

## Technical Bulletin # 53

**To:** Coulometrics Support Personnel  
**From:** Applications/Engineering Dept.  
**Date:** February 10, 2004  
**Subject:** Internal Oxygen Dosing on the CM5014S.

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### Oxygen Dosing Solenoid Valve Connections, Operation and Usage

An oxygen dosing solenoid valve is now included as an integral part of all CM5014S Sulfur Coulometers manufactured by UIC, Inc.

Oxygen dosing is an important factor in the successful sulfur analysis of compounds with very high organic content such as coal, coke or lake sediments. Oxygen dosing aides in the complete conversion of S to SO<sub>2</sub> while maintaining a minimal formation of SO<sub>3</sub>. It also helps decrease the amount of sooting or ash that can form when combusting highly organic samples and extends the integrity of the copper catalyst within the combustion tube.

Oxygen dosing is not used for the analysis of sulfites, SO<sub>2</sub> or H<sub>2</sub>S when utilizing the CM5130 Acidification Module or for the analysis of total sulfur by combustion of predominantly inorganic samples. In these cases the solenoid valve may be disconnected so that it does not cycle during analyses. Instructions on how to disconnect the solenoid valve are given later in this section.

### Connecting the CM5014S to the Flow Meters

Two gases are required for the proper operation of oxygen dosing system; UHP oxygen and UHP nitrogen. Both gases should be connected to a two-stage regulator and the outlet pressure for both gases should be set for 8-10 psi. Using the fittings provided, attach the tubing so that it mimics the flow shown in Figure 1 below.

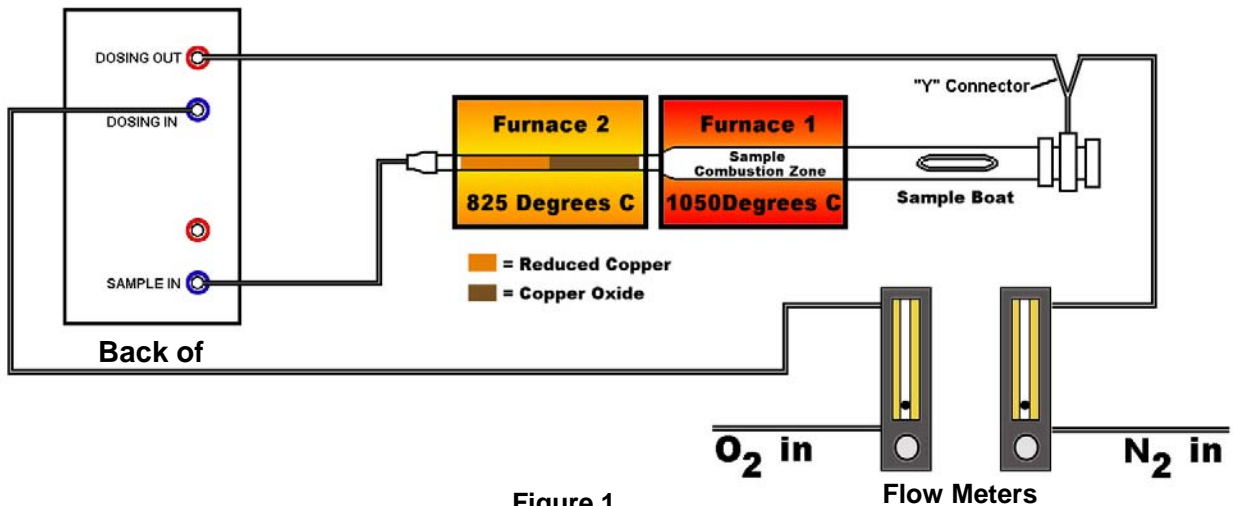


Figure 1

### Operation of the Dosing Valve

The oxygen dosing valve, as configured from the factory, will automatically energize (turn on) for approximately 3 seconds at the beginning of the second interval as defined by the analysis parameters. For example, if the interval entered into the analysis parameters screen was 1.0 minutes then the dosing valve will energize at the beginning of the second minute of analysis

time. Thereafter, the dosing valve will energize at the beginning of the next interval if 110ug or more of the analyte (S, SO<sub>2</sub> or SO<sub>3</sub>) was realized during the previous interval. This continues until the analysis is complete.

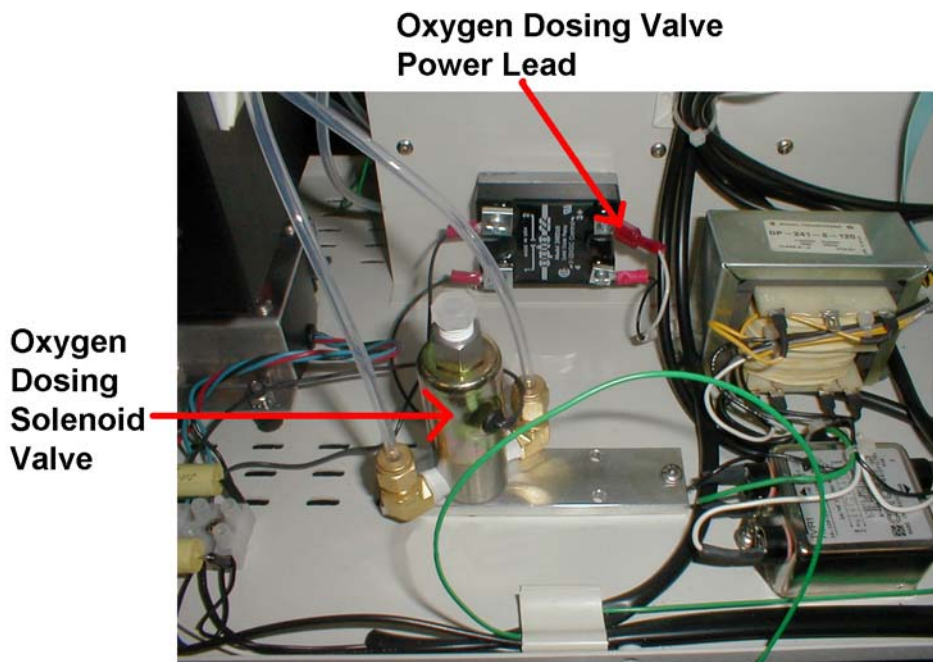
The oxygen dosing valve can be manually activated at any time while in Run Analysis mode by pressing the 'F6' key.

To set the oxygen flow rate first, configure the system as shown in Figure 1 above. Turn on the coulometer and open the carrier gas valves on the regulators. Next, from the "Ready" screen use the down arrow to bring up the main menu on the CM5014S. Select Run Analysis. Press 'F6' and, when the dosing valve energizes, note the oxygen gas flow on the appropriate flow meter. Set the oxygen flow to 100 ml/min, pressing the 'F6' key several times if necessary. The nitrogen flow rate can be set directly to 100 ml/min without the use of the dosing valve.

### Disconnecting the Oxygen Dosing Solenoid Valve

The majority of sulfur analysis applications will not require the use of the oxygen dosing valve. Therefore, it may be desirable to disconnect the solenoid valve and prevent it from energizing. To do so, first **UNPLUG THE CM5014S FROM THE ELECTRICAL OUTLET**. Remove the 6 screws holding on the right side panel (when viewed from the front). Remove the panel and, before pulling the panel away, disconnect the green ground wire from the terminal on the inside of the panel. You should now be able to see the solenoid valve and power source as shown in the illustration below:

### CM5014S Oxygen Dosing Valve Placement



Remove the top (white) lead from the power source as shown above. Replace the green ground wire terminal to the side panel and remount the side panel. Reconnect the power cord for the CM5014S to the electrical outlet and restart the instrument.