

SF-ExplorIR: Calibration Verification Procedure

I. OBJECTIVE

This document describes the procedure for recording the calibration verification of your **Spectros Instruments SF-ExplorIR**. Verifying the calibration ensures the proper operation and accuracy of the SF-ExplorIR. After recording the calibration verification, you will have reset and extended the compliant period of the monitor (365 days).

Note: The reading uncertainty of the SF-ExplorIR is ± 1 ppm at 5ppm. This is why for greater accuracy it is recommended to calibrate with a SO₂F₂ Certified Standard Gas at 50 ppm. It is in this case that the uncertainty is a smaller percentage of the reading. All SF-ExplorIR Monitors are factory calibrated to read ± 1 ppm up to 20ppm SO₂F₂

II. SERVICE ITEMS REQUIRED FOR ANNUAL CALIBRATION VERIFICATIONS

- Phillips Type Screwdriver
- 10-20L gas sample bag as reservoir for calibration gas standard. Gas should be applied from bag to monitor and not directly from cylinder.
- Internet Access to www.spectrosinstruments.com
- Calibration Gas (verified with date of expiration and error)

SCOTT-MARRIN, INC RIVERSIDE, CA 92507
Sulfuryl Fluoride in Air (40-50 ppm recommended)

- Spectros Instruments *iMonitor Software* (from www.spectrosinstruments.com)
- 9Pin (DB9) serial connector or USD to 9 pin connector (Supplied by Spectros)
- Internal Fresh Air Bag (Supplied by Spectros)
- Internal hydrophobic filter (Supplied by Spectros)
- Internal Li Ion Disc Battery # CR 2032 Standard
- Annual Calibration Events Credits (Supplied by Spectros)

III. RECEIVING THE MONITOR

Upon receipt of the SF-ExplorIR, the authorized distributor/ service center should complete a visual inspection to include and record

- All items received
- Overall appearance of monitor
- Inspect Battery and ALL Battery Connections for any irregularities
- Power ON monitor with mains power and battery in-line.
- Note and record firmware version and days remaining before calibration is void.

IV. VERIFICATION OF ENTERED VALUES AS RECEIVED

Procedure:

- 1) Turn unit on and verify that unit is version 2.07 or higher.
 - a) Review the upgrade process if this is not the case.
- 2) Once the unit starts counting down press ◀ and ▶ at the same time to enter the *1st Level Menu*, then using the press ▼ 7 times, until you get to “DIAG”.
- 3) Press and hold down ▶ and then press the "ENTER" key.
- 4) The Version **X.XX** number along with the revision date will be displayed
- 5) Then press the “Esc” button to enter the *2nd Level Menu*
- 6) On the display screen the arrow should be pointing at “DIGIPOT”. Press Enter. The number displayed should be as close to 4.2 as possible.
- 7) Record the number then press Enter.
- 8) Using the ▶ button, move the arrow to “tempco” hit enter.
- 9) Record the number then press Enter.
- 10) Use the down arrow to “IR” then press Enter. The number in the lower right corner is labeled Mw
- 11) Record the IR Voltage, Mw
- 12) Use the ▼ arrow until “GAS CAL” is selected. Hit Enter, and record the number.
- 13) Use the “Esc” button to get back to the first display screen.
- 14) Record any measured PPM readings while performing these steps while in fresh air.
- 15) Turn off the ExplorIR monitor

V. OPEN MONITOR FOR VISUAL INSPECTION



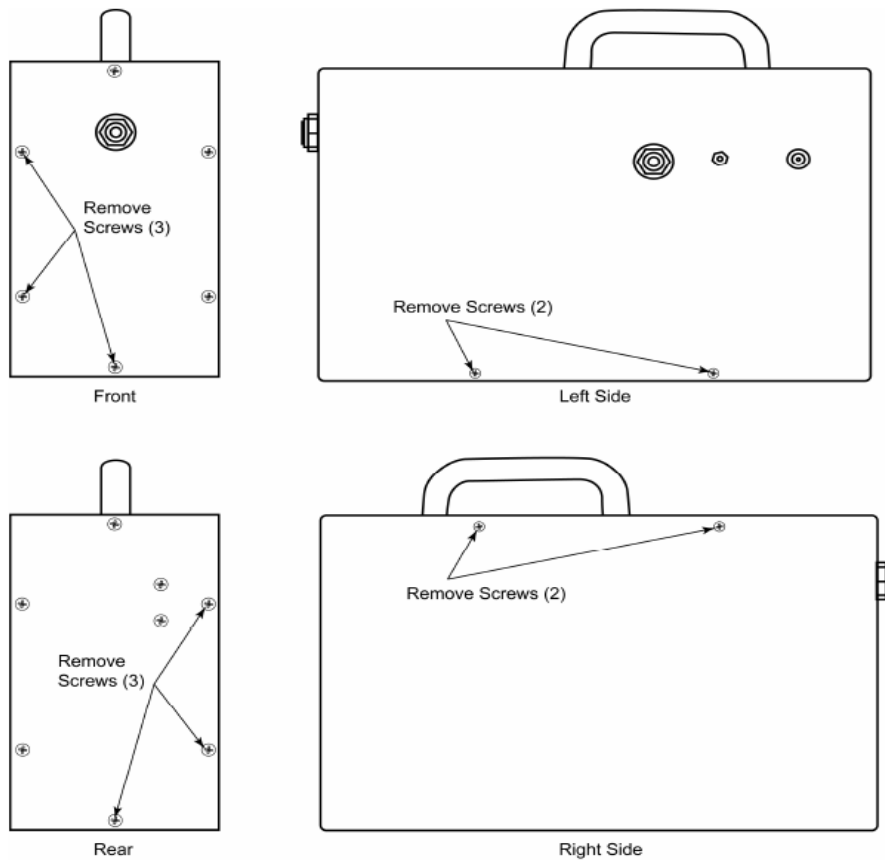
The SF-ExplorIR can be considered to be assembled in two distinct sections each shaped in the form of the letter “L”. The front (sample inlet panel) and rear panel should remain connected to the “L” section with the stickers and small rectangular hole. The other “L” section with 10 screws should be removed to access and service.

When servicing the parts inside the SF-ExplorIR, disassemble the monitor’s metal chassis as follows:

Procedure:

1. Remove monitor and its battery pack from the soft carrying case.
2. Unplug battery pack from monitor.
3. Remove a total of 10 screws from the locations shown in the illustrations below.
4. Carefully separate the metal chassis.

The authorized service technician should take care to make sure all electrical connectors are in place, all tubing is likewise secure and overall monitor integrity is maintained.



VI. REPLACEMENT OF INTERNAL AIR BAG AND HYDROSCOPIC FILTER

The Spectros Instruments provided Internal Filter and Fresh Air Bag should be replaced at the same time and on an annual basis in addition to the Li Battery CR2032.

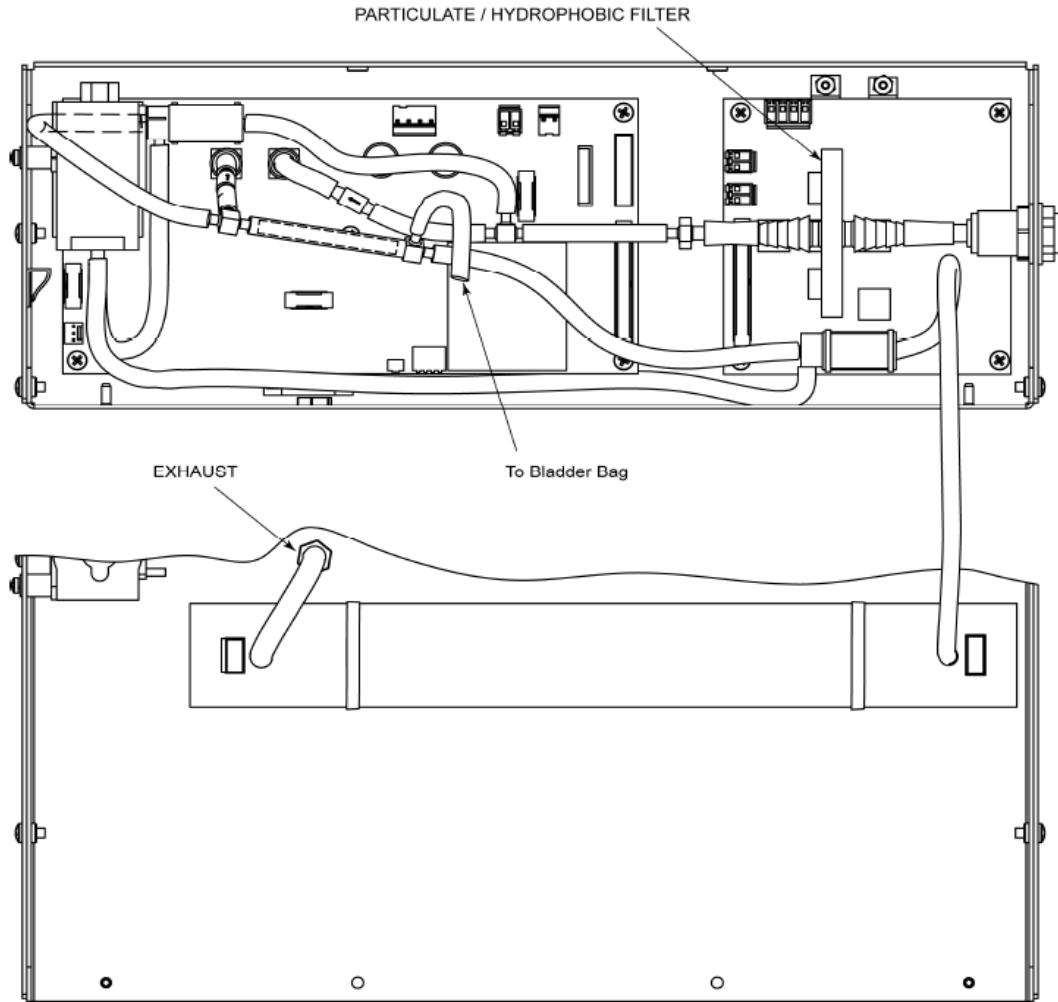
Procedure:

Replacement of the Li Battery CR2032.

1. Disassemble the monitor's metal chassis as per above.
2. Plug in the Battery to the monitor and start the ExplorIR, you do not have to wait for a full warmup.
3. Locate the **CR2032** Li button cell battery and remove it.
4. You may find it helpful to use a needle nosed plyer to get the battery from the battery holder.
5. Pay special attention to the orientation of the battery, the **+** side of the battery will face the front of the monitor
6. Replace with a new CR2032 battery
7. You may now turn off the monitor and unplug from the battery.

Replace the internal Hydrophobic Filter and Sample Air Bag.

1. See illustration and locate the internal Hydroscopic Filter & Sample Air bag.
2. Using a permanent marker such as a "Sharpe", write today's date along with your initials on the Sample Bag and the Internal Hydrophobic filter.
3. The tubing connecting on either side of the filter is a force fitting, simple twist while pulling on the tubing to remove.
4. When installing the new filter, pay special attention to the side of the filter with the words "**Inlet**". This side of the filter should be facing the front of the monitor.
5. Replace the internal bag after writing the date on it.
6. Using the permanent marker, make a mark on the inlet valve over the inlet fitting.
7. Using this mark as a guide turn the valve head counter clockwise.
8. It is best to hold on to the tubing protruding from the valve so you do not unscrew valve from the bag.
9. The valve stem needs to be opened 1.5 turns.



VII. RESTORE CALIBRATION FACTOR TO 1.000

Procedure:

1. Access Menu by pressing the up and down arrow together
2. Move cursor to "DIAG" menu item
3. Press Enter and Right arrow simultaneously to access FACTORY MENU
4. Firmware date code is displayed. Record software version as received.
5. Press escape/silence button. You are now in the Factory Menu.
6. Scroll down until cursor is besides "Gas Cal" and hit Enter
7. Record Value
8. Using the arrow keys, edit the value back to 1.000
9. Press Enter to accept change then silence twice to exit menus

VIII. APPLYING CALIBRATION GAS

Note:

- Allow the monitor to achieve a full 15-minute warmup before applying Cal Gas
- It will be necessary to apply Cal Gas to any monitor following any parts replacement

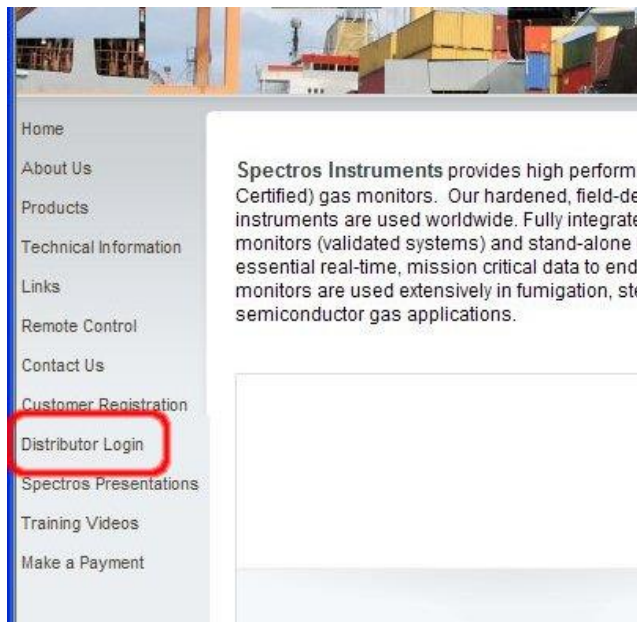
Procedure:

1. Use Certified SO₂F₂ Calibration Gas. Record :Manufacturer; Expiration Date; Certified Concentration with Accuracy
2. With fresh air bag already REPLACED WITH A NEW ONE
 - a. Once the unit starts counting down press ◀ and ▶ at the same time to enter the 1st Level Menu.
 - b. Scroll down to "**DIAG**" and hit Enter. This is the Diagnostic Menu
 - c. 4 values displayed on this screen are on top row Detector Voltage and Fault Code; Bottom Row Detector Temperature and Sensor Pressure
 - d. From this screen hit Right Arrow and display 4 new numbers. The top left number is a measure of the noise level of the detector. Values should be in range of 0.0010 OR LOWER...BUT Stable Values
 - e. From this screen hit Up Arrow and display 4 new numbers. Top Left is ppm NOT STP corrected. Top right is Digipot Setting to get close to 4.2mV. Bottom Left is Absorbance Units and Bottom Right is Digipot Voltage
 - f. Hit Enter. This forces monitor to zero on fresh air value.
 - g. Attach bag of Certified Calibration Gas and read from this screen.
3. Compute and Enter Calibration Factor
 - a. Compute Calibration Factor as Applied ppm/Displayed ppm
 - b. Typical values will range from 0.800 to 1.200
 - c. Refer to # 1 above to enter new calibration factor

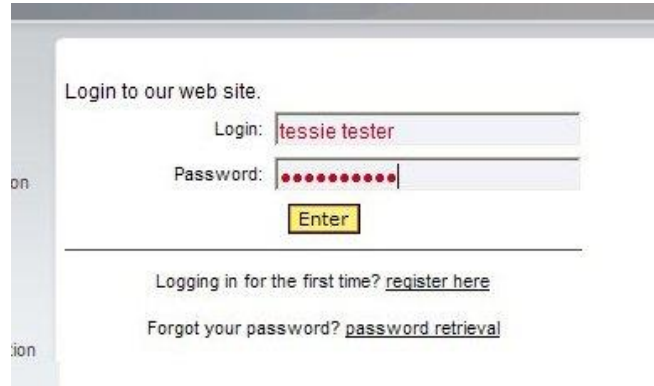
IX. RECORDING CALIBRATION VERIFICATION

Calibration events are posted on our web site, www.spectrosinstruments.com. Our secure site will allow you to record the data associated with the calibration of your monitor and confirm that the parameters fall within preset guidelines.

On the left side of our home page, you'll find our navigation menu. Click 'Distributor Login' to authenticate to our site. You will be brought to our login form.



Enter the login information provided by Spectros Instruments. If you've forgotten your password, click 'password retrieval' and you'll be given a chance to enter your email address for password notification. The email address given must match that in your account.



Login to our web site:

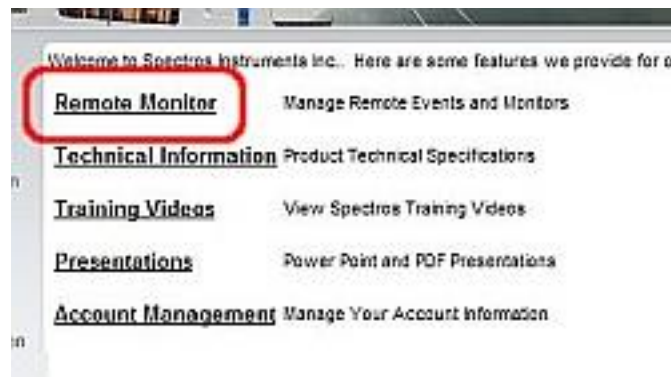
Login:

Password:

Logging in for the first time? [register here](#)

Forgot your password? [password retrieval](#)

Once authenticated, you will see our Welcome menu. The menu provides a list of links provided only to our registered Distributors. Select 'Remote Monitor' from the list to reach the monitor management section of our site.



The monitor management section has its own navigation menu. Select 'Monitors' to see a list of the monitors you've purchased.



The screenshot shows the Spectros Instruments web application interface. On the left, there is a navigation menu with options: Home, Events, and Monitors. The 'Monitors' option is highlighted with a red box. The main content area displays an 'Events' table with the following data:

Event	Start Date	Customer	City	Status	Alerts
1	2/1/2006	John Doe	Nonwood, MA 02062	COMPLETE	
2	12/22/1999	Betsy McCue	Beluga	COMPLETE	
3	9/22/2008	Jackie Chan	Los Angeles, CA	COMPLETE	
4	10/28/2008	Bobby Brown	Hollywood	COMPLETE	
5	10/29/2008	Sammy Rusole	Bedrock	COMPLETE	
6	10/27/2008	Tessie Tester	Nonwood, MA 02062	COMPLETE	
7	11/28/2008	Mark Groucho		COMPLETE	
8	8/28/2007	John Testing		COMPLETE	
10	1/1/1990	Dennis Glennon		COMPLETE	
11	10/23/2007	Joe User	Hometown	ACTIVE	

Below the table is a yellow 'Add Event' button.

From the list of monitors displayed, including the label you've provided, the Model Number, Serial Number, etc., click on the name given to the monitor you are verifying the calibration of.

Label	Model	Serial	Last Location	Last Calibrated
Multi Point 1		1234567890	-	
Single Point 1	SF-ExplorIR	11223444	- Living Room	2/22/2008
Single Point 2	SF-ExplorIR	332332332	-	3/10/2008
Test Monitor		12345	-	
Lunchbox	SF-ExplorIR	123123123123	-	11/16/2007



You will now see more information regarding this monitor. Click on 'Calibrate' to see our calibration verification form.

Monitor Details			
Label	Portable Unit 1	Serial #	33233233
Model	SFExplorir	Points	1
Calibrate		Submit	

If you need to purchase credits for calibration verification, you will be brought to our shopping cart. Enter the number of credits you would like to purchase, and complete the checkout process. We will notify you as soon as your payment is authorized and credits are available.

Device Calibration Check					
Product	SF-ExplorIR	Label	Single Point 2	Serial	332332332

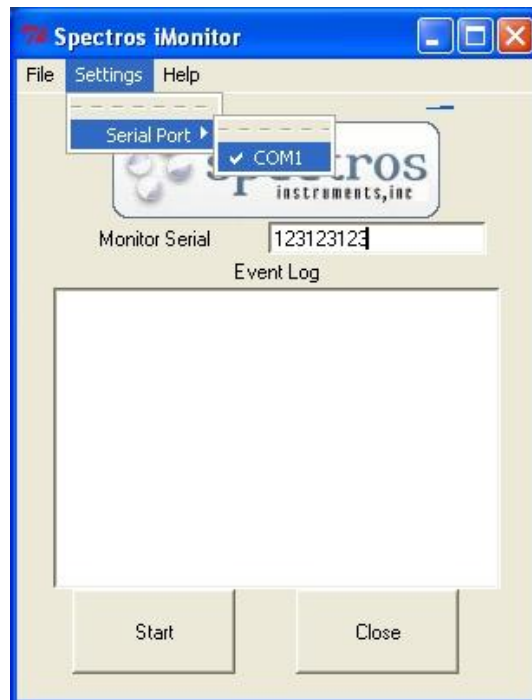
Record a Calibration Check			
Date	Standard Manufacturer	Standard Concentration	Monitor Reading
03/10/2008			
Cylinder #	Standard Valid Until	Detector Voltage	
Save			

Previous Calibration Checks				
Date	Admin	Calib. Manu.	Calib. Conc.	Actual Reading
2/12/2008	Caravello Anthony	Gills Gas Supply	5.0	4.97
2/12/2008	Caravello Anthony	Gills Gas Supply	5.0	4.83
2/12/2008	Caravello Anthony	Gills Gas Supply	5.0	4.62
2/12/2008	Caravello Anthony	Gills Gas Supply	5.0	4.62
2/22/2008	Caravello Anthony	Bordeaux Drugs	4.0	3.98
3/9/2008	Caravello Anthony	Bills Gas	5	4.8
3/10/2008	Caravello Anthony	Parthenon Distributables	5	4.97

When you have credits, the 'Calibrate' button will bring you to the form. Fill in the necessary fields associated with your calibration standard and the monitor responses. Click 'Submit' and exit. Your Calibration Verification is completed.

X. RESETTING MONITOR

Once your calibration verification is recorded, you will need to update the monitor. Use the DB9 Serial Connector to join a working serial port on your PC and the 9 pin connector on the top of the SF-ExplorIR. Start the *iMonitor* update software provided and select the appropriate serial port from the drop down menu. Enter the serial number for your monitor.



Before you click the Start Button, navigate to the update prompt on your SF-ExplorIR. This is accessed via the Factory Menu. The Factory Menu is at the level that allows parameters of the monitor to be changed. Only Authorized Representatives should access this menu.



XI. ACCESSING THE **CONNECT2PC** PROMPT ON MONITOR

- **Note:** Depending on Network Security it may be necessary to use a hotspot or an Aircard to use the Spectros Calibration Software.
- Some VPN networks also can cause the Calibration software to not work.

To invoke the **reset**, go to the Factory Menu

1. Press ◀ and ▶ at the same time to enter the *1st Level Menu*
2. Press ▼ 7 times, until you get to **“DIAG”**
3. Hold down ▶ and then press the **"ENTER"** key.
4. Screen Displays REV 2.07 or later
5. Hit ESC
6. Scroll thru to **"PWR UPS"** and hit the ◀ and ▶ at the same time to get the prompt.
7. The Monitor should prompt you to **'Connect2PC'**
8. Click the **'Start'** button on the iMonitor interface,
9. and then the **'Enter'** button on the Monitor.

The software will collect information from the monitor, and post it to our system which returns a unique code required to reset this device for this event. The software will send this information to the monitor, which should display 'Verification Complete' and reset the lock. You may now cycle the power on the monitor and continue using it. Disconnect from personal computer and turn unit off and quickly back on to confirm unit has been reset.

Recheck the **digipot** and **tempco** settings: **reenter if necessary. Turn unit on/off a total of 10 times**