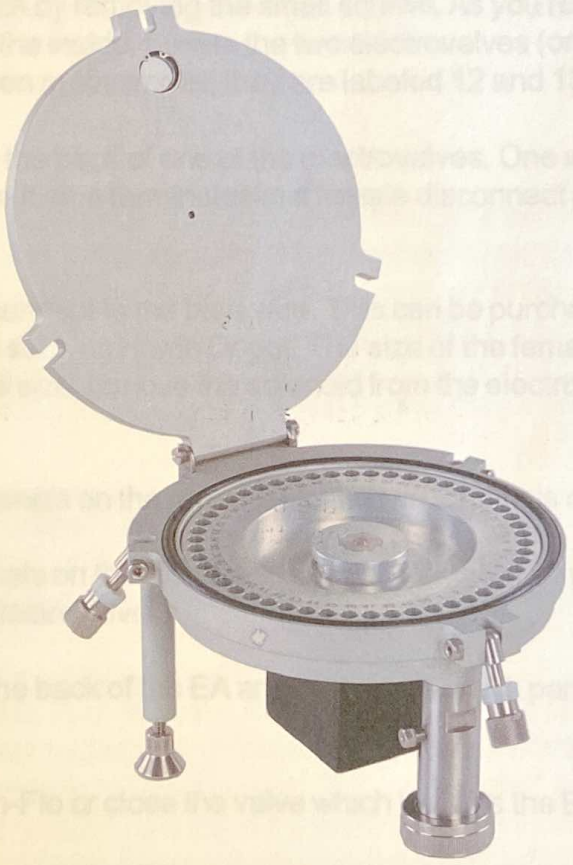
Zero Blank Autosampler
Installation and Operation Instructions
for the
ECS 4010 Elemental Combustion System



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Costech "Zero Blank" Autosampler
Installation and Operating Instructions

The sealed design of our autosampler has the advantage of avoiding any nitrogen background from the introduction of samples into the combustion reactor. Since all samples are purged simultaneously and the sample chamber remains sealed, there is no atmospheric contamination during the sample analysis.

EA Installation

Unpack the autosampler and control module and examine the different components. The autosampler carousel has three wires attached; one coming from the drive motor, red wires for connection to the "sampler" electrovalves in the ECS 4010 elemental analyzer, and a third set (25-pin female connector) to connect to a TC/EA. The control module is placed on top of the analyzer adjacent to the autosampler during normal operation.

1) Open the back panel of the EA by removing the small screws. As you remove this panel, disconnect the grounding wire attached to the inside. Locate the two electrovalves (on the top right) which control the air supply to the PN150 air driven autosampler, they are labeled 12 and 13.

2) Disconnect the two wires on the back of one of the electrovalves. One wire is soldered on so you will need a soldering iron to remove it, one terminates in a female disconnect (the type of connector) and can be simply pulled off.

3) Connect a small female disconnect to the bare wire. This can be purchased at an electronics shop or even a home impropvent store such as Home Depot. The size of the female disconnect is 0.110 X 0.020, but if you are not sure about the size, remove the solenoid from the electrovalve and take it to the store to match it up.

4) Connect the two female terminals on the red wires to the two terminals of the electrovalve.

5) Connect the two male terminals on the red wires to the two female connectors on the wires you just removed from the back of the electrovalve.

6) Run the red-wire cable out the back of the EA and replace the back panel. Do not forget to reconnect the ground wire to the panel.

7) Turn on the dilutor in the Con-Flo or close the valve which isolates the EA and mass spectrometer.

8) Place the control module on top of the EA and connect the autosampler to the combustion tube.

9) Attach the carrier gas line to the port in the side of the "drop tube" of the autosampler.

10) Attach the cable from the drive motor (with the round black connector on the end) to the back of the control module. **IMPORTANT: DO NOT DISCONNECT OR CONNECT THE CABLE TO THE MOTOR WHILE THE CONTROL MODULE IS POWERED ON.** Connect the control module to a 110V outlet and turn it on with the switch on the front panel.

NOTE: When using the optional isolation valve connect the carrier gas line to the bottom port and the purge line to the upper port. You must also bypass the restrictor in the purge circuit. It is located in the back of the ECS, just above and to the left of the electrovalves for the autosampler. It is a coil of SS tubing. After removing the restrictor connect the two lines together using a short piece of 2 mm tubing.

11) **IMPORTANT**: You must now set the Sample Stop 1-2 second longer than the Sample Delay. For example; if the Sample Start is set for 10 seconds, the Sample Stop must be set for 11-12 seconds. This is because the Zero Blank autosampler is getting its start signal from the electrovalves as they are energized. If it continues to receive a signal it will turn the carousel every 2.5 seconds, and drop samples into the combustion reactor.

12) Installing the sample carousel: There should be a Teflon washer which is installed on the motor shaft below the carousel. Place the sample carousel on the motor shaft and turn it until the hole in the bottom plate drops onto the alignment pin. Continue to turn the carousel until it drops into place. When the carousel is installed correctly, it will sit slightly below the top of the body of the autosampler.

13) Select which carousel (32, 50, or 100 positions) is being used. The 3 position switch on the front panel of the control module controls the programming for the different carousels.

Aligning the Carousel

NOTE: Before aligning the carousel press the Manual Advance button on the front of the control module several times to check that the system is operating correctly. It will only advance once every 2.5 seconds. Also, if you try to align the carousel before pressing Manual Advance at least once, there is a possibility of the carousel spinning completely around. There is no harm in doing this, however, if there were samples in the carousel they would all drop into the combustion reactor. This procedure should be repeated every time the power is turned off and on to the control module.

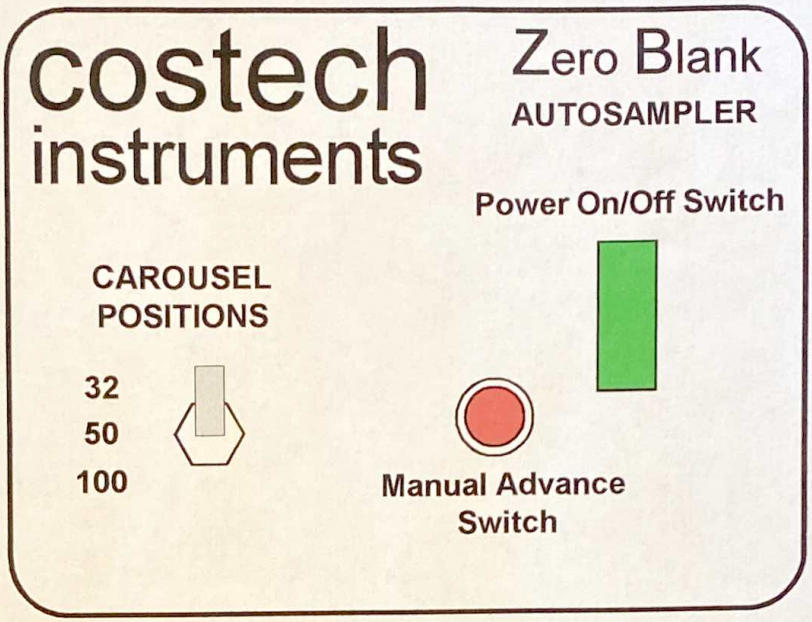
The autosampler is driven by a precision micro-stepping motor which is microprocessor controlled. Since there are no "gears" the carousel must be aligned electronically before starting so the carousel positions line up over the combustion tube. When you turn on the control module you will hear the motor "snap", and the carousel may move slightly. The motor has aligned itself to a point corresponding to a tooth on an electronic "gear". The sample carousel will most likely not be perfectly aligned with a hole directly over the sample drop tube. Turn the carousel manually until you are at or near position 45-46. Press the manual advance button on the front of the control module several times to check the carousel movement. To align the carousel exactly, use the small "fine adjustment" switch (Jog switch) on the back of the control module. In the "up" position the carousel will move in a clockwise direction, in the "down" position counter clockwise. Hold the switch up (clockwise direction) until the hole is perfectly aligned over the center of the drop tube. The carousel aligns better if you make the fine adjustment in the clockwise direction. Press the manual advance button on the front of the control module panel. This should advance the carousel one position and allow you to check the alignment. Press it or hold it in, waiting 2.5 seconds between each move (the program has been written to allow it to advance one position every 2.5 seconds) until position 50 is over the drop tube. If it is not aligned, repeat the procedure. The carousel should now be aligned and will hold this alignment as long as the control module is powered.
NOTE: You do not have to align it on position 50, however, if you turn the carousel again manually (by hand) it will not be perfectly aligned and you will need to realign the carousel.

Operation

Open the purge vent on the top of the autosampler to vent the pressure inside the sealed chamber. Release the three fittings holding the lid closed and open the lid. Place your samples in the carousel and close the lid. Tighten the three fittings evenly, securing the lid and making the seal to atmosphere. Do not tighten one bolt completely, then another, as this will cause the lid to seal unevenly. Start all three bolts, then lightly tighten two at a time, moving around the lid until they are all completely tight. Wait 2-5 minutes (minimum 5 minutes when connected to a mass spectrometer) to purge the internal chamber of any residual atmospheric gases and then close the purge valve. Allow a few minutes for the gas pressures, helium flow rate and baseline to stabilize. Turn off the dilutor or turn on the flow to the mass spectrometer. Begin the analysis.

Note: With the optional isolation valve: Close the isolation valve, open the purge vent, open the sample chamber and add samples. Close and secure the lid by tightening the three fittings. With the purge vent open, turn on purge and let gas flow for 2-5 minutes. Close purge vent, and **turn purge off.** Open isolation valve, wait for baseline to stabilize. Begin the analysis.

Front View - Control Module



Rear View - Control Module