

ARTISAN®
TECHNOLOGY GROUP

Your **definitive** source for quality pre-owned equipment.

Artisan Technology Group
(217) 352-9330 | sales@artisantg.com | artisantg.com

Full-service, independent repair center
with experienced engineers and technicians on staff.

We buy your excess, underutilized, and idle equipment
along with credit for buybacks and trade-ins.

Custom engineering
so your equipment works exactly as you specify.

- Critical and expedited services
- In stock / Ready-to-ship
- Leasing / Rentals / Demos
- ITAR-certified secure asset solutions

Expert team | Trust guarantee | 100% satisfaction

All trademarks, brand names, and brands appearing herein are the property of their respective owners.

Find the *Bio-Rad 165-1754* at our website: *Click HERE*

Vacuum Pump and Vapor Trap

Instruction Manual

Catalog Numbers
165-1754
and
165-1755

BIO-RAD

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Table of Contents

Page

Section 1 Safety 1

Section 2 Introduction and Specifications 1

2.1 Introduction 1

2.2 Specifications 2

Section 3 Setup 2

3.1 Unpacking 2

3.2 Vapor Trap Setup 2

3.3 Vacuum Pump Setup 6

Section 4 Operation 7

4.1 Startup 7

4.2 Draining the Vapor Trap 7

4.3 Monitoring Vacuum Pump Fluid 8

Section 5 Maintenance 9

5.1 Changing the Pumping/Trapping Medium 9

5.2 Maintenance for Applications with Acetic Acid 9

5.3 System Flushing with the Vacuum Pump and Vapor Trap Maintenance Kit 10

5.4 Replacing the Vapor Trap's Electrical Fuse 11

Section 6 Troubleshooting 12

6.1 Vacuum Pump 12

6.2 Vapor Trap 13

Section 7 Ordering Information 13

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

List of Figures

Figure 1 View of Fluid Level Indicator 3
Figure 2 Rear View of Vapor Trap 4
Figure 3 Tubing Connections 5
Figure 4 Exploded View of Tubing Connection 6
Figure 5 Trap Positioning for Draining.....8

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Note

To insure best performance from the Vacuum Pump and Vapor Trap, become fully acquainted with these operating instructions before use.

Model _____

Catalog No. _____

Date of Delivery _____

Warranty Period _____

Serial No. _____

Invoice No. _____

Purchase Order No. _____

Warranty

Bio-Rad Laboratories warrants the Vacuum Pump and Vapor Trap against defects in materials and workmanship for 1 year. If any defects occur in this instrument during this warranty period, Bio-Rad Laboratories will repair or replace the defective parts free. The following defects, however, are specifically excluded:

1. Defects caused by improper operation.
2. Repair or modification done by anyone other than Bio-Rad Laboratories or an authorized agent.
3. Use of fittings or other spare parts supplied by anyone other than Bio-Rad Laboratories.
4. Damage caused by lack of proper maintenance.
5. Damage caused by accident.
6. Damage caused by disaster.
7. Use of oil other than Bio-Rad's Pumping/Trapping Medium.

For any inquiry or request for repair service, contact Bio-Rad Laboratories after confirming the model and serial number of your instrument.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Section 1
Safety

When opening the Vacuum Pump drain, do not touch the Pumping/Trapping Medium until it has cooled. No user-serviceable parts are inside the Vacuum Pump and Vapor Trap. To insure electrical safety, do not remove the covers of either the Vacuum Pump or Vapor Trap.

For instructions on replacing the electrical fuses, see Section 5.3.

Do not operate this instrument in ambient temperatures exceeding 45 °C.

Important: This instrument should not be modified in any way. Alteration of this instrument will:

- Void the manufacturer's warranty
- Create a potential safety hazard

Bio-Rad is not responsible for any injury or damage caused by the use of this instrument for purposes other than those for which it is intended or by modifications of the instrument not performed by Bio-Rad or an authorized agent.

Section 2
Introduction and Specifications

2.1 Introduction

The Bio-Rad Vacuum Pump and Vapor Trap provide a steady, non fluctuating vacuum. The Bio-Rad Vacuum Pump and Vapor Trap are designed specifically for use with the Model 543 and 583 Gel Dryers and are particularly effective when used in conjunction with these gel dryers. The Vapor Trap's purpose in this vacuum system is to remove liquids and vapors from the vacuum system and thus protect the Vacuum Pump from damage due to corrosion, increasing its lifetime substantially.

During the process of drying electrophoresis gels, liquid and vapors are evolved from the gel. Water, solvents, and/or acids are typically drawn from electrophoresis gels through the vacuum line. Without adequate protection, they would be ingested by the vacuum pump, causing deterioration of performance and failure. An efficient means of collecting these contaminants is vital to successful operation of the system.

The Vapor Trap condenses vapors to liquid form and continuously removes the liquid from the vacuum system. The Vapor Trap uses a patent pending liquid valve technology employing a corrosion resistant Pumping/Trapping Medium, which draws the condensed vapors from the vacuum system.

The Vacuum Pump provided with this system is supplied with an internal continuous gas ballast for better protection against vapor condensation in the pump.

Note: For efficient trapping to occur, the heat setting on the gel dryer must be at least 50 °C, and optimally 80 °C or higher.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

2.2 Specifications

Vacuum Pump

Nominal pumping speed	1 CFM (28 liters/minute) @ 60 Hz 0.8 CFM (22 liters/minute)@ 50 Hz
Ultimate pressure*	5 Torr
Pumping trapping medium capacity	0.45 liters (0.48 quart)
Sound level	56 dBA
Tubing connection	3/8 inch ID hose
Safety	Thermal overload protected
Dimensions	13 x 36.8 x 21.3 (W x D x H cm)
Weight	11.1 kg

Vapor Trap

Pumping/trapping medium capacity	500 ml
Condensed vapor capacity	1.5 liters
Ultimate pressure*	10 Torr
Inlet and outlet connections	For 3/8 inch ID hose
Cooling fans	200 CFM
Fuses	115 V, Type T 230 V, Type T50
Dimensions	21 x 26.5 x 34.5 (W x D x H cm)
Weight	9.5 kg

* Pressure is additive giving the Vacuum Pump and Vapor Trap a total ultimate pressure of 15 Torr maximum.

Section 3
Setup

3.1 Unpacking

Carefully remove the Vacuum Pump and Vapor Trap from the carton. Keep the packing material intact so it can be reused if necessary. Keep all paperwork and inspection tags for future reference. Find the following connection pieces which are supplied:

Stainless steel flared tube fittings (2)

Eight foot section of 3/8 inch wire reinforced vacuum tubing (1)

Hose clamps for 3/8 inch ID tubing, (3)

Exhaust filter, includes manifold and filter element (1)

Replacement exhaust filter elements (2)

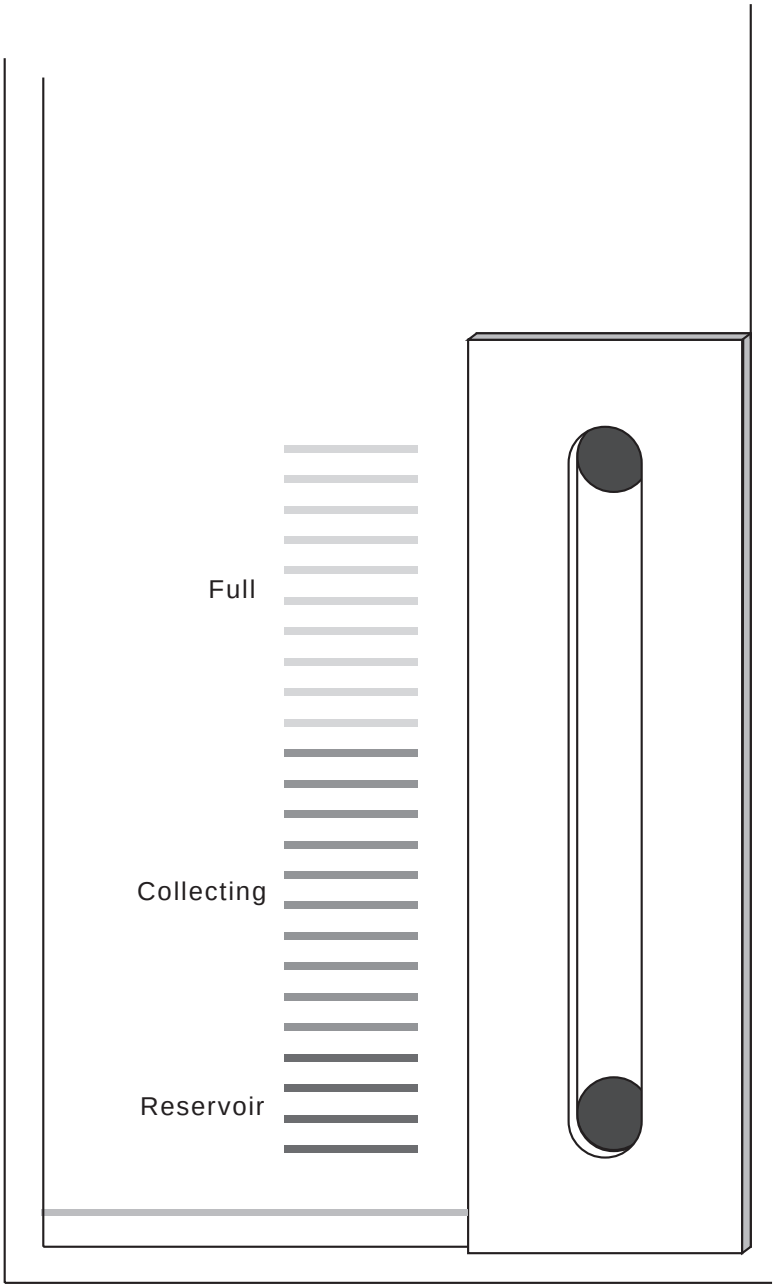
3.2 Vapor Trap Setup

The Vapor Trap should be placed in a clean area with adequate space for adding and draining fluid and for access to vacuum connections. The area should be well ventilated. Free movement of air through the Vapor Trap is necessary for trapping to occur. Position the Vapor Trap between the Vacuum Pump and the gel dryer, as close as possible to these components, while maintaining sufficient space to perform routine maintenance such as draining trapped liquid (see Figure 3). When possible, we recommend that the Vapor Trap be set up at a lower level than the gel dryer to take advantage of gravity to move condensed liquid in the vacuum lines into the Vapor Trap's reservoir.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Filling Vapor Trap with Pumping/Trapping Medium

Remove the fill cap from the fill port on the top of the Vapor Trap next to the 2-way carrying handle. Fill the Vapor Trap to a level within the RESERVOIR range, indicated by the blue region of the level indicator next to the sight window on the front of the Vapor Trap (approximately 500 ml). Refer to Figure 1. Use a funnel or container with a pouring spout to avoid spillage. Be sure to replace and tighten the fill cap. (The fill cap should tighten easily, without cross threading if seated properly.) Failure to do so will create a vacuum leak resulting in higher base pressure which can ruin the gel, and/or give longer than expected drying times.



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Fig. 1. View of fluid level indicator.

Vacuum Connections

The vacuum connections are on the top rear corners of the Vapor Trap (see Figure 2). They are labeled with the name of the component they are to be attached to (GEL DRYER & VACUUM PUMP). The connectors are 3/8 inch OD flared stainless steel connection tubes for 3/8 inch ID wire reinforced vacuum tubing (tubing is supplied). The steel tubes are connected with a 5/8 inch - 20 threaded polypropylene ferrule nut. The nut is tightened to a maximum of 40-50 inch-pounds. Finger tight is usually sufficient. If the connector tubes slide in and out, the nut is not tight enough.

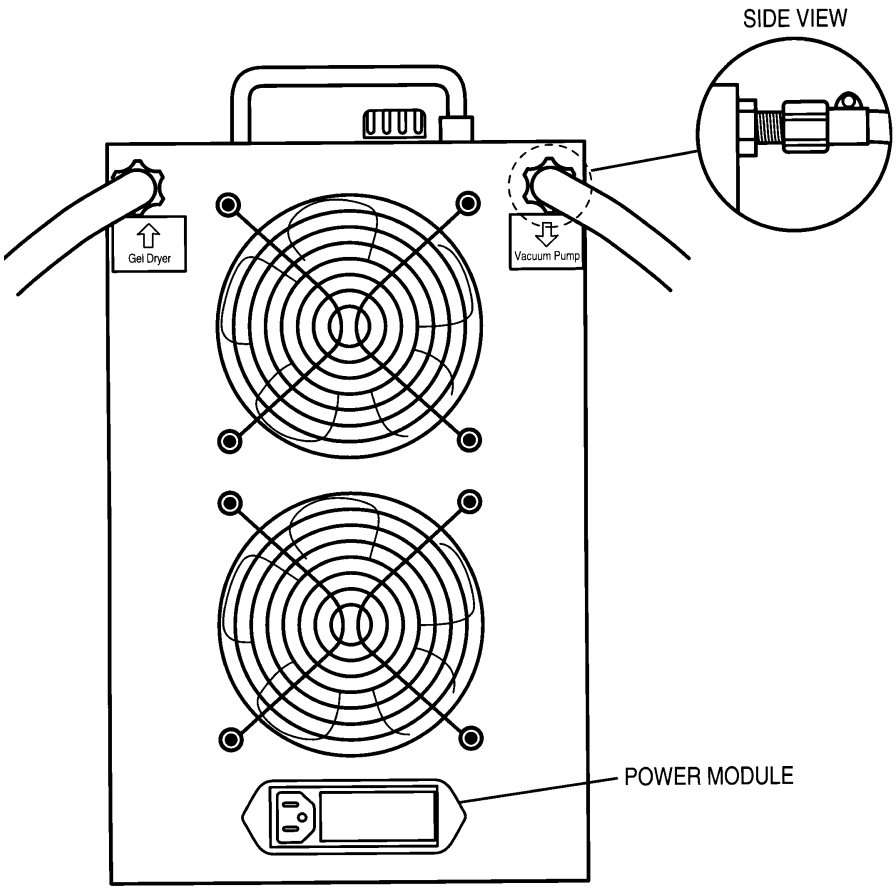


Fig. 2. Rear view of vapor trap.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

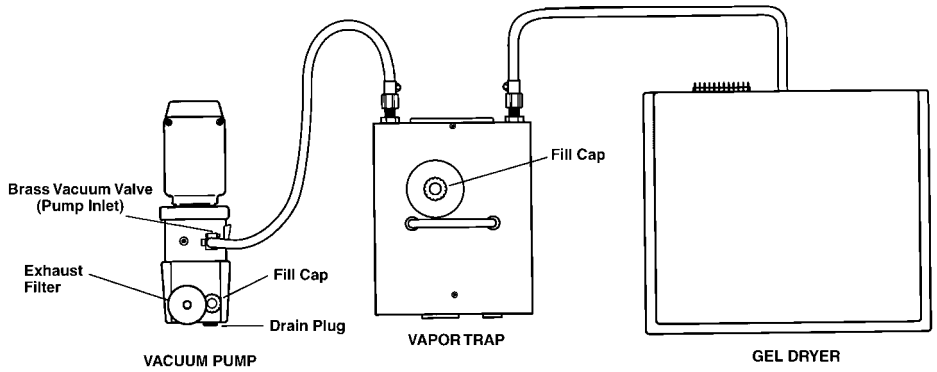


Fig. 3. Tubing connections - top view.

1. An eight foot section of wire reinforced vacuum tubing is supplied for attaching the Vapor Trap to the Vacuum Pump and gel dryer. Cut the tubing into two pieces of sufficient length to reach the drying system components while keeping the pieces as short as possible to minimize vacuum loss.
2. Push each of the two sections of tubing over a connection tube and secure with the metal hose clamps which are supplied.
3. After inserting the connection tubes into the ends of the vacuum tubing pieces, as in Figure 4, connect each steel tube to the bulkhead fittings at the back of the Vapor Trap. Tighten the white plastic ferrule so that the connector tube does not slide in or out.
4. Next, the section of tubing from the Vapor Trap to the Vacuum Pump should be connected by pushing it onto the Vacuum Pump's intake fitting. Then secure it using the metal hose clamps provided.
5. Connection of the line to the gel dryer is accomplished by pushing the tubing onto the graduated polypropylene connector at the back of Bio-Rad's Model 583 or 543 Gel Dryers.

Note: Do not operate the Vapor Trap in room temperatures above 45 °C, as proper condensation will not happen at elevated ambient temperatures.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

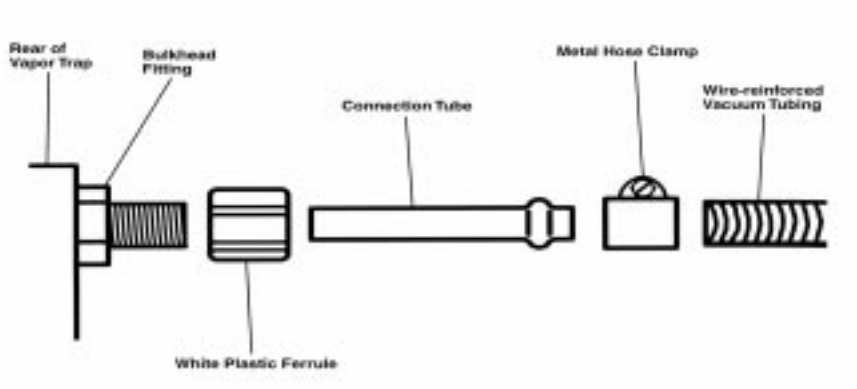


Fig. 4. Exploded view of tubing connection.

3.3 Vacuum Pump Setup

Filling Vacuum Pump with Pumping/Trapping Medium

1. Remove the fill cap located on the top of the Vacuum Pump case (see Figure 3 for location).
2. Add the Pumping/Trapping Medium supplied in the bottle packaged with each Vacuum Pump and Vapor Trap. The Vacuum Pump should be filled to a level between the ADD and FULL marks indicated on the fill window (maximum of 450 ml). Do not overfill the pump as excess Pumping/Trapping Medium may splash out of the exhaust.

Note: System performance is not guaranteed when other brands or grades of medium are used. Use only Bio-Rad Pumping/Trapping Medium when refilling the Vacuum Pump and Vapor Trap.

3. Replace the fill plug.
4. Plug the Vacuum Pump and Vapor Trap into an electrical outlet. We recommend use of a power strip for convenience.

Note: All oil-sealed vacuum pumps, including the Bio-Rad Vacuum Pump, discharge oil mist from the exhaust port when the pump operates under high flow conditions, such as when the pump's intake is at or near atmospheric pressure. Typically, oil mist, in the form of a white puff of smoke, can be seen from the exhaust port when no filter is used. When the vacuum level and the corresponding air flow through the pump are reduced, very little, if any, oil mist will be emitted. However, a filter is recommended. A complete exhaust filter is included with the Vacuum Pump and additional filter elements are available as replacement parts (catalog number 165-1758).

Exhaust Filter Installation

An exhaust filter and replacement exhaust filter elements are supplied with the Vacuum Pump. To install the complete exhaust filter, remove the yellow shipping cap and screw the filter manifold containing a filter element into the pump's exhaust port.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Section 4
Operation

4.1 Startup

1. Before starting the gel drying run, check to insure that the Vacuum Pump and Vapor Trap have sufficient levels of Pumping/Trapping Medium.
2. Make sure that the exhaust filter is installed on the Vacuum Pump's exhaust port.
3. Close the valve at the Vacuum Pump inlet and turn on the Vacuum Pump and Vapor Trap.
4. Allow the Vacuum Pump to warm up to normal operating temperature (takes approximately 10-15 minutes). It is critical that the valve is closed during this warm up period; if left open, performance is degraded and excessive oil mist will clog the exhaust filter.
5. After warm up, position the gel in the dryer and cover with the sealing gasket (and lid for the Model 543 or 583 Gel Dryers).
6. Open the vacuum valve between the Vapor Trap and the gel dryer and begin the drying sequence.
7. When the gel is dry, release the vacuum by lifting the edge or the corner of the sealing gasket. Immediately close the vacuum valve on the Vacuum Pump
8. Run the Vacuum Pump and Vapor Trap for an additional 30 minutes (minimum) to allow any remaining volatiles in the system to be evacuated.

Note: Running the Vacuum Pump and Vapor Trap continuously will enhance the performance of the system and possibly extend the life of the system. To do so, always close the valve located at the Vacuum Pump inlet when not drying a gel.

4.2 Draining the Vapor Trap

The collected liquid must be drained if the Pumping/Trapping Medium level is in the FULL range or can be expected to rise into the FULL range during the next cycle. In order to predict the amount of liquid rise in the Vapor Trap, observe the amount collected during one drying sequence. The amount of liquid collected depends on the type, size, and %T of the gel. If these variables remain constant, then one can predict the approximate amount of liquid rise for a typical run.

Caution: If the collected liquid is allowed to rise above the FULL range, it may be drawn into the Vacuum Pump, which can cause damage and reduce the expected lifetime of the Vacuum Pump.

Excess liquid is drained from the Vapor Trap though the drain valve on the lower right front of the Vapor Trap (see Figure 5). Before draining, make sure that the valve at the intake of the vacuum pump is closed. Make sure that the fill cap on top of the Vapor Trap is removed so that the drain flow is not impeded. Position the front of the Vapor Trap near the edge of the table top so that there is sufficient room under the drain valve for a receptacle. Place the receptacle under the drain to catch the collected liquid. Make sure that the receptacle has sufficient capacity to hold all of the drained liquid.

Turn the valve stem counter-clockwise to fully open (approximately 11 revolutions). The clear liquid will be drained first. Continue draining until only colored Pumping/Trapping Medium is exiting the drain valve. You may wish to tilt the Vapor Trap forward to remove the last remaining amount of clear liquid. The approximate time required for draining when the

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Vapor Trap is completely full is 2 minutes. Close the drain valve to save the remaining Pumping/Trapping Medium which can be reused. Add Pumping/Trapping Medium until it reaches the top of the blue RESERVOIR range. The Vapor Trap is now ready for the next gel drying run.

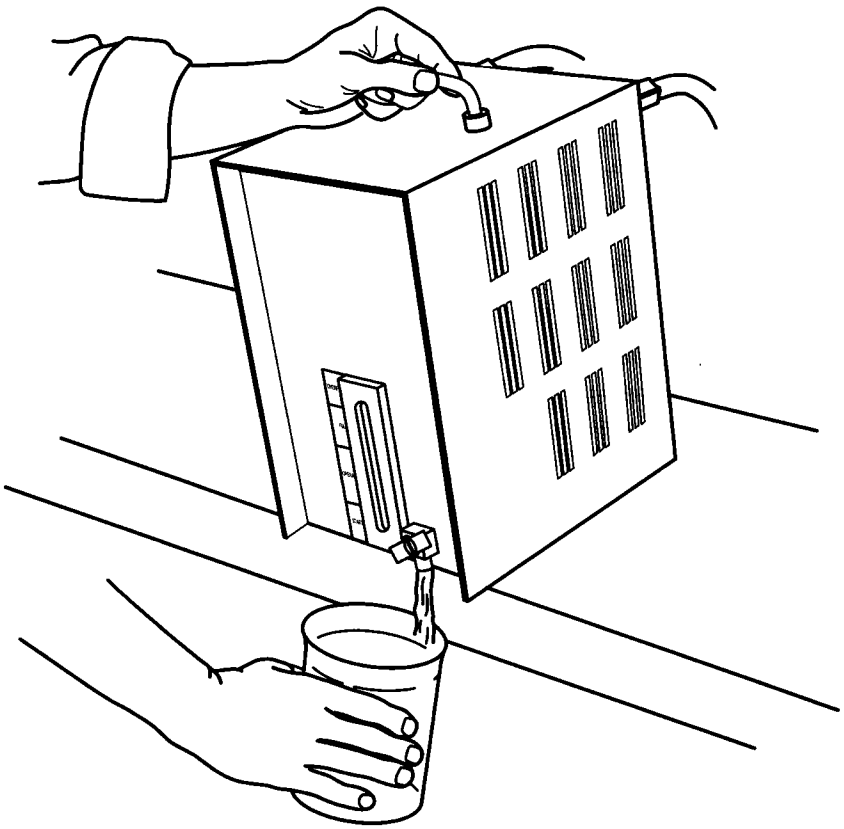


Fig. 5. Trap positioning for draining

4.3 Monitoring Vacuum Pump Fluid

The Vacuum Pump's fluid level should be checked periodically to insure that the pump hasn't taken on additional liquids or turned color. During normal operation, the high efficiency of the Vapor Trap will keep the Vacuum Pump fluid relatively free from contaminants. If the Pumping/Trapping Medium does take on contaminants, it will be reflected in a higher fluid level or a change in Pumping/Trapping Medium color. If either of these conditions is noted, follow the maintenance instructions in Section 5.1.

Warning: The Pumping/Trapping Medium is hot and can cause burns; the operating temperature of the fluid is typically 60 °C or higher. Avoid skin contact with the fluid.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Section 5
Maintenance

5.1 Changing the Pumping/Trapping Medium

The Vacuum Pump fluid should be changed whenever a rise in the Pumping/Trapping Medium level or change in color is detected, or every three months, whichever comes first. To drain fluid from the Vacuum Pump:

1. Place a receptacle under the drain to catch the Pumping/Trapping Medium. The container should have at least a 1 liter capacity.
2. Loosen the drain plug on the lower end of the Vacuum Pump module case next to the fluid level window.
3. The Vacuum Pump may be tilted forward to remove residual Pumping/Trapping Medium out of the reservoir.

To refill the Vacuum Pump with Pumping/Trapping Medium:

1. Replace the drain plug and remove the black plastic fill plug on the top of the reservoir.
2. Fill the Vacuum Pump with Pumping/Trapping Medium until the level is between the "ADD" and "FULL" mark as seen from the fluid level window. **Do not overfill the pump.** *Excess fluid tends to clog exhaust filter and prevent Pumping/Trapping Medium from draining back into Vacuum Pump reservoir.*
3. Replace the fill plug.
4. Check the Pumping/Trapping Medium level again after the Vacuum Pump warms up to its normal operating temperature. Add or remove Pumping/Trapping Medium as needed. It is normal for the fluid level to change upon initial start up.

Note: When filling the pump, be sure to use only Bio-Rad Pumping/Trapping Medium. The performance specifications apply only if this fluid is used.

5.2 Maintenance for Applications with Acetic Acid

Use of acetic acid in the gel may require more frequent Pumping/Trapping Medium changes for the Vacuum Pump and Vapor Trap. Large amounts and high concentrations can cause precipitation to occur in the Pumping/Trapping Medium.

If precipitation occurs in the Vapor Trap fluid, then drain the Vapor Trap completely (not just the clear liquid portion), and refill with fresh Pumping/Trapping Medium. If the precipitate prevents the Vapor Trap from draining properly, pick up the Vapor Trap and swirl to dislodge the blockage. Do not let any precipitate build up in the Vapor Trap. This constitutes lack of proper maintenance (see warranty).

If precipitation occurs in the Vacuum Pump, a flushing procedure is recommended. To flush, first drain all fluid from the Vacuum Pump. Pour 100 ml of Pumping/Trapping Medium (or System Flushing Fluid) into the Vacuum Pump inlet port and turn the Vacuum Pump on. This will cause air to surge through the pump to help flush out fluid and condensate which may still be in the Vacuum Pump. Repeat if fluid exiting the drain is not completely clean. Replace the drain plug and refill through the fill port. Make sure the Vacuum Pump fluid level is adequate before starting the next gel drying run.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

A Vacuum Pump and Vapor Trap Maintenance Kit (catalog number 165-1759) is available including System Flushing Fluid (containing a mild detergent), Pumping/Trapping Medium, and complete instructions.

5.3 System Flushing with the Vacuum Pump and Vapor Trap Maintenance Kit

It is recommended that under normal use, both the Vacuum Pump and Vapor Trap be drained, flushed, and refilled every 3 months. The Vacuum Pump and Vapor Trap Maintenance Kit contains a sufficient quantity for four complete flushings and refillings of the Vacuum Pump and Vapor Trap; enough for 1 year under normal use.

Vacuum Pump

Periodic flushing of the Vacuum Pump is required because over time, some of the solvent normally collected in the Vapor Trap may be condensed in the Vacuum Pump, and running the Vacuum Pump for 30 minutes after each gel run may not completely dispel this collected solvent.

Note: With time, a brownish, rust color may be noticed on the inside of the Vacuum Pump. This is normal and will not affect the performance of the Vacuum Pump.

Sometimes the Pumping/Trapping Medium in the Vacuum Pump may turn color, indicating solvent contamination. Under these conditions, a flushing procedure should be performed. Otherwise, the Vacuum Pump may lose efficiency, increasing the time required to dry a gel.

Maintenance Procedure for the Vacuum Pump:

1. Run the Vacuum Pump for at least 30 minutes, with the inlet valve in the closed position, to allow the Vacuum Pump to reach its operating temperature.

Turn the pump off.

2. Using a container with a capacity of at least 500 ml, remove the drain plug and drain the Pumping/Trapping Medium into the container. Tip the Vacuum Pump to facilitate draining.
3. Replace the drain plug, and refill with 500 ml of System Flushing Fluid.
4. Run the Vacuum Pump for another 30 minutes.
5. Drain the System Flushing Fluid, and replace with the Pumping/Trapping Medium.

Some pumps with an appreciable amount of contamination may require an additional flushing before charging with Pumping/Trapping Medium.

Vapor Trap

Periodic maintenance of the Vapor Trap is required because with time, some of the collected solvent in the bottom of the Vapor Trap may begin to form a precipitate. Normal draining of the solvent may not completely remove this contamination. This will not affect the performance of the Vapor Tap, but if left unchecked, a precipitate buildup may eventually impede the draining process.

Sometimes a grayish precipitate may be noticed on the lower portion of the sight glass. Generally, this is an indication that a flushing procedure should be performed.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Maintenance Procedure for the Vapor Trap:

1. Drain all fluid from the Vapor Trap.
2. Add 500 ml of the System Flushing Fluid to the Vapor Trap. Lift the Vapor Trap up and gently shake to loosen any precipitate which may have formed on the walls of the collector in the Vapor Trap.
3. Let stand for about 15 minutes.
4. Drain this fluid and replace with 500 ml of the Pumping/Trapping Medium.

Some Vapor Traps with an appreciable amount of contamination may require an additional flushing before charging with Pumping/Trapping Medium.

Notes:

1. It is recommended that this maintenance procedure be performed for both the Vacuum Pump and Vapor Trap at the same time, and that a note be placed for all users to see indicating the next scheduled maintenance.
2. Do not substitute any other type of System Flushing Fluid or Pumping/Trapping Medium. Other types of fluid may degrade the performance of the system and react adversely with the collected solvents.

5.4 Replacing the Vapor Trap's Electrical Fuse

The fuse is inside the power module on the lower rear of the Vapor Trap (see Figure 2). Remove the rectangular plastic cover to the right of the plug on the power entry module using a flat head screwdriver. Wedge one corner of the blade of the screwdriver under the cover and pry it open. Be careful not to damage the plastic cover (there is a notch in the plastic just to the right of the plug to aid in removing the cover). The cover and the fuse holder are one unit. Remove the fuse and replace it if necessary. Snap the cover back in place.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Section 6
Troubleshooting

6.1 Vacuum Pump

Condition	Probable Cause	Recommended Action
Pump will not start	1. No power	1. Check switches and fuses
	2. Room is too cold	2. Drain and refill pump with warm (25 °C) Pumping/Trapping Medium. Try to start system with intake open to atmosphere.
	3. Pump mechanism is jammed	3. Call Bio-Rad Technical Service (1-800-424-6723 in the U.S.)
Pump does not reach 29 inches Hg	1. Pumping/Trapping Medium is contaminated	1. If sample of medium is cloudy, flush and change pump medium
	2. Pump is not filled with Pumping/Trapping Medium or level is low	2. Add Pumping/Trapping Medium so that the level is between FULL and ADD
	3. Leak in vacuum system	3. Examine tubing and connections. Locate and eliminate leak source.
Excessively noisy	1. Intake or exhaust lines are restricted	1. Clear and straighten out tubing
	2. Internal mechanism damaged	2. Call Bio-Rad Technical Service (1-800-424-6723 in the U.S.)
Pump generates excessive smoke or mist from exhaust port	1. Pump overfilled	1 Check fluid level. Drain excess Pumping/Trapping Medium.
	2. Exhaust filter element defective	2. Replace exhaust filter elementp
System performance has degraded over time or does not achieve its rated pumping speed	1. Pump is running too cold	1. Allow pump to run prior to beginning the gel drying proccess until it warms up to its operating temperature
	2. Exhaust or intake line is too narrow	2. Install larger inner diameter tubing
	3. Pumping/Trapping Medium is contaminated	3. Check Pumping/Trapping Medium. Flush and change pump's Pumping/Trapping Medium
	4. Vacuum Pump fouled	4. Change Pumping/Trapping Medium more frequently
Pumping Medium is dark, dirty, or has an unusual color.	1. Pumping/Trapping Medium contaminated by vapors, liquids, or other foreign material ingested by pump, or Pumping/Trapping Medium has degraded, or Vacuum Pump was run with inadequate volume of Pumping/Trapping Medium, or recommended Pumping/Trapping Medium not used	1. Flush Vacuum Pump and change Pumping/Trapping Medium

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

6.2 Vapor Trap

Condition	Probable Cause	Recommended Action
Trap will not start	1. No power	1. Check the switch and fuse. Note: Also, check for air circulation out of the side vents which is evidence that the trap is on. The trap is very quiet while operating.
System performance has degraded over time (also see Vacuum Pump troubleshooting)	1. Leak in the trap. Movement of coils can cause loosening.	1. Call Bio-Rad Technical Service (1-800-424-6723 in the U.S.
White precipitate visible in sight glass	1. Oxidation of aluminum reservoir	1. Flush with Pumping/Trapping Medium or System Flushing Fluid. If difficult to drain, call Bio-Rad Technical Service (1-800-424-6723) in the U.S.

Section 7
Ordering Information

Catalog Number	Product Description
	Gel Dryers
165-1740	**Model 543 Gel Dryer,** 100/120 V, includes power cord, Porous Gel Support, Transparent Sealing Gasket, Filter Paper Backing, Cellophane Membrane Backing, and instruction manual
165-1741	**Model 543 Gel Dryer,** 220/240 V, same as above
165-1745	**Model 583 Gel Dryer,** 100/120 V, includes power cord, Porous Gel Support, Transparent Sealing Gasket, Filter Paper Backing, Cellophane Membrane Backing, Sequencing Gel Filter Paper, and instruction manual
165-1746	**Model 583 Gel Dryer,** 220/240 V, same as above
	Gel Drying Systems
165-1750	**Model 543 Gel Drying System,** 100/120 V, includes Model 543 Gel Dryer, Vacuum Pump and Vapor Trap, Pumping/Trapping Medium (1 L), vacuum tubing and connectors, and instruction manuals
165-1751	**Model 543 Gel Drying System,** 220/240 V, same as above
165-1752	**Model 583 Gel Drying System,** 100/120 V, includes Model 583 Gel Dryer, Vacuum Pump and Vapor Trap, Pumping/Trapping Medium (1 L), vacuum tubing and connectors, and instruction manuals
165-1753	**Model 583 Gel Drying System,** 220/240 V, same as above
	Vacuum Pump and Vapor Trap
165-1754	**Vacuum Pump and Vapor Trap,** 115 V, 60 Hz, includes Vacuum Pump, Vapor Trap, Pumping/Trapping Medium (1 L), vacuum tubing and connectors, and instruction manual
165-1755	**Vacuum Pump and Vapor Trap,** 230 V, 50 Hz, includes Vacuum Pump, Vapor Trap, Pumping/Trapping Medium (1 L), vacuum tubing and connectors, and instruction manual
165-1756	**Pumping/Trapping Medium,** 1 liter

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Catalog Number	Product Description
165-1757	**Tubing and Connector Kit,** includes vacuum tubing (8 ft), connectors (2), and hose clamps (3)
165-1758	**Replacement Vacuum Pump Exhaust Filter**, 4
165-1759	**Vacuum Pump and Vapor Trap Maintenance Kit,** includes Pumping/Trapping Medium (3.8 liters), System Flushing Fluid (3.8 liters), instructions
165-1760	**Pumping/Trapping Medium,** 3.8 liters
165-1761	**System Flushing Fluid,** 3.8 liters

Gel Drying Accessories

165-1742	**Model 543 Porous Gel Support**
165-1743	**Model 543 Transparent Sealing Gasket**
165-0921	**Filter Paper Backing,** 18 x 34 cm, 25 sheets
165-0922	**Cellophane Membrane Backing,** 18 x 34 cm, 50 sheets
165-1747	**Model 583 Porous Gel Support**
165-1748	**Model 583 Transparent Sealing Gasket**
165-0962	**Filter Paper Backing,** 35 x 45 cm, 25 sheets
165-0963	**Cellophane Membrane Backing,** 35 x 45 cm, 50 sheets
165-0959	**Sequencing Gel Filter Paper,** 35 x 45 cm, 25 sheets

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Bio-Rad Laboratories

Life Science Group

2000 Alfred Nobel Drive
Hercules, California 94547
Telephone (510) 741-1000
Fax: (510) 741-1060

Eastern Regional Office, *85A Marcus Dr., Melville, New York 11747 • Phone (516) 756-2575 • Fax (516) 756-2594*
Australia, *Bio-Rad Laboratories Pty Limited, Unit 11, 112-118 Talavera Rd P.O. Box 371, North Ryde, NSW 2113 • Phone 02-805-5000 • Fax 02-805-1920*
Austria, *Bio-Rad Laboratories Ges.m.b.H., Auhofstrasse 78D, 1130 Wien • Phone (1) 877 89 01 • Fax (1) 876 56 29*
Belgium, *Bio-Rad Laboratories S.A./N.V., Begoniastraat 5, 9810 Nazareth Eke • Phone 09-385 55 11 • Fax 09-385 65 54*
Canada, *Bio-Rad Laboratories (Canada) Ltd., 5671 McAdam Road, Mississauga, Ontario L4Z 1N9 • Phone (905) 712-2771 • Fax (905) 712-2990*
China, *Bio-Rad Laboratories, 14, Zhi Chun Road, Hai Dian District, Beijing 100088 • Phone (01) 2046622 • Fax (01) 2051876*
Denmark, *Bio-Rad Laboratories, Symbion Science Park, Fruebjergvej 3, DK-2100 Copenhagen • Phone 45-39 17 99 47 • Fax 45-39 27 16 98*
France, *Bio-Rad S.A., 94/96 rue Victor Hugo, B.P. 220, 94 203 Ivry Sur Seine Cedex • Phone (1) 49 60 68 34 • Fax (1) 46 71 24 67*
Germany, *Bio-Rad Laboratories GmbH, Heidemannstraße 164, D-80939 München/Postfach 450133, D-80901 München • Phone 089 31884-0 • Fax 089 31884-100*
India, *Bio-Rad Laboratories, C-248 Defence Colony, New Delhi 110 024 • Phone 91-11-461-0103 • Fax 91-11-461-0765*
Italy, *Bio-Rad Laboratories S.r.l.,Via Cellini, 18/A, 20090 Segrate Milano • Phone 02-21609 1 • Fax 02-21609-399*
Japan, *Nippon Bio-Rad Laboratories, Sumitomo Seimei Kachidoki Bldg, 3-6 Kachidoki, 5-Chome, Chuo-Ku, Tokyo 104 • Phone 03-3534-7665 • Fax 03-3534-8497*
The Netherlands, *Bio-Rad Laboratories B. V., Fokkerstraat 10, 3905 KV Veenendaal • Phone 0318-540666 • Fax 0318-542216*
New Zealand, *Bio-Rad Laboratories Pty Ltd., P. O. Box 100-051, North Shore Mail Centre, Auckland 10 • Phone 09-443 3099 • Fax 09-443 3097*
Pacific, *Bio-Rad Laboratories, Unit 1111, 11/F., New Kowloon Plaza, 38, Tai Kok Tsui Road, Tai Kok Tsui, Kowloon, Hong Kong • Phone 7893300 • Fax 7891257*
Singapore, *Bio-Rad Laboratories (Singapore) Ltd., 464 Siglap Road, #01-02 Flamingo Valley, Singapore 1545 • Phone (65) 4432529 • Fax (65) 4421667*
Spain, *Bio-Rad Laboratories, S. A. Avda Valdelaparra 3, Pol. Ind. Alcobendas, E-28100 Alcobendas, Madrid • Phone (91) 661 70 85 • Fax (91) 661 96 98*
Sweden, *Bio-Rad Laboratories AB, Gärdsvägen 7D, Box 1276, S-171 24 Solna • Phone 46-(0)8-735 83 00 • Fax 46-(0)8-735 54 60*
Switzerland, *Bio-Rad Laboratories AG, Kanalstrasse 17, Postfach, CH-8152 Glattbrugg • Phone 01-809 55 55 • Fax 01-809 55 00*
United Kingdom, *Bio-Rad Laboratories Ltd., Bio-Rad House, Maylands Avenue, Hemel Hempstead, Herts HP2 7TD • Free Phone 0800 181134 • Fax 01442 259118*

SIG 093094 *Printed in USA*

4006003 Rev B

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Artisan Technology Group is an independent supplier of quality pre-owned equipment

Gold-standard solutions

Extend the life of your critical industrial, commercial, and military systems with our superior service and support.

We buy equipment

Planning to upgrade your current equipment? Have surplus equipment taking up shelf space? We'll give it a new home.

Learn more!

Visit us at **artisantg.com** for more info on price quotes, drivers, technical specifications, manuals, and documentation.

Artisan Scientific Corporation dba Artisan Technology Group is not an affiliate, representative, or authorized distributor for any manufacturer listed herein.

We're here to make your life easier. How can we help you today?

(217) 352-9330 | sales@artisantg.com | artisantg.com

ARTISAN® TECHNOLOGY GROUP