Glovebox Installation

Your Glovebox has been fully assembled, operated and tested at our production facility. A “Glovebox Function Test” sheet should accompany the system. On it, you will see that the operation of system components has been checked and the glovebox and antechamber(s) have been tested for leaks under positive and negative pressure. Also, to ensure that the glovebox purifier performs optimally, the vacuum level during regeneration has been tested.

The glovebox is ready to be hooked up and to begin working for you.

If you have any questions about these instructions or anything regarding the glovebox installation, please call 1-603-773-9333 and ask for Customer Service, send your fax inquiry to 1-603-773-0008, or E-mail a message to service@mbraunusa.com.

Step 1 – Getting the Glovebox Off the Pallet -

The glovebox is secured to the shipping pallet by wood braces. You will need to remove the braces with a crow bar.

The glovebox is equipped with wheels for ease of movement and leveling feet for lab installation or shipping. Lower the glovebox onto the wheels by screwing the leveling feet up into the glovebox stand. You will need a wrench to get them started and then turn the leveling feet by hand.

Once the feet are up, the glovebox will roll freely on the wheels. You will need a few strong individuals to perform the next step – lowering the box to the ground. Roll the end of the glovebox opposite the large antechamber to the edge of the pallet. Lower the wheels to the floor. There is no substitute for strength in this step. Now, roll the glovebox off of the pallet carefully, supporting the weight as the remaining set of wheels meet the floor.

The glovebox purifier cart is also equipped with wheels. The cart will roll forward and back. You may lower it off the pallet in the same manner as the glovebox or lift it off.

Step 2 – Connecting the Glovebox -

Once the glovebox has been moved into place for operation, lower the leveling feet until the box no longer rolls. Roll the purifier cart into position beneath the antechamber.

See picture 1.

There are components packed in the antechamber that you will need to set up the glovebox. Remove them and lay them out on a bench top. You should find:
• 1 pair butyl gloves, 4 large o-rings
• Hardware kit containing clamps, o-rings, and electronics cabinet key
• Short KF40 to KF25 copper pipe
• Electrical feedthrough
• Power strip
• Technical manual
• Glove box Function test sheet
• Tygon® braided hose, for optional water cooling

On the purifier cart, along with the electrical cabinet, blower, vacuum pump and purifier column, you will see: two lengths of coiled Tygon® braided hose; a coiled, gray, Festo gas line with a stainless steel 6mm nut on the end; a power cable with a square electrical connector at the end; a box containing the glove box foot pedals for pressure control; and a coiled electrical wire with the main power plug for your glovebox system at the end. Take the foot pedals out of the box and place them on the floor in front of the lower shelf of the glovebox stand – bring them out from under the stand to keep the wire out of the way. The oil mist trap to your vacuum pump has been unclamped to prevent damage in shipping. Using a KF25 clamp and o-ring from the hardware kit, clamp the mist trap into place. See picture 2 & 3.

Picture 2

Coming off of the electrical cabinet you will see a gray plastic bellows hose connected to the Siemens OP7 touch pad. This is the user interface for the Programmable Logic Controller (PLC) that runs your glovebox. The gray bellows hose allows you slack to install the black bracket on the OP7 to the two bolts on the end panel in front of the large antechamber. The OP7 should swivel from front to back once installed. See picture 4.

Picture 3

Next, from the rear of the purifier cart take the gray Festo line and attach the 6mm nut to the fitting located beneath the glovebox, in the rear right corner. This line will allow the PLC to read internal glovebox pressure. Use 2 wrenches, one on the nut and one on the Swagelok® feedthrough, to tighten this fitting securely. From this position beneath the box, you will see the green and yellow ground wire coming from the rear, left corner of the purifier cart. The ground wire should be connected to the glovebox stand, as seen in picture 5.
While beneath the glove box, connect the heat exchanger to the stainless steel bellows hose coming off of the blower. See picture 6.

Next, connect the KF25 to KF40 copper pipe to the hand valve beneath the antechamber. Use a clamp and o-ring, as shown in picture 7. The lower end of this pipe connects to the stainless steel bellows hose coming from the vacuum pump. The pipe fitting on the side of the pipe connects with the black flexible vacuum line extending off of the valve block. See picture 8.

Connect the flexible stainless steel hose from the vacuum pump to the copper antechamber pipe with a clamp and o-ring.

Connect the copper pipe running beneath the glove box to the stainless steel flex hose, as shown in picture 9.
The glovebox light hood is already supplied with a light ballast and fluorescent bulb. To complete the wiring of the light hood, run the cable from the purifier cart up the wire track behind the glovebox antechamber, as shown in picture 10. Connect the plug adapter to the wire from the light hood, already on top of the glovebox.

The glovebox gloves are secured to the glove ports via butyl rubber o-rings. Place the glove on the glove port so that the ridge at the shoulder of the glove is in the rear most groove on the glove port. Next, snap the o-rings into place one by one over the glove material on the glove port. There should be two o-rings on each glove port. The o-rings fit into grooves on the glove port.

The glovebox should now be ready for operation. You should have one main electrical wire coming from the purifier cart to plug into your power source. Plug the wire in and turn the power knob on the electrical cabinet to the ON position. You will see on the OP7 display that the system runs through a series of tests at start up. This is normal each time power is interrupted to the system. Turn the vacuum pump on at this point by pressing the button labeled Vacuum Pump. The pump should be activated at all times while the box is switched on.

**Step 3 – Gas in the Glovebox**

The next step is to check that your glovebox has been made leak tight. With the Tygon® hose from the VG valve connected to your working gas supply, supplied at 80 PSI, you will be able to add gas to the glovebox by setting the operating pressure parameters with the OP7. Make sure to use hose clamps when securing gas lines.
To set the box parameters, press the number 7 on the keypad. From this screen you will be able to set the pressure parameters in the box. To check the glovebox for any sort of leaks, set the pressure first to a positive value. For example, set the upper pressure limit to 12 mbar and the lower pressure limit to 9 mbar. The box PLC will call for gas from the cylinder by opening the VG valve where the Tygon® line is tied into. Gas will be added until you are within the pressure range. The gloves will stick straight out of the box. The glovebox should be able to hold pressure for 5 minutes. If you have a leak, the pressure will fall to 9 mbar and below, and the box will add gas to try to maintain the limits you have set.

If there is a leak, systematically check to see if all clamps are tight and all Swagelok® connections. Typical spots to check are the pressure fitting beneath the box, the clamps on the piping, etc. You may wish to squirt a small amount of soap solution around the fittings to check for leaks (bubbles will develop if a leak is present). The glove ports may need to be tightened. Check for tightness by twisting the glove port clockwise. The glove ports are tight when they absolutely cannot be turned. If a drop in pressure persists, call Customer Service for assistance. Keep in mind that we have checked the system for leaks prior to shipment; the box should maintain pressure.

Once pressure is maintained in the positive range, check for pressure maintenance in the negative range. Set the upper pressure level to –7 mbar and the lower set point to –11 mbar. Although unusual, a glovebox may show signs of pressure leak in the negative range but not in the positive range. If a leak is present, the box will creep toward atmospheric pressure and will add vacuum to maintain the parameters you have set. Again, check all of the fittings you have assembled for tightness.

**Step 4 – Purging the Glovebox**

Once it is established that the glovebox is leak tight, you may begin purging. Purging is the process of ridding the glovebox of all room air, in favor of the inert gas you will be working with. The goal is to reduce the oxygen and moisture level in the box to below 100 ppm so that the glovebox purifier can take over and bring down oxygen and moisture to below 1 ppm, respectively.

The Technical Manual, also supplied with the BRAUN system describes in depth the manner in which the glovebox should be purged. It also explains how much gas you will need to purge for what size system you have. In the Technical Manual, see the section on Purging.

We simply recommend purging out of the antechamber and for a 1250 mm x 780 mm standard size glovebox, such as the Unilab, you will need to purge 2 and ½ cylinders of gas (based on standard US cylinders - 304 cubic feet of gas per cylinder). If purging from a bulk gas supply or house supply, purge duration will depend upon flow rate. Refer to the table at the back of this manual for information on purge gas consumption based on box volume. A chart indicating box volume is also provided.

To purge out the antechamber, first set your pressure set points to an upper point of 12 mbar and a lower point of 9 mbar. Open the inside antechamber door a small amount. We will create a “leak” in the glovebox system so that inert gas is continually flowing in and pushing out room air. To achieve the goal of purging goal of less than 100 ppm oxygen and moisture, we must turn the volume of gas within the chamber over between 12 and 14 times.

Create the “leak” by slowly opening the outside antechamber door. Internal gas from the box will begin leaking out and the pressure will drop to below your set working parameters. You will hear the VG valve clicking open and closed as the PLC tries to maintain the set pressure parameters. Open the door just enough so that the valve stays open and gas is continually added. In turn, gas will continually be pushed out the antechamber. As the cylinder empties, residual oxygen and moisture-laden room air is being forced out of the glovebox. Room air may pool in box corners, so it is important to stir the air by waving the gloves around within the glovebox.
As the cylinder empties, monitor the delivery pressure. Be sure to close the outside antechamber door before pressure drops so low that the gas cylinder is unable to maintain the pressure parameters you have set in the box. Close the outside antechamber door immediately to prevent the backflow of room air into the glovebox. The VG valve will stay open and add gas to bring the glove box to within your pressure set points.

You are now ready to change cylinders.

To change the cylinder, first close off the needle valve to isolate the Tygon® line. The goal here is to keep room air from entering the line to the glovebox. If your regulator does not have a needle valve, back off the pressure until it is “closed”. Next, close the cylinder valve. You may now change the gas cylinder and continue purging. Crack the outside antechamber door until the VG valve again remains open.

Remember, to bring the oxygen and moisture levels in the glovebox to a range where the purifier will be effective you must purge through 2 and ½ cylinders (304 cubic feet per cylinder) of inert gas.

**Step 5 – Beginning Operation**

Your glovebox has been regenerated prior to shipment. The purifier is sealed and is ready to begin operation. Once you have purged as previously described, you may press the circulation button on your OP7 touch pad. The blower will switch on and the electro-pneumatic valves on top of the purifier will automatically open. The purifier is now filtering out residual oxygen and moisture from the glovebox atmosphere. If the delivery pressure from the cylinder is not great enough (i.e. – not 80 p.s.i.) you will receive an error message on the OP 7. It will read, “Inlet/ Outlet Valves Not Open”. Increase pressure to 80 p.s.i.

Normally, you will only need to regenerate every 2-3 months, or as needed based upon glovebox use. Since the glovebox oxygen and moisture levels are slightly higher than normal, you should perform regeneration within a few days of start up.

**Step 6 – Regeneration**

The regeneration gas supply needs to be connected to the pipe fitting below the VRE valve. The regulator on the regeneration gas cylinder needs to be able to deliver at 5 p.s.i.

To begin regeneration, switch circulation off by pressing the Circulation button. Next, press the button marked Regeneration. The screen will prompt you to “Check Regeneration Gas Supply, Continue With INS Key”. At this point open the pressure on the regeneration gas cylinder to 5 p.s.i. or until you hear gas coming from the short vent line, coming off of the valve block. You may need to increase the delivery pressure to 7 or 8 p.s.i., as regulators vary. A Regeneration Cycle will consume approximately ½ of a 304 cubic foot cylinder of regeneration gas.

Once you hear gas flowing from the vent line, press the INS key to continue regeneration. The Regeneration Cycle is automatic. It will last 16 hours. During this time you may continue to work within the glovebox, but the purifier is isolated.

We recommend performing regeneration prior to leaving work at in the evening, so that the cycle is complete in the morning and you may continue working while the box is in Circulation mode.
Valves:
VG - gas in
VV - vacuum
VRE - regeneration gas
VRV - regeneration vacuum
VRS - exit valve
VS1 - pressure compensation / cooling

Glove Box Gas Flow Diagram

Valves:
VG - gas in
VV - vacuum
VRE - regeneration gas
VRV - regeneration vacuum
VRS - exit valve
VS1 - pressure compensation / cooling
**Valve Block**

- **Working Gas In**
- **Regeneration Gas In**
- **Regeneration Vent Line**