V·CAL™

Six-Unit Calibration Station for Ventis™

Product Manual

Set-up
Operation

Part Number: 17153100-1
Version 2

INDUSTRIAL SCIENTIFIC

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WARNINGS AND CAUTIONARY STATEMENTS

WARNING: Read and understand this manual before operating the equipment.

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 (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; if it is not installed and used in accordance with the instruction manual, it 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.

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CAPABILITIES

The V•Cal™ is a stand-alone calibration station designed to work in conjunction with Ventis™ Multi-gas Monitors. It supports up to six instruments and is available in three models based on cradle configuration.

Cradle configurations.

- Six cradles for aspirated instruments only
- Six cradles for diffusion instruments only
- Three cradles for aspirated instruments only and three cradles for diffusion instruments only

Regardless of cradle configuration, each station has three cradles on the back row and three on the front row. As shown below, the cradles are numbered one through six, from left to right, from front row to back row.

The station has three internal pumps. Each pump controls two cradles. For example, as noted below, internal pump 1 controls cradles 1 and 4.

	Cradle number		
Back row	4	5	6
Front row	1	2	3
Internal pump	1	2	3

Each internal pump has a solenoid that controls the flow of gas (and fresh air) *to* the cradles. These solenoids are referred to in this manual as “cradle solenoids”.

A fourth solenoid, referred to as the “gas solenoid”, controls the flow of calibration gas and fresh air *from* the station's intake ports.

The station communicates directly with up to six docked instruments to perform bump tests and calibrations. It can also charge up to six instruments equipped with rechargeable Lithium-ion (Li-ion) battery packs.

Calibration and bump test records are saved to the station’s memory which can store a total 12,000 records. The results for each calibration and bump test performed are automatically sent, in report form, to an external serial printer (via an RS232 connection) when connected.

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

Accessory Software enabled capabilities for the host PC.

- Read and write instrument and calibration station settings.
- Read the instrument data log.
- Read the instrument event log.
- Access bump test and calibration records from the station.

The following operating systems support Accessory Software:

- Windows XP
- Windows Vista
- Windows 7
- Windows 8

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UNPACKING THE STATION

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

Quantity	Part Number	Description
1	18107664	V•Cal Six-Unit Calibration Station Each aspirated cradle is fitted with a tube 0.1524 m (6") in length. The tubing is attached to the cradle's instrument inlet at one end; the white fitting on the other end is attached to the cradle inlet. See manual section, Hardware Overview. NOTE: one 0.1524 m (6") tube with a t-fitting is provided for each aspirated cradle.
1	17093659	Urethane tubing 1.219 m (4')
1	17121310	USB cable
1	17118027	Fitting (for calibration gas port)
1	17124074	Fitting (for fresh air port)
1	17121070	*Industrial Scientific Accessory Software* Suite CD
1	17124447	Data-link manual
1	17135864	Service card
1	17123787	Warranty card
1	17153158	Reference to online manual
1	17136623	Power supply with plug adapters (North American, Europlug, UK/Ireland, and Australia)

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

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USER INTERFACE

The calibration station user interface is comprised of the following.

- Character LCD display
- Two pushbuttons
- Six sets of three LEDs (one set for each cradle)

The LCD is a twenty-character by two-line display. It is backlit when the station performs a task or displays the result of a task. The user can select one of four display languages for the LCD, English, Spanish, French, or German.

The LCD continuously shows status (or error) messages for each docked instrument. Messages can display for two instruments at a time on the LCD. Each message is preceded by a cradle number (1, 2, 3, 4, 5, or 6) to indicate which instrument the message applies to. For example, when displayed together, these messages indicate that the instrument in cradle 1 passed calibration and the instrument in cradle 2 failed calibration.

1-Cal Passed
2-Cal Failed

Throughout this manual, any LCD message that indicates the status of a particular cradle has the designation, “X-“. For example, “X-Cal Passed” where X will display on the LCD as 1, 2, 3, 4, 5, or 6.

The station’s two pushbuttons, “BUMP” and “CALIBRATE”, are used to initiate the performance of those functions when one or more instruments are 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 procedures (e.g., printing).

Each set of LEDs is associated with a particular cradle and has a green, amber, and red indicator (from left to right). The LEDs are used in combination with messages on the LCD to indicate the status of each cradle.

- 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 pending, or that the instrument is charging.
- The red LED indicates the docked instrument has failed a calibration or bump test. The red LED can also indicate an error has occurred.

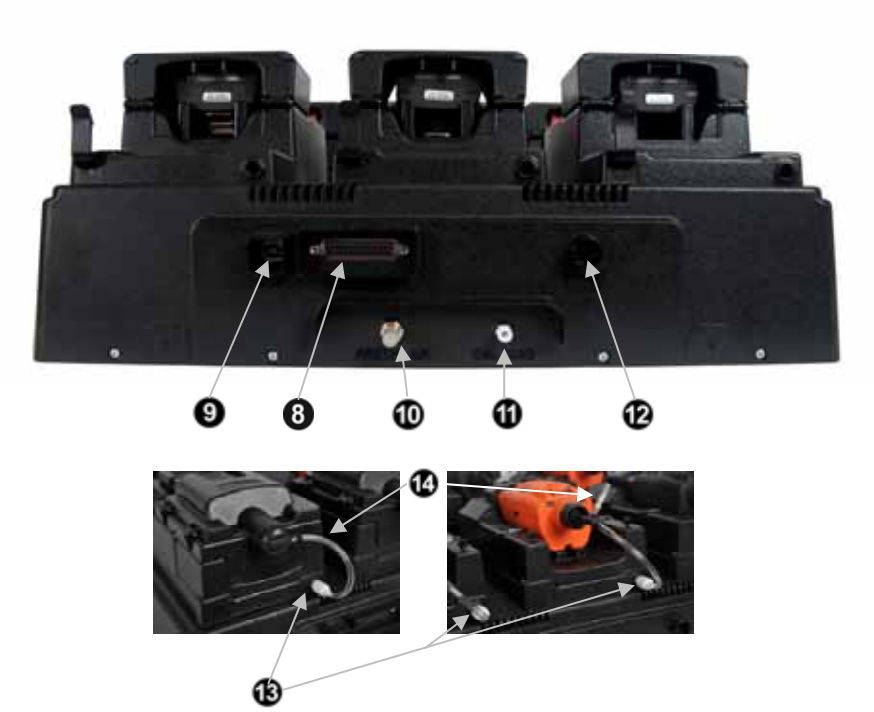
STATION PREPARATION

Hardware Overview (Front)

Diagram Number	Feature
1	Cradle lid
2	Cradle lid latch (diffusion cradles only)
3	LED indicators
4	Bump button
5	LCD display
6	Calibrate button
7	Instrument inlet

Hardware Overview (Back)

Diagram Number	Feature
8	Printer port
9	USB port
10	Fresh air port
11	Calibration gas port
12	Power input
13*	Cradle inlet
14*	Cradle tubing (for use when station door in *attached*)
14*	Cradle tubing with T-fitting (for use when station door is *removed*)
*Aspirated cradles only.	



Software Installation and Hardware Connections

To identify the parts referenced in the following instructions, refer to the above manual sections, Hardware Overview and Unpacking the Station.

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	To complete the installation, continue following the instructions as they display on the PC. Be sure to choose the desired language for the software 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.

HARDWARE CONNECTIONS	
Attaching cables and cords.	
1	*USB cable.* o On the back of the station, locate the port marked "USB". o 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 port on the back of the station.
2	*Printer connection (if desired).* o Connect the printer cord to the port marked "printer" on the back of the station. o Tighten the captive screws to secure the connection.
3	*Power supply.* o On the back of the station, locate the power input marked, "12VDC". o Connect the power *supply* to the 12VDC input.

Connecting the gas cylinder and demand flow regulator.	
1	Attach the demand flow regulator to the gas cylinder and turn clockwise to tighten.
2	• On the back of the station, locate the inlet marked, “CAL GAS”. • Connect either end of the supplied 1.219 m (4’) urethane tubing to the CAL GAS inlet. Connect the other end to the regulator’s nipple; the nipple fits inside the tubing.
FOR ASPIRATED CRADLES *ONLY*. **Enabling the flow of calibration gas to the instrument.** *The station can perform calibrations and bump tests with the cradle door **attached** to the station (Option 1) OR **removed** from the station (Option 2). To enable the flow of calibration gas to the docked instrument, follow the instructions below for option 1 OR option 2.*	
***Option 1**: the instrument door remains **attached** to the cradle.* **NOTE: The station ships from the factory with this option enabled.**	
1	Locate the cradle inlet on the back of the cradle.
2	Locate the tubing that has a white fitting at one end; the other end of the tubing has *no other fittings*. • Fasten the white fitting to the cradle inlet; turn clockwise to tighten. • Attach the other end of the tubing to the cradle's instrument inlet.
***Option 2**: the instrument door is **removed** from the cradle.*	
1	Detach the tubing from the cradle inlet.
2	Lift the door to remove it from the cradle; set the door and its tubing aside or store for future use.
3	Locate the tubing that has a white fitting at one end and a t-fitting at its other end. • Fasten the white fitting to the cradle inlet; turn clockwise to tighten. • Attach the other end of the tubing directly to the inlet of a docked instrument.

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STATION USE

Power-on and -off

To power-on the station, plug the power supply into the power source. To power-off the station, unplug the power supply. There is no power-on/-off switch.

Start-up Mode

When powered-on, the station performs a series of internal diagnostics as described below.

If the station fails any diagnostic test, the red LEDs turn on for all affected cradles. A system error message displays on the LCD to describe each failure encountered. These messages are defined in the manual section, Status and Error Messages.

DISPLAY	INSTRUCTIONS
V·Cal 6-Unit Calibration Station	No user action required.
V·Cal v 1.00.07 Displays station name and software version number (shown: v 3.00.07).	No user action required.
Warming Up V·Cal Displays during diagnostic testing of the system's pumps, solenoids, board, and memory.	No user action required.
12345678901234567890 ABCDEFGHIJKLMNOPQRST Displays to verify the correct operation of the LCD.	No user action required.

Verify V·Cal LEDs Displays as the station verifies LED operation. All six LED sets simultaneously turn on, then off in this order: red, amber, green, and all.	No user action required.
 Displays to verify pixel integrity.	No user action required.
Checking V·Cal Clock Displays as the functionality of the real-time clock is checked.	No user action required.
22 Jan 2010 12:34:56 Displays current date and time (in 24-hour format) if the clock check was successful.	No user action required.

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Idle Mode

When the "ready" or "charging" messages display for occupied cradles and there are no station faults, the station is in *idle mode*. From idle mode, the user can enter station *set-up mode,* or can bump test or calibrate docked instruments. Beginning with set-up mode, each of these processes is outlined in the following manual sections, Set-up Mode, and Calibration and Bump Testing.

Set-up Mode

From *set-up mode*, the user can complete station procedures and change station settings.

Station procedures.
- Print alarm events for docked instrument(s)
- Print all calibration and bump test records saved to the station
- Delete all saved calibration and bump test records from the station
- Run station diagnostics

Station settings.
- Calibration interval days
- Time and date
- LCD display language

In set-up mode, each procedure or setting option is presented to the user in the order shown below. Instructions are provided for completing or bypassing each task.

✓ *NOTE: In set-up mode, when no button is pressed within ten seconds, the message displayed on the LCD is cleared and the station returns to idle mode.*

Access to set-up mode.
From idle mode, simultaneously press **BUMP** and **CALIBRATE**; hold for one second, then release.

DISPLAY MESSAGE	INSTRUCTIONS
Print Instrument Alarm Events This procedure sends all alarm event data for the docked instruments to the printer.	Press **BUMP to bypass** the procedure; the user advances to the next set-up mode feature, *Print V•Cal Records*. Press **CALIBRATE to begin** the printing procedure.

Print Events ➔ Instrument X Displays for each cradle with a docked instrument; allows the user to confirm (or cancel) the print command for each instrument.	Press **BUMP to bypass** printing for the cradle number shown. Press **CALIBRATE to send the data** to the printer for that cradle's instrument. Continue to use the BUMP and CALIBRATE buttons to print or bypass the printing for each docked instrument. If all printing options are bypassed, the user advances to the next set-up mode feature, *Print V•Cal Records*.
Printing Instrument Alarm Events Displays while the instrument events print.	No user action required. *NOTE: While the events print, the station ignores all button presses and USB communications.*
Print V•Cal Records This procedure sends *all* bump test and calibration records from the station memory to the printer.	Press **BUMP to bypass** the procedure; the user advances to the next set-up mode feature, *Clear V•Cal Records*. Press **CALIBRATE to begin** the printing procedure.
Print Records? NO YES Displays to allow the user to confirm (or cancel) the print command.	Press **BUMP to cancel** the print command; the user advances to the next set-up mode feature, *Clear V•Cal Records*. Press **CALIBRATE to send the data** to the printer.
Printing Record X of YYY Displays to indicate printing progress, where X = the record number currently printing and YYY = the total number of records that are being sent to the printer.	Press **BUMP** to can cancel any remaining printouts. *NOTE: After printing the saved bump test and calibration reports, they are NOT automatically deleted from the station. The "Clear V•Cal Records" function is used to complete that task.*

Clear V•Cal Records This procedure deletes *all* bump test and calibration records from the station memory. *NOTE: The clear records function is executable regardless of whether or not the records have been printed.*	Press **BUMP to bypass** the procedure. The records remain in the station memory and the user advances to the next set-up mode feature, *Cal Interval Days*. Press **CALIBRATE to delete** all records saved to the station.
Clear Records? NO YES Displays to allow the user to confirm (or cancel) the clear records command.	Press **BUMP to cancel** the clear records command. The records remain in the station memory and the user advances to the next set-up mode feature, *Cal Interval Days*. Press **CALIBRATE to delete** all records saved to the station memory.
V•Cal Records Cleared Displays to indicate the records have been successfully deleted from the station's memory.	No user action required.
Cal Interval 30 Days Displays the current setting for the number of days between calibrations (shown: 30). Allows the user to set the number of days between calibrations. The setting is programmed into the station as well as any docked instrument.	Press **BUMP TEST to bypass** the setting process; the user advances to the next set-up mode feature, *Set Date and Time*. Press **CALIBRATE to edit** the value for the calibration interval.
Cal Interval ➔ 30 Days Valid values: 1 – 365 days Increment: 1 day	Press **BUMP to change** the value; hold to speed the increment pace. (After the counter reaches 365, it starts again at 1.) Press **CALIBRATE to set** the value displayed.

Set Cal Interval On Instruments Allows the user to set the calibration interval value on the docked instrument to match the station's calibration interval value.	Press **BUMP TEST to bypass** the setting process; the user advances to the next set-up mode feature, *Set Date and Time*. Press **CALIBRATE to complete** the setting process.
Set Cal Interval? No Yes Displays to allow the user to confirm (or cancel) the setting of instrument calibration interval values.	Press **BUMP to cancel** the setting process. Press **CALIBRATE to complete** the setting process.
Set Time and Date 22 Jan 2011 13:34:56 Displays the current date and time (in 24-hour format). Each value can be changed. Values are presented to the user in this order: month, day, year, hour, and minutes.	Press **BUMP TEST to bypass** the setting process; the user advances to the next set-up mode feature, Select Language. Press **CALIBRATE to edit** any of the time or date values.
Set Time and Date ➔ 22 Jan 2011 The first date value subject to change (year) will blink.	Press **BUMP to edit** the blinking value, if needed. Press **CALIBRATE to set** the value displayed. Continue to use the BUMP and CALIBRATE buttons, respectively, to edit and set the next blinking value.
Set Time and Date ➔ 13:34 The first time value subject to change (hour) will blink.	Press **BUMP to edit** the blinking value, if needed. Press **CALIBRATE to set** the value displayed. Continue to use the BUMP and CALIBRATE buttons, respectively, to edit and set the next blinking value.

Select Language English Displays the language setting currently in use by the station. Allows the user to choose one of four language options for the station's LCD.	Press **BUMP TEST to bypass** the setting process and advance to the next set-up mode feature, *System Check* procedure. Press **CALIBRATE to edit** the language selection, if needed.
Select Language ➔ English The language selection options are presented to the user in this order: English (shown), Espanol, Francais, and Deutsch.	Press **BUMP to bypass** the displayed language. Continue to press BUMP until the desired language displays. Press **CALIBRATE to set** the displayed language.
Change Printer Paper Allows the user to power-on the printer. The paper is automatically fed by the printer when a new roll is inserted.	Press **BUMP to bypass** the procedure. Press **CALIBRATE to power-on** the printer. During this time, the V•Cal will display "Insert New Paper Roll OK". Press **CALIBRATE** again to power-off the printer. *Note: The Insert New Paper Roll OK screen will not time out, to allow the user as much time as necessary to change the paper roll.*
V•Cal System Check This procedure allows the user to initiate a diagnostic check of the system. When selected, the station will cycle through all diagnostic tests described in the manual section, Start-up.	Press **BUMP TEST to bypass** the diagnostics procedure and advance to the *Exit Set-up* display. Press **CALIBRATE to initiate** the station's system diagnostics.
Exit Setup	Press **BUMP TEST to remain in set-up mode.** The user returns to the first set-up mode feature, *Print Instrument Alarm Events.* Press **CALIBRATE to exit set-up** mode and return to idle mode.

Figure 1 lists the information contained in reports that are generated from the printing procedures described above: printing instrument events and printing V•Cal Records (calibration and bump test reports).

Report information generated from set-up mode functions.

Print Instrument Events	**Print V•Cal Records**
• Industrial Scientific Corp. • Name of calibration station and its software version • Date of printout • Instrument serial number • Instrument software version • Instrument hardware version • For each alarm event: o Sensor type o Sensor serial number o Sensor high alarm threshold o Sensor low alarm threshold o Peak gas exposure value during alarm o Duration of alarm event in seconds o Time and date the alarm occurred o Instrument user setting o Instrument site setting • A blank for the user's signature • A blank for the user to enter the date • A blank for the user to enter the time	• Industrial Scientific Corp. • Name of calibration station and its software version • Date and time of calibration (or bump test) • Instrument serial number • Instrument software version • Instrument hardware version • Instrument zero, calibration, or bump test result (pass or fail) • Recommended date for next calibration (shown for calibration only; date is blank for a failed calibration) • For each sensor: o Sensor type o Span reserve (for calibration) or Final bump test reading (for bump test) o Calibration gas concentration o High alarm threshold o Low alarm threshold o Zero, calibration, or bump test results • A blank for the user to enter the cylinder lot number • A blank for the user's signature
Figure 1a. Event report.	**Figure 1b.** Calibration and bump test reports.

###

Docking and Removing the Instrument

STEP	INSTRUCTIONS
Docking the ASPIRATED instrument.	
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 cradle.
2	To properly dock the instrument in the cradle, complete or observe the following. • The instrument's display faces the user and its logo is readable. • Press down on the instrument to secure it in the cradle; if needed, slide the instrument forward to secure.
3	Close the cradle lid.
Docking the DIFFUSION instrument.	
1	When the station faces the user, its cradle lid hinge is at the top of the cradle. Lift up to open.
2	To properly place the instrument in the cradle, complete or observe the following. • The instrument's display faces the user and its logo is readable. • Press down on the instrument to secure it in the cradle; if needed, slide the instrument forward to secure.
3	Close the cradle lid.
Removing the DIFFUSION or ASPIRATED instrument	
1	Lift the cradle lid (as instructed above for an aspirated or diffusion instrument).
2	Lift the instrument to remove it from the cradle.

Calibration and Bump Testing

The station delivers calibration gas to as many as three cradles simultaneously. After the first three instruments are calibrated (or bump tested), the station automatically calibrates (or bump tests) any other docked instruments.

The calibration and bump testing processes are described below. During these processes, various status or error messages may display. The messages can apply to the station, the instrument, or an accessory. They are described in the manual section, Status and Error Messages.

The Calibration Process.
To begin the calibration process, press **CALIBRATE;** hold for three seconds and release. The station runs a check to determine if any instruments were just calibrated.

NOTE: If a printout of the calibration report is desired, ensure the printer is connected to the station.

DISPLAY	INSTRUCTIONS
Cradles 1, 2, 5 Cal Again? Displays to indicate which, if any, instruments have just been calibrated and their cradle numbers.	Press **CALIBRATE to begin** the recalibration of the instrument(s). Press **BUMP TEST to skip** the recalibration.
X-Warming up Displays for any instrument that is charging; indicates the station is preparing the instrument for calibration.	No user action required. For all other installed sensor combinations, the Zero in Progress message displays next.
X-Zero in Progress Displays during the zero process which requires approximately 15 seconds to complete. The amber LEDs turns on for each affected cradle. If an instrument's *only* installed sensor is O2, a pending message displays in place of the zero in-progress message.	No user action required.

X-Zero Passed X-Zero Failed Displays along with a red or green LED to indicate which instruments have passed (green) or failed (red) the zero process. The instrument LCD indicates which sensor(s) is in failure.	No user action required. The station automatically cancels the calibration for any affected cradle.
X-Cal in Progress Displays during the calibration process. The amber LED turns on for each affected cradle.	No user action required. The station reads and applies the calibration gas settings from the instrument.
X-Cal Passed X-Cal Failed Displays along with a red or green LED to indicate which instruments have passed (green) or failed (red) calibration. The calibration report for each instrument is sent out the RS232 port for printing and is saved to the station.	Remove the instrument from the cradle to clear the display. *NOTE: The instrument must pass a zero and/or calibration before it is useable.*

The Bump Test Process.
To begin the bump test process, press **BUMP TEST;** hold for three seconds and release.

NOTE: If a printout of the calibration report is desired, ensure the printer is connected to the station.

DISPLAY	INSTRUCTIONS
X-Warming up Displays for any instrument that is charging; indicates the station is preparing the instrument for bump testing.	No user action required.
X-Bump in Progress Displays during the bump test process. The amber LED turns on for each affected cradle. The gas name abbreviation and calibration gas value for each sensor display as that sensor is bump tested. For example, "X-25.0 ppm H2S".	No user action required. The station reads and applies the bump test parameters (gas percentage and response time settings) from the instrument. The station determines if any installed sensor for any instrument is in a calibration fail or zero fail state. For those instruments, the station automatically cancels the bump test and performs a calibration. If the calibration is successful, the station then automatically bump tests the instrument(s).
X-Bump Passed X-Bump Failed Displays along with a red or green LED to indicate which instruments have passed (green) or failed (red) the bump test. The calibration report for each instrument is sent out the RS232 port for printing and is saved to the station.	The station automatically calibrates any instruments that failed the bump test. Each cradle's bump test result display clears when the instrument is removed from the cradle.

Status and Error Messages

As noted below, status and error messages can apply to the station, the instrument, or an accessory.

Station-related Status and Error Messages.

The user can take corrective actions as noted. When no corrective action is noted, contact ISC or a distributor of ISC products for technical support.

NOTE: All station related errors are logged and saved to the station's memory. This aids in the diagnosis and correction of technical service issues.

MESSAGE	INSTRUCTION
Busy Please Wait Displays when the USB is downloading data or communicating with the station.	No user action required. • The bump test and calibrate functions are not available. • Set-up mode is not accessible. • USB communications are accepted and processed.
Check V•Cal Pump X *Or* X-Check Pump Displays to indicate which of the station's three pumps has failed. The red LED turns on for each affected cradle.	Contact factory. • Bump test and calibration functions are *not* available for the affected cradles. • Set-up mode is accessible. • USB communications are accepted and processed.
Check V•Cal Gas Solenoid Displays to indicate the main gas/air intake solenoid is not operating properly. This affects the flow of gas or air to all six cradles; all six red LEDs turn on.	Contact factory. • Bump test and calibration functions are *not* available. • Set-up mode is accessible. • USB communications are accepted and processed.

Check V•Cal Cradle Solenoid X *Or* X-Check Solenoid Displays to indicate when any solenoid is not operating properly. The red LED and the display indicate which cradle numbers are affected.	Contact factory. • Bump test and calibration functions are *not* available for the affected cradles. • Set-up mode is accessible. • USB communications are accepted and processed.
Check V•Cal Board Displays to indicate the board current falls outside the acceptable limits (or may indicate an oscillator or A/D failure). All six red LEDs turn on.	Contact factory. • Bump test and calibration functions are *not* available. • Set-up mode is accessible. • USB communications are accepted and processed.
V•Cal Memory Error Displays to indicate the station cannot read from or write to its memory. All six red LEDs turn on.	Contact factory. • The bump test and calibrate functions are not available. • Set-up mode is accessible. • USB communications are accepted and processed.
V•Cal Clock Error Indicates an invalid date or clock setting on the station's real-time clock. All six red LEDs turn on.	The user can enter set-up mode and attempt to re-set the date and time. (See the manual section, Set-up Mode.) • Bump test and calibration functions are not available. • Set-up mode is accessible. • USB communications are accepted and processed.

Cradle-, Instrument-, and Accessory-related Status and Error Messages.

The user can take corrective actions as noted below. The user can also consult the appropriate instrument or accessory manual. When no corrective action is noted, contact ISC or a distributor of ISC products for technical support.

MESSAGE	INSTRUCTION
X-Ready Displays when an instrument is installed and is not charging. The green LED turns on for each affected cradle.	• The bump test and calibrate functions are available. • Set-up mode is accessible. • USB communications are accepted and processed.
X-Charging Displays to indicate the station is charging an instrument equipped with a Li-ion battery. The amber LED turns on for each affected cradle. *NOTE: Always refer to the instrument's battery icon to assess the level of charge.*	• The bump test and calibrate functions are available. • Set-up mode is accessible. • USB communications are accepted and processed.
X-Close Lid May display when a bump test or calibration is started. Indicates a cradle lid is not closed; the red LED turns on for each affected cradle.	Ensure the cradle lid is closed. When the lid is successfully closed the display message for the affected cradle(s) indicates a status of "pending"; the amber LED turns on. The station will complete any calibrations (or bump tests) already in-progress. It will then automatically complete any pending calibrations (or bump tests).

X-Pending Displays during the zero process for any docked instrument equipped with only an O2 sensor. Displays during the bump test or calibration processes for any instrument in queue for calibration. Displays after a “Close Lid” error has been encountered and successfully addressed by the user. The amber light turns on for each affected cradle.	No user action required.
X-Waiting to Connect **Y-Waiting to Connect** Displays as the station attempts to communicate with a docked instrument. The amber LED turns on for each affected cradle. If communication with the instrument is established within three minutes, one of two messages displays depending on the status of the battery: X-Charging or X-Ready. If communication is *not* established within three minutes, this error message displays: X-Inst Comm Error.	No user action required. • The bump test and calibrate functions are available. • Set-up mode is accessible. • USB communications are accepted and processed.
X-Inst Comm Error Displays if the bump test or calibrate process is started and the station cannot establish communication with the instrument. The red LED turns on for each affected cradle.	The calibration or bump test is automatically aborted. • Set-up mode is accessible. • USB communications are accepted and processed. Press BUMP TEST or CALIBRATION to attempt the process again. If unsuccessful the display persists until the instrument is removed from the station.

X-Instrument Error Indicates the docked instrument is in a system alarm condition. A system alarm occurs when the aspirated instrument's pump is not operating correctly. The red LED turns on for each affected cradle.	The calibration bump test or is automatically aborted by the station. The display persists until the instrument is removed from the station. • The bump test and calibrate functions are *not* available. • Set-up mode is *not* accessible. • USB communications are accepted and processed. Ensure the instrument's pump and the cradle's instrument inlet are clear and free of debris; dock the instrument again. If the message persists, the instrument's pump may be in need of factory service or replacement.
X- Sensor Error Indicates the docked instrument has one or more failed sensors.	The instrument LCD indicates which sensor(s) is in failure. The user can attempt to correct the error by replacing the sensor(s).
Error – Cradle X Cal Gas Mismatch Displays during a bump test or calibration to indicate one of these conditions exists among the instruments to be calibrated (or bump tested): • More than 4 different sensor types are installed. • LEL and CH4 sensor types are installed in different instruments. • The installed sensor types match, but the calibration gas concentration values differ. The error message indicates the cradle number of the first mismatched instrument. The red LED turns on for each affected cradle.	The calibration or bump test is automatically aborted by the station. The display persists until the instrument(s) is removed from the station. • Set-up mode is accessible. • USB communications are accepted and processed. The user can remove the mismatched instrument from its cradle. If the remaining instruments are *not* mismatched, the "Ready" message displays and the bump test and calibration functions are available.

Printer Fault Low Temperature May display when a station attempts to print. Indicates the temperature inside the station is below -10°C (14°F).	The printer functions are not available. • The bump test and calibrate functions is available after the Printer Fault screen times out. • Setup mode is accessible after the Printer Fault screen times out. • USB communications are accepted and processed.

###

SOFTWARE USE

Software Functions

Accessory Software 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.
Data Logging	Shows data log 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 data log, 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 Accessory Software 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.

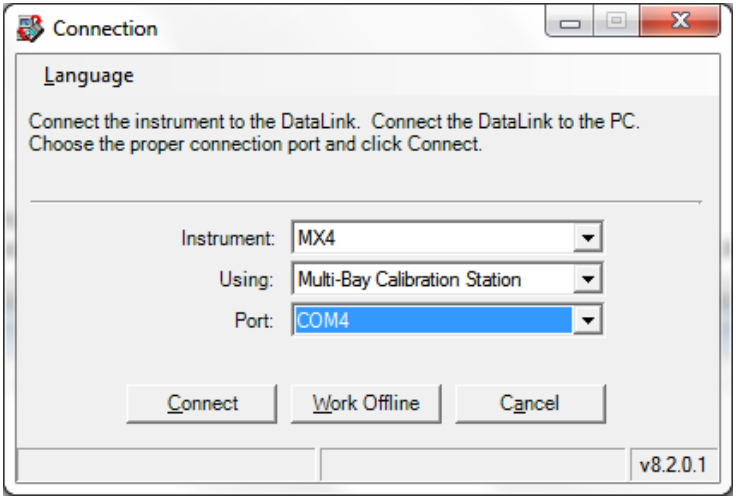


Figure 3. Connection form.

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.

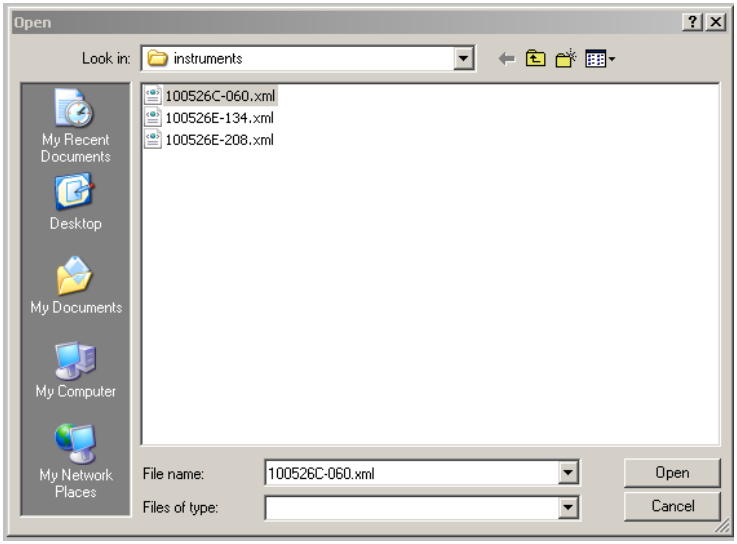


Figure 4. Offline instrument access window.

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 Data Logging, plus any downloaded calibration and bump test records.

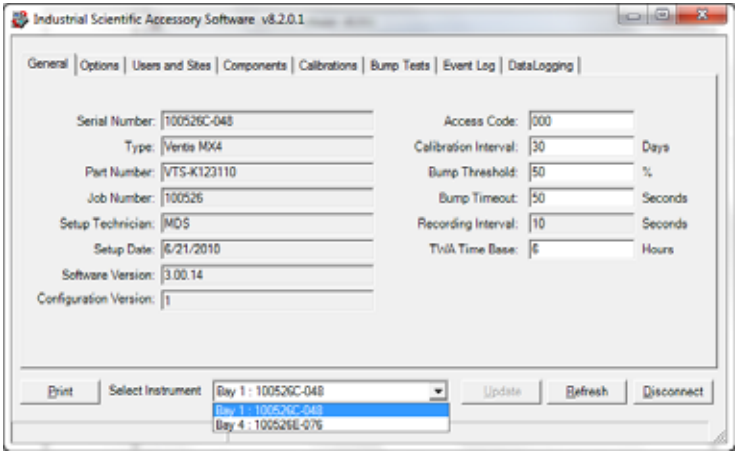


Figure 5. General tab.

The opening software screen after connecting to a docked instrument or connecting to work offline. The fields shown in white are editable. The "Select Instrument" drop-down allows the user to access the datalog for any installed instrument.

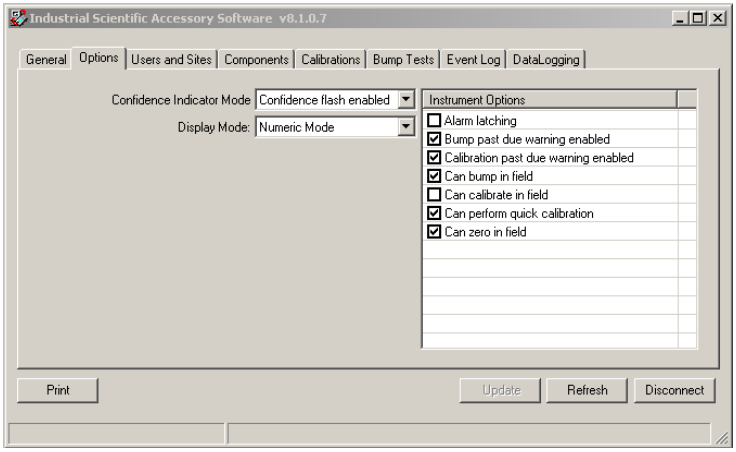


Figure 6. Options tab.

The instrument configuration options can be initially set and subsequently changed from this screen. A check mark indicates the option is enabled.

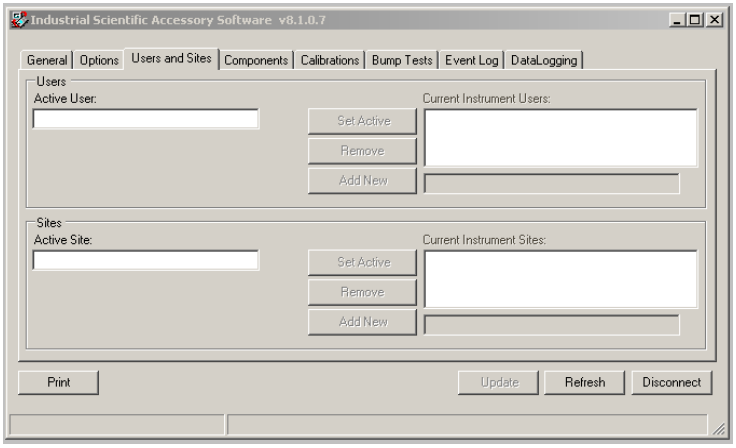


Figure 7. Users and Sites tab.

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.

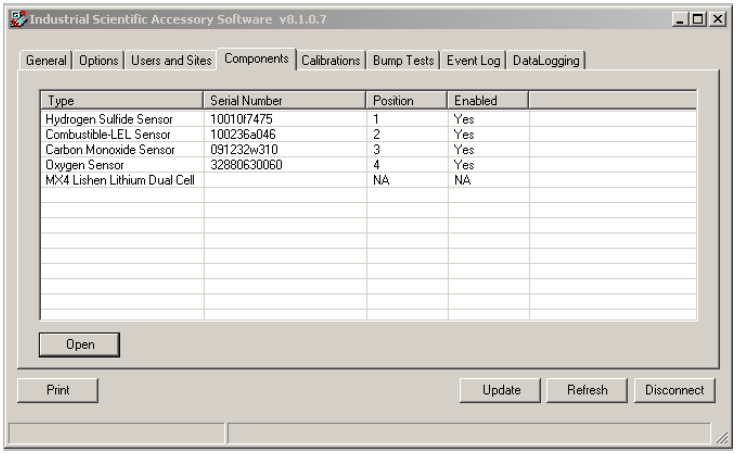


Figure 8. Components tab.

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).

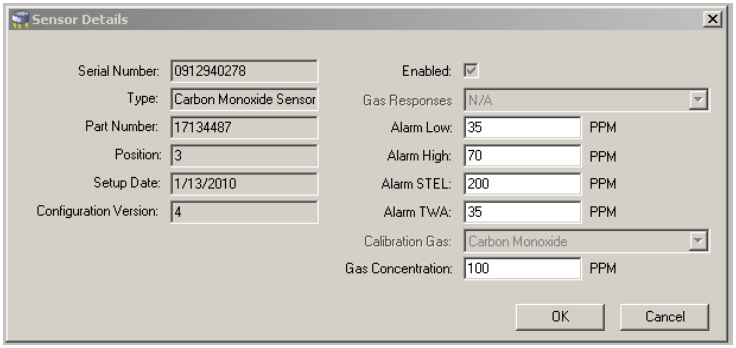


Figure 9. Sensor Details window.

The sensor details screen allows the software user to change alarm set points as well as the calibration gas concentrations for the installed sensors.

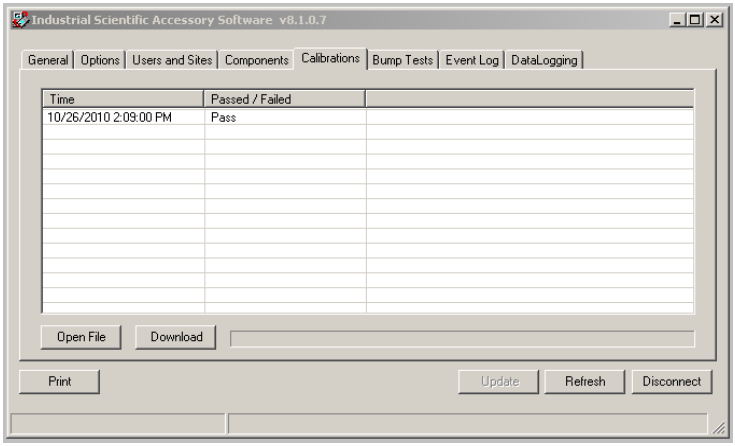
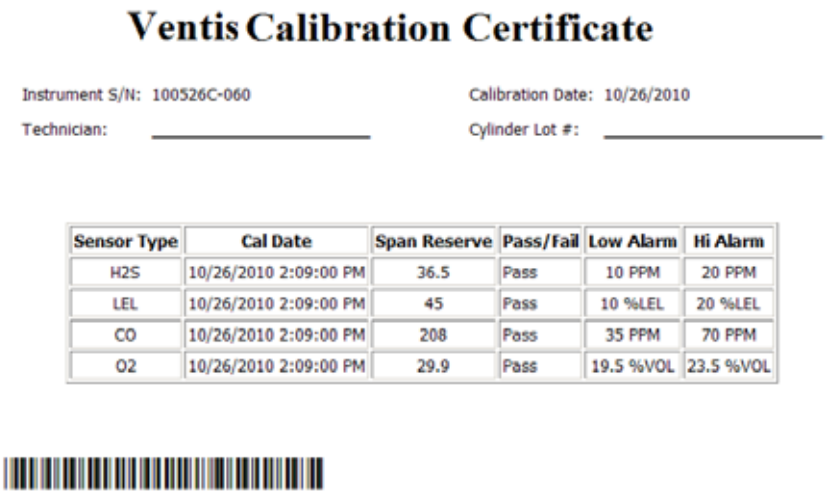


Figure 10. Calibrations tab.

Lists all certificate files for calibration results that have been downloaded for the instrument. If the software user highlights a certificate and selects the “Open File” command, that calibration certificate opens in a new window. When the “Download” command is selected, all calibration certificates are downloaded from the station.



Ventis Calibration Certificate

Instrument S/N: 100526C-060 Calibration Date: 10/26/2010

Technician: _____ Cylinder Lot #: _____

Sensor Type	Cal Date	Span Reserve	Pass/Fail	Low Alarm	Hi Alarm
H2S	10/26/2010 2:09:00 PM	36.5	Pass	10 PPM	20 PPM
LEL	10/26/2010 2:09:00 PM	45	Pass	10 %LEL	20 %LEL
CO	10/26/2010 2:09:00 PM	208	Pass	35 PPM	70 PPM
O2	10/26/2010 2:09:00 PM	29.9	Pass	19.5 %VOL	23.5 %VOL

Figure 11. Sample Calibration Certificate.
The user can print the certificate if needed.

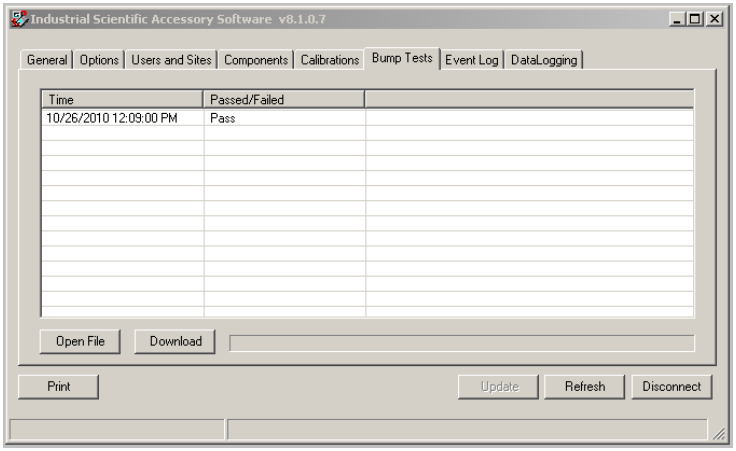
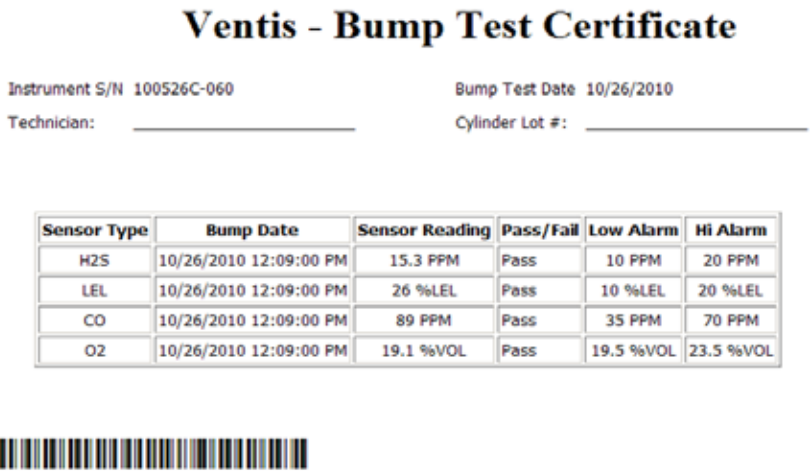


Figure 12. Bump Tests tab.

Lists all certificate files for bump test results that have been downloaded for this instrument. If the software user highlights a certificate and selects the “Open File” command, that bump test certificate opens in a new window. When the “Download” command is selected, all bump test certificates are downloaded from the station.



Ventis - 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.

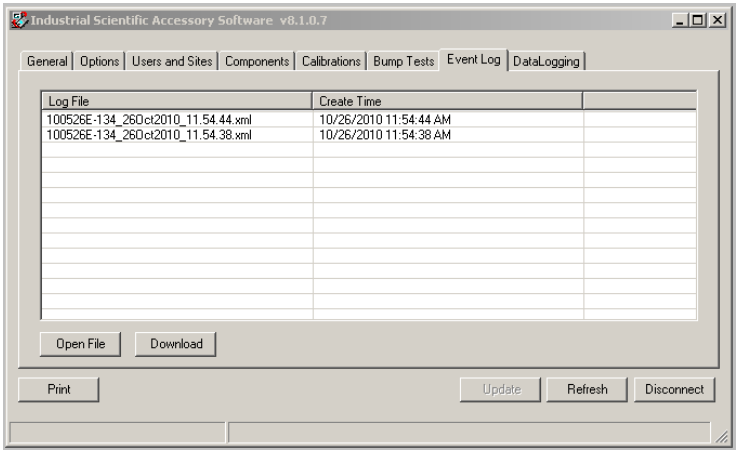


Figure 14. Event Log tab.

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 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		Bump past due warning enabled	On
Calibration past due warning enabled	On		Can zero in field	On
Alarm latching	Off		Can perform quick calibration	On
Can calibrate in field	Off			

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
091232w310	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 data logs when the “Print” command is selected from the Data Logging tab.

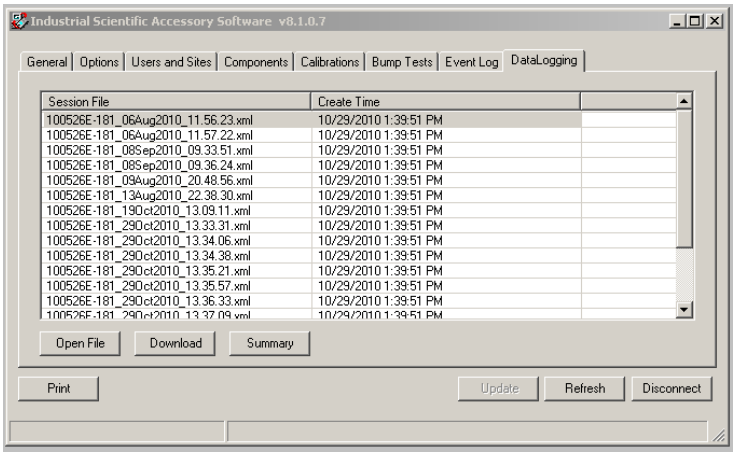


Figure 16. Data Logging tab

The Data Logging tab lists all downloaded data logs 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).

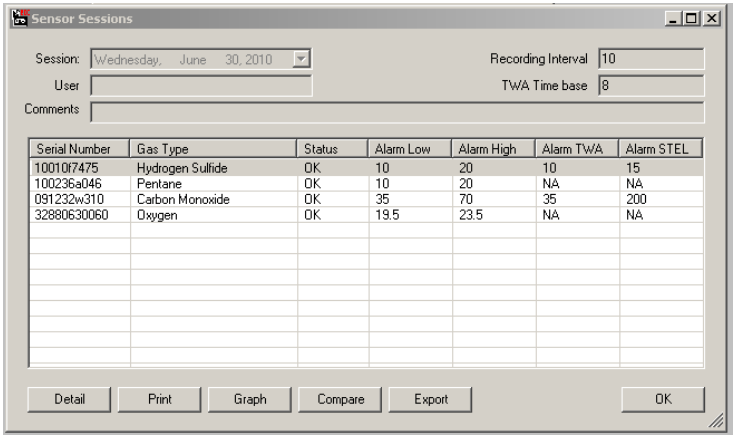


Figure 17. Sensor details.

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

Problem	Likely Cause(s)
Display is blank…	No power to the instrument; check power supply connections. 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

Feature	Specification
Instruments supported	Ventis Aspirated with Extended Range Lithium-ion (typical) Ventis diffusion with Lithium-ion (typical)
Dimensions	465 mm (18.31") X 527 mm (20.75") X 195 mm (7.68")
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 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

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

WARRANTY

Industrial Scientific Corporation's Six-Unit Calibration Station for the Ventis are warranted to be free from defects in material and workmanship for a period of one year after purchase.

Limitation Of Liability

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MANUFACTURER DECLARATION OF CONFORMITY
Déclaration de Conformité Constructeur

CE

The company **Industrial Scientific Corporation**, Pittsbuurgh, Pennsylvania USA, declares that the following new material:
*(La société **Industrial Scientific Corporation**, Pittsburgh, Pennsylvania USA, atteste que le matériel neuf désigné ci-après:)*

Apparatus *(Appareil)* type VENTIS MX4 6-Unit Calibration Station

Comply with the requirements of the following European Directives:
(est conforme aux exigences des Directives Européennes suivantes:)

I) The European Directive Low Voltage 2006/95/CE of 27/12/06
Directive Européenne Basse Tension 2006/95/CE du 27/12/06

Harmonized European Standards: *(Normes européennes harmonisées):*	**EN 60950, EN 61010**
Test report: *(Rapport de test)*	**E203424-A1-CB-1**

II) The European Directive EMC 24/108/EC of 15 Dec 04: Electromagnetic Compatibility
Directive Européenne CEM 24/108/EC du 15 Dec 04: Compatibilité Electromagnétique

Harmonized European Standards: *(Normes européennes harmonisées):*	**EN 61326, EN 55011, Class A**
Test report(s): *(Rapport de test)*	1810-7664

On behalf of the manufacturer
Pour le fabricant

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The Authorized Representative
La Personne Autorisée

Tom Henson
Global Senior Director,
Portable Instruments
(Directeur Technique)
07 May 2015

OUR MISSION
Preserving human life on, above and below the earth
Delivering highest quality, best customer service ...
every transaction, every time

OHSAS 18001 Certified
ISO 9001 Certified
ISO 14001 Certified

Pittsburgh, PA: May 07

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