

# Technical Bulletin

## 49i Series Cell A/B Test

### Models 49i / 49i-PS

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The purpose of this procedure is to provide instrument users an easy to use procedure to check for solenoid leaks in the Model 49i Ozone Analyzer or 49i-PS Primary Standard Calibrator.

Leaks in the solenoids can cause an imbalance in concentration readings between cells. When an imbalance is noticed this test should be performed to help determine the cause of the imbalance.

This procedure assumes some user familiarity with the instrument menu structure. If difficulty is encountered navigating the menu, please consult the instrument instruction manual where a menu structure breakdown is located. It is entitled Flowchart of Menu-Driven Software and is typically located in the beginning of Chapter 3 – Operation.

1. Using an external source of ozone generate approximately 0.5 ppm (500 ppb) and introduce to the analyzer or calibrator.
2. Press the menu button to enter the main menu.
3. Using the down arrow button, scroll down to the diagnostics menu selection and press the enter button to display the diagnostics menu selections.
4. Again using the down arrow button scroll down to Cell A/B O3 and press enter. The unit will now display the concentration as determined in each cell individually.
5. Once the unit has stabilized on the external ozone gas sample, using a separate piece of paper, manually take 10 successive simultaneous update readings from Cell A and Cell B. Readings update every 10 seconds. Find the average of the Cell A readings and the average of the Cell B Readings. The average readings of Cell A and Cell B should agree within +/- 3% of each other.

A balance reading of better than 3% indicates there is no leak across the solenoids.

A constant low reading on one cell indicates an imbalance. The imbalance can be caused by a dirty cell, dirty lines to the cell or a leaking solenoid.

To check for dirty cell, remove and swap the cells i.e. place cell A in the cell B position and place cell B in the A position. If the issue follows the cell, clean or replace the cell or cells. If the imbalance persists, a leaky valve is indicated and the solenoid or solenoids must be replaced.

For confirmation of solenoid leak the following leak test below should be performed.

## **Confirmation of Leak Through Solenoid – Solenoid Leak Test**

1. First turn off power to the instrument and disconnect the power cord to prevent accidental powering of the unit.
2. Disconnect the solenoid wiring connectors from the main power supply board.
3. Disconnect the tubing to the solenoids and remove the solenoid assembly from the unit with both solenoids on the baseplate as a unit.
4. Further disconnect the interconnecting tubing from the solenoids and from the bottom of the solenoid base plate remove each solenoid.
5. The easiest and most effective way to check for solenoid leaks is to install a vacuum pressure gauge in the normally open port of the solenoid. Now connect a line from the common port of the solenoid to the inlet of the instrument pump. Start the instrument and note the pressure the gauge reading while the valve is in this position.
6. Next, turn off the instrument and remove the pressure gauge from the normally open port of the solenoid and move it to the normally closed port of the solenoid. Leave the common port connected to the pump inlet. Now connect the solenoid wiring connector to the sample solenoid position PJ8 on the measurement interface board. Start the instrument.
7. To activate and change the state/position of the solenoid put the unit in the service mode - Go to the instrument controls menu tab down to service mode and enter. Turn service mode on. Go back to the main menu and tab down to where Service is now displayed. Enter the Service menu.

8. Tab down to pressure check and press enter.
9. In this menu go to sample pressure and again press enter. This will change the state of the solenoid and will also lock the solenoid in that position so that it will not repeatedly change states.
10. Make note of the pressure reading on the gauge and compare it to the previous pressure reading.
11. These pressure readings should be the same. If one is higher than the other this will confirm there is a leak in the solenoid and it must be replaced.
12. Repeat the above steps for the second solenoid and compare the pressure readings. Again, if the pressures are not the same this will confirm a leak and the solenoid must be replaced.
13. After solenoids have been confirmed good with no leaks or have been replaced, reverse the order in which they were removed and reinstall in the instrument. Take extra care with tubing connections to prevent leaks. Teflon tape may be used for threaded NPT connections.  
The sample solenoid is the solenoid located closest to the rear of the instrument and wiring is connected to the sample connector PJ8 on the measurement interface board.  
The reference solenoid is the solenoid located towards the front of the instrument and wiring is connected to the reference connector PJ9 on the measurement interface board.  
During installation, make sure the unit is turned off and the power cord is disconnected to prevent accidental powering of the unit.
14. Restart the unit and check operation.

Should any questions or difficulties be encountered in the performance of this procedure, please contact the Thermo Scientific Technical Support Dept. at T: 508-520-0430 Option 2 for Technical Support then press 1 for Gas Analyzers.

Units can also be returned for factory repair at the Franklin, MA Repair Depot. Please contact the Thermo Customer Service Group at T: 508-520-0430 Option 1 for Customer Service or the Thermo Technical Support Group at T: 508-520-0430 Option 2 Technical Support for an RA (return authorization) to return the instrument.