If they are Ok, click **Install** and the installation process will begin. If you want to change installation settings, click **Back** and change them to the desired settings.
10. During software installation, the installation program may find newer versions of Windows files on your computer than those in the Installation CD. If this happens, the installation software will ask you if you want keep these newer files. Click **Yes** to do so.
11. Follow the on-screen instructions to complete software installation.

## Chapter 4: Using the SM-2001U & SM-2003U

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### Overview

The SM-2001U and SM-2003U calibration stations are capable of performing bump tests and calibrations on instruments and charging rechargeable battery packs in instruments. This chapter describes procedures for using the calibration stations to bump test, calibrate, and recharge GX-2001 and GX-2003 instruments. It also describes the information that is saved in a calibration station's memory and how to save that information to a USB flash drive.

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### Bump Testing Instruments

When a bump test is performed, the calibration station performs an air adjust operation on an instrument and then applies calibration gas to the instrument. The calibration station analyzes the response results based on criteria defined by the MODE switch position and determines if the instrument passed the bump test. The criteria set by the MODE switch is defined in Table 4 on page 20.

To perform a bump test on an instrument:

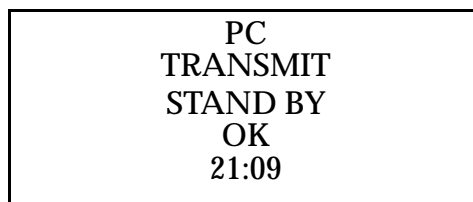
1. Verify that the appropriate calibration gas cylinder is connected to the CAL. GAS fitting on the back of the calibration station.
2. Verify that the MODE switch is in the position that defines the desired bump test pass criteria. See Table 4 on page 20.
3. If the calibration station is off, turn it on using the power switch on the back of the station. The CHARGE status LED will begin to blink green.
4. Put the instrument to be bump tested into the calibration station. A GX-2001 is placed into an SM-2001U and a GX-2003 is placed into an SM-2003U.
  - For a GX-2001, attach the flow adapter cup to the sensor side of the instrument before inserting it into the SM-2001U.
  - For the GX-2003, place the instrument into the SM-2003U, connect the plastic fitting on the end of the coiled black tube to

the inlet fitting, and then connect the plastic fitting on the end of the straight green tube to the exhaust fitting.

If you take more than a few seconds before continuing, the CHARGE LED may begin blinking yellow indicating that the calibration station is charging the battery pack in the instrument if the instrument has a battery pack whose charge is low enough.

5. Turn on the instrument.

- A GX-2003 will begin its normal startup sequence and after a few seconds, the pump will turn off and the display will indicate it is ready to communicate with the calibration station:



PC  
TRANSMIT  
STAND BY  
OK  
21:09

If LB Mode is activated on a GX-2003, press the POWER ENTER button as soon as the unit turns on to avoid waiting 20 seconds for the unit to time out of the Mode Select screen to begin its startup sequence.

- A GX-2001 will begin its normal startup sequence and after a second or two the display will indicate the following:



Conn

6. The CHARGE status LED will start blinking green and the calibration station will take several seconds to connect to the instrument. During this time, the CAL. status LED will blink yellow.
7. When the connection is complete, the CAL. status LED will become solid yellow indicating that you can continue with the next step.
8. Press and hold the BUMP button for at least one second, then release it. The bump test begins. During the bump test, the BUMP control LED will flash green and the CAL. status LED will flash yellow indicating that a bump test is in progress. The calibration station will perform the following functions:

- Apply fresh air to the instrument for 30 seconds.
- Perform a zero operation on the instrument.

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**NOTE:** If one or more of the sensors fails the zero operation, then the calibration station will abort the bump test and will not apply calibration gas. If this happens, the CAL. status LED will blink red indicating a failure and the BUMP control LED will stop blinking and be on steadily green.

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- Apply calibration gas to the instrument for the time defined by the MODE Switch setting.
  - Purge the system with fresh air for 30 seconds.
9. After the system is purged, the BUMP control LED will stop blinking and be on steadily green and the CAL. status LED will be on steadily green if the bump test passed or steadily red if the bump test failed.
  10. If the bump test failed and the MODE switch is set to position 5, 6, 7, 8, or 9, the calibration station will calibrate the instrument.
  11. The results of the bump test will be stored in the calibration station's memory and will be available to copy to a USB flash drive. See "Copying Calibration and Bump Test Records to a USB Flash Drive" on page 34 for instructions to copy the saved bump test and calibration records to a USB flash drive.
  12. If you want to perform a bump test on a GX-2003 with 100% volume methane, See "Bump Testing and Calibrating a GX-2003 with 100% Volume Methane" on page 28 for instructions.
  13. Turn off the instrument by pressing and holding the BUMP and VOL. control buttons simultaneously for at least one second and then releasing them. If no control buttons are pressed for 10 minutes, the calibration station will automatically turn off the instrument.



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**CAUTION:** *When using the GX-2001 with the SM-2001U or the GX-2003 with the SM-2003U, do not turn off the instrument using the instrument power switch. Use the BUMP and VOL. control buttons on the calibration station to turn off the instrument.*

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14. Remove the instrument from the calibration station.

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## Calibrating Instruments

The SM-2001U and SM-2003U calibration stations are capable of performing a calibration on an instrument that is connected to it. When a calibration is performed, the calibration station performs an air adjust operation on an instrument and then applies calibration gas to the instrument. The calibration station analyzes the calibration results and determines if the instrument passed the calibration.

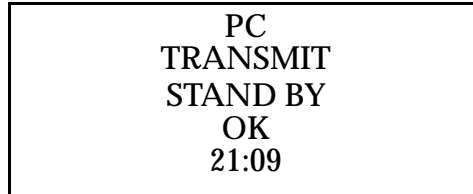
To perform a calibration on an instrument:

1. Verify that the appropriate calibration gas cylinder is connected to the CAL. GAS fitting on the back of the calibration station.
2. If the calibration station is off, turn it on using the power switch on the back of the station. The CHARGE status LED will begin to blink green.
3. Put the instrument to be calibrated into the calibration station. A GX-2001 is placed into an SM-2001U and a GX-2003 is placed into an SM-2003U.
  - For a GX-2001, attach the flow adapter cup to the sensor side of the instrument before inserting it into the SM-2001U.
  - For the GX-2003, place the instrument into the SM-2003U, connect the plastic fitting on the end of the coiled black tube to the inlet fitting, and then connect the plastic fitting on the end of the straight green tube to the exhaust fitting.

If you take more than a few seconds before continuing, the CHARGE LED may begin blinking yellow indicating that the calibration station is charging the battery pack in the instrument if the instrument has a battery pack whose charge is low enough.

4. Turn on the instrument.

- A GX-2003 will begin its normal startup sequence and after a few seconds, the pump will turn off and the display will indicate it is ready to communicate with the calibration station:



PC  
TRANSMIT  
STAND BY  
OK  
21:09

If LB Mode is activated on a GX-2003, press the POWER ENTER button as soon as the unit turns on to avoid waiting 20 seconds for the unit to time out of the Mode Select screen to begin its startup sequence.

- A GX-2001 will begin its normal startup sequence and after a second or two the display will indicate the following:



Conn

5. The CHARGE status LED will start blinking green and the calibration station will take several seconds to connect to the instrument. During this time, the CAL. status LED will blink yellow.
6. When the connection is complete, the CAL. status LED will become solid yellow indicating that you can continue with the next step.
7. Press and hold the CAL. button for at least one second, then release it. The calibration begins. During the calibration, the CAL. control LED will flash green and the CAL. status LED will flash yellow indicating that a calibration is in progress. The calibration station will perform the following functions:
  - Apply fresh air to the instrument for 30 seconds.
  - Perform a zero operation on the instrument.

---

**NOTE:** If one or more of the sensors fails the zero operation, then the calibration station will abort the calibration and will not apply calibration gas. If this happens, the CAL. status LED will blink red indicating a failure and the CAL. control LED will stop blinking and be on steadily green.

---

- Apply calibration gas to the instrument for 90 seconds.
  - Purge the system with fresh air for 30 seconds.
8. After the system is purged, the CAL. control LED will stop blinking and be on steadily green and the CAL. status LED will be on steadily green if the calibration passed or steadily red if the calibration failed.
  9. The results of the calibration will be stored in the calibration station's memory and will be available to copy to a USB flash drive. See "Copying Calibration and Bump Test Records to a USB Flash Drive" on page 34 for instructions to copy the saved bump test and calibration data to a USB flash drive.
  10. If you want to perform a calibration on a GX-2003 with 100% volume methane, see "Bump Testing and Calibrating a GX-2003 with 100% Volume Methane" on page 28 for instructions.
  11. Turn off the instrument by pressing and holding the BUMP and VOL. control buttons simultaneously for at least one second and then releasing them. If no control buttons are pressed for 10 minutes, the calibration station will automatically turn off the instrument.

---

**CAUTION:** *When using the GX-2001 with the SM-2001U or the GX-2003 with the SM-2003U, do not turn off the instrument using the instrument power switch. Use the BUMP and VOL. control buttons on the calibration station to turn off the instrument.*

---

12. Remove the instrument from the calibration station.

---

## Bump Testing and Calibrating a GX-2003 with 100% Volume Methane

The GX-2003 can have a %volume methane detector installed. This detector cannot be bump tested or calibrated using the typical gas mix that is used for the other detectors. To accommodate this special need, the SM-2003U includes the VOL. control button. This button activates the %volume gas function. When this function is active, the SM-2003U will bump test or calibrate only the %volume detector in a GX-2003 when a bump test or calibration is performed. If an instrument does not have an active %volume detector, then the VOL. button does not function.

---

**NOTE:** The SM-2001U also includes a VOL. control button, but it does not function on an SM-2001U since the GX-2001 does not have %volume methane capability.

---

To bump test or calibrate the %volume detector in a GX-2003, do the following:

---

**NOTE:** If you have performed a bump test or calibration on a GX-2003 and then wish to perform a bump test or calibration on the %volume detector, begin with instruction 8 below.

---

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***WARNING: Use only 100% volume methane when bump testing or calibrating a GX-2003 %volume detector. Use of a different concentration will result in an inaccurate bump test or calibration.***

---

1. Verify that the 100% volume methane gas cylinder is connected to the CAL. GAS fitting on the back of the SM-2003U.
2. If performing a bump test, verify that the MODE rotary switch is in the position that defines the desired bump test pass criteria. See Table 4 on page 20.  
If performing a calibration, skip this step
3. If the calibration station is off, turn it on using the power switch on

the back of the station. The CHARGE status LED will begin to blink green.

4. Put the GX-2003 to be bump tested or calibrated into the SM-2003U, connect the plastic fitting on the end of the coiled black tube to the inlet fitting, and then connect the plastic fitting on the end of the straight green tube to the exhaust fitting.

If you take more than a few seconds before continuing, the CHARGE LED may begin blinking yellow indicating that the calibration station is charging the battery pack in the instrument if the instrument has a battery pack whose charge is low enough.

5. Turn on the GX-2003. It will begin its normal startup sequence and after a few seconds, the pump will turn off and the display will indicate it is ready to communicate with the SM-2003U:

PC TRANSMIT STAND BY OK 21:09
-------------------------------------------

If LB Mode is activated on a GX-2003, press the POWER ENTER button as soon as the unit turns on to avoid waiting 20 seconds for the unit to time out of the Mode Select Screen to begin its startup sequence.

6. The CHARGE status LED will start blinking green and the calibration station will take several seconds to connect to the instrument. During this time, the CAL. status LED will blink yellow.
7. When the connection is complete, the CAL. status LED will become solid yellow indicating that you can continue with the next step.
8. Press and hold the VOL. button until the VOL. LED turns on, then release it. It will remain on as long as the %volume gas function is active.
9. Press and hold the BUMP or CAL. button for at least one second, then release it. The bump test or calibration begins. During the bump test, the BUMP or CAL. control LED will flash green and the CAL. status LED will flash yellow indicating that a bump test or calibration is in progress. The calibration station will perform the

following functions:

- It will apply fresh air to the instrument for 30 seconds.
- It will perform a zero operation on the GX-2003.

---

**NOTE:** If the %volume methane detector fails the zero operation, then the calibration station will abort the bump test or calibration and will not apply calibration gas. If this happens, the CAL. status LED will blink red indicating a failure and the CAL. control LED will stop blinking and be on steadily green.

---

- It will apply calibration gas to the GX-2003 for the time defined by the MODE Switch setting if a bump test is being performed or for 90 seconds if a calibration is being performed.
  - Purge the system with fresh air for 30 seconds.
10. After the system is purged, the BUMP or CAL. control LED will stop blinking and be on steadily green and the CAL. status LED will be on steadily green if the bump test or calibration passed or steadily red if the bump test or calibration failed.
  11. If a bump test failed and the MODE switch was set to 5, 6, 7, 8, or 9, the calibration will calibrate the GX-2003.
  12. The results of the bump test or calibration will be stored in the calibration station's memory and will be available to copy to a USB flash drive. See "Copying Calibration and Bump Test Records to a USB Flash Drive" on page 34 for instructions to copy the saved bump test and calibration data to a USB flash drive.
  13. If you wish to disable the %volume calibration function, press and hold the VOL. button until the VOL. LED turns off.
  14. Turn off the instrument by pressing and holding the BUMP and VOL. control buttons simultaneously for at least one second and then releasing them. If no control buttons are pressed for 10 minutes, the calibration station will automatically turn off the instrument.

---

**CAUTION:** *When using the GX-2001 with the SM-2001U or the GX-2003 with the SM-2003U, do not turn off the instrument using the instrument power switch. Use the BUMP and VOL. control buttons on the calibration station to turn off the instrument.*

---

15. Remove the instrument from the SM-2003U.

---

## Charging an Instrument in a Calibration Station

The SM-2001U and SM-2003U calibration stations can be used to charge the rechargeable battery pack in a GX-2001 or GX-2003. A calibration station will not recharge the batteries in an alkaline version of the GX-2003. To maximize the battery pack run time and the battery pack life, make sure the battery pack's charge is as low as possible before recharging it.

To recharge the battery pack in an instrument after performing a bump test or calibration:

1. Perform a bump test or calibration on an instrument as described in "Bump Testing Instruments" on page 22 or "Calibrating Instruments" on page 25 or "Bump Testing and Calibrating a GX-2003 with 100% Volume Methane" on page 28.
2. After the bump test or calibration has been completed, turn off the instrument by pressing and holding the BUMP and VOL. control buttons simultaneously for at least one second and then releasing them. If no control buttons are pressed for 10 minutes, the calibration station will automatically turn off the instrument.
3. After a few seconds, the CHARGE status LED on the right front of the calibration station will start blinking yellow. The CAL. status LED on the front left of the calibration station will continue to be either green or red depending on the result of the bump test or calibration.

4. If the battery pack is fully charged, then the CHARGE status LED will turn solid green in a few minutes.

If the battery pack is drained enough for the calibration station to charge it, the CHARGE status LED will continue to blink yellow while charging is taking place. Both the GX-2001 and GX-2003 will take approximately 90 minutes to fully charge.

5. When the charge is complete, the CHARGE status LED will turn solid green.

To recharge the batteries in an instrument without performing any other operations:

1. Place the instrument in the calibration station. If no bump test or calibration will be performed, it is not necessary to make any tubing connections to the instrument.
2. Turn on the calibration station using the power switch on the back.
3. The CHARGE status LED on the right front of the calibration station will begin to blink green for a few seconds, then blink yellow.
4. If the battery pack is fully charged, then the blinking yellow LED will turn solid green in a few minutes.

If the battery pack is drained enough for the module to charge it, the CHARGE status LED will continue to blink yellow while charging is taking place. Both the GX-2001 and GX-2003 will take approximately 90 minutes to fully charge.

5. When the charge is complete, the CHARGE status LED will turn solid green.



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## Calibration and Bump Test Records

The SM-2001U and SM-2003U save a record of each bump test and calibration performed. The calibration stations are capable of saving up to 200 such records. When a calibration station's memory becomes full, the oldest record is overwritten when a new record is saved. These saved records can be saved to a USB flash drive using the USB port.

### Available Memory in the Calibration Station

The COPY function LED above the copy button indicates how much of the calibration station's memory has been used. The table below describes the various indications.

**Table 5: COPY LED Indications**

<b>COPY LED Indication</b>	<b>Memory Used</b>
Off	None. No records are saved
Solid Green	Less than 80% of the calibration station's memory has been used.
Solid Yellow	More than 80% of the calibration station's memory has been used.
Solid Red	The calibration station's memory is full. A newly saved record will overwrite the oldest one.

The calibration station's memory can be cleared by simultaneously pressing and holding the CAL. and COPY control buttons for five seconds.

## Copying Calibration and Bump Test Records to a USB Flash Drive

The calibration station will only perform a copy operation if there is at least one record saved in its memory. If there are no records saved in the station's memory, the COPY LED will be off and the COPY button will not function. Do the following to save calibration and bump test records in the calibration station's memory to a USB flash drive.

1. If the calibration station is off, turn it on using the power switch on the back of the station.

---

**NOTE:** The USB port on the front of the calibration station cannot be used to connect the SM-2001U or the SM-2003U to a computer, only to save calibration and bump test records to a USB flash drive.

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2. Install a USB flash drive into the USB port on the front of the calibration station. The calibration station will take a few seconds to determine how much memory is available in the flash drive.
  - If the flash drive's available memory is not enough for the contents of the calibration station's memory, the COPY LED will alternate between green and red. Enough memory will have to be cleared in the flash drive for the records in the calibration station's memory.
  - If there is enough available memory in the flash drive for the contents of the calibration station's memory, the COPY LED will begin flashing in the same color that it was before installing the flash drive.
3. Press and release the COPY button. The COPY LED will become solid red while the records in the calibration station's memory are copied to the flash drive.

4. Wait until the flash drive's LED stops blinking, then remove the flash drive from the USB port.

---

**NOTE:** If you pull out the flash drive while it's LED is still blinking, the file saved in the flash drive with the calibration and bump test records may be incomplete.

---

5. If the flash drive has not already been used with a calibration station, a folder named **DAT** will be created on the flash drive and a file with all the saved calibration and bump test records will be saved to this folder.

If the flash drive has been used before with a calibration station, the file will be saved to the existing **DAT** folder.

6. The files on the flash drive can now be either transferred to a computer or kept on the flash drive for use with the Single Module Data Viewer Software. See the next section, "Bump Test and Calibration Record Files", for a discussion of these files and how to use them.

## **Bump Test and Calibration Record Files**

Each time a copy function is performed, a file is saved to the flash drive in the **DAT** folder. The file name will begin with either "SM-2001SAMPLE" or "SM-2003SAMPLE" depending on whether the records came from an SM-2001U or SM-2003U and the remainder of the file name will depend on the date of the most recent bump test or calibration performed on the calibration station. So it is possible to have multiple files in the DAT folder from the SM-2001U or SM-2003U.

The files that a calibration station saves to a USB flash drive are structured so that they can be imported into a database controlled by the Single Module Data Viewer software. See "Importing Files Into the Database" on page 39 for instructions to add files to the database.

## Bump Testing or Calibrating and Saving Files To a Flash Drive Multiple Times In One Day

The SM-2001U and SM-2003U assign file names to calibration and bump test record files based on the day of the most recent calibration or bump test record saved in the calibration station's memory. If a copy operation is performed, additional bump tests or calibrations are performed, and another copy operation is performed with the same flash drive all on the same day, the existing file on the flash drive from the first copy operation will be overwritten by the file from the second copy operation because it's name will be the same as the new file. In this case, no information is lost since the second file saved to the flash drive includes all the records that were in the first file.

However, if a copy operation is performed, **the calibration station memory is cleared**, additional bump tests or calibrations are performed, and another copy operation is performed with the same flash drive all on the same day, this will result in the information in the file from the first copy operation being lost. This is because the file saved to the flash drive in the second copy operation only includes records since the memory was cleared and when it overwrites the file from the first copy operation, all the information in the first file is lost.

---

**CAUTION:** *If copying a calibration station's memory to a flash drive multiple times during the same day, transfer the calibration/bump test record files from the flash drive to a computer hard drive or some other memory device if the calibration station memory is cleared to avoid possible loss of information during subsequent copy operations.*

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# Chapter 5: Single Module Data Viewer Software

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## Overview

The Single Module Data Viewer Software is used to view, organize, and print bump test and calibration records that were created by the SM-2001U and SM-2003U. It can also be used to export these records from its database for use in other programs. This chapter describes how to use the Single Module Data Viewer Software.

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## Launching the Single Module Data Viewer Software

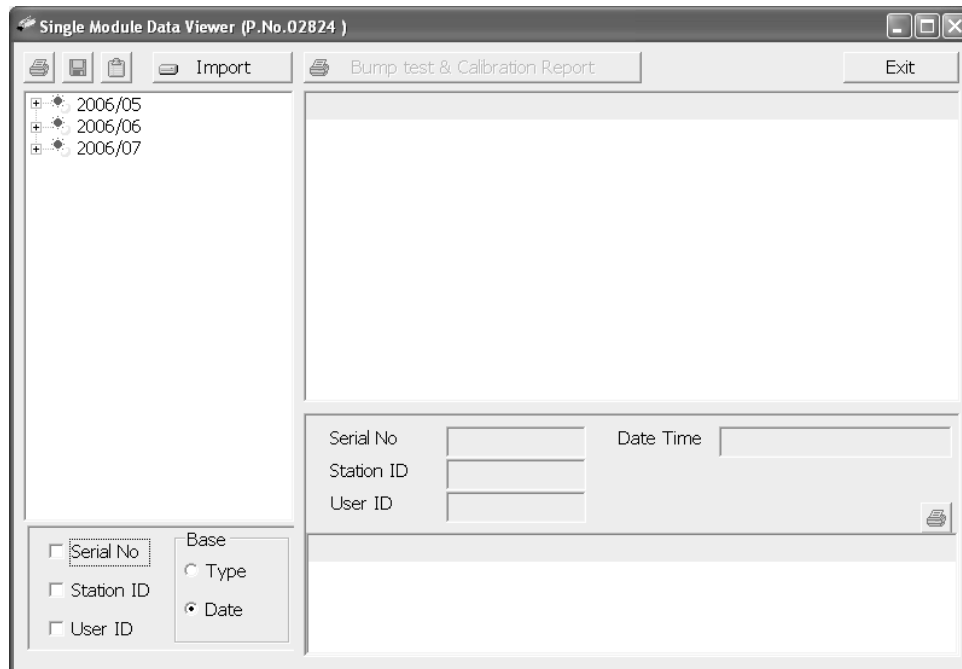
1. Click **Start** on the Windows<sup>®</sup> Icon Tray, then select **Programs/Single Module Data Viewer**.

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**NOTE:** If you are starting the software for the first time, a message window appears informing you that a database has been created. If this occurs, click **OK**.

---

2. The Single Module Data Viewer program is launched and the data viewing window appears.



**Figure 5: Single Module Data Viewer Window**

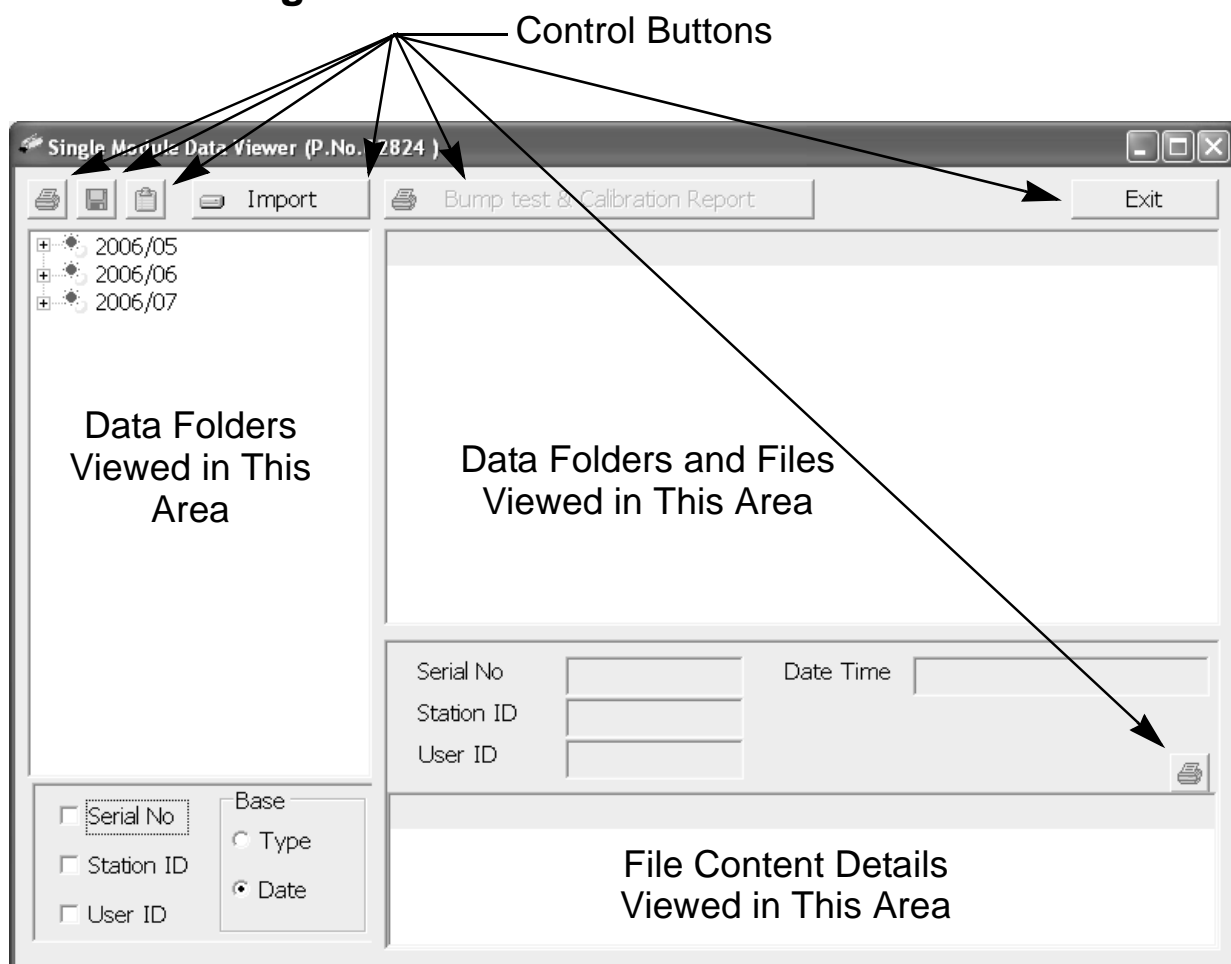
---

**NOTE:** When you start the Single Module Data Viewer program for the first time, there will be no data in the left part of the data viewing window since no data has been imported into the database yet.

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## Using the Single Module Data Viewer Software

### Data Viewing Window



**Figure 6: Data Viewing Window**

All of the operations that can be performed in the Single Module Data Viewer Program can be executed from the data viewing window. There are function buttons along the top of the window and one in the lower right that initiate the various operations. The upper left side of the window displays the contents of the database. The lower left corner of the window has selection boxes that allow you to organize the data. The

upper right side of the window shows the contents of the item selected in the upper left side, and the lower right side indicates the contents of the item selected in the area above it. In the example above, the data is organized by date.

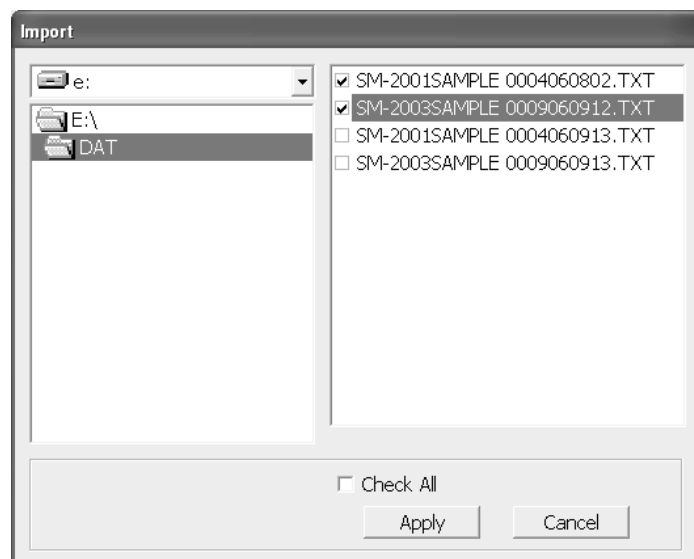
You can do the following in the data viewing window:

- Import files into the database that were created by an SM-2001U or SM-2003U
- View the bump test and calibration data saved in the database.
- Delete data.
- Print bump test or calibration results (pass or fail indication only).
- Copy bump test or calibration records to the clipboard or to a particular location on your computer or network.
- Print a bump test or calibration report that includes the results and all gas readings.

## Importing Files Into the Database

The files generated by the SM-2001U and SM-2003U are structured to be imported into the Single Module Data Viewer Software database. To import data files into the database, do the following:

1. While in the Data Viewing Window, click the **Import** button. The Import Window will appear.



**Figure 7: Import Window**

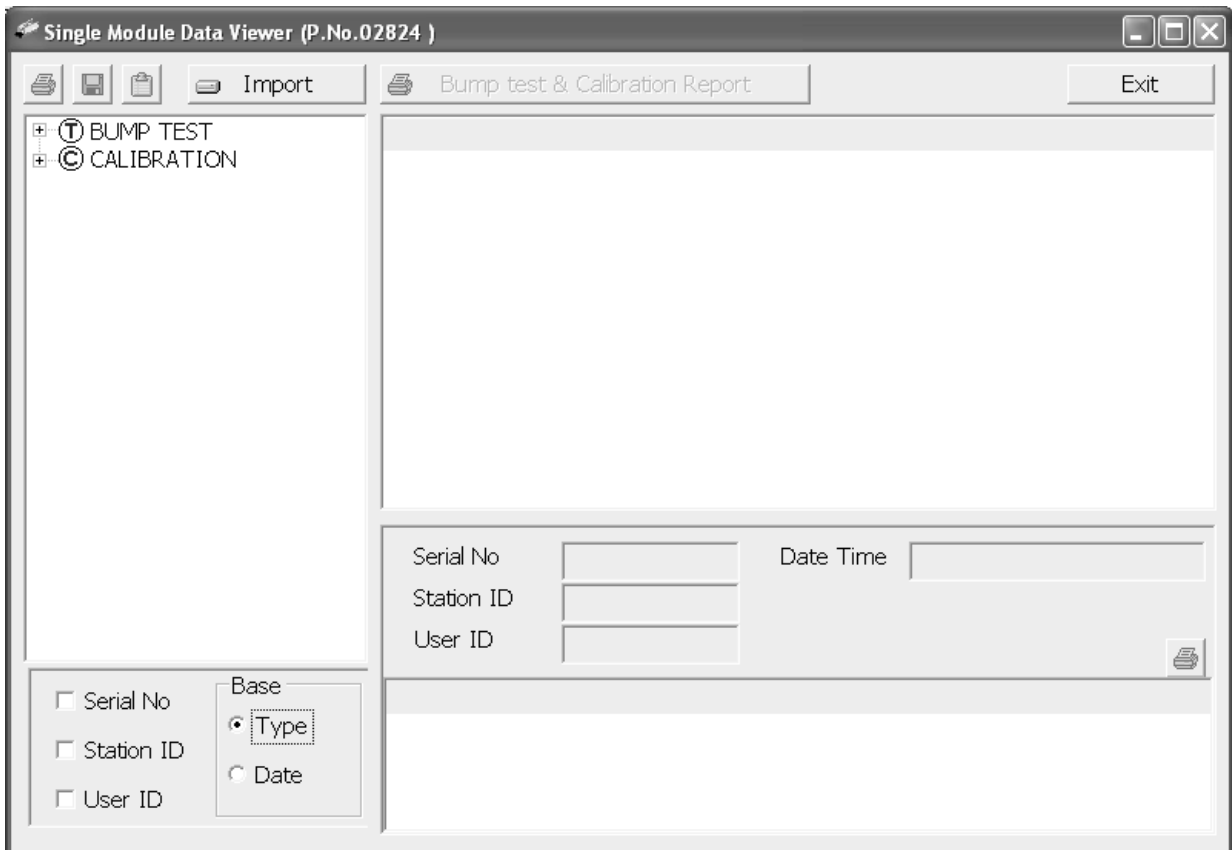
2. Navigate to the location of the files that you want to import into the database and select them.
3. Click the **Apply** button. A window will appear for a few seconds indicating that the file or files are being imported.
4. The files are now added to the database.

## Viewing the Data

When viewing the data, it can be organized in two ways:

1. Base View Format

In base view format, neither of the Serial No, Station ID, or User ID selection boxes in the lower left of the window are selected and the Base box appears next to these selection boxes. The data can be organized by either the data type (bump test and calibration data) or by the month and year. The example below shows the data organized by type.



**Figure 8: Data in Base Viewing Format**

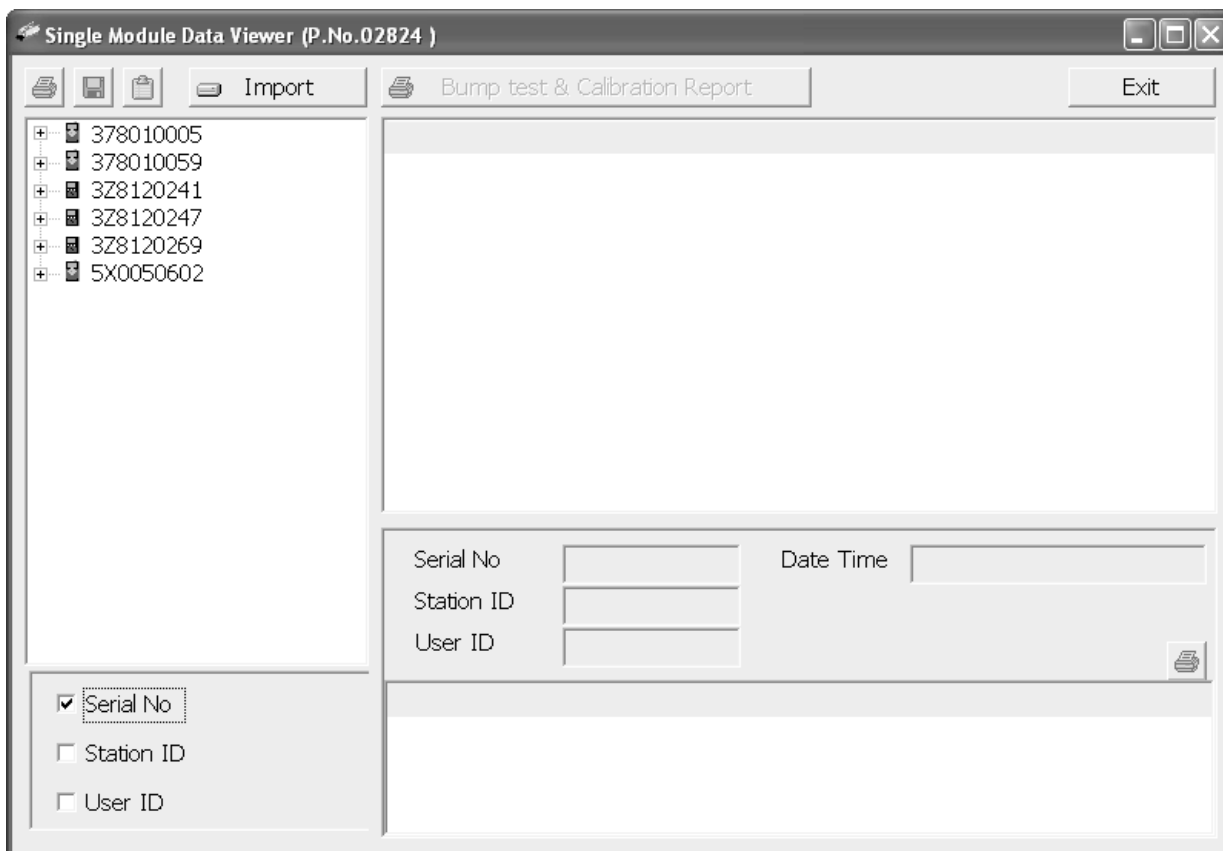


## 2. ID View Format

In ID view format, the data can be organized by one or more of the following items depending on which selection box or boxes in the lower left corner of the data viewing window are selected:

- Serial Number
- Station ID
- User ID

If any of these boxes is selected, the Base box disappears. The example below shows the data organized by serial number.

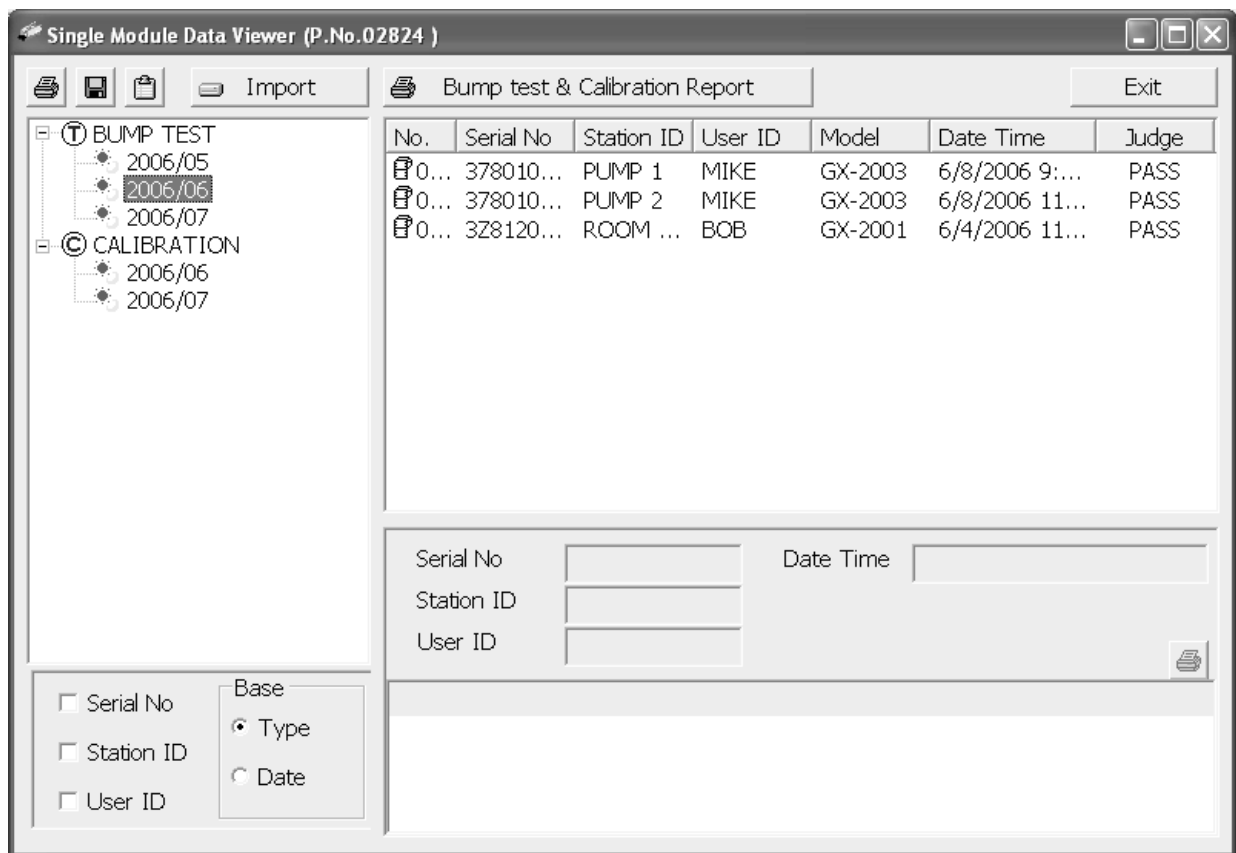


**Figure 9: Data in ID Viewing Format**

The data is organized in folders. A data folder is represented as an icon in the left side of the data viewing window. If there is a (+) or a (-) symbol to its left, then it contains another folder. There are various folder icons which are used depending on how the data is organized.

Once you have selected how you want to organize the data:

1. Click the expanded view symbol (+) next to a folder in the left side of the data viewing window or double click the folder to view the contents below it. Single click on the folder to view the contents in the right side of the window. If a folder is expanded and you want to close it, click the (-) symbol next to the folder or double click it.
2. When an item no longer has a (+) or (-) symbol next to it, single click it and the contents of the item will be shown on the right side of the window.
3. If you are viewing data in base view format with the data organized by type, expand the data folder you wish to view, bump test or calibration data. Folders organized by year/month will appear below the folder. Click on the folder whose contents you wish to see. The bump test or calibration files in the folder will be shown in the upper right side of the data view window.

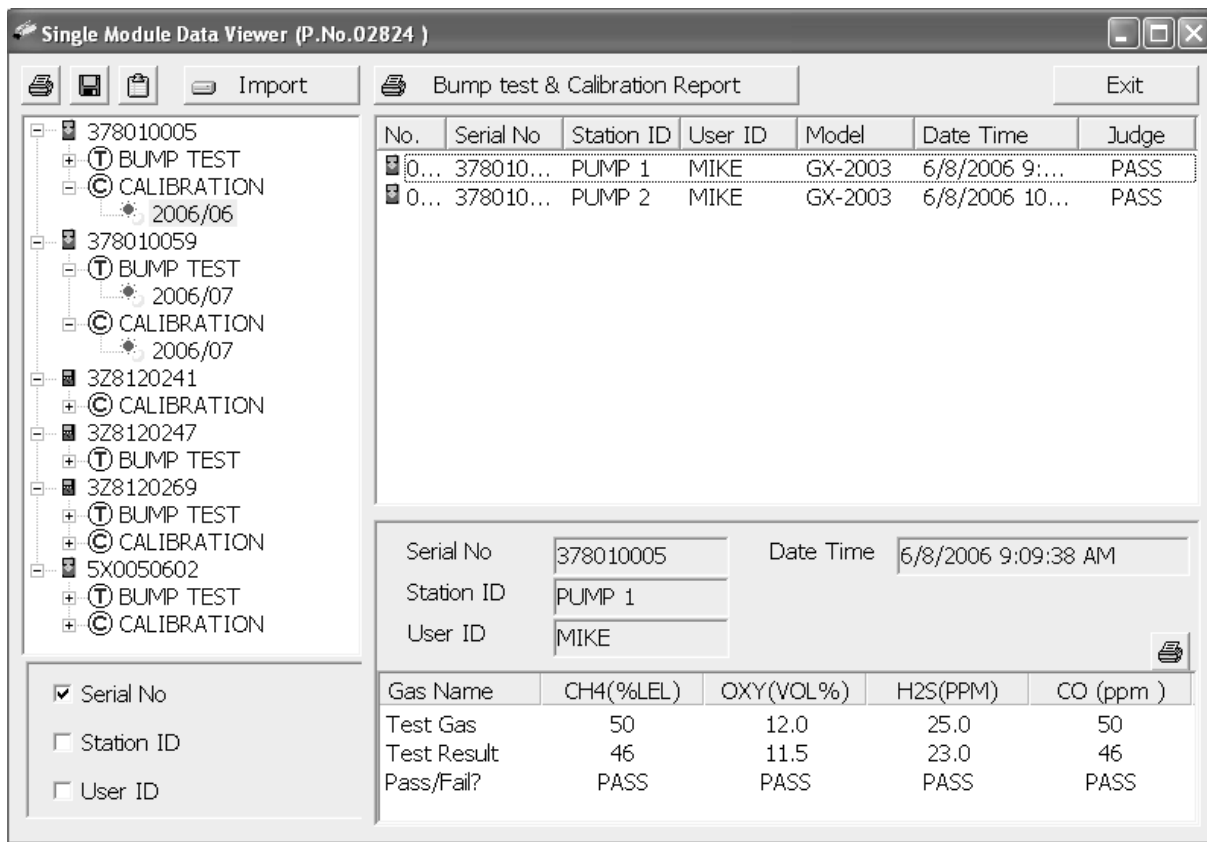


**Figure 10: Calibration/Bump Test Files in Base View Format**

If you organize the data by date, then folders organized by year/

month appear in the left side of the window. Expand the folder you want to see and click on the calibration or bump test folder. The calibration or bump test files will appear in the upper right side of the window.

If you are viewing data in ID view format, expand the folders in the left side of the window until the bump test or calibration folder you wish to view is visible. Expand the folder. Folders organized by year/month will be listed below the calibration or bump test folder. Click the folder whose contents you want to view and the calibration or bump test files in it will be shown in the upper right side of the data view window. The example below is organized by serial number.



**Figure 11: Calibration/Bump Test Files in ID View Format**

- Files that record a failed calibration or bump test on all channels are highlighted in red. Files that record a calibration or bump test where not all channels passed are highlighted in orange.
- To view the file contents, click on the file in the upper right part of

- the data view window that you wish to view. The contents in the file will appear in the lower right part of the window. The contents include the instrument's serial number, station ID, user ID, bump test or calibration time, test gas, and gas readings during the operation.
6. To print the files as they appear in the upper right part of the data view window, click the print button in the upper left corner of the window. A dialog box will appear confirming if you want to print. Click **OK**.
  7. To print the contents of all files in the upper right window, click the **Bump test & Calibration Report** button above the files. A dialog box will appear showing the selected printer and confirming if you want to print. Verify that the selected printer is correct and click **OK**.
  8. To print the contents of one of the files in the upper right part of the data view window, click on one of the files to select it and then click the print button that appears above the file details in the lower right. A dialog box will appear showing the selected printer and confirming if you want to print. Verify that the selected printer is correct and click **OK**.
  9. To save files as they appear in the upper right part of the data view window, click the **Save To File** button to the right of the print button in the upper left corner of the window. The **Save To File** button has a floppy disk icon in it. A "Save As" dialog box will appear for you to specify the filename, file location, and file type. Select the **Text files (\*.csv)** choice to save the information as a comma separated value file that may be opened with a spreadsheet program such as Microsoft Excel.
  10. To save files to the clipboard as they appear in the upper right part of the data view window, click the **Copy To Clipboard** button. The **Copy To Clipboard** button has a clipboard icon in it. The file will be saved to the clipboard. It can then be pasted into a document by using the Paste command in an application.

## Deleting Data

You can delete an instrument, bump test data, or calibration data in the data view window. The delete function is password protected to avoid

accidental deletion of instruments or data. To delete an instrument or data, perform the following:

1. Find the item you wish to delete and right click it. A window will appear that says “Delete(D) Change Password(C)”.
2. Click on “Delete(D)”. A password entry window will appear.
3. Enter the password and click **OK**. The default password is “ABCDE” and is case sensitive. A confirmation window will appear.
4. Click **OK** to complete the deletion of the selected item.

## Changing the Password

The default password is “ABCDE” and is case sensitive. You can change the password in the data view window. To change the password perform the following:

1. Right click in the upper right or upper left part of the data view window. A window will appear that says “Delete(D) Change Password(C)”.
2. Click on “Change Password(C)”. A window will appear prompting you for the current password.
3. Enter the current password and click the **Current Password** button. A window will appear prompting you for the new password.
4. Enter the new password and click the **New Password** button. A confirmation window will appear prompting you for the new password again.
5. Enter the new password again and click the **Confirm New Password** button. A window will appear indicating that the password has been changed.
6. Click **OK** to complete the password update.

## Exiting the Program

To exit the Single Module Data View program, do the following:

1. Click the **Exit** button in the upper right corner of the data view window. A confirmation window will appear.

2. Click the **OK** button to exit the program or the **Cancel** button to return to the program.

## Spare Parts List

**Table 6: Spare Parts List**

Part Number	Description
06-0201RK	Exhaust fitting plug, DataCal 2000 module
06-1248RK	Polyurethane tubing, 5/16-inch OD x 3/16-inch ID, for connecting calibration cylinder to calibration station
06-1254RK	Polyurethane tubing, 7/16-inch OD x 5/16-inch ID, for exhaust tube, 10 feet maximum
33-0165RK	Particle air filter replacement
43-4155RK	Fuse, 5 x 20 mm, 2A, 250V
47-1013RK	Power cord, for 115 VAC
71-0130RK	Operator's Manual SM-2001U & SM-2003U Single Module Calibration Stations (this document)
81-0016RK-05	Cylinder, methane, 100% volume, 58 liter steel
81-0090RK-03	Three-gas calibration cylinder, 50% LEL CH <sub>4</sub> /12% O <sub>2</sub> /50 ppm CO, 103 liter steel
81-0154RK-02	Four-gas calibration cylinder, 50% LEL CH <sub>4</sub> /12% O <sub>2</sub> /50 ppm CO/25 ppm H <sub>2</sub> S, 58 liter aluminum
81-1054RK	Demand flow regulator, 50/103 liter
81-SM2001U	Single Module Calibration Station for GX-2001
81-SM2003U	Single Module Calibration Station for GX-2003
83-0009RK	Single Mode Data Viewer software