



**Calibration Station for the Ventis MX4**  
**Product Manual**  
Set-up  
Operation



Part Number: 17153101-1  
Version 0

**INDUSTRIAL**  
**SCIENTIFIC**

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## WARNINGS AND CAUTIONARY STATEMENTS

### **WARNING:**

Read and understand this manual before operating.

### **WARNING:**

Failure to perform certain procedures or note certain conditions may impair the performance of this product. For maximum safety and optimal performance, please read and follow the procedures and conditions listed below.

### **CAUTION:**

For safety reasons, this equipment must be operated and serviced by qualified personnel only.

### **CAUTION:**

Equipment is rated for indoor use only at altitudes below 2,000 m or 6,000'.

### **CAUTION:**

Compressed gas cylinders and their contents may present specific hazards to the user. Use only in a well ventilated area. Use only in accordance with the instructions and warnings as marked on the cylinder and the appropriate Material Safety Data Sheets.

### **NOTE:**

The station should be cleaned only with a soft cloth; do not use solvents or other liquids.

### **NOTE:**

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at the user's own expense.

*Contact your service representative immediately if you suspect that the station is working abnormally.*

## CAPABILITIES

The V•Cal™ is a stand-alone calibration station designed to work in conjunction with the Ventis MX4™ Multi-gas Monitor. The station is available in two dedicated models, one for the aspirated instrument and one for the diffusion instrument; the latter is MX4 iQuad compatible.

The station communicates directly with a docked instrument to perform bump tests and calibrations. It can also charge an instrument equipped with a rechargeable Li-ion (lithium-ion) battery pack.

Calibration and bump test records are saved to the station's "buffer" (or memory) which can store a total of approximately 150 records. The results for each calibration and bump test performed are automatically sent, in report form, to an external serial printer (via a TTL-serial connection) when connected.

The station can communicate with a host PC across a USB connection, when the PC is running ISAS (Industrial Scientific Accessory Software). The following capabilities are included in the calibration station with respect to commands from the host PC:

- Reading/writing instrument and calibration station settings.
- Reading the instrument datalog.
- Reading the instrument event log.
- Accessing bump and calibration records from the station.

The following operating systems support ISAS.

- Windows XP Professional
- Windows Vista
- Windows Server 2003
- Windows Server 2008

## UNPACKING THE STATION

The station's box contains the following items. Each item should be accounted for in the unpacking process.

Quantity	Part Number	Description
1	18108631	V•Cal Calibration Station (includes: one 6" or 0.1524 m tube with a white luer AND one 6" inch or 0.1524 m tube with a white luer and t-fitting)
1	17093659	Urethane tubing (4" or 0.1016 m)
1	17121310	USB cable
1	17118027	Fitting (for gas inlet)
1	17124074	Fitting (for fresh air cylinder)
1	17121070	Industrial Scientific Accessory Software Suite CD
1	17051710	Power cord
1	17142126	Power supply

*Reporting a problem.* After unpacking, if any item is missing or appears to have been damaged, contact a local distributor of Industrial Scientific products or Industrial Scientific Corporation. Please refer to the manual section, [Contact Information](#).

## USER INTERFACE

The calibration station user interface is comprised of the following.

- Character LCD display
- Two pushbuttons
- Three LEDs

The LCD is an eight-character by two-line display. It is backlit when the station performs a task or displays the result of a task.

The station's two pushbuttons, "CALIBRATE" and "BUMP TEST", are used to initiate the performance of those functions when an instrument is docked. These buttons are also used to access the station's set-up mode where a variety of station settings can be set or changed, and where the user can access station functions.

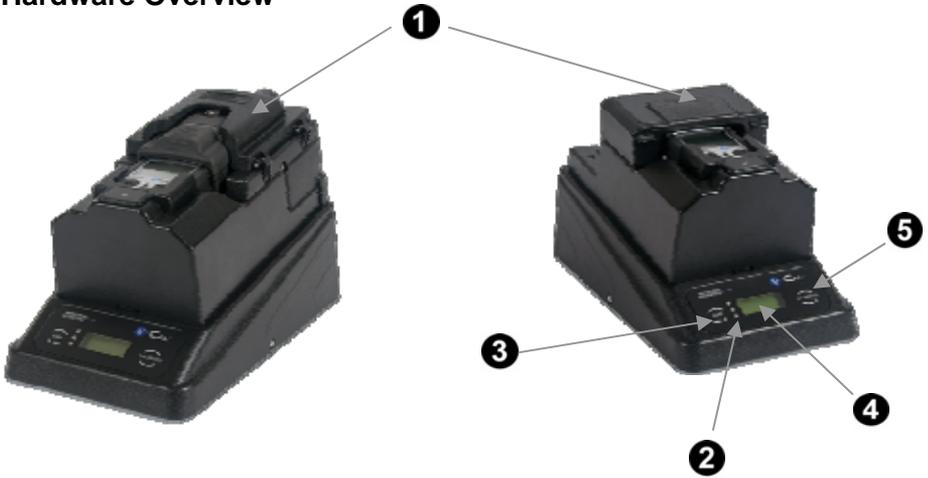
The station's three LEDs serve to indicate the status of the station. They are also used to help communicate bump test, zero, and calibration results.

- The green LED indicates the docked instrument has passed a calibration or bump test.

- The amber LED indicates a calibration or bump test is in-progress, or that the instrument is charging.
- The red LED indicates the docked instrument has failed a calibration or bump test. The red LED is also used to indicate an error has occurred; the LCD displays the error message(s).
- If no instrument is docked, all LEDs are off, the station is in “Ready” status, and all station functions are accessible.

## STATION PREPARATION

### Hardware Overview



#### ASPIRATED MODEL

Front of station (top); Back of station (bottom).

Items 1-10 are common to both the aspirated and diffusion models.

#### DIFFUSION MODEL

Front of station (top); Back of station (bottom).

Items 1-10 are common to both the aspirated and diffusion models.

Diagram Number	Feature
1	Cradle lid
2	LED indicators
3	Bump test button
4	LCD display
5	Calibrate button
6	Printer connection
7	USB connection
8	Fresh air input
9	Calibration gas input
10	Power input
11*	Instrument inlet connection
12*	Aspirated connection tubing (for use when station door in <i>attached</i> )
12*	Aspirated connection tubing with T-fitting (for use when station door is <i>removed</i> )
*Aspirated station only.	

## Software Installation and Hardware Connections

Refer to the above manual section, [Hardware Overview](#) to identify the parts referenced in the following instructions.

SOFTWARE INSTALLATION	
1	To install the software, insert the software CD into the CD drive of the host PC. The InstallShield Wizard program automatically starts and begins the installation process. If the program does not start, open a window on the computer to view the contents of the CD; double-click on the file titled, "Setup.exe".
2	<p>To complete the installation, continue following the instructions as they display on the PC.</p> <p>Be sure to choose the desired language for the user interface. This is completed from the drop-down menu that appears on one of the first installations screens. The choices are Chinese (simplified), English (United States), French (Standard), German, or Spanish. Highlight the desired language and click the "OK" button to continue.</p>

HARDWARE CONNECTIONS	
<b>Attaching cables and cords.</b>	
1	<p><i>USB cable.</i></p> <ul style="list-style-type: none"> <li>On the back of the station, locate the connection marked "USB".</li> <li>To connect the station to the computer, insert the cable's flat end into the computer's USB port; plug the other end into the USB connection on the back of the station.</li> </ul>
3	<p><i>Printer connection (if desired).</i></p> <ul style="list-style-type: none"> <li>Power-off the printer.</li> <li>Connect the printer cord to the connection marked "printer" on the back of the station. Tighten the captive screws to secure the connection.</li> </ul>
3	<p><i>Power supply and power cord.</i></p> <ul style="list-style-type: none"> <li>On the back of the station, locate the connection marked, "12VDC".</li> <li>Connect the power <i>supply</i> to the 12VDC connection.</li> <li>Connect the other end of the power supply to the <i>power cord</i>.</li> </ul>
<b>Connecting the gas cylinder and demand flow regulator.</b>	
1	Attach the demand flow regulator to the gas cylinder and turn clockwise to tighten.

2	<ul style="list-style-type: none"> <li>• Connect either end of the supplied urethane tubing to the regulator's nipple; the nipple fits inside the tubing.</li> <li>• On the back of the station, locate the fitting marked, "CAL GAS". This is the gas intake fitting; connect the other end of the tubing to the gas intake fitting.</li> </ul>
<p>FOR ASPIRATED STATIONS <i>ONLY</i>.</p> <p><b>Enabling the flow of calibration gas from the station to the instrument.</b>  <i>The station can perform calibrations and bump tests with its door <b>attached</b> to the station (Option 1) OR <b>removed</b> from the station (Option 2). To enable the flow of calibration gas to the installed instrument, follow the instructions below for option 1 OR option 2.</i></p>	
<p><b>Option 1:</b> <i>the instrument door remains <b>attached</b> to the station.</i></p>	
1	<p>Locate the instrument inlet connection on the back of the station.</p>
2	<p>Locate the tubing that has a white luer at one end; the other end of the tubing has <i>no other fittings</i>.            Fasten the luer to the instrument inlet connection; turn clockwise to tighten.</p>
3	<p>To calibrate or bump test an installed aspirated instrument, attach the other end of the tubing to the air intake nipple extending from the station's cradle lid.</p>
<p><b>Option 2:</b> <i>the instrument door is <b>removed</b> from the station.</i></p>	
1	<p>Lift the door to remove it from the station; set the door aside or store for future use.</p>
2	<p>Locate the instrument inlet connection on the back of the station.</p>
3	<p>Locate the tubing that has a white luer at one end and a t-fitting at its other end. Fasten the luer to the instrument inlet connection; turn clockwise to tighten.</p>
4	<p>Attach the other end of the tubing directly to the instrument's air intake. To calibrate or bump test, install the instrument in the station.</p>

## STATION USE

### Power-on and -off

After all hardware connections have been completed and the software has been installed, plug in the power cord to power-on the station. There is no power-on/-off switch. To power-off the station, unplug the power cord.

### Start-up Mode

When initially powered on, the station warms up and performs a series of internal diagnostics. During this process, or *start-up mode*, a series of messages displays as shown below.

DISPLAY	INSTRUCTIONS
<b>V·Cal</b> <b>v 3.00.07</b> Displays station name and software version number (e.g., 3.00.07).	No user action required.
<b>Warming Up</b>	No user action required.
<b>12345678</b> <b>ABCDEFGH</b> LCD Test Display	No user action required.
<b>Verify LEDS</b> The station's LEDs each briefly turn on, then off.	No user action required.
 Pixel Test Display	No user action required.

<p><b>Checking Currents</b>                  Displays as the station checks the current draw of various station subsystems to make sure they are operating correctly.</p>	<p>No user action required.</p>
<p><b>Checking Clock</b>                  Displays as the station checks for a valid date and time on the real-time clock.</p>	<p>No user action required.</p>
<p><b>22Jan10 12:34:56</b>                  Displays current date and time if the clock check was successful.</p>	<p>No user action required.</p>

If the station passes all diagnostics, the Ready or Charging message displays and all station functions are available.

If the station fails any diagnostic test, the red LED turns on and a system error displays on the LCD for each failure encountered. Possible errors include “Check Pump”, “Check Sol”, “Check Board”, and “Clock Error”. These error messages and all other error and status messages are described below.

✓ *NOTE: Cycle the power to the station to clear errors.*

STATUS MESSAGES	
DISPLAY	STATION STATUS
<p><b>Waiting to...</b></p> <p><b>Connect</b>                      Alternately display when an instrument is docked as the station attempts to communicate with the instrument.</p>	<p>The bump test and calibrate functions are available.                      Set-up mode is accessible.                      USB communications are accepted and processed.</p> <p>If communication with the instrument is established within three minutes, one of two messages displays depending on the status of the battery: Charging or Ready.</p> <p>If communication is <i>not</i> established within three minutes, the red LED turns on and this error message displays: Inst Comm Error.</p>

<p><b>Busy Wait</b> Displays when the USB is downloading data or communicating with the station.</p>	<p>The bump test and calibrate functions are <i>not</i> available. Set-up mode is <i>not</i> accessible.</p>
<p><b>Charging</b> Displays to indicate the station is charging an instrument equipped with a Li-ion battery. The amber LED turns on.</p> <p><i>NOTE: Always refer to the instrument's battery icon to assess the level of charge.</i></p>	<p>The bump test and calibrate functions are available. Set-up mode is accessible. USB communications are accepted and processed.</p>
<p><b>Printing</b> • • • Displays while records print.</p>	<p>The bump test and calibrate functions are <i>not</i> available. Set-up mode is <i>not</i> accessible. USB communications are <i>not</i> accepted or processed.</p>
<p><b>Ready</b> Displays when an instrument is installed and is not charging. The green LED turns on.</p>	<p>The bump test and calibrate functions are available. Set-up mode is accessible. USB communications are accepted and processed.</p>
<p><b>Close Lid</b> May display when a bump test or calibration is started. Indicates the station's cradle lid is not closed.</p>	<p>Close the cradle lid. After the lid is closed, the station automatically restarts the calibration or bump test process.</p>
<p><b>ERROR MESSAGES</b></p>	
<p><b>DISPLAY</b></p>	<p><b>STATION STATUS</b></p>
<p><b>Inst Error</b> May display during a bump test or calibration. Indicates the instrument is in a system alarm state.</p>	<p>The bump test or calibration is automatically aborted by the station. The display persists until the instrument is removed from the station.</p> <p>The bump test and calibrate functions are <i>not</i> available. Set-up mode is <i>not</i> accessible. USB communications are accepted and processed.</p>

<p><b>PRN off</b>  <b>Low temp</b>                  May display when a station attempts to print. Indicates the temperature inside the station is below -15°C or 5°F.</p>	<p>--</p>
<p><b>Inst</b>  <b>Comm Error</b>                  Displays if the bump test or calibrate process is started and the station cannot establish communication with the instrument.</p>	<p>The bump test or calibration is automatically aborted.                  Set-up mode is accessible.                  USB communications are accepted and processed.</p> <p>With another press of the bump test or calibration button, the station will again attempt the process. If unsuccessful the display persists until the instrument is removed from the station.</p>
<p><b>No Inst</b>  <b>Detected</b>                  Displays if the bump test or calibrate process is started and the station does not detect the presence of an instrument.</p>	<p>The bump test or calibration is automatically aborted. Set-up mode is accessible.                  USB communications are accepted and processed.</p> <p>With another press of the bump test or calibration button, the station will again check for an instrument and attempt to perform the process requested. If unsuccessful, the display persists until the instrument is removed from the station.</p>
<p><b>Check Pump</b>  <b>Check Sol</b>  <b>Check Board</b>                  May display during the diagnostic process. Indicates the board, solenoid, or pump current falls outside the acceptable limits.</p>	<p>Bump test and calibration functions are <i>not</i> available.                  Set-up mode is accessible.                  USB communications are accepted and processed.</p>

<p><b>Clock Error</b> Indicates an invalid date or clock setting on the station's real-time clock.</p>	<p>Bump test and calibration functions are <i>not</i> available. Set-up mode is accessible. USB communications are accepted and processed.</p>
<p><b>EEPROM Error</b> Indicates the station cannot read and/or write to its memory.</p>	<p>The bump test and calibrate functions are available; however, the results may not be saved to the station. Set-up mode is accessible. USB communications are accepted and processed.</p>
<p><b>Pump Error</b> May display after a failed zero, calibration, or bump test. Indicates a possible fault with the instrument pump, <i>not</i> the station.</p>	<p>Re-try calibration or check the air intake on the instrument's pump to ensure it is clear.  The calibration function is available. The bump test function is <i>not</i> available. Set-up mode is accessible. USB communications are accepted and processed.</p>
<p><b>Illegal Inst</b> May display when a bump test or calibration is started. Indicates the installed instrument is not compatible with the station.</p>	<p>Check that the instrument is compatible with the station; refer to the manual section, <u>Capabilities</u>.  Bump test and calibration functions are <i>not</i> available. Set-up mode is accessible. USB communications are accepted and processed.</p>

## Idle Mode

When the Ready or Charging message displays, the station is in *idle mode* and all station functions are available. From idle mode, the user can enter station *set-up mode*, or can bump test or calibrate an instrument. Beginning with set-up mode, each process is outlined in the following manual sections, Set-up Mode, Calibrate and Bump Test.

## Set-up Mode

In *set-up mode*, the user can access and perform a variety of station functions, and can initially set or subsequently change station settings.

*Functions Accessible in Set-up Mode.*

- Print Events (instrument-related)
- Print Buffer\*
- Clear Buffer\*

- Cal Days
- Set Date
- Select Language
- Check System

*\*Buffer is synonymous with memory. It refers to the station's saved bump test and calibration records, not the datalog of the docked instrument.*

The tasks that can be accomplished within each set-up function are described below and are presented in the order in which they are encountered by the user. Instructions for completing or bypassing each task are also provided. Generally, the **BUMP TEST** button functions as a “bypass” or “no” option; it is also used to edit values (e.g., to set the date). The **CALIBRATE** button generally functions as a “begin” or “yes” option; it is also used to set values.

✓ *NOTE: In set-up mode, when no button is pressed within ten seconds, the screen times out and the station returns to idle mode.*

DISPLAY MESSAGE	INSTRUCTIONS
Ready or Charging	Simultaneously press <b>BUMP TEST</b> and <b>CALIBRATE</b> , hold for three seconds, and release to enter <b>set-up mode</b> .
Print Events When selected, all event data for the installed instrument (not the station) are sent to the printer.	Press <b>BUMP TEST</b> to <b>bypass</b> the print events function and advance to the Print Buffer function. Press <b>CALIBRATE</b> to <b>begin</b> printing.
Print OK Y N Displays to allow the user to continue with or cancel the print command. If confirmed, all event data from the installed instrument is printed.	Press <b>BUMP TEST</b> to <b>bypass</b> printing and advance to the Print Buffer function. Press <b>CALIBRATE</b> to <b>send the data</b> to the printer; the Printing Events message displays.
Printing Events Displays while the event log prints.	No user action required.  <i>NOTE: While the event log prints, the station ignores all button presses and USB communications.</i>

<p><b>Print Buffer</b></p> <p>When selected, <i>all</i> bump test and calibration records saved to the station are sent to the printer.</p>	<p>Press <b>BUMP TEST to bypass</b> the print buffer function and advance to the Clear Buffer function. Press <b>CALIBRATE to begin</b> printing.</p> <p><i>NOTE: The station can store up to 150 bump test and calibration reports. If the buffer is nearly full, it may take more than 30 minutes to complete the printing task.</i></p>
<p><b>Print OK Y N</b></p> <p>Displays to allow the user to continue with or cancel the print command. If confirmed, <i>all</i> records saved to the station are printed.</p>	<p>Press <b>BUMP TEST to clear</b> the print command. The user advances to the next set-up function, "Clear Buffer". Press <b>CALIBRATE to send the data</b> to the printer.</p>
<p><b>Printing</b></p> <p>. . .</p>	<p>Displays while the records print. No user action required.</p> <p><i>NOTE: While buffer records print, the station ignores all button presses and USB communications.</i></p> <p><i>NOTE: After printing the saved bump test and calibration reports, they are NOT automatically deleted from the station. The "clear buffer" function is used to complete that task.</i></p>
<p><b>Clear Buffer</b></p> <p>When selected, <i>all</i> saved bump test and calibration records are deleted from the station.</p>	<p>Press <b>BUMP TEST to bypass</b> the clear buffer function. The records remain in the buffer and the user advances to the next set-up function, Cal Days. Press <b>CALIBRATE to delete</b> all records saved to the station.</p> <p><i>NOTE: The clear buffer function is executable regardless of whether or not the buffer has been printed.</i></p>
<p><b>Clear OK Y N</b></p> <p>Displays to allow the user to continue with or cancel the clear command. If confirmed, all bump test and calibration records saved to the station are deleted.</p>	<p>Press <b>BUMP TEST to cancel</b> the clear buffer command. The records remain in the buffer and the user advances to the next set-up function, Cal Days. Press <b>CALIBRATE to delete</b> all records saved to the station.</p>

<p><b>Buffer Cleared</b> Displays to indicate the station's records have been successfully deleted.</p>	<p>No user action required.</p>
<p><b>Cal Days</b> <b>30</b> Displays the current setting for the number of days between calibrations (e.g., 30).</p>	<p>This function allows the user to set the elapsed time between calibrations. The setting is programmed into the station as well as the instrument.  Press <b>BUMP TEST to bypass</b> the setting process and advance to the next set-up function, Set Date. Press <b>CALIBRATE to edit</b> the value.</p>
<p><b>30</b> <b>^ OK</b>  Valid values: 1 – 365 days Increment: one day</p>	<p>Press <b>BUMP TEST to increase</b> the number of days, if needed; hold to speed the increment pace. Press <b>CALIBRATE to set</b> the value displayed.</p>
<p><b>Set Date</b></p>	<p>Press <b>BUMP TEST to bypass</b> the setting process and advance to the next set-up function, Select Language. Press <b>CALIBRATE to edit</b> the values, if needed. Each of these values can be changed and are presented to the user in this order: month, day, year, hour, and minutes.</p>
<p><b>01 Month</b> <b>^ OK</b> Displays show for each date and time values. The station uses a 24-hour format for time settings.</p>	<p>The first date/time value subject to change is the month (as shown). Press <b>BUMP TEST to edit</b> the value, if needed. Press <b>CALIBRATE to set</b> the value displayed.  Continue to use the BUMP TEST and CALIBRATE buttons, respectively, to edit and set all date and time values.</p>
<p><b>Select Language</b></p>	<p>Press <b>BUMP TEST to bypass</b> the setting process and advance to the next set-up function, Check System. Language options are presented to the user in this order: English, Espanol, Francais, and Deutsch.  Press <b>CALIBRATE to edit</b> the language selection, if needed.</p>

<p>English ^ OK</p>	<p>Press <b>BUMP TEST to bypass</b> the first language displayed, English. The next available language displays. Continue to press BUMP TEST until the desired language displays. Press <b>CALIBRATE to set</b> the language.</p>
<p>Check System</p>	<p>With the Check System function, the user can ask the station to run a full set of diagnostics. The station will cycle through all tests described in the manual section, <u>Start-up</u>.  Press <b>BUMP TEST to bypass</b> the diagnostics process and advance to the Exit display. Press <b>CALIBRATE to complete</b> the system diagnostics.</p>
<p>Exit</p>	<p>Press <b>BUMP TEST to remain in set-up mode</b>. The user returns to the first function in set-up mode, Print Events. Press <b>CALIBRATE to exit set-up mode</b> and return to idle mode.</p>

Figure 1 lists the information contained in reports that are generated from the printing processes described above, printing events and printing the buffer (calibration and bump test reports).

Report information generated from set-up mode functions.	
Print Events	Print Buffer
<ul style="list-style-type: none"> <li>• Industrial Scientific Corp.</li> <li>• Name of calibration station and its software version</li> <li>• Date of printout</li>   <li>• Instrument serial number</li> <li>• Instrument software version</li> <li>• Instrument hardware version</li>   <li>• For each alarm event:                             <ul style="list-style-type: none"> <li>○ Sensor type</li> <li>○ Sensor serial number</li> <li>○ Sensor high alarm threshold</li> <li>○ Sensor low alarm threshold</li> <li>○ Peak gas exposure value during alarm</li> <li>○ Duration of alarm event in seconds</li> <li>○ Time and date the alarm occurred</li> <li>○ Instrument user setting</li> <li>○ Instrument site setting</li> </ul> </li>   <li>• A blank for the user's signature</li> <li>• A blank for the user to enter the date</li> <li>• A blank for the user to enter the time</li> </ul>	<ul style="list-style-type: none"> <li>• Industrial Scientific Corp.</li> <li>• Name of calibration station and its software version</li> <li>• Date and time of calibration (or bump test)</li>   <li>• Instrument serial number</li> <li>• Instrument software version</li> <li>• Instrument hardware version</li>   <li>• Instrument zero, calibration, or bump test result (pass or fail)</li> <li>• Recommended date for next calibration (shown for calibration only; date is blank for a failed calibration)</li>   <li>• For each sensor:                             <ul style="list-style-type: none"> <li>○ Sensor type</li> <li>○ Span reserve (for calibration) or Final bump test reading (for bump test)</li> <li>○ Calibration gas concentration</li> <li>○ High alarm threshold</li> <li>○ Low alarm threshold</li> <li>○ Zero, calibration, or bump test results</li> </ul> </li>   <li>• A blank for the user to enter the cylinder lot number</li> <li>• A blank for the user's signature</li> </ul>
<b>Figure 1a.</b> Event report.	<b>Figure 1b.</b> Bump test and calibration report.

## Docking and Removing the Instrument

STEP INSTRUCTIONS	
<b>Docking the ASPIRATED instrument.</b>	
1	When the station faces the user, its cradle lid hinge is to the user's right. Lift the lid from the left to open the station and reveal its cradle.
2	To properly place the instrument in the station cradle, complete or observe the following. <ul style="list-style-type: none"> <li>• The instrument's display faces the user and its logo is readable.</li> <li>• Position the instrument so its battery contacts will touch station's charging contacts.</li> <li>• Press down on the instrument to secure it in the cradle; the cradle's spring supports will depress.</li> <li>• If needed, slide the instrument forward to secure.</li> </ul>
3	Close the cradle lid.
<b>Installing the DIFFUSION instrument</b>	
1	When the station faces the user, its cradle lid hinge is at the top of the station. Lift the lid from the bottom to open the station and reveal its cradle.
2	To properly place the instrument in the station cradle, complete or observe the following. <ul style="list-style-type: none"> <li>• The instrument's display faces the user and its logo is readable.</li> <li>• Position the instrument so its battery contacts will touch station's charging contacts.</li> <li>• Press down on the instrument to secure it in the cradle; the cradle's spring supports will depress.</li> <li>• If needed, slide the instrument forward to secure.</li> </ul>
3	Close the cradle lid.
<b>Removing the DIFFUSION or ASPIRATED instrument</b>	
1	Lift the cradle lid (as instructed above for an aspirated or diffusion instrument).
2	Lift the instrument to remove it from the station.
3	Close the cradle lid.

## Calibration

DISPLAY	INSTRUCTIONS
<p><b>Ready</b> Or <b>Charging</b> The station checks to see if the instrument was just calibrated.</p>	<p><i>NOTE: If a printout of the calibration report is desired, ensure the printer is on and not in fault before beginning the calibration process. Printer faults (e.g., out of paper) are not indicated on the station. If the printer is in fault, the report does not print.</i></p> <p>Press <b>CALIBRATE to begin</b>; hold for three seconds and release.</p>
<p><b>Cal Again?</b> Displays if the instrument has just been calibrated.</p>	<p>Press <b>CALIBRATE to begin</b> the recalibration of the instrument. Press <b>BUMP TEST to cancel</b> the recalibration. The station returns to its ready state in idle mode.</p> <p><i>NOTE: if no button is pressed, the instrument is not recalibrated and the "Cal Pass" message displays.</i></p>
<p><b>Warming up</b>  <b>Ventis MX4</b> Alternately display if the instrument is charging. This indicates the station is preparing the instrument for calibration.</p>	<p>No user action required.</p> <p>If the instrument's <i>only</i> installed sensor is O<sub>2</sub>, the Cal In Progress message displays next. For all other installed sensor combinations, the Zero in Progress message displays.</p>
<p><b>Zero in Progress</b> Displays during the zero process which requires approximately fifteen seconds to complete. The station's amber LED turns on.</p>	<p>No user action required.</p> <p>If the zero process <i>passes</i>, the calibration process is started by the station and the Cal In-Progress message displays.</p> <p>If the zero process <i>fails</i>, the calibration is canceled and the "Cal Fail" message displays.</p>

<p><b>Cal in Progress</b></p> <p>Displays during the calibration process. If the instrument is set for standard calibration*, the gas name abbreviation and calibration gas value for each sensor display as that sensor is calibrated. The station's amber LED turns on.</p> <p>*When an instrument is configured for standard calibration, each sensor is calibrated independently, or one sensor at a time. For a quick calibration, all installed sensors are calibrated or bump tested simultaneously.</p>	<p>No user action required. The Cal Pass or a Cal Fail message displays to indicate the calibration results.</p>
<p><b>Cal Pass</b></p> <p>Displays to indicate the instrument has passed the zero and calibration processes. The station's green LED turns on. The calibration report is sent out the RS232 port for printing and is saved to the station's buffer.</p>	<p>Remove the instrument from the station to clear the display.</p>
<p><b>Cal Fail</b> Or <b>Zero Fail</b></p> <p>Displays to indicate which process the instrument failed. The station's red LED turns on.</p> <p>The fail message displays alternately with error messages. A pump error message indicates a problem with the instrument's pump. Sensor name message(s) indicates which sensor(s) failed the process.</p>	<p>Remove the instrument from the station to clear the display.</p> <p><i>NOTE: The instrument must pass a zero and/or calibration before it is useable.</i></p>

## Bump Test

DISPLAY	INSTRUCTIONS
<p><b>Ready</b> Or <b>Charging</b></p>	<p><i>NOTE: If a printout of the bump test report is desired, ensure the printer is on and not in fault before beginning the bump test process. Printer faults (e.g., out of paper) are not indicated on the station. If the printer is in fault, the report does not print.</i></p>
<p><b>Bump in Progress</b></p> <p>Displays during the bump test process. The gas name abbreviation and calibration gas value for each sensor display as that sensor is bump tested. The station's amber LED turns on.</p>	<p>No user action required.</p> <p>The station reads and applies the bump test parameters (gas percentage and response time settings) from the instrument.</p> <p>If one or more installed sensors are in a calibration or zero fail state, the station automatically cancels the bump test and performs a calibration.</p>
<p><b>Bump Pass</b></p> <p>Displays to indicate the instrument passed a bump test. The station's green LED turns on. The bump test report is sent out the RS232 port for printing and is saved to the station's buffer.</p>	<p>Remove the instrument from the station to clear the display.</p>
<p><b>Bump Fail</b></p> <p>Displays to indicate the instrument failed a bump test. The gas name abbreviation for each failed sensor also displays. The station's red LED turns on.</p>	<p>Remove the instrument from the station to clear the display.</p>

## SOFTWARE USE

### Software functions

ISAS software functions are organized into categories, and are presented on the software's user interface as "tabs". The tabs are listed below with descriptions of the functions accessible from each.

TAB	FUNCTION/CONTENTS
General	Administration information for the instrument.
Options	Instrument configuration options.
Users and Sites	Shows active user and site saved in instrument (not viewable on instrument).
Components	Shows details of the instrument's components.
Calibrations	Shows calibration data associated with each instrument (can view saved records or download the latest).
Bump Tests	Shows bump test data associated with each instrument (can view saved records or download the latest).
Event Log	Shows log files and associated data for each instrument.
DataLogging	Shows datalog files and associated data for each instrument.

Beginning with the General tab, each tab is reproduced in the following pages. Command icons (or buttons) also appear on each tab and accomplish the following when selected by the user.

**Refresh:** generally used when a new instrument is docked to access its datalog, event log, settings, etc.

**Update:** after editing any value on a tab, the instrument settings are updated to reflect the new value(s).

**Print:** opens a new window containing a printable report of the information relevant to the tab.

**Disconnect:** returns the user to the Connection form.

## Using the software

If ISAS is not already running, double-click on the desktop icon to reach the Connection form. The software can also be started from “Programs” within the computer’s “Start” menu.



Figure 2. Desktop icon.

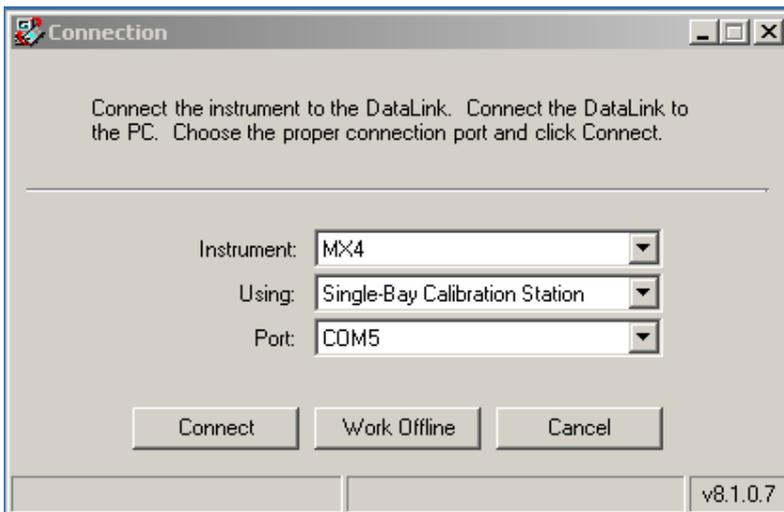


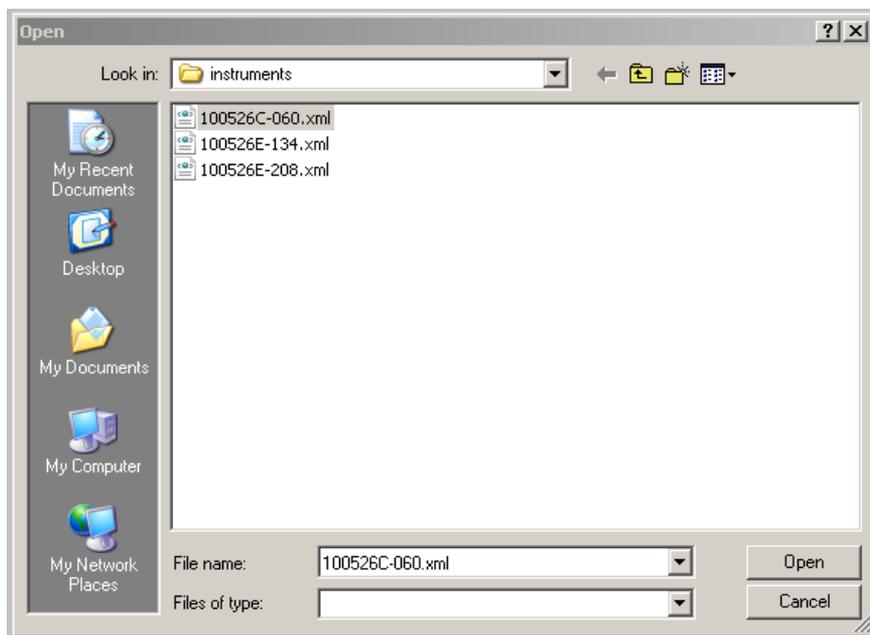
Figure 3. Connection form.

### Connection options:

*Complete the connection to the docked instrument.* Choose the appropriate instrument name, station type, and communications port (the default is the port with the highest port number). Choose “Connect” to complete the connection with the installed instrument. The software opens to the main screen—the “General” tab—where data are editable and the download function is accessible.

*Work offline.* Choose “Work offline” to view previously downloaded data and reports with no device connected to the PC. The next window to open presents a list of serial number those of instruments available to view offline (see Figure 4). Highlight the desired serial number and click “Open”. The

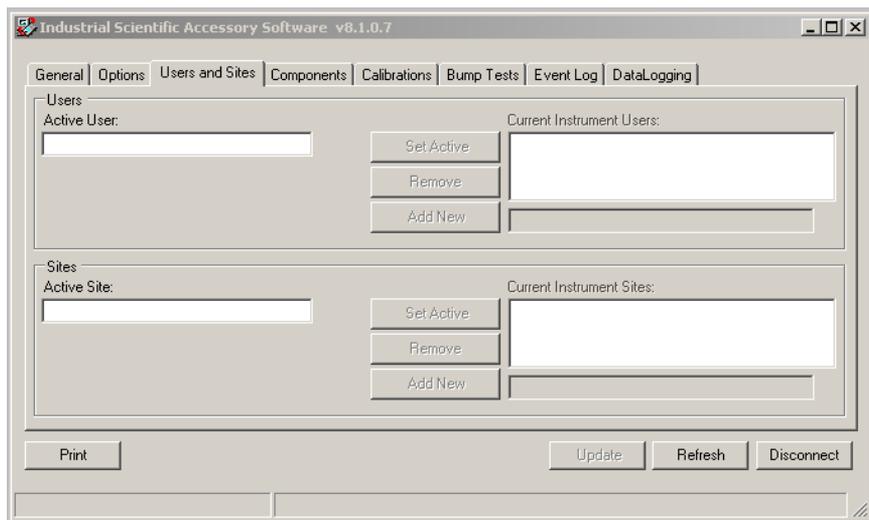
software opens to the main screen—the “General” tab. When working offline, data are *not* editable and the download function is *not* accessible.



**Figure 4.** Offline instrument access window.

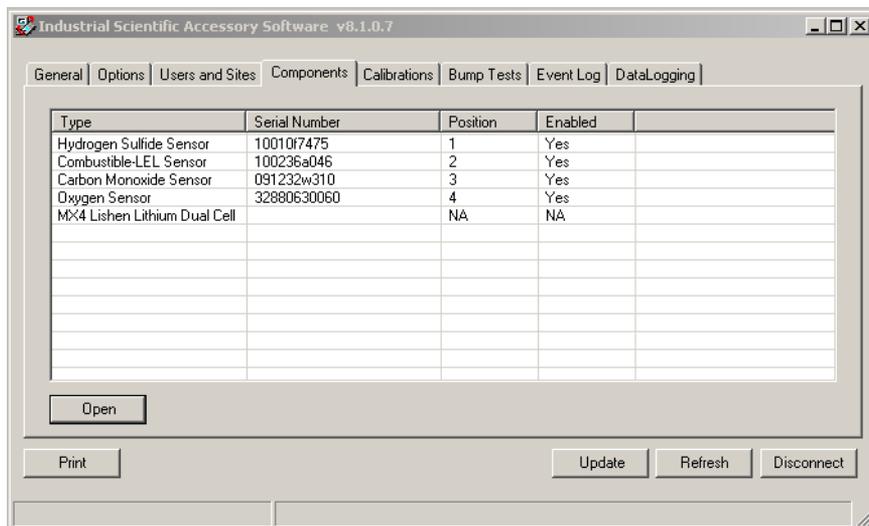
The software user can highlight an instrument serial number and select “Open” to view that instrument’s downloaded data. The accessible read-only data includes that which is associated with these tabs: General, Components, Event Log, and DataLogging, plus any downloaded calibration and bump test records.





**Figure 7.** Users and Sites tab.

The software user can assign, to the docked instrument, one active user name and one active site name. This information is saved in the instrument, but not viewable on the instrument.



**Figure 8.** Components tab.

The components tab lists all components installed in the instrument. The software user can highlight a component and select “Open” to view and modify its settings (e.g., Sensor Details window shown below in Figure 9).





## Ventis MX4 - Bump Test Certificate

Instrument S/N 100526C-060

Bump Test Date 10/26/2010

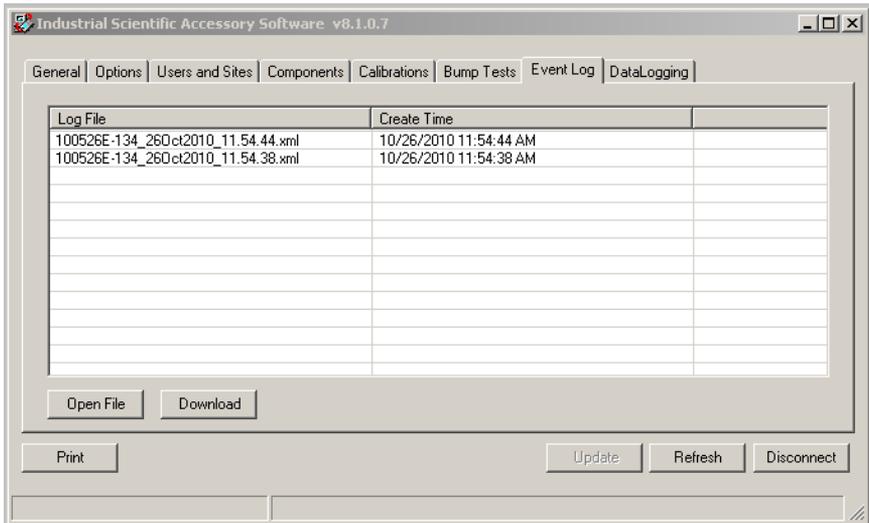
Technician: \_\_\_\_\_

Cylinder Lot #: \_\_\_\_\_

Sensor Type	Bump Date	Sensor Reading	Pass/Fail	Low Alarm	Hi Alarm
H2S	10/26/2010 12:09:00 PM	15.3 PPM	Pass	10 PPM	20 PPM
LEL	10/26/2010 12:09:00 PM	26 %LEL	Pass	10 %LEL	20 %LEL
CO	10/26/2010 12:09:00 PM	89 PPM	Pass	35 PPM	70 PPM
O2	10/26/2010 12:09:00 PM	19.1 %VOL	Pass	19.5 %VOL	23.5 %VOL



**Figure 13.** Sample Bump Test Certificate.  
The software user can print the certificate if needed.



**Figure 14.** Event Log tab.  
Lists all downloaded event logs for the docked instrument. If the software user highlights a log file and selects the “Open File” command, that event log report opens in a new window. When the Download command is selected, all event logs are downloaded from the connected instrument.

## Ventis MX4 100526C-060

10/26/2010 11:58:59 AM

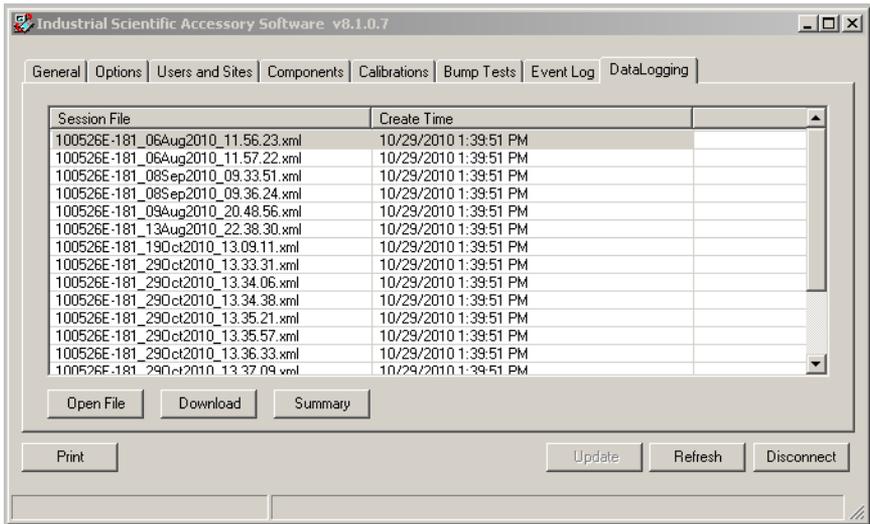
Serial Number: 100526C-060      Access Code: 000  
 Type: Ventis MX4      Calibration Interval: 33 Days  
 Part Number: VTS-K123110      Recording Interval: 10 Seconds  
 Job Number: 100526  
 Setup Technician: MDS      TWA Time base: 8 Hours  
 Setup Date: 6/18/2010      User:  
 Software Version: 3.00.10      Site:

INSTRUMENT OPTIONS				
Can bump in field	On	<input type="checkbox"/>	Bump past due warning enabled	On
Calibration past due warning enabled	On	<input type="checkbox"/>	Can zero in field	On
Alarm latching	Off	<input type="checkbox"/>	Can perform quick calibration	On
Can calibrate in field	Off	<input type="checkbox"/>		

Sensor SN	Sensor Type	Enabled	Cal Gas	Cal Gas Conc	Low Alarm	Hi Alarm	TWA Alarm	STEL Alarm	Calibration Date
10010f7475	Hydrogen Sulfide Sensor	Yes	Hydrogen Sulfide	25 PPM	10 PPM	20 PPM	10 PPM	15 PPM	6/18/2010 9:18:33 AM
100236a046	Combustible-LEL Sensor	Yes	Pentane	25 LEL	10 LEL	20 LEL	N/A	N/A	6/18/2010 9:20:16 AM
091232v310	Carbon Monoxide Sensor	Yes	Carbon Monoxide	100 PPM	35 PPM	70 PPM	35 PPM	200 PPM	6/18/2010 9:19:28 AM
32880630060	Oxygen Sensor	Yes	Oxygen	20.9 VOL	19.5 VOL	23.5 VOL	N/A	N/A	6/18/2010 9:17:32 AM

Alarm Time	Duration	Gas	Sensor SN	Hi Alarm	Low Alarm	Peak Reading	User	Site
10/5/2010 9:21:56 AM	00:05	Oxygen	32880630060	23.5	19.5	19		
10/5/2010 9:21:41 AM	00:06	Oxygen	32880630060	23.5	19.5	18.7		

**Figure 15.** Sample printout for event log. A similarly formatted report is also available for datalogs when the “Print” command is selected from the DataLogging tab.



**Figure 16.** DataLogging tab

The DataLogging tab lists all downloaded datalogs for the docked instrument. When the “Download” command is selected, all data logs are downloaded from the connected instrument.

When the user highlights a session, the command buttons will accomplish the following:

- The “Summary” command opens a new window with all sensor data for that session.
- The “Print” command opens in a new window that is similar in content and format, to the Event Log Report as shown above in Figure 15.
- The “Open File” command allows the software user to view the next level of detail for a highlighted session, as shown below in the Sensor Session data (Figure 17).

**Sensor Sessions**

Session: Wednesday, June 30, 2010      Recording Interval: 10

User:      TWA Time base: 8

Comments:

Serial Number	Gas Type	Status	Alarm Low	Alarm High	Alarm TWA	Alarm STEL
10010f7475	Hydrogen Sulfide	OK	10	20	10	15
100236a046	Pentane	OK	10	20	NA	NA
091232w310	Carbon Monoxide	OK	35	70	35	200
32880630060	Oxygen	OK	19.5	23.5	NA	NA

Detail    Print    Graph    Compare    Export    OK

**Figure 17.** Sensor details.

By highlighting a single sensor and clicking on the “Detail” button, the user can view a complete list of readings for that sensor for that sensor session. The sensor session can be printed, shown graphically, or exported to a comma separated variable file by using the “Print”, “Graph”, or “Export” command buttons, respectively. The “Compare” feature allows the user to compare the sensor session data for two or more highlighted components.

## DIAGNOSING COMMON PROBLEMS

<b>Problem</b>	<b>Likely Cause(s)</b>
Display is blank...	No power to the instrument; display is damaged. Contact factory.
Unit resets...	Internal error. Cycle the power. If problem persists, contact factory.
Instrument continually fails bump test or calibration...	Ensure calibration gas is connected and the bottle is full. Sensors may require replacement. Contact factory.
Printer is not working...	Ensure paper is in printer and printer ribbon is in place.
No communication to PC...	Ensure application software and the USB driver are installed on PC. Ensure USB cable is plugged in. Ensure the correct COM port is selected on the Connection window of the software.
V•Cal does not communicate with instrument...	Ensure IR ports on both the V•Cal and the instrument are clean from dirt and debris.
V•Cal PC software will not connect to instrument...	Ensure instrument is placed in the instrument cradle. Ensure IR ports on both V•Cal and instrument are clean from dirt and debris.

**SPECIFICATIONS**

	<b>Aspirated</b>	<b>Diffusion</b>
Instruments supported	Ventis MX4 Aspirated with Extended Range Lithium-ion (typical)	Ventis MX4 diffusion with Lithium-ion (typical)  MX4 iQuad diffusion with Lithium-ion (typical)
Dimensions	172 mm x 67 mm x 66 mm (6.8" x 2.6" x 2.6")	Ventis MX4 diffusion MX4 iQuad diffusion 103 mm x 58 mm x 30 mm (4.1" x 2.3" x 1.2")
Gas Inlets	One fresh air, one gas cylinder	
Pump Flow Rate	500 ml/min	
Input	Universal AC power supply; 110 / 240 VAC, 50/60 Hz	
Communication	On-board LEDs give status indication. Multilingual LCD display shows status and set-up menus. Real-time readings on the Ventis MX4 display during calibration.	
Internal memory	Stores up to 150 bump test and calibration reports before overwrite. Memory retains information when power is off.	

**PERFORMANCE SPECIFICATIONS**

<b>Category</b>		<b>Specification</b>
Operating Temperature Range		0°C to +50°C
Storage Temperature		-20°C to +60°C
Operating Humidity Range		0 to 80% RH up to 31°C, decreasing linearly to 50% RH at 40°C
External Power Supply Ratings	Supply voltage	110-240 VAC
	Frequency range	50/60 Hz
	Current Rating	1.5A
Installation Category		2
Pollution Degree		2





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