

CoreDryTM

Operators Guide



Instron[®]
Inc.

Innovators In Instrumentation Technology

TM
CoreDry
Operators Guide

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Version 7

InstroTek[®], Inc.
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Patent Pending

Important

CoreDry units are shipped within the Continental United States with oil in the pump – the additional oil shipped with the unit is for your next oil change.

*CoreDry units shipped outside the Continental United States are **WITHOUT** oil in the pump. – an extra bottle is shipped with the unit for filling before use.*

PRECAUTIONS WHEN USING THE COREDRY

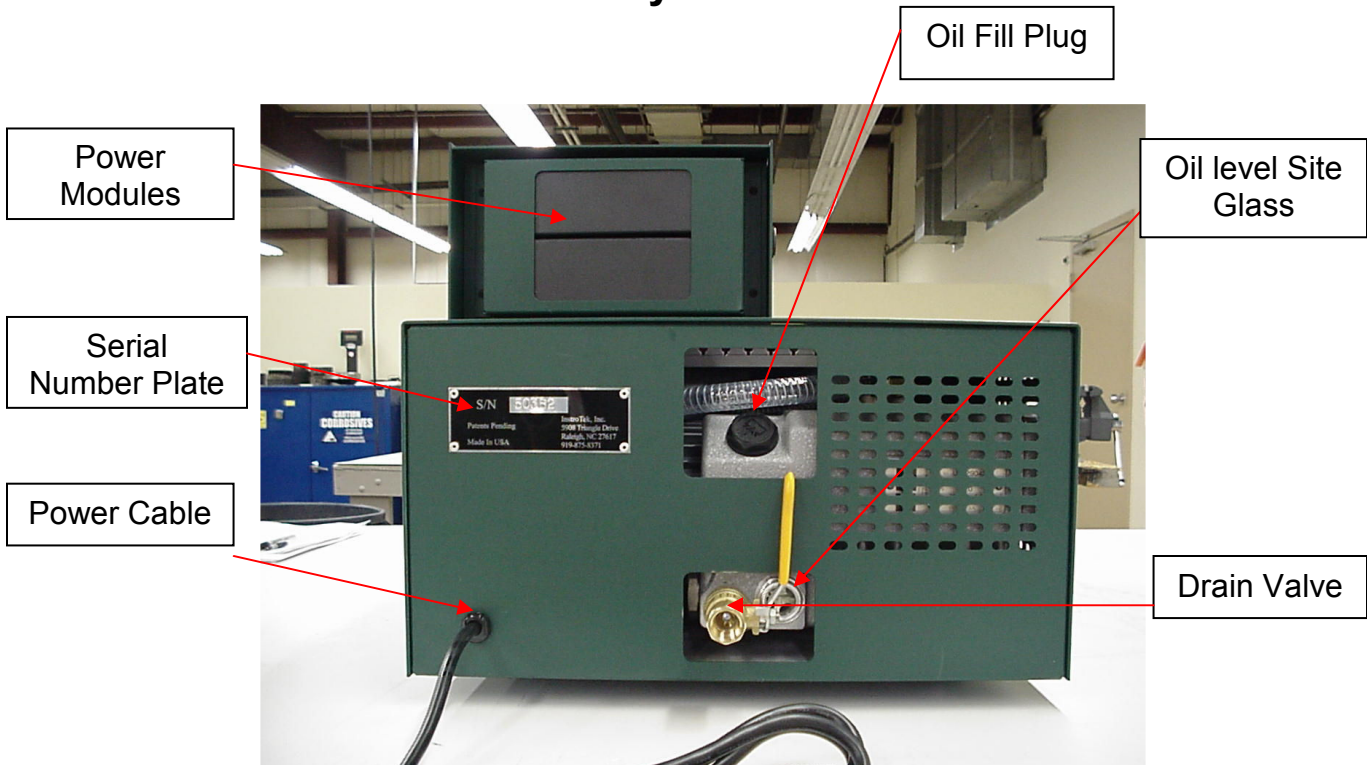
1. There is an air heater located inside the CoreDry to maintain the sample at room temperature. The heat is on during flow cycle. **THE BOTTOM OF THE DRYING CHAMBER MAY BE VERY HOT DURING AND AFTER COMPLETION OF THE TEST.**
2. Be aware that the vapor trap reaches temperatures below freezing.
3. Voltage of 120V is present inside the CoreDry cabinet. **DO NOT PROBE INTO THE MAIN CABINET WITH CONDUCTIVE MATERIALS, TOOLS, FINGERS OR HANDS. IF COVER MUST BE REMOVED CONTACT INSTROTEK FIRST.**
4. Do not attempt to repair this unit. Maintenance on this unit must be done by trained technicians.
5. Change your vacuum pump oil after 80 hours of use (the indicator in the software will prompt you to do this). Only use recommended vacuum oil (InstroTek part number 1520137).
6. Change your Tank Filters every 1 to 2 months depending on usage (InstroTek part number 1009012 package of 12 filters).
7. Change your exhaust filter on the vacuum pump once a year (InstroTek part number 1520084 or 1520084.1 depending on pump model).
8. Call InstroTek at (919) 875-8371 if you have any questions.

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CoreDry Components



CoreDry Front View



CoreDry Back View

Introduction

Congratulations on the purchase of your CoreDry Unit. The CoreDry is a new, innovative device used for rapid vacuum drying of samples, while maintaining the sample at room temperature. Keeping the sample cool during drying process ensures that the characteristics of the sample have not changed.

This product is the result of industry demand for rapid testing results in the road paving industry in which previous drying methods took many hours. Although the results are the same, drying with rapid vacuum technology provides the user with samples that can be tested in a few minutes. Now you can use the dry weight from the CoreDry to measure your core density in minutes or get a quick measure of your stockpile aggregate moisture content.

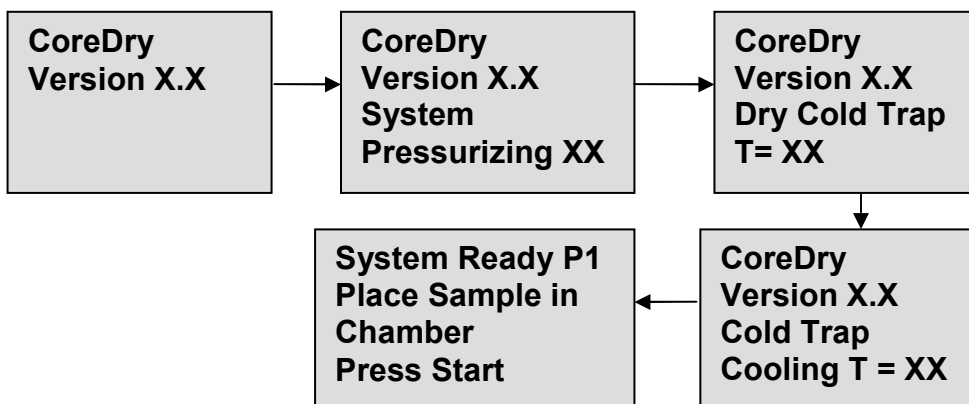
The CoreDry uses high vacuum in conjunction with a thermoelectric cold trap to first draw the water out from every pore of a sample, quickly evaporate the drawn out water by lowering the vapor pressure and then trap and condense the vapor in a separate chamber. The vapor trap serves two purposes in the system: first it prevents much of the vapor from entering the pump which keeps the pump efficiency high and secondly it improves the efficiency of the drying process by increasing the vacuum of the system by causing condensation to occur.

SETUP AND QUICK START

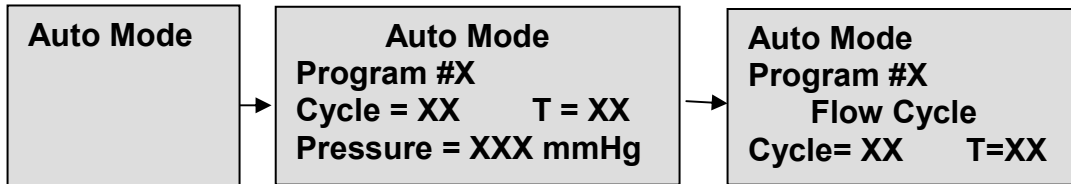
1. **Remove from shipping box:** Remove foam protection from box and remove CoreDry unit, covers and accessories. Place CoreDry close to 120V outlet on a flat bench surface. Leave at least 6" of space on both sides of the CoreDry for air circulation. **DO NOT PLACE NEXT TO ANY HEAT GERNERATING DEVICES.**
2. **Pump oil:** In continental United States, the pump oil bottle sent with the unit inside the drying chamber is for a future oil change after approx. **80 hours of use. IMPORTANT – For international units, use the oil to fill the vacuum pump, before the first use.** Please refer to maintenance section of this manual for filling and replacing the vacuum pump oil.
3. **Lids and Flow Plate:** Remove the Sample Chamber lid, which is located next to the CoreDry unit inside the box. The Flow Plate/Mesh holder is in the bottom of the large tank along with extra tank filters, the Cold Trap lid, a bottle of oil, and the CoreDry CD. Remove all packing material from the large tank. Place the wire mesh sample support in the bottom of the large sample tank on top of the flow plate. Place the lids on the large and small tanks.
4. **Turn on CoreDry:** Plug the unit in a wall outlet and flip on the on/off switch to the ON position. The display will indicate the software version once turned on. Next it will pressurize the system. Then the display will prompt for the user to dry the cold trap. After the Cold Trap is dry the CoreDry will cool the Cold Trap. Once all the initial steps have been completed the system is ready to for use.

Note: Always plug the CoreDry directly into the wall socket. Do not use extension cords or power strips.

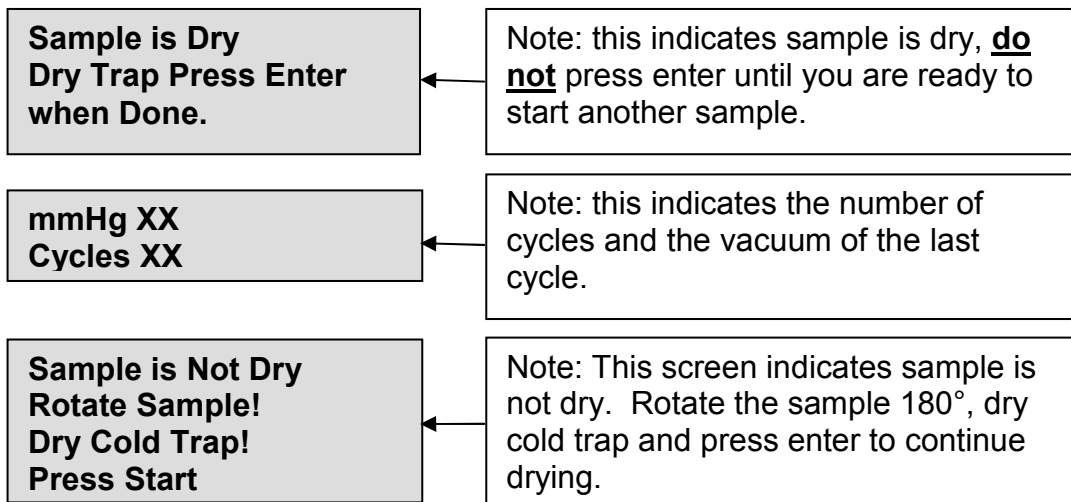
Turn Unit On: Initialization and prep flow chart.



Place the sample in the chamber, place the lid firmly on the chamber and the unit starts cycling (after pushing the start key):



Unit cuts off when sample is dry or a message will prompt the user to rotate the sample, when sample is not completely dry.



5. Daily Test:

- a- Everyday before starting operation, dry the cold trap and the sample chamber using a lint free cloth. Do not use paper towel as pieces of paper can get left in the system and subsequently be pulled into the vacuum pump.
- b- Place the appropriate lids on the sample chamber and the cold trap. Press start to begin a test without any samples. The vacuum reading on the display should be 6 mmHg or less when complete. If the vacuum without a sample is higher than 6 mmHg, refer to the trouble shooting section or call InstruTek for service information.

Note: When you receive the CoreDry or after transport to other locations, you might have to run the CoreDry several cycles to achieve 6 mmHg. Moisture from humidity might build up within the vacuum lines. By running the unit several times, the CoreDry eliminates the moisture in the pipes and reduces the pressure within the chamber to 6 mmHg.

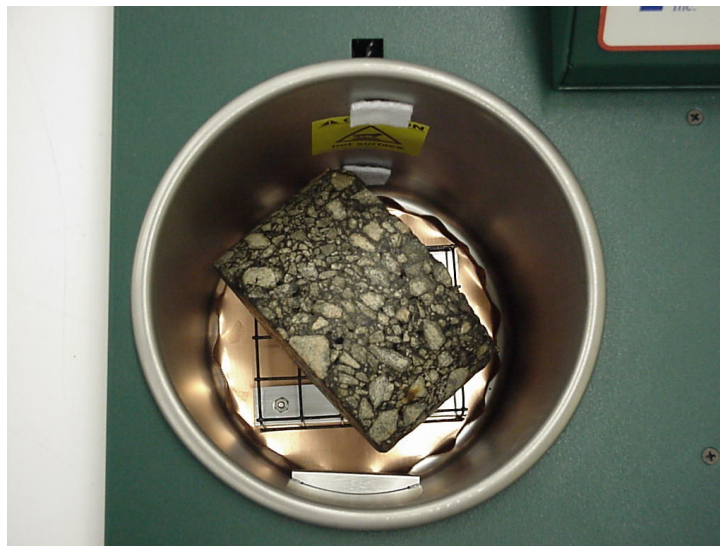
6. Drying Samples:

Note: *To speed up the drying process for multiple samples, dry one sample in the CoreDry and place all other samples in front of a fan.*

- a- Make sure the sample is at room temperature or higher. Higher sample temperatures will speed up the drying time and is preferable (temperature not to exceed 110F). Conversely, cooler than room sample temperatures will significantly lengthen the drying time.
- b- Towel dry the surface of your wet asphalt sample to remove as much of the free water as possible. Place the sample on its side, then on the wire mesh sample support (as shown below), place the lid on sample chamber and press start. When sample is dry, unit will automatically stop and pressurize so that lids can be freely removed.

Important note for drying extremely wet samples- *If the sample is not dry after 45 cycles, remove the sample and place at room temperature for 15 minutes. After 15 minutes it is ok to put the sample back in the sample chamber and complete the drying with the CoreDry.*

Note: STOP button can be pressed at anytime to stop the operation and release pressure in the chambers.



For best results,
place the sample on
its side.

- 7. **Cold Trap:** Liquid and/or ice will accumulate in the cold trap as samples are drying. Between samples, during rotations, and for faster drying, it is best to remove the cold trap lid and the divider plate and wipe out the moisture. Be sure to always replace the divider before drying the next sample.

Caution: Use a lint free cloth to remove moisture from the cold trap and the sample chamber. Do not use paper towel as pieces of paper will be left in the system and subsequently be pulled into the vacuum pump.

Menu Functions

To access the Menu press the 'Menu' Button on the CoreDry Keypad. To cycle through the different menu settings press the Up or Down key to change the menu options. To view or change a menu press 'Enter' when a particular menu option is displayed. To exit out of the Menu press 'Stop' or press the 'Down' key until the main display is reached.

1. **Program #:** This menu function allows you to program up to 5 different settings for drying cores or other samples. Press the 'UP' and 'DOWN' keys to cycle between Programs 1 through 5 once desired program is selected Press 'Enter' to Store.
2. **Oil Change:** Displays the amount of time until your next oil change is required. Time is displayed in hours.
3. **Run Hours:** Displays the amount of time the CoreDry unit has operated. Time is displayed in hours.
4. **Max Cycles:** This menu function shows the maximum number of cycles the CoreDry will run until the sample needs to be rotated. Default setting is 10.
5. **Check Cal:** This will display the current status of the Calibration. It will show either "Calibrated" or "Not Calibrated."
6. **Cool Time:** Displays the amount of time that the Cold Trap will cool at initialization and in between samples. Default setting is 60.
7. **Self Test:** Before using Self Test place both lids on sample tank and Cold Trap. The Self Test switches between the individual parts of the CoreDry to isolate and determine the operational status of each part. The Self Test will switch between the valves, relay, pump, +Line, and Power Supplies. Once the Self Test is completed the CoreDry will display the results of the Self Test as well as all of the current settings. The screen will scroll every 5 seconds or the Up and Down arrows can be used to navigate through the results. **NOTE: Units with serial numbers 499 and below that have been upgraded do not include a Self Test feature. Menu item "7. Sys Settings" will display the current system settings.**
8. **Oil Reset:** Resets the timer in between oil changes back to 80 hours. After each oil change it is important to go into this menu function and reset the timer.
9. **Tank Filter:** Resets the timer for the tank filters. After the tank filters have been changed it is important to go into this menu function and reset the timer.

- 10. Exh Filter:** Resets the timer for the Pump Exhaust filter. After the Pump Exhaust filter has been changed it is important to go into this menu function and reset the timer.
- 11. Beeper Vol.:** Adjusts the volume of the beeper between four settings Off, Low, Med, or High. Default setting is Med.

Aggregate Testing Using the InstronCoreDry™

The CoreDry can be used for determination of aggregate moisture content. Use the following procedure to dry aggregates and to determine moisture content:

- 1- Set the CoreDry to program 2 (PR2) by pressing the Menu key. Change the program number to program 2.
- 2- Remove the wire mesh sample holder and the flow plate from the sample chamber.
- 3- Place the bottom portion of the aggregate fixture on a scale capable of reading to 0.1 gram and tare the scale.
- 4- Place approximately 100-500 grams of aggregates in the aggregate fixture. Please refer to the following table for aggregate quantities to use in the fixture. Record weight.
- 5- When you determine the sample weight, re-tare the scale.
- 6- Replace the lid and tighten the fasteners on the aggregate fixture.
- 7- Weight the entire fixture with the aggregate on the scale. Record this as weight A. This is the weight of the entire fixture with wet aggregates.
- 8- Place the aggregate fixture in the chamber. The fixture will be in direct contact with the bottom of the sample chamber
- 9- Place the chamber lid on top of the sample chamber and press Enter.
- 10-The unit will start the drying operations.
- 11-When the unit stops, remove the aggregate fixture and place on the scale. Record this weight as weight B. This is the weight of the fixture and the dry aggregate.

Caution: The aggregate fixture might be hot to the touch, when it's removed from the sample chamber.

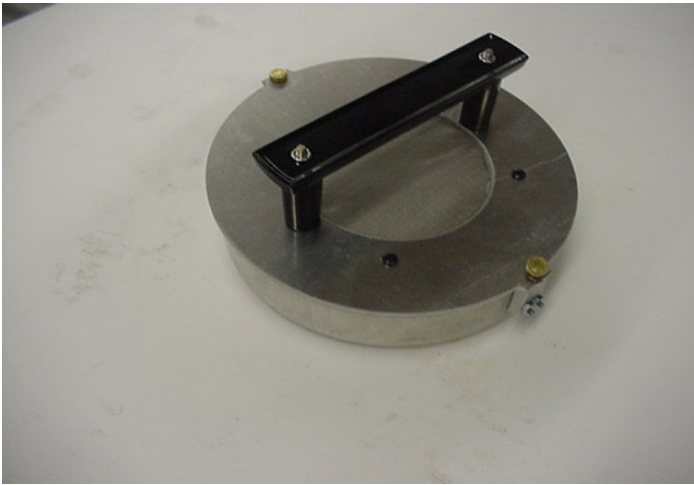
Note: If the maximum number of cycles (20) is reached and the aggregate is still not dry, the unit will display a message prompting the user to turn the sample and restart the drying operations. At this point remove the fixture from the chamber, shake the fixture to re-orient the aggregates and replace inside the sample chamber. Close the lid and press Enter. The unit will continue until the sample is completely dry.

- 12-Determine the moisture content by the following equation

$$\text{Moisture Content} = \text{Weight A} - \text{Weight B}$$

Aggregate Type	Sample Weight
Crushed fine aggregates and sand	100-150 grams
Rounded fine aggregates	300-400 grams
Coarse aggregates	400-500 grams

- Note, the above estimates on sample weight is based on saturated Aggregate samples. If the aggregate is not saturated, higher sample weights can be used.



Aggregate Sample
Fixture



Aggregate Fixture
with one fastener
and lid removed

Warranty

InstroTek extends a 1-year warranty on the CoreDry to the original purchaser of this equipment. This warranty covers defects in material, workmanship and operation under the conditions of normal use and proper maintenance. This warranty includes all components except for normal wear items.

InstroTek will replace, free of charge, any part found to be defective within the warranty period.

This warranty is void if inspection shows evidence of abuse, misuse or unauthorized repair.

This warranty covers replacement of defective materials and workmanship only. It does not cover shipping charges, duties or taxes in the transport to and from the factory or authorized service center. Always insure the shipment, if a return for repair is needed. InstroTek does not take responsibility for shipping damages.

InstroTek's liability is in all cases limited to the replacement price of its products. InstroTek shall not be liable for any other damages, whether consequential, indirect, or incidental arising from use of its product.

If return of the product is necessary, please include return shipping directions, contact name, phone & fax number and a description of the action needed.

Do not ship products back via small parcel carriers i.e. UPS or FedEx. Use a freight shipping company i.e. R&L, UPS Freight or Estes.

Call InstroTek, Inc. for shipping details at (919) 875-8371 or fax at (919) 875-8328.

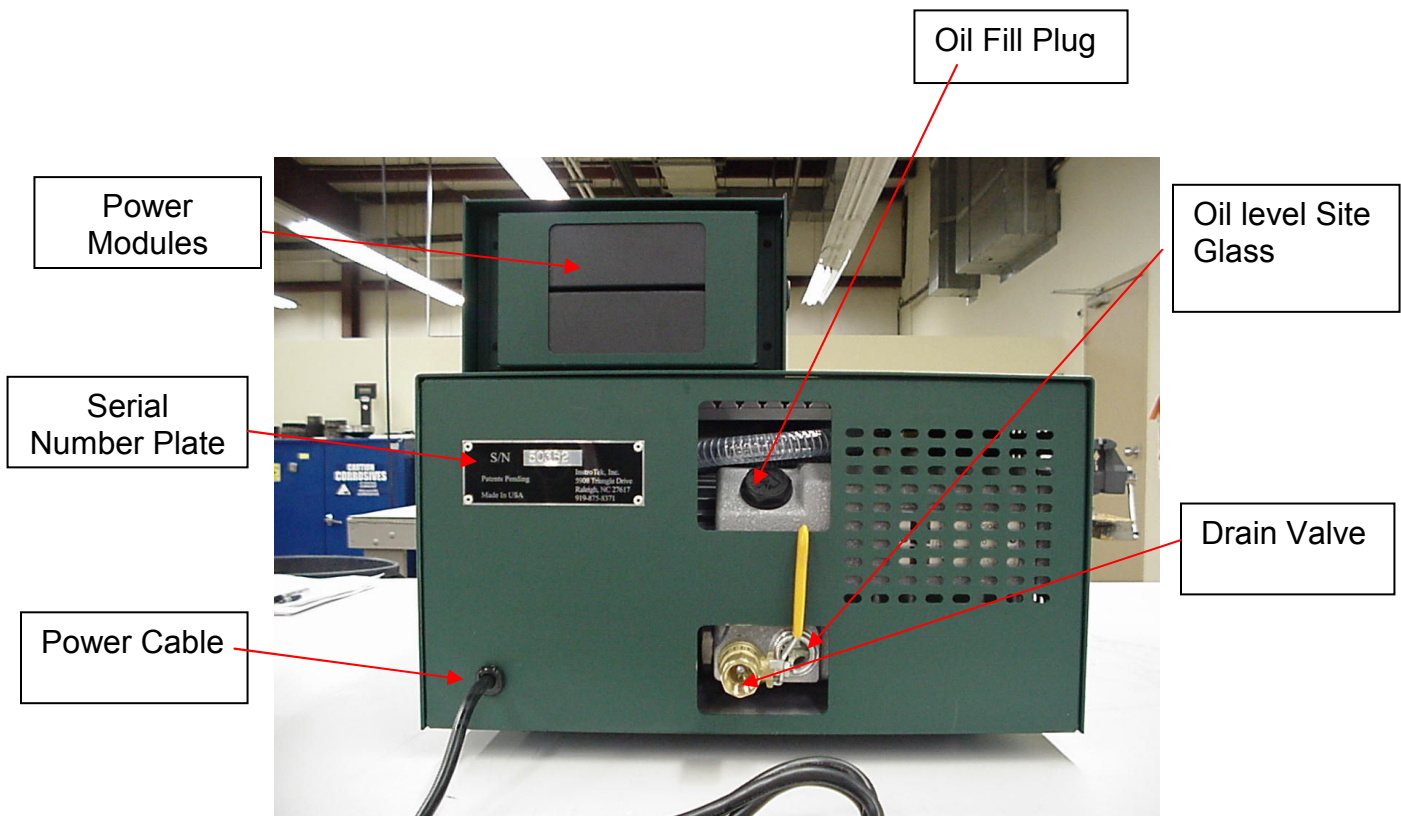
Maintenance

Tank filters- clean frequently (Replacement part number 1009012)

1. The two particle filters cover the tank ports. Remove the filters when dust or debris is present and replace with two new filters. These filters are used to protect your pump from damage due to particles and debris. A screen will alert you as to when it is recommended to change the filters. Once that screen has appeared and after you change the filters go into the Menu option 9 to reset the timer for the next change.

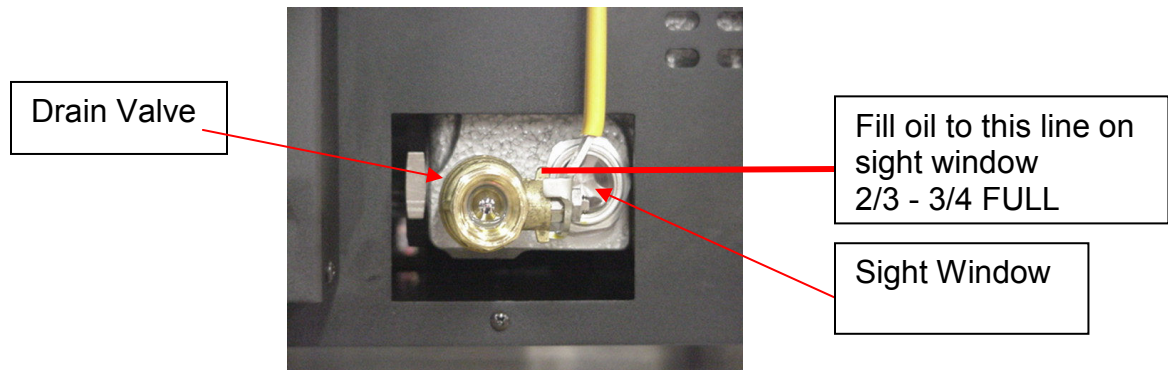
Change Oil – Every 80 hours of normal use (this will be indicated on the LCD readout and can be checked under the Main Menu option 2). (Replacement part number 1520137)

1. Turn the ON/OFF switch to OFF position.
2. Unplug the power cord from the wall outlet.
3. Slide the unit around so that the back panel can be accessed.
4. Remove the fill cap. Place a 2"-3" block or book under the front of the CoreDry to tilt the drain.



5. While holding a pint container under the drain, open the drain valve. (The first time this is done you may have to cut off the shipping tie.)
6. Close the valve after draining and use a funnel to refill the pump to 2/3 to 3/4 full by viewing the level in the pump view window. Replace the fill cap. Do not over tighten the fill cap.

7. Once oil has been changed go to Menu option 8 and reset the timer for the next Oil change.



Caution: Please dispose of the oil in a responsible manner. Always discard the oil at certified disposal facilities.

Caution: Carefully remove any spilled oil from the floor to avoid accidents.

Only use high-quality synthetic vacuum oil. Vacuum pump oil can be obtained by calling InstroTek at 919-875-8371 or fax 919-875-8328. InstroTek part number 1520137.

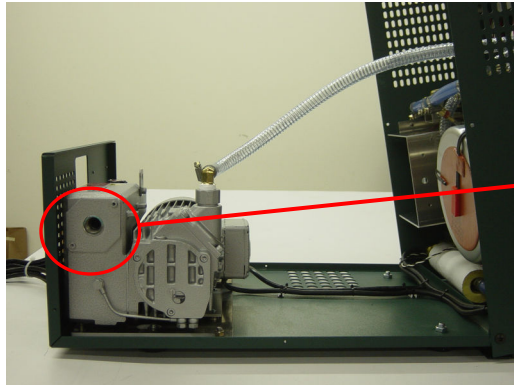
Pump Filter Change- Necessary if vacuum does not reach 6 mmHg with tank empty or every 12 months.

Changing Pump Filter - Busch Pump. (Replacement part number 1520084.1)

CAUTION: Do not attempt any repairs or maintenance of CoreDry™ with the power cord connected to AC Power. Make sure it is unplugged, and then contact InstroTek for instruction.

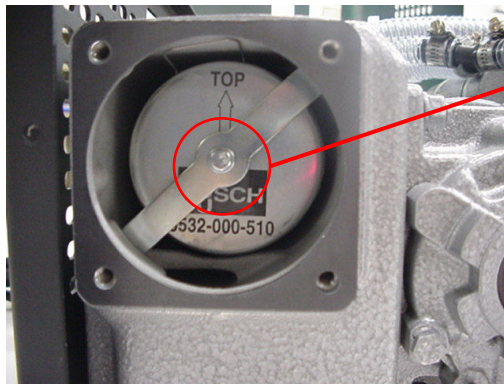
Tools Needed: #2 Phillips screwdriver, 4" Adjustable wrench

1. Turn CoreDry™ off and unplug unit from power source.
2. Remove tank and cold trap lids from unit.
3. To remove top cover of CoreDry™, unscrew 4 pan head #6 black screws located on outside surface of green top cover (4 screws total 1 on each side at the back edges and 1 on each side in the middle near the bottom).
4. Prior to lifting top cover place a piece of foam or other support in front of CoreDry™
5. Lift top cover and rotate towards the front to expose the pump located towards the rear of the unit. (Pull the sides out slightly to clear the inside components when removing and replacing the top cover.)
6. Locate the exhaust port on the left side of the vacuum pump. Remove the four 10mm bolts that hold the cover to the exhaust filter. After removing the four bolts, you may have to gently pry the cover off with a flat screwdriver.



Exhaust Cover

7. Remove filter stuffing to expose exhaust filter.
8. Loosen screw located on the bar clip holding the exhaust filter in place and remove bar when loosened.

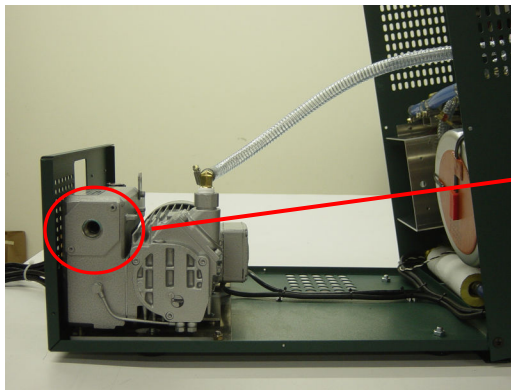


Loosen screw
and remove
retaining bar

9. Gently pull old exhaust filter out by the attached clip above the arrow on the filter. Verify that rubber O-Ring is removed with the filter.
10. Install new filter making sure gasket fits snugly into filter seat in chamber.
11. Replace retaining bar and tighten screw.
12. Replace filter stuffing and exhaust cover. Tighten the four bolts that hold the exhaust cover on.
13. Replace top cover of CoreDry™. Make sure that wiring and hosing remains undisturbed and is not crimped between base and top cover.
14. Replace all exterior screws.
15. Go into Menu option 10 and reset the timer for the Exhaust Filter.

Changing Pump Filter - Welch Pump (Replacement part number 1520084)

1. Turn the ON/OFF switch to OFF position.
2. Unplug the power cord from the wall outlet.
3. To remove top cover of CoreDry™, unscrew all black screws located on outside surface of green top cover (4 screws total 1 on each side at the back and 1 on each side in the middle near the base).
4. Prior to lifting top cover place a piece of foam or other support in front of CoreDry™
5. Lift top cover and rotate towards the front to expose the pump located towards the rear of the unit. (Pull the sides out slightly to clear the inside components when removing and replacing the top cover.)



Exhaust Cover

6. Use 5/32 allen wrench to remove two screws holding pump filter cover.
7. Use a 3/8 allen wrench to unscrew filter inside the pump housing.
8. Verify that O-Ring is removed with old filter.
9. Replace with new filter and reassemble cover.
10. Go into Menu option 10 and reset the timer for the Exhaust Filter.

Verify Vacuum Pressure Reading (every 6 months) *Analog Vacuum gauge required for this test - InstroTek p/n 1300150*

1. Warm up CoreDry by running the unit empty with both lids on for three separate tests.
2. Dry Cold Trap to make sure there is no moisture inside the Cold Trap.
3. Place Vacuum Gauge inside sample chamber and place lids on both Sample Chamber and Cold Trap.
4. Start test by pressing Enter.
5. As the pressure drops compare the readings on the CoreDry display to the Vacuum Gauge inside the Sample Chamber. Pressure can only be compared during the Vacuum Cycle. At T= 5 take note of final pressure on Vacuum Gauge and compare to CoreDry displayed pressure.
6. If the two readings are the same no adjustment is necessary. Continue using the unit and verify again in 6 months.
7. If the two readings are not the same take note of the difference between the Vacuum Gauge and the displayed pressure and contact InstroTek at (919)875-8371 for instruction on how to adjust pressure offset.

Troubleshooting

CoreDry does not turn on –

- Make sure unit is plugged in then test by plugging another device into the same outlet such as a lamp or fan.
- Power supplies may not be working.
- Contact InstroTek for troubleshooting help 919-875-8371.

CoreDry runs but does not draw vacuum –

- Make sure both lids are seated correctly on the sample tank and the vapor/cold trap. Push down gently to seat while unit is running.
- Install clean tank port fabric filters.
- Make sure the pump oil fill cap is installed, fitting correctly and tight.
- Check oil drain valve, should be closed completely.
- Run Self Test to make sure everything is working within normal parameters.
- Open CoreDry and make sure no hoses are pinched or loose.
- Contact InstroTek for troubleshooting help 919-875-8371.

CoreDry works but is taking longer time to dry samples than before –

- Make sure lids, pump fill cap and drain valve are all correctly sealed.
- Install clean tank port fabric filters.
- Check the vacuum readings on the screen for a dry empty chamber. The readings should be 6mmHg or lower.
- Run Self Test to make sure everything is working within normal parameters.
- Feel vapor trap to make it is sure cold.
- Change pump oil. Test to see if results have improved.
- Change pump exhaust filter. Test to see if results have improved.
- Contact InstroTek for troubleshooting help 919-875-8371.

CoreDry will not release vacuum –

- Make sure the unit is powered on.
- Run Self Test to make sure everything is working within normal parameters.
- Remove 4 screws total 1 on each side at the back edge and 1 on each side in the middle near the base. Rotate top cover forward and slowly remove one of the hoses from sample tank. **WARNING DOING SO WILL RELEASE VACUUM IN TANK AND WILL CAUSE THE LIDS TO BECOME FREE TO MOVE.**
- Contact InstroTek for troubleshooting help 919-875-8371.

Warning screen prompting to change oil –

- Change oil following procedure outlined in manual.
- Contact InstroTek for troubleshooting help 919-875-8371.

Warning screen prompting to change tank filters –

- Change tank filters with new filters and reset timer in menu option 8.
- Contact InstroTek for troubleshooting help 919-875-8371.

Warning screen prompting to change exhaust filter –

- Change Exhaust filter following procedure outlined in manual.
- Contact InstroTek for troubleshooting help 919-875-8371.