

# Installing the Oil Return Line with Ballast Control on the Edwards RV5 Vacuum Pump

## Step 1: Vacuum Pump Connections

### Edwards RV5 Oil-Sealed Vacuum Pump

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**WARNING**

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The normal surface temperature of the pump body at ultimate vacuum (operation) at ambient temperature of 20°C is 50°C to 70°C. If you use the pump at a high ambient temperature, the temperature of the pump body may exceed 70°C, and you must fit suitable guards to prevent contact with hot surfaces. For more information refer to the pump operating manual.

1. Install the Ozone Destruction Chemical Trap mounting bracket to the top of the pump with the screws and provided wrench (Figure 1). The Ozone Destruction Chemical Trap is a white plastic cylinder approximately 1 foot (30 cm) in length by 1.5 inches in (3.8 cm) diameter fitted with a barbed fitting on both ends.
2. Remove the protective cap from the pump inlet port.
3. Install the metal, conical screen and black centering o-ring into the pump inlet port (Figure 3).
4. Attach the aluminum 1/2-inch barbed adapter to the inlet port with the metal clamping ring.
5. Slide the 2 inches Tygon<sup>®</sup> vacuum hose over the pump inlet barbed adapter and secure with a hose clamp (Figure 1).
6. Slide another hose clamp over the 2 inches Tygon<sup>®</sup> vacuum hose.
7. Remove the plastic caps from the barb fittings on the ends of the Chemical<sup>®</sup> Ozone Destruction Chemical Trap.
8. Press the Ozone Destruction Chemical Trap into the mounting bracket and the 2 inches of Tygon<sup>®</sup> vacuum hose.
9. Tighten the hose clamp.
10. Locate the Oil Return Line Kit (G6600-60023).



11. Remove the drain plug and the bonded seal from the oil mist filter. The bonded seal looks like a metal washer with a black, inner o-ring.
12. Install the bonded seal to the oil mist filter drain adapter. The drain adapter (Edwards Part Number A25201005) looks like a drain plug with a small plastic nozzle.
13. Install the black, drain adapter (Edwards Part Number A25201005) into the oil mist filter.
14. Remove the plastic protective cover from the pump exhaust port. Place the centering o-ring on the pump exhaust port (Figure 3).
15. Place the oil mist filter onto the o-ring on the pump exhaust port. Install the filter so that the gray half is above the white half of the filter (Figure 1).
16. Position the oil mist filter so the drain adapter points toward the gas ballast inlet (Figure 2).
17. Fit the clamping ring onto the adapter and oil mist filter and hand tighten.
18. Turn the gray plastic, gas ballast control to position II, the high flow position (Figure 3).
19. Push the gas ballast control down against the spring. Turn the gas ballast control counterclockwise to release it.
20. Remove the gas ballast control from the pump. Leave the spring in position in the gas ballast inlet.
21. Locate the tall aluminum gas ballast control and oil return assembly.
22. Install the small o-ring into the groove on the shaft of the gas ballast control and oil return assembly.
23. Push the control down against the spring. Turn the gas ballast control clockwise until the nozzle on the aluminum ballast control is over the '0' mark on the top of the pump. *The "0" position is when the ballast control is turned completely clockwise.*
24. Cut a suitable length, approximately half, of the black flexible, silicone oil return line. When installed to the filter, ensure the tubing is not tight and has no tight bends.
25. Install the steel restrictor into one end of the flexible oil return line. Install the steel restrictor approximately half-way between the ends of the oil return line.
26. Fit one end of the line to the drain adapter on the oil mist filter. Fit the other end of the line to the nozzle on the gas ballast adapter.
27. Use the black hose clips to secure the ends of the flexible oil return line.
28. Add oil to the vacuum pump by removing either oil fill cap. Add sufficient oil to bring the oil level in the oil sight glass to approximately one-third and one-half between the minimum and maximum oil level marks on the pump. Replace the oil fill cap prior to operation of the pump. **Do not add oil above the half-way mark on the oil pump sight gauge.**

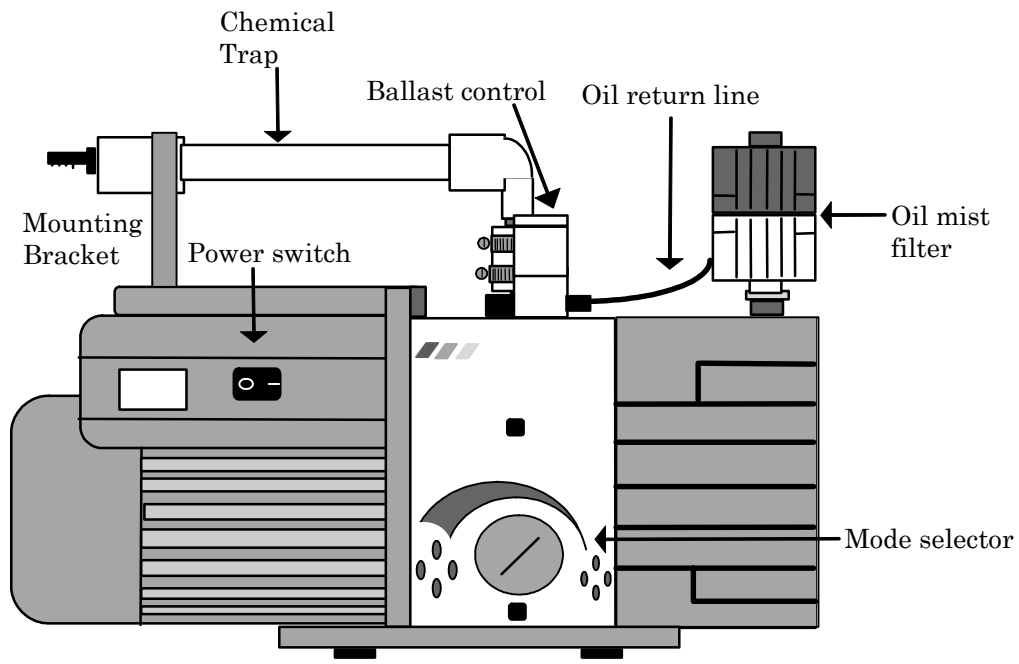
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**WARNING**

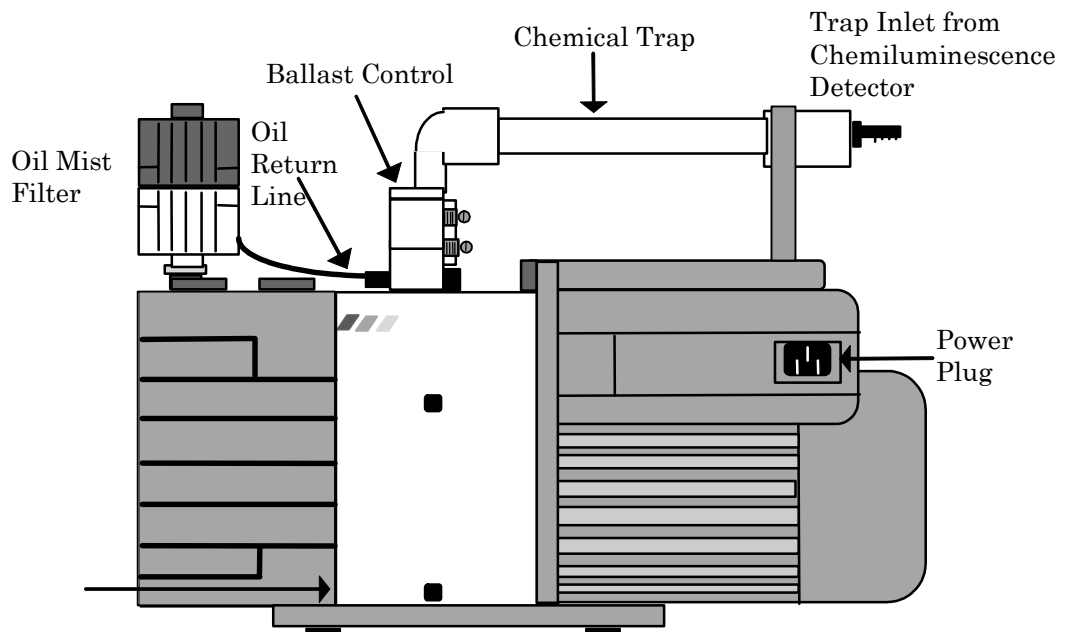
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Do not operate the vacuum pump with the oil level below the minimum oil level mark or above the maximum oil level mark.

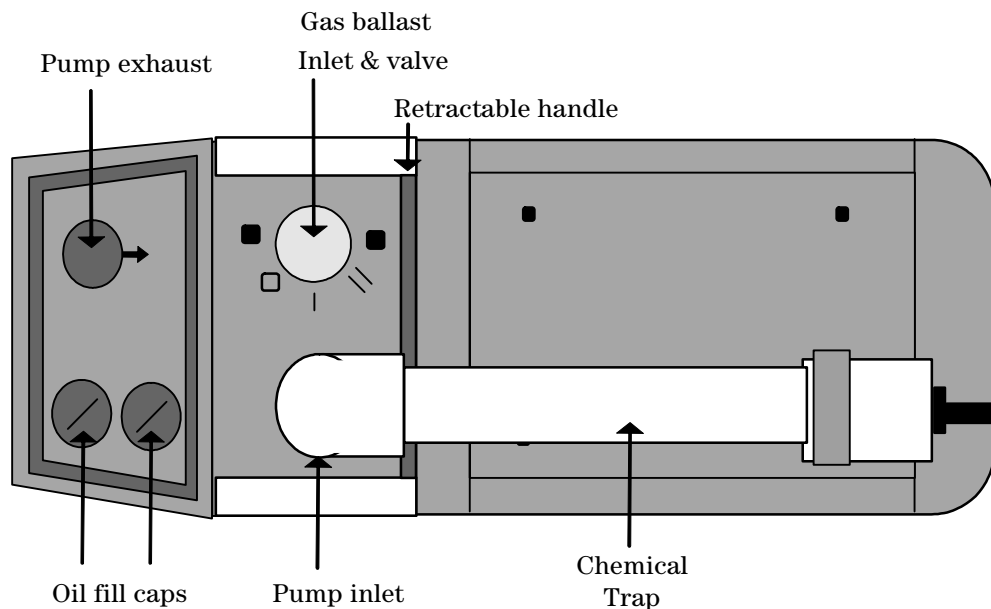
29. Place a hose clamp over the heat shrink end (the end covered with black material) of the 6 feet Tygon<sup>®</sup> vacuum line.
30. Connect the heat shrink end of the 6 feet Tygon<sup>®</sup> vacuum line to the barbed fitting labeled [EXHAUST] located on the rear of the 255 NCD or 355 SCD. Secure with a hose clamp.
31. Place the OR SCD near the gas chromatograph. Make sure you have access to the rear of the Model 255 NCD OR MODEL 355 SCD for connection of the electrical power and recorder cables. Place the vacuum pump within 3 feet of the NCD or SCD.
32. To connect the vacuum line from the detector to the assembled vacuum pump, place a hose clamp over the non-heat shrink end of the vacuum line. Connect the vacuum hose to *the straight end of the Ozone Destruction Chemical Trap*. Secure with the clamp (Figure 2).
33. Vent the exhaust gas from the vacuum pump to a fume hood to eliminate any potential hazard.
34. Place the vacuum pump in an adequately ventilated area or connect an exhaust line (not provided) to the outlet located at the top of the mist filter. Attach an aluminum 1/2-inch barbed adapter to the outlet with the metal clamping ring and another centering o-ring. Secure the exhaust line with a hose clamp (not provided) to the aluminum adapter. Route the exhaust line to a fume hood or other suitable discharge location.
35. Shape the exhaust line to capture excess water (Figure 4). Do not allow water to condense in the exhaust line and drip back into the coalescing filter. Alternatively, install a water trap using a vacuum flask after the coalescing filter to capture excess water and prevent water from dripping back into the coalescing filter.
36. Make sure that water does not condense in the exhaust line and fall back into the mist filter. Transparent 3/8 inch (0.95 cm) ID tubing is recommended.



**Figure 1 RV-5 Oil-Sealed Vacuum Pump (Front Side)**



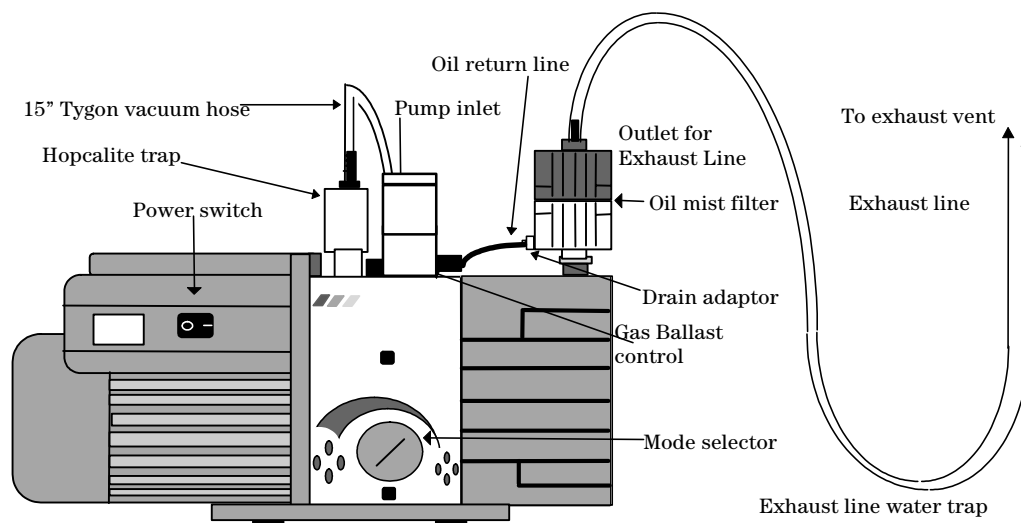
**Figure 2 RV-5 Oil-Sealed Vacuum Pump (Back Side)**



**Figure 3 RV-5 Oil-Sealed Vacuum Pump (Top View)**

**Note**

Sometime water condensation and accumulation are visible in the exhaust line. This is normal. However, do not allow water to continue to accumulate after approximately one week of operation. Significant water accumulation may indicate improper pump operation or an improperly vented exhaust line. Water accumulation in the exhaust line can cause damage to the pump. Contact Agilent at [www.agilent.com/chem](http://www.agilent.com/chem) if water accumulation continues to occur.




**Figure 4 RV-5 Oil-Sealed Vacuum Pump Exhaust Line**

## Step 2: Setting the Gas Ballast Position

### Edwards RV5 Oil-Sealed Vacuum Pump



Set the mode selector to the High Vacuum mode, the small  symbol (Figure 4).

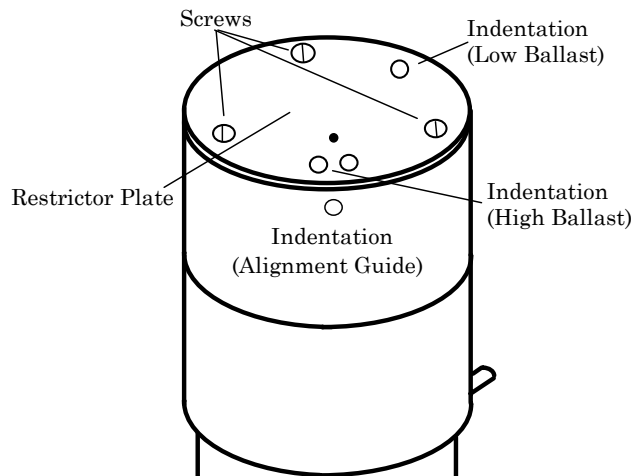
Do not set the mode selector to the High Throughput mode, the large  symbol.

The RV5 vacuum pump and the Oil Drain Kit with ballast flow control ensures the vacuum pump operates continuously with a gas ballast flow. The purpose of the ballast control is to sweep ambient air into the pump oil. The water is from the combustion of hydrogen and air in the Stainless Steel Burner. The air purges the water into the oil coalescing filter. The filter separates the oil from the water, vents the air and water, and returns the oil to the vacuum pump.

The Oil Drain Kit with the ballast control continuously returns trapped oil in the oil mist filter to the vacuum pump. Operating the vacuum pump with the Oil Drain Kit with the ballast control reduces oil loss from the pump and minimizes the need to refill the pump with oil.

The Oil Drain Kit with the ballast control supplied is configured so that the gas ballast flow rate is equivalent to that with the gas ballast control on the pump in position “II”. For most application, there is no need to change the gas ballast flow rate. If required, you can adjust the gas ballast flow using the following procedure.

1. Set the mode selector to the High Vacuum mode, the small  symbol (Figure 4). Do not set the mode selector to the High Throughput mode, the large  symbol.
2. The restrictor plate on top of the aluminum ballast control has three screws. Remove the three screws that secure the restrictor plate. **DO NOT DISMANTLE THE ASSEMBLY.** (Figure 5)
3. The restrictor plate has circular indentations. The position of the indentations with respect to the indentation on the side of the oil return assembly identifies the gas ballast flow setting. Turn the restrictor to the required position.
  - To select no gas ballast flow (**NOT RECOMMENDED**), turn the restrictor plate so that none of the indentations are aligned with the indentation on the side of the oil return assembly.
  - To select low gas ballast flow, turn the restrictor plate so that the single indentation on the restrictor plate is aligned with the indentation on the side of the oil return assembly.
  - To select high gas ballast flow (the setting the ballast control is shipped from the factory), turn the restrictor plate so that the two indentations are aligned with the indentation on the side of the oil return assembly.



**Figure 5 Oil Drain Kit with Ballast Control**

Turn the switch on the vacuum pump to the on position.

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**Important**

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Note the position of the oil level in the window after operating the pump for several hours. Everyday for the next several days of operation, recheck the oil level. If the oil level is increasing, water is accumulating in the oil reservoir. Make sure the water vapor is properly being expelled from the oil mist filter. If the oil level is dropping, excess air flow through the pump is forcing oil out of the vacuum pump. Turn the restrictor plate so that the single indentation on the restrictor plate is aligned with the indentation on the side of the oil return assembly. After adjustment of the gas ballast, allow the system to operate for an additional day and check the oil level again.

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**Important**

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Check the exhaust line from the vacuum pump for water accumulation. You will see water condensation and accumulation in the exhaust line. Do not allow water to continue to accumulate after approximately one week of operation. Significant water accumulation may indicate improper pump operation or an improperly vented exhaust.

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**Important**

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Periodically visually check the oil return line that exits from the oil mist filter and returns to the gas ballast plug to ensure that the inline restrictor is not clogged. Inspect the return line to determine if there is flow of oil along the line. If there is no visible flow, a clogged restrictor is possible and may require replacement. Contact Agilent at [www.agilent.com/chem](http://www.agilent.com/chem) for a replacement restrictor.

Make sure that water does not condense in the exhaust line and fall back into the mist filter. Use transparent 3/8 inch (0.95 cm) ID tubing.

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**Note**

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Sometime water condensation and accumulation are visible in the exhaust line. This is normal. However, do not allow water to continue to accumulate after approximately one week of operation. Significant water accumulation may indicate improper pump operation or an improperly vented exhaust line and will damage the pump. Contact Agilent at [www.agilent.com/chem](http://www.agilent.com/chem) if water accumulation continues to occur.

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**Important**

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**Air in the Oil:** It is normal for the oil to appear foamy from air in the oil when viewing the oil in the oil level window. The purpose of the ballast control is to sweep ambient air into the pump oil. Ensure the oil level when the pump is operating is not above the “Full” mark on the pump.