Chapter 8
Commissioning the System

CHAPTER 8: COMMISSIONING THE SYSTEM

8.1 General Information

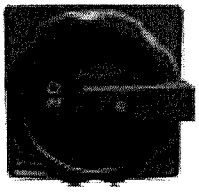
After completing the installation, the system is ready to be activated. Gas can now be added to the box to prepare for normal operation. The system is equipped with a foot pedal which is used during a pressure leak test or during normal operation of the box to temporarily increase or decrease the pressure inside the glovebox.

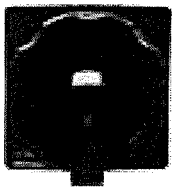
While a leak test has been performed during production of the system, after initial installation and gas has been added, it is necessary to perform a static pressure test to check the system for any possible leaks. This is done to ensure all connections made during the installation are tight and seated properly. The static pressure test also checks other components on the system which may have shifted during the shipping process.

After the leak test has been completed, the purge operation must be performed to rid the box of all room air and replace it with the chosen working gas. After the purge procedure is complete, the box can be used for normal operation in circulation mode.

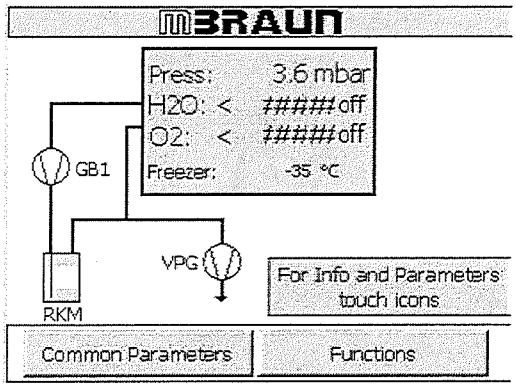
8.3 System Activation

Turn the Main Power switch located on the side of the electrical cabinet on the purifier cart from the **Off** position to the **On** position.





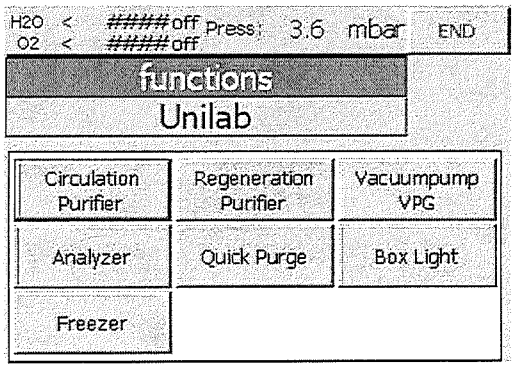
The panel will display a series of screens (program starting up) before the start screen is displayed.



Touch the **Functions** button on the start screen.

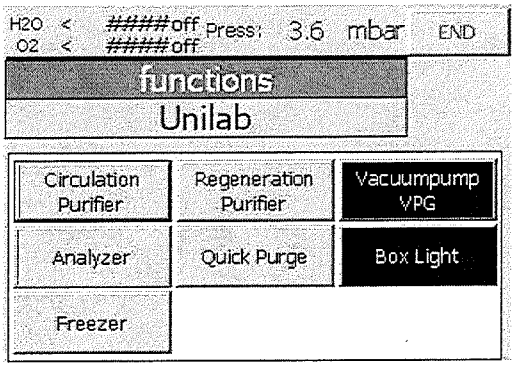
Touch the **Vacuum Pump** button to activate the vacuum pump.

Touch the **Box Light** button to turn the light on.



NOTICE The vacuum pump should remain on at all times while the system is in operation.

Touch the **End** button to return to the start screen.

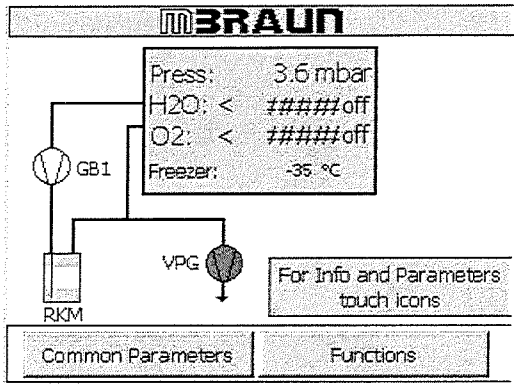


Using the regulator, turn on the working gas supply and set the pressure to 80psi.

8.3 Static Pressure Leak Test

The static pressure leak test is performed in both the positive and negative pressure states. The process for running the test in either state is the same with the exception of the parameter setpoints and foot pedal controls.

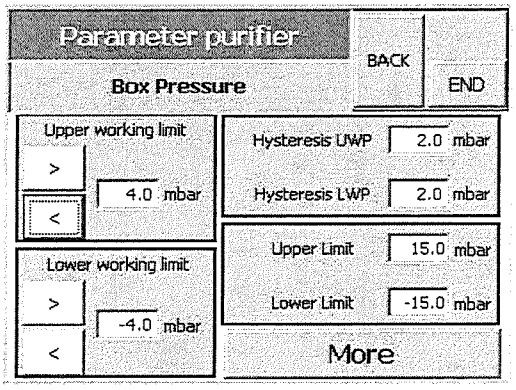
Touch the **Box Pressure/Analyzer** display box on the start screen.



Use the arrows listed under Upper Working Limit and Lower Working Limit to increase or decrease the box atmosphere pressure setpoint in one tenth decimal intervals.

or

Touch the number field next to the corresponding parameter to display the alphanumeric keypad.

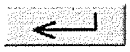


Recommended Positive State Setpoints

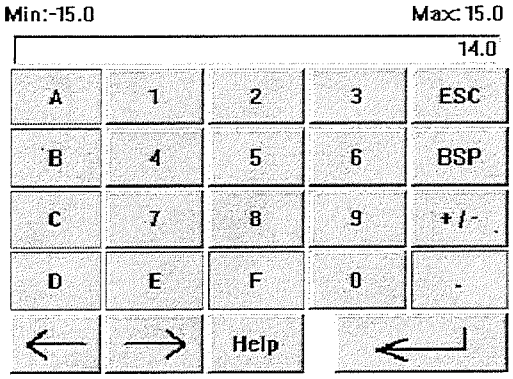
- *Upper Working Limit: 14.0mbar*
- *Lower Working Limit: 0.0mbar*

Recommended Negative State Setpoints

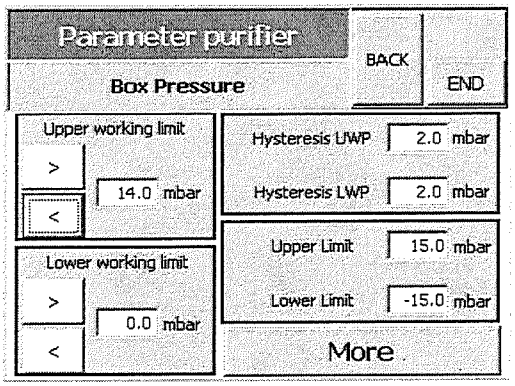
- *Upper Working Limit: -14.0mbar*
  Lower Working Limit: 0.0mbar

Enter the desired limit and touch the  button to return to the Box pressure screen.

Use the  button to set the parameter to the positive or negative.



Touch the **End** button on the Box Pressure Parameters screen.



Using the foot pedal control, adjust the gas pressure inside the box until the pressure reaches the desired level range.

The pressure will fluctuate until it settles at a fixed level between +/- 10-12mbar.

NOTICE	If the pressure drops below +/-10mbar, use the foot pedal to add gas until the pressure reaches the desired level.

Once the pressure settles, monitor the pressure level for five (5) minutes.

NOTICE	It is normal for the pressure level to fluctuate slightly during the 5 minute static pressure test. However, a pressure decrease of more than .3mbar indicates there is a leak in the system. Check all connections made during the installation process. If this doesn't fix the problem, refer to the Troubleshooting chapter of this manual or contact the M.Braun Service Department.

After five (5) minutes, if the pressure level has stayed constant, the glovebox can be tested in the opposite pressure state.

After testing the box in both the positive and negative states with no leaks present, the box is ready for purging.

8.4 Purging the System

NOTICE

Systems equipped with freezers or other components that may be protected by covers must be open during the purging process.

If the system has been in use prior to purging, ensure that the freezer(s) is deactivated and is at room temperature before beginning the process.

The instructions below include information regarding glovebox systems equipped with analyzers. The analyzers, which are used to monitor the oxygen and moisture levels inside the glovebox, can be used to determine when the glovebox atmosphere reaches the desired purity level.

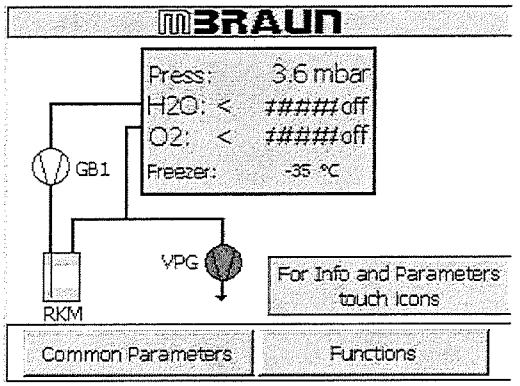
Glovebox systems which are not equipped with analyzers require the gas consumption to be monitored to determine when the glovebox atmosphere reaches the desired purity level. Refer to the Gas Consumption chart in Chapter 3 for more information.

Adjusting the Parameters

NOTICE

Adjusting the parameters is only necessary when using the Reverse or Manual purge methods.

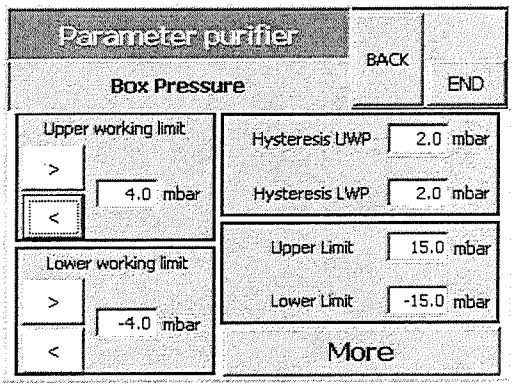
Touch the **Box Pressure/Analyzer** display box on the start screen.



Use the arrows listed under Upper Working Limit and Lower Working Limit to increase or decrease the box atmosphere pressure setpoint in one tenth decimal intervals.

or

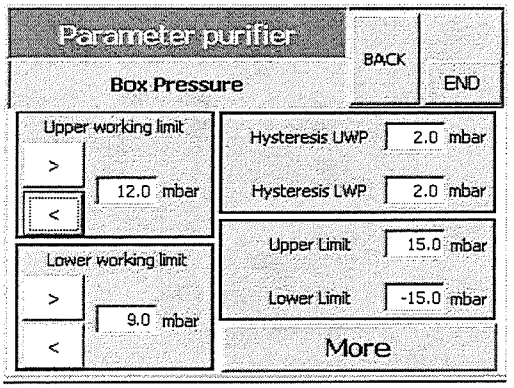
Touch the number field next to the corresponding parameter to display the alphanumeric keypad. Use the keypad to adjust the parameters in the same manner as before.



Recommended Setpoints

- *Upper Working Limit: 12.0mbar*
- *Lower Working Limit: 9.0mbar*

Touch the **End** button.

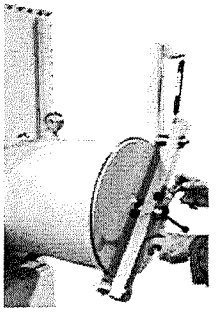


Reverse Purge Method (no manual purge valve or quick purge function present)

Open the inner antechamber door.

Very slowly turn the outer antechamber door handle in a counterclockwise motion until the glovebox pressure drops to a level between 1.0mbar and 8.0mbar and the VG valve stays open* providing a constant flow of gas into and out of the box.

**When the valve stops clicking it is open.*

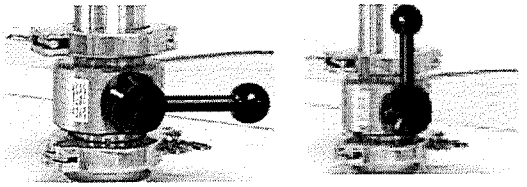


Unilab 1200: Purge for approximately 75 minutes.

Unilab 2000: Purge for approximately 90 minutes.

Manual Purge Method (manual purge valve present)

Open the manual hand valve located on the top of the glovebox.



The VG valve will open and close to allow working gas to flow into the box. Once the pressure inside the box drops to a level between 1.0mbar and 8.0mbar, the valve will stay open* providing a constant flow of gas into and out of the box.

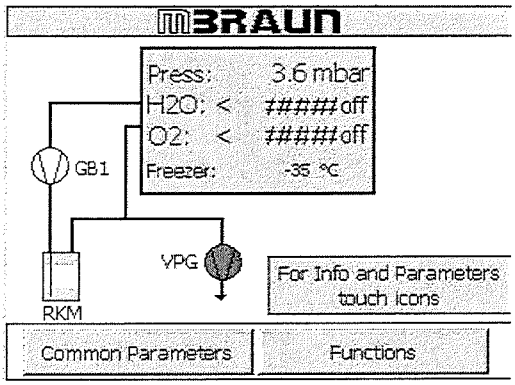
**When the valve stops clicking it is open.*

Unilab 1200: Purge for approximately 75 minutes.

Unilab 2000: Purge for approximately 90 minutes.

Automatic Purge Method (quick purge function present)

Touch the **Functions** button on the start screen.

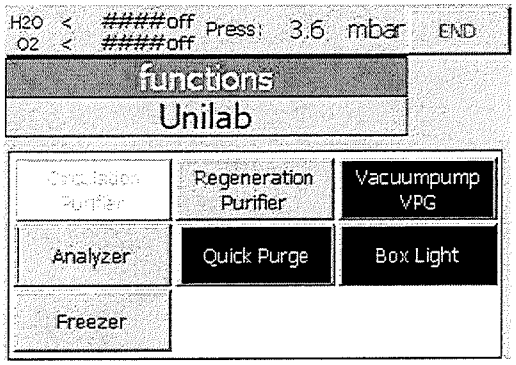


Touch the **Quick Purge** button on the functions screen to activate the purging process.

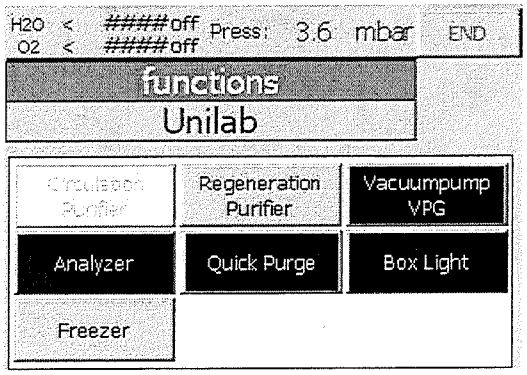
The circulation button is blanked out as this function is unavailable during the purging process.

Continue purging for 45 minutes.

Touch the **Analyzers** button to activate the analyzers.

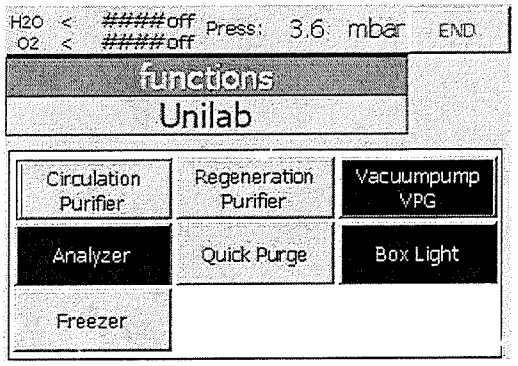


Touch the **End** button to return to the Start Screen.



Continue purging until the oxygen and moisture content inside the box reach the desired ppm levels.

Touch the **Quick Purge** button on the functions screen to deactivate purging once the desired levels have been attained.



Chapter 9
System Operation

CHAPTER 9: SYSTEM OPERATION

9.1 General Information

After the system has been fully commissioned, it may now be used for normal operation in circulation mode. Prior to using the glovebox in circulation mode the box pressure parameters can be adjusted for the upper and lower working limits. There are no recommended set parameters, the setpoints are based on user preference.

At any time during use of the box, the foot pedal can be used to add or remove working gas from the box temporarily. This is especially useful when attempting to place hands inside the gloves and into the box when working in the positive pressure state.

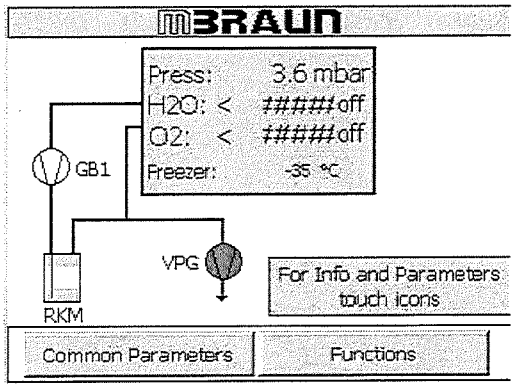
Adjusting the parameters is done in the same manner as was done during the static leak test and purging during the commissioning of the box. Please refer to Chapter 8 of this manual for instructions.

9.2 Circulation Mode

NOTICE

- The circulation process can only be started if all other functions (purge and regeneration) are inactive.
- There are no recommended setpoints for the circulation mode. Upper and lower working pressure limits are based on user preference.
- If the oxygen level in the system rises above 150ppm, deactivate circulation and begin purging. Continue purging until the oxygen level drops below 100ppm.

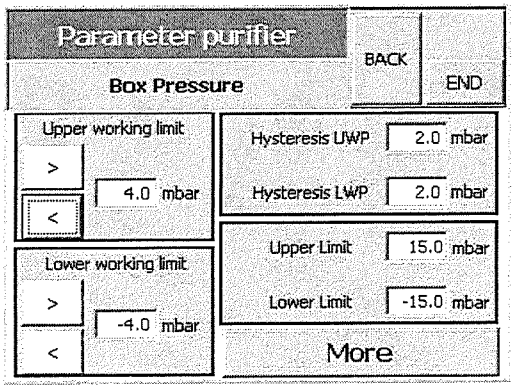
Touch the **Box Pressure/Analyzer** display box on the start screen.



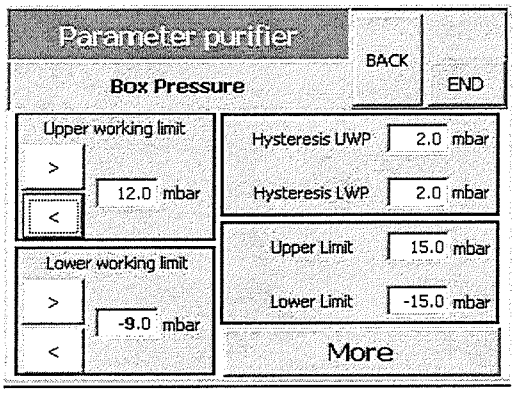
Use the arrows listed under Upper Working Limit and Lower Working Limit to increase or decrease the box atmosphere pressure setpoint in one tenth decimal intervals.

or

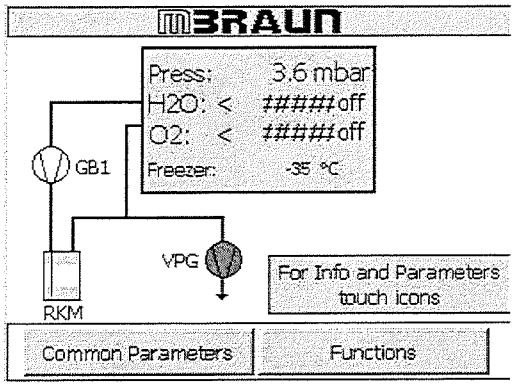
Touch the number field next to the corresponding parameter to display the alphanumeric keypad. Use the keypad to adjust the parameters in the same manner as before.



Touch the **End** button.

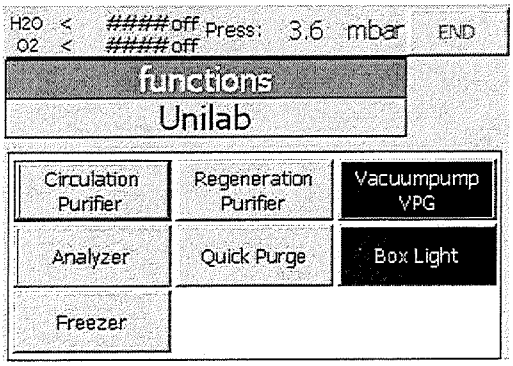


Touch the **Functions** button on the start screen.

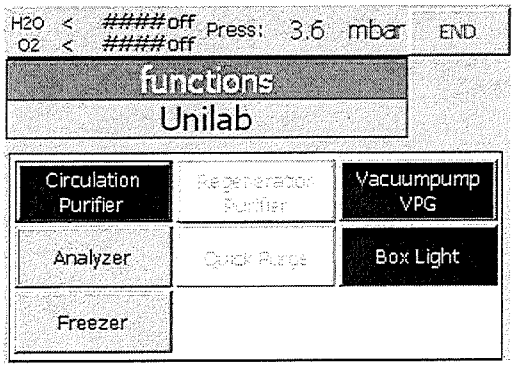


Touch the **Circulation Purifier** button on the functions screen.

The regeneration and quick purge (if existing) buttons are blanked out as these functions are unavailable during the purging process.



Touch the **End** button to return to the Start Screen.



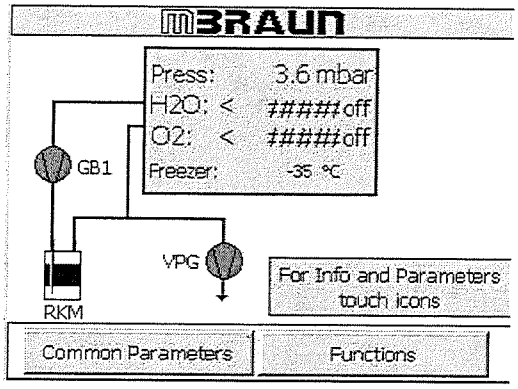
The glovebox will continue to circulate the working gas until the function is deactivated.

9.3 Analyzers

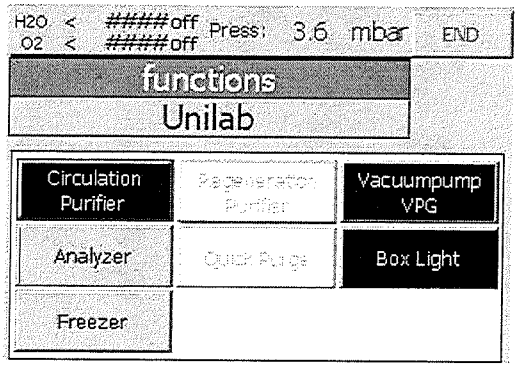
General Information

This section applies only to systems that are equipped with moisture and/or oxygen analyzers.

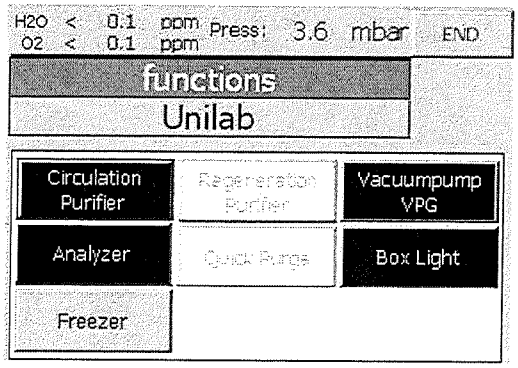
Touch the **Functions** button on the Start screen.



Touch the **Analyzers** button to activate the analyzer(s).



Touch the **End** button to return to the Start Screen.



Follow the steps above to deactivate the analyzer(s).

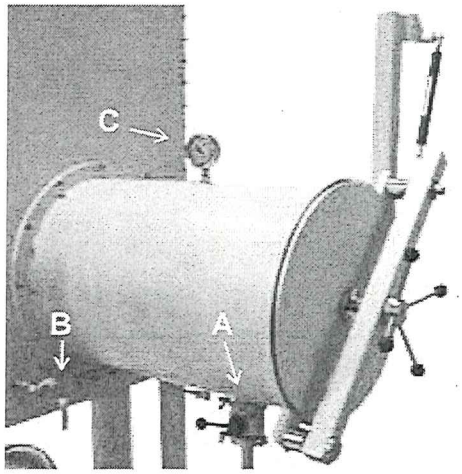
9.4 Antechamber Operation

Transferring Material into the Glovebox – Large Antechamber

Follow the steps below to perform a transfer of materials from room environment into the glovebox using the large antechamber.

Before opening the outside antechamber door, verify:

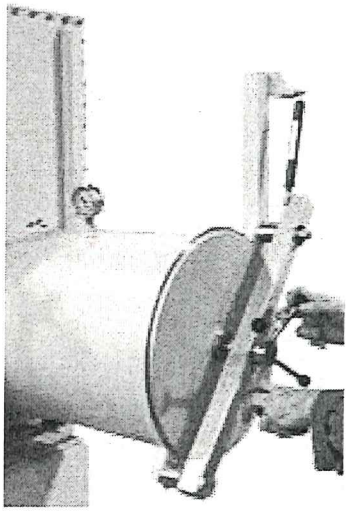
- The inner antechamber door is closed;
- The evacuate hand valve (A) is in the closed position;
- The refill hand valve (B) is in the closed position;
- The antechamber is not under vacuum (gauge (C) should read zero).



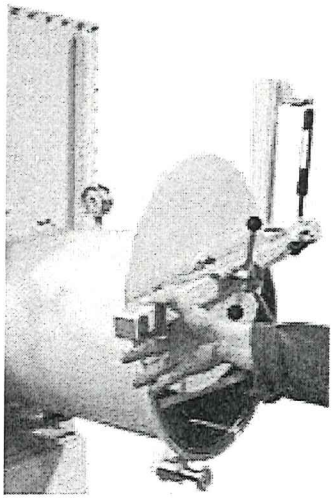
The picture to the right displays the correct hand valve position and the reading on the gauge at the zero position.

Note: Valve for refilling the large antichamber is yellow, between the small & larger chambers.

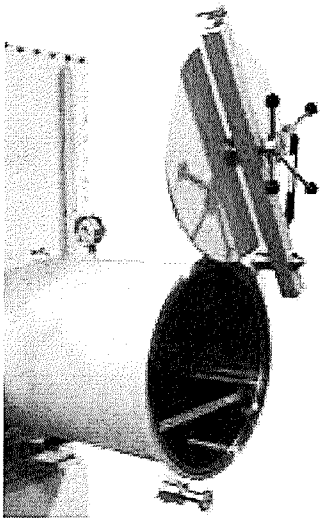
Turn the
a counte



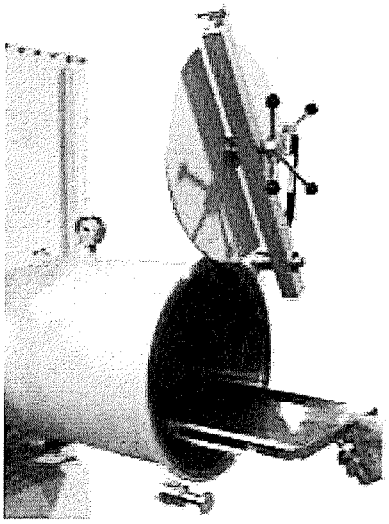
Carefully open the antechamber door by lifting it in an upward direction.



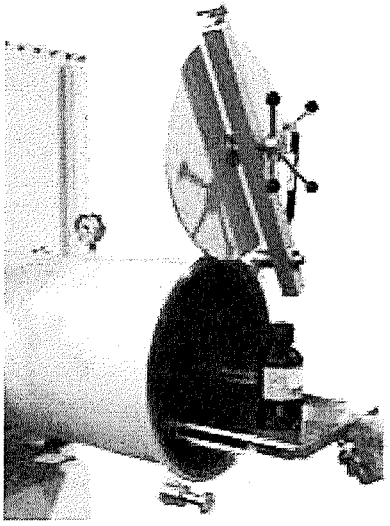
Let go of the door handle and allow the door to rise completely.



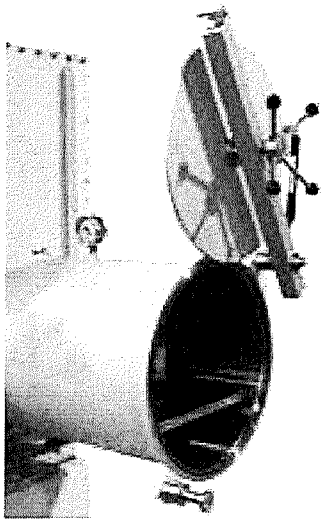
Gently pull out the sliding tray.



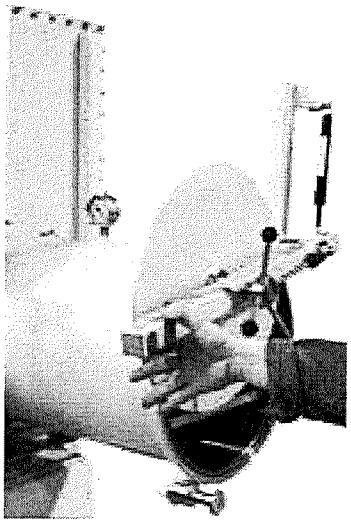
Place the materials to be used on the tray and slide the tray back into the antechamber.



Gently push the sliding tray back into the antechamber.

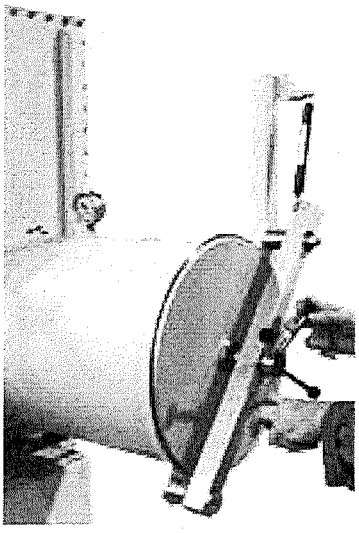


Close the outer door by pulling it down until groove at the end of the arm rests on the spindle.

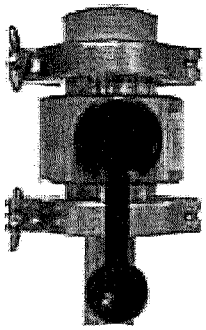


Place four fingers, two each on opposite spindles, on the door handle and gently turn in a clockwise motion until the door touches the chamber.

Tighten ¼ turn more.

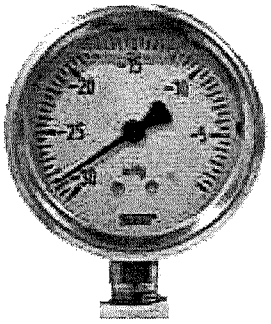


Evacuate the antechamber by turning the evacuation hand valve to the **open** position.

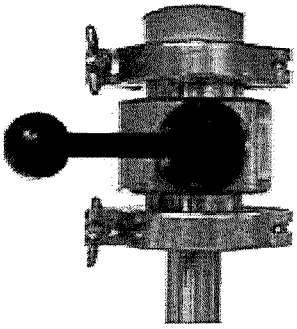


Wait for the gauge to settle at the **negative** position and continue to evacuate for:

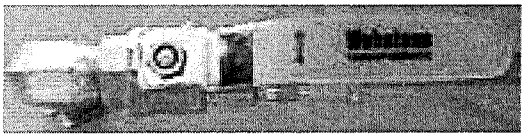
Non-porous Material: 5 minutes
Porous Material: 12 hours



Turn the evacuation valve to the **closed** position.

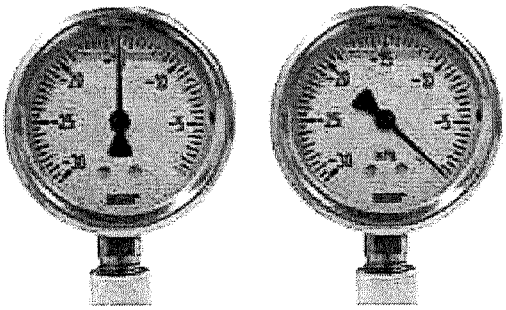


Refill the antechamber by turning the refill valve to the **open** position.

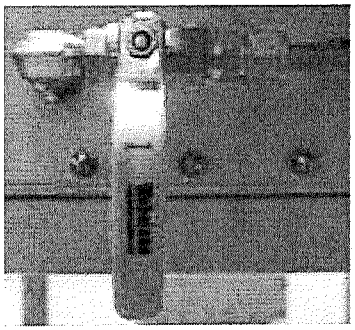


Non-porous Material
Wait for the gauge to settle at the **halfway** mark on the gauge.

Porous Material
Wait for the gauge to settle at **zero (0)**.



Turn the refill valve to the **closed** position.



Repeat this process as necessary according the following recommended guidelines:

Non-porous Material

Evacuation (3 total cycles)

- *2 Additional Cycles – 5 minutes each*

Refill (3 total cycles – 2 intermediate, 1 final)

- *1 Intermediate Cycle – refill chamber halfway*
- *1 Final Cycle – refill chamber to atmosphere (or zero on the gauge).*

Porous Material

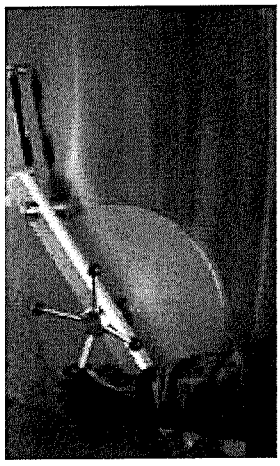
Evacuation

- *1 Cycle – 12 hours*

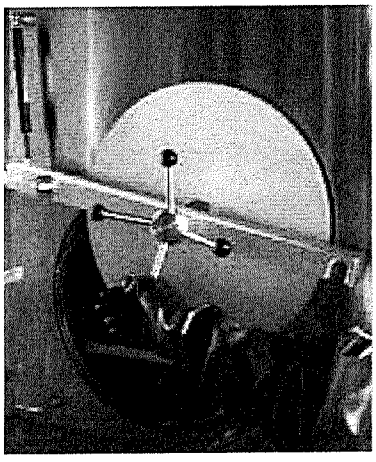
Refill

- *1 Cycle – refill chamber to atmosphere (or zero on the gauge).*

Grasp the door handle with two fingers in a counterclockwise motion.

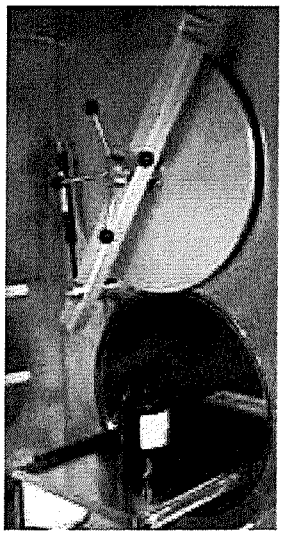


Carefully open the antechamber door by lifting it in an upward direction and guiding it until it stops.

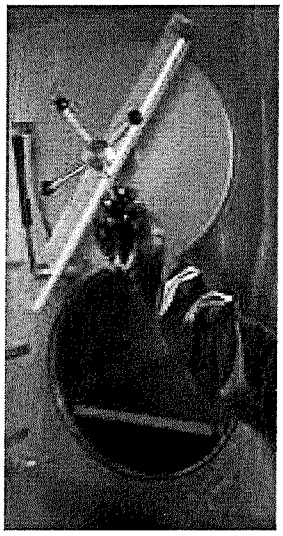


Gently pull out the tray and transfer the material into the glovebox.

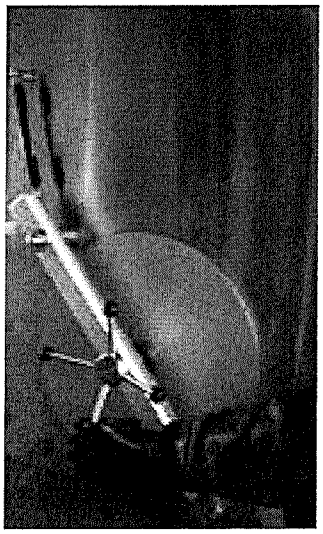
At this time, materials to be transferred out of the box may be placed on the tray.



After all materials are transferred into the glovebox, grasp the door handle and gently pull the door down until it rests on the door stop.



Grasp the door handle with two fingers in a clockwise motion.



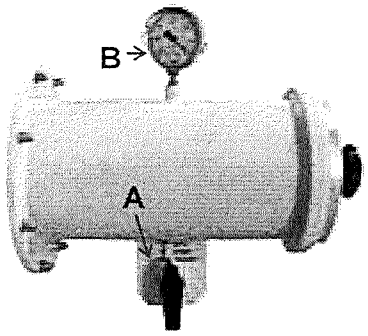
Transferring Material into the Glovebox – Mini Antechamber

Follow the steps below to perform a transfer of materials from room environment into the glovebox using the large antechamber.

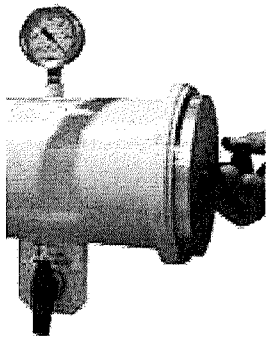
Before opening the outside antechamber door, verify:

- The inner antechamber door is closed;
- The hand valve (A) is in the closed position;
- The antechamber is not under vacuum (gauge (B) should read zero).

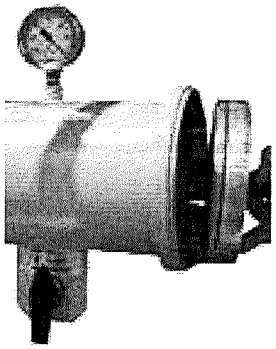
The picture to the right displays the correct hand valve position and the reading on the gauge at the zero position.



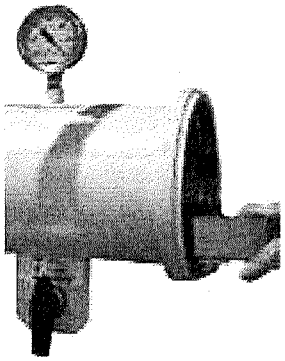
Turn the handle on the outer antechamber door in a counterclockwise direction to open it.



Remove the door.



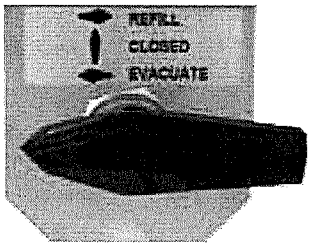
Gently pull out the sliding tray.



Place the materials to be used on the tray and slide the tray back into the antechamber.

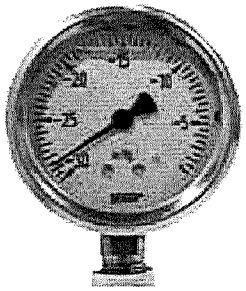
Replace the cover and lock into place by turning in a clockwise motion.

Evacuate the antechamber by turning the hand valve to the **Evacuate** position.

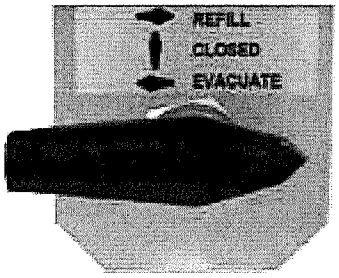


Wait for the gauge to settle at the **negative** position and continue to evacuate for:

Non-porous Material: 3 minutes
Porous Material: 12 hours

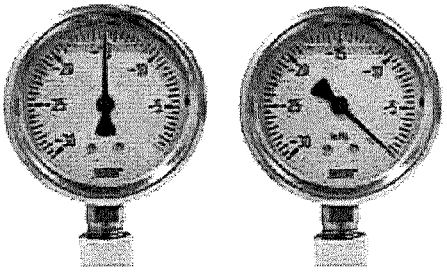


Refill the antechamber by turning the valve to the **Refill** position.



Non-porous Material
Wait for the gauge to settle at the **halfway** mark on the gauge.

Porous Material
Wait for the gauge to settle at **zero (0)**.



Repeat this process as necessary according the following recommended guidelines:

Non-porous Material

Evacuation (3 total cycles)

- *2 Additional Cycles – 3 minutes each*

Refill (3 total cycles – 2 intermediate, 1 final)

- *1 Intermediate Cycle – refill chamber halfway)*
- *1 Final Cycle – refill chamber to atmosphere (or zero on the gauge).*

Porous Material

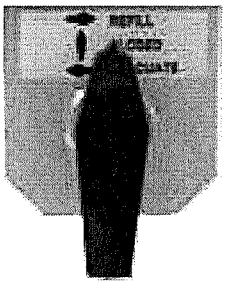
Evacuation

- *1 Cycle – 12 hours*

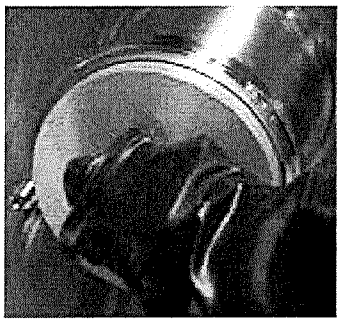
Refill

- *1 Cycle – refill chamber to atmosphere (or zero on the gauge).*

Turn the hand valve to the **Closed** position.



Turn the handle on the inner antechamber door in a counterclockwise direction to open it.



Remove the door.

Gently pull out the sliding tray.

Remove the materials to be used from the tray and slide the tray back into the antechamber.

Replace the cover and lock into place by turning in a clockwise motion.

Transferring Material out of the Glovebox

Transferring material out of the box is also a completely manual procedure. Follow the above steps in reverse to transfer materials out of the glovebox into room environment.

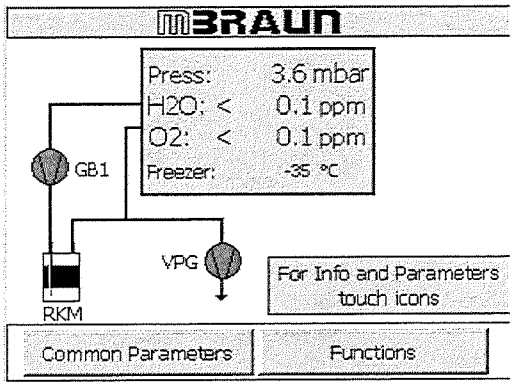
9.5 Freezers

General Information

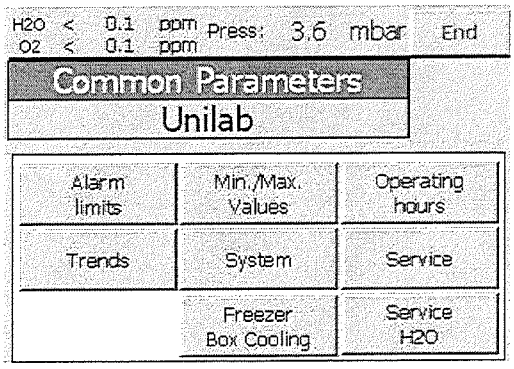
NOTICE	The actual temperature inside the freezer will always be displayed even if the freezer is inactive.

This section applies only to systems that are equipped with freezers.

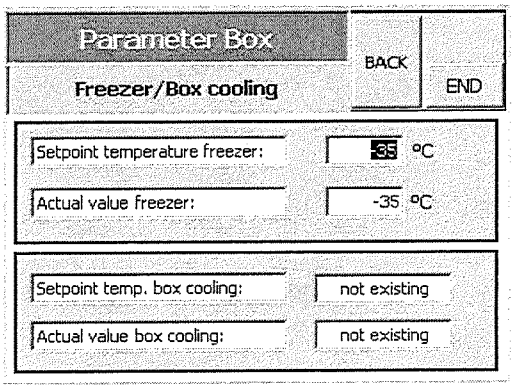
Touch the **Common Parameters** button on the Start screen.



Touch the **Freezer/Box Cooling** button on the parameters screen to display the Freezer/Box Cooling parameters screen.



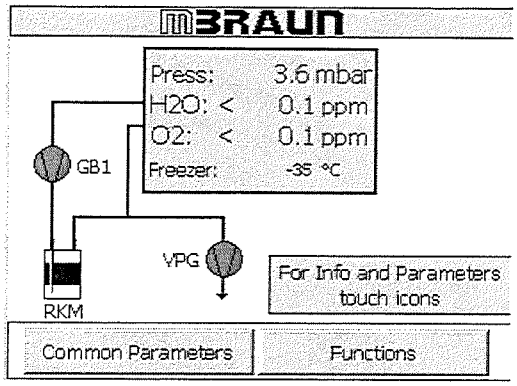
Touch the number field next to the **Setpoint Temperature Freezer** to display the alphanumeric keypad. Use the keypad to adjust the parameters in the same manner as before.



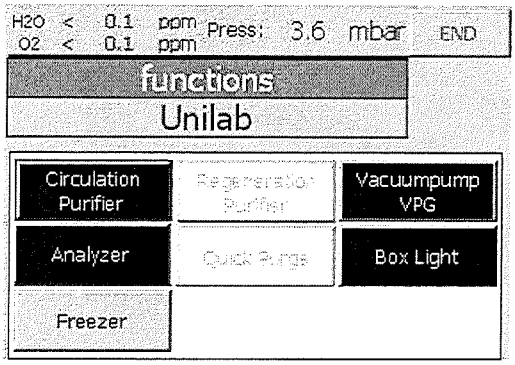
NOTICE	The default setpoint is -35°C however, the freezer parameters can be set at any temperature between -10°C and -35°C.

Touch the **End** button to return to the start screen.

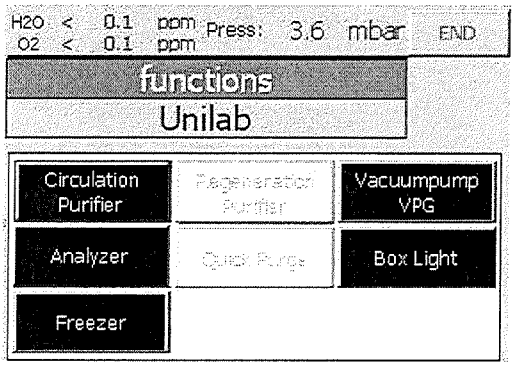
Touch the **Functions** button to display the functions screen.



Touch the **Freezer** button to activate the freezer.



Touch the **End** button to return to the start screen.



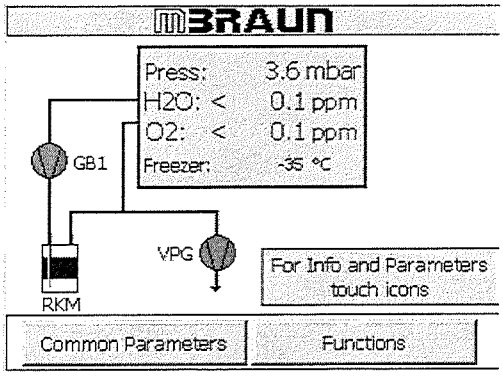
9.6 Regeneration Mode

NOTICE The regeneration process can only be started if the circulation process is inactive.

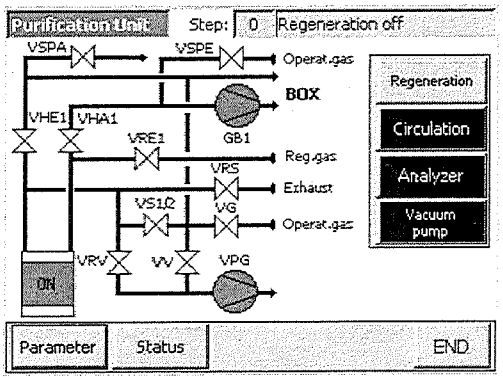
Circulation Auto Start

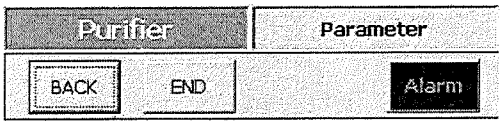
If desired, the circulation process can be started automatically following the end of the regeneration procedure. Follow the steps below to have circulation start automatically after the regeneration procedure is completed. Skip this step to restart the circulation process manually after the regeneration procedure is completed.

Touch the **RKM (Purifier)** icon on the start screen.

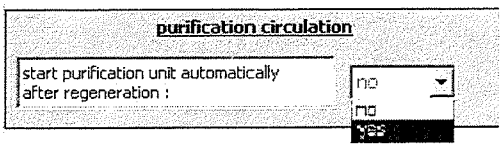


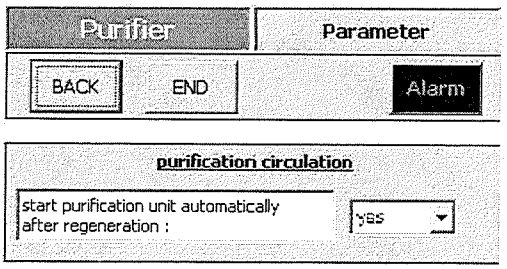
Touch the **Parameter** button on the purifier layout screen.





Select **Yes** from the drop down menu.

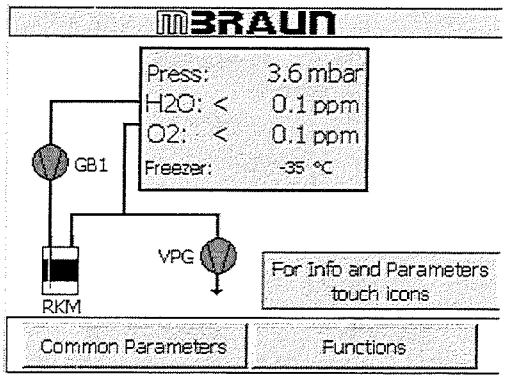




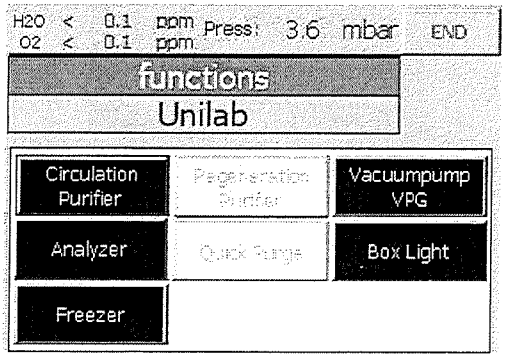
Touch the **End** button to return to the start screen.

Regeneration

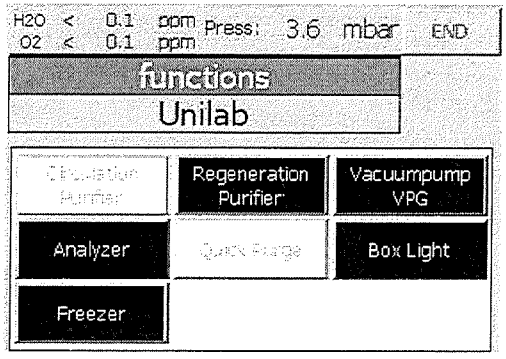
Follow the steps below to start the regeneration process.



Touch the **Functions** button on the start screen.

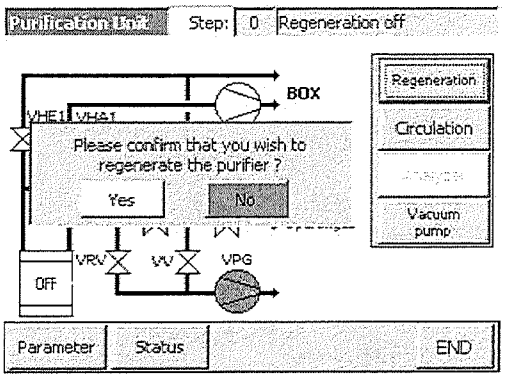


Deactivate the circulation process, if active, by touching the **Circulation Purifier** button.



Touch the **Regeneration Purifier** button on the functions screen.

The circulation button is blanked out as this function is unavailable during the purging process.



The purifier layout screen is displayed with the following message.

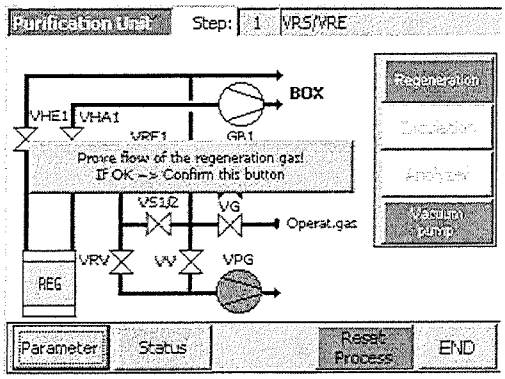
Please confirm that you wish to regenerate the purifier?

This message must be acknowledged (yes or no) before regeneration will initialize.

Using the regulator, turn on the regeneration gas supply and set the pressure to 5psi.

Place the end of the regeneration vent line running from the VRS valve on the valve block located on the back of the purifier to a 100ml (minimum size) collection vessel.

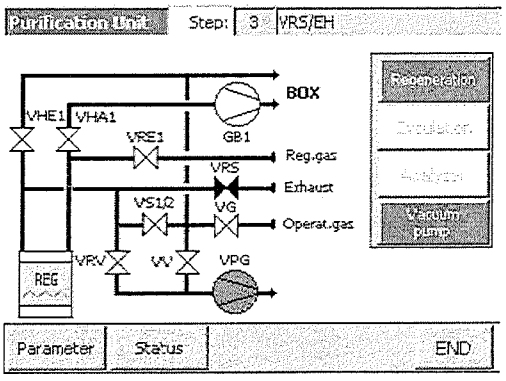
Vent the line and vessel to fume hood or other facility ventilation system.



A second message is displayed:

Prove flow of the regeneration gas! If OK → Confirm this button

This message must also be acknowledged before regeneration will initialize. Touch the message on the screen after confirming the flow is correct according to the above information.



After acknowledging the second message the purifier layout screen can remain displayed. This screen will display the active step in the regeneration process.

or

Touch the **End** button to display the start screen. To display the purifier layout screen at any time during the regeneration process touch the **RKM** icon on the start screen.

NOTICE

- After completing a regeneration process, the vacuum pump oil should be changed. Refer to vendor supplied manuals for instructions on changing the oil.
- Used oil should be disposed of in accordance with all facility, local and federal guidelines.

Chapter 10
Maintenance & Troubleshooting

CHAPTER 10: MAINTENANCE & TROUBLESHOOTING

10.1 General Information

This chapter provides general information for general maintenance of the Unilab Glovebox system and troubleshooting various problems which may be encountered during operation of the system. For information regarding troubleshooting of vendor manufactured components, please consult the vendor supplied user manuals.

NOTICE	Contact the M.Braun Service Department with questions regarding any of the troubleshooting steps listed below.

10.2 Maintenance Requirements

Daily Maintenance and Service

Windows:	Clean the exterior with a mild solution of soap or detergent and lukewarm water. Using a soft lint free cloth or sponge, gently wash the sheet to loosen dirt and grime and rinse well with clean water. To prevent water spotting, thoroughly dry with chamois or cellulose sponge. Avoid the use of abrasive cleaners, squeegees and/or other cleaning implements that may mar or gouge the coating. **Compatible Cleaning Agents:** **Aqueous Solutions of Soaps and Detergents** Windex[1] Top Job[2] Joy[2] Mr. Clean[2] Fantastik[3] Formula 409[4] 1 Registered Trademark of Drackett Products Co. 2 Registered Trademark of Procter & Gamble 3 Registered Trademark of Texize, Division of Norton Norwich Products Inc. 4 Registered Trademark of Clorox Co. **Organic Solvents** Butyl Cellosolve Hexcel, F.O. 554 Kerosene Neleco–Placer Naphtha (VM&P) grade Turco 5042 **Alcohols** Methanol and Isopropyl Alcohol
Gloves:	Check all gloves for damage. The surface of the gloves in which the user's hands are placed should be coated lightly with talcum powder to prevent drying and brittleness. Replace gloves immediately if any signs of damage or wear are detected. Never attempt to repair gloves.
Antechamber:	Check antechamber door seals for damage and/or debris. Coat lightly, as needed, with high vacuum grease. If the antechamber doors are difficult to open or close, apply a light coating of white lithium grease or other lubricant to the pivot points and/or door spindle.
Connections:	Check all connections to ensure they are seated properly and are leak free.
Components:	Observe the maintenance instructions of the third-party manufactured components as directed in supplied manuals.

Quarterly and Annual Maintenance and Service

Quarterly	Annually
• Inspect the gloves and glove ports, replace as needed. • Inspect the fluorescent box lights, replace as needed. • Inspect the solenoid valves, replace as needed. • Leakage test. • Test of the functions. • Inspect box filters, replace as needed.	• Replace the gloves. • Inspect the glove ports, replace as needed. • Inspect the fluorescent box lights, replace as needed. • Inspect the solenoid valves, replace as needed. • Leakage test. • Test of the functions. • Replace box filters. • Calibrate oxygen and moisture analyzers.

10.3 Touch Panel Maintenance

General Information

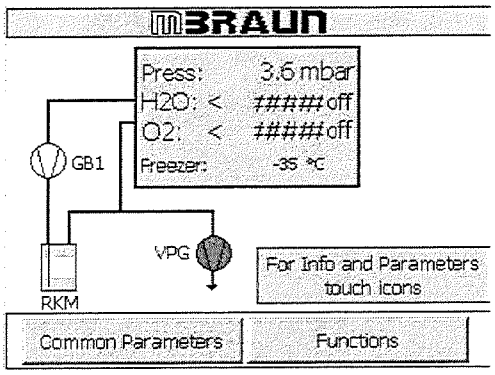
By accessing the System Screen the user can:

- Calibrate the touch panel screen
- Clean the touch panel screen
- Adjust the date & time settings

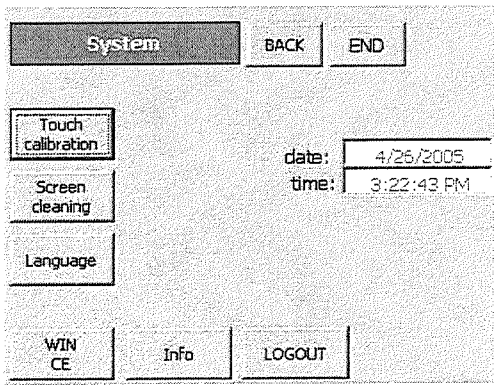
Below are instructions for each function.

Screen Calibration

Touch the **System** button on the Start Screen to access the System Settings Screen.



Touch the **Touch Calibration** button to activate the calibration process.

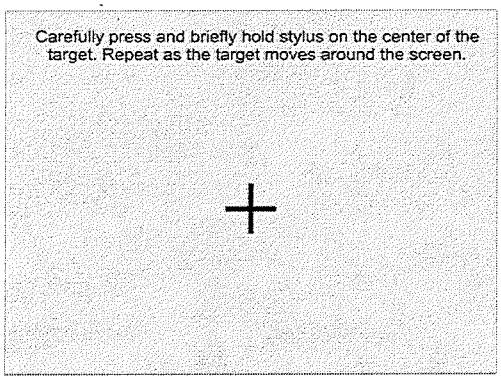


Five calibration crosses are displayed in succession at random points on the screen.

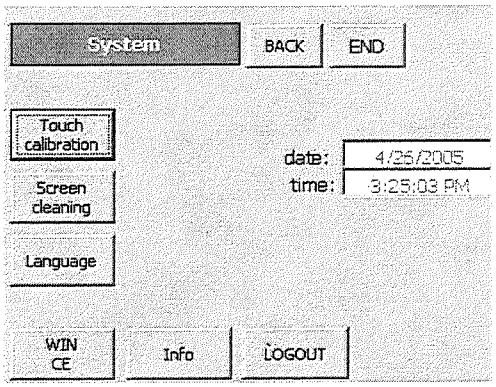
Follow the instructions displayed on the screen and touch each calibration cross as it is displayed.

To accept the changes made during the calibration process touch the screen at any time.

To reject the changes made during calibration wait for 30 seconds until the overlaid timer bar has reached zero. The system will revert back to the default settings.

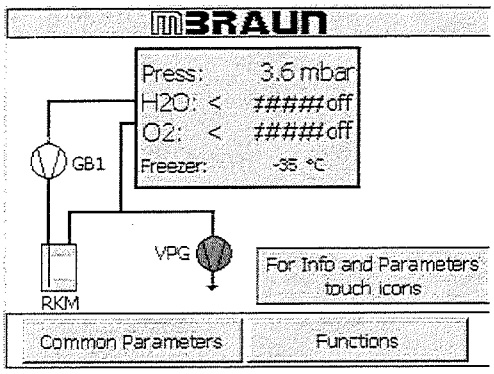


Upon completion of the calibration procedure, touch the **Main** or **Back** buttons to access the Start Screen and resume normal operation.

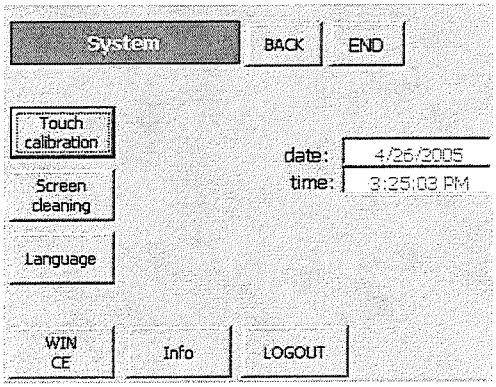


Screen Cleaning

Touch the **System** button on the Start Screen to access the System Settings Screen.

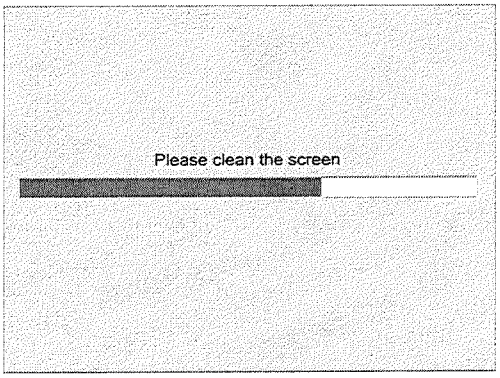


Touch the **Screen Cleaning** button.

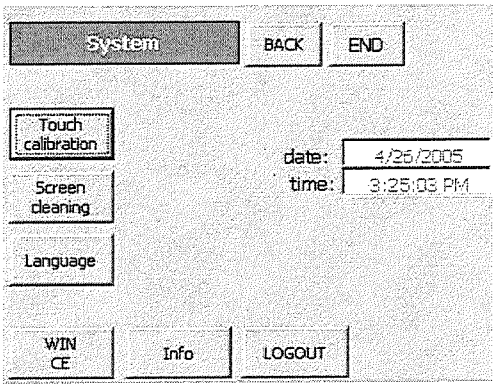


All system functions are locked out for 30 seconds while a screen with a timer bar is displayed to allow the user to clean the screen without interfering with system processes.

Clean the screen by applying a small amount of non-abrasive cleanser directly to a soft lint free cloth and gently wipe the screen. Do not apply the cleanser directly to the screen!

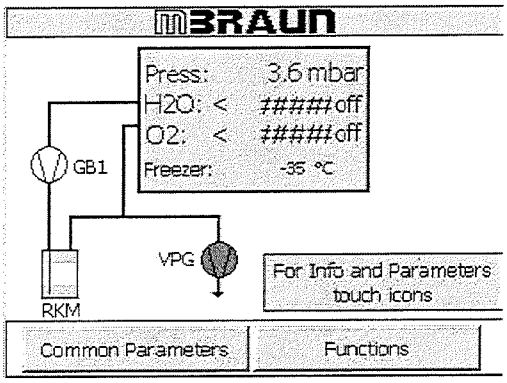


Upon completion of the cleaning procedure, touch the **Main** or **Back** buttons to access the Start Screen and resume normal operation.



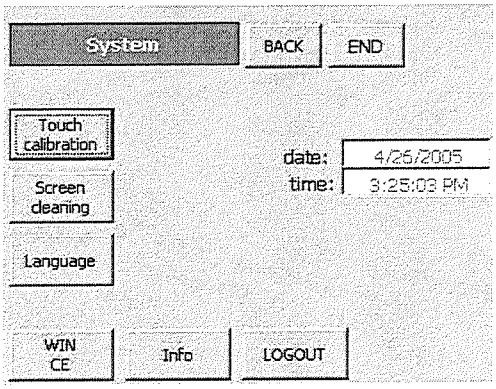
Setting the Date and Time

Touch the **System** button on the Start Screen to access the System Settings Screen.

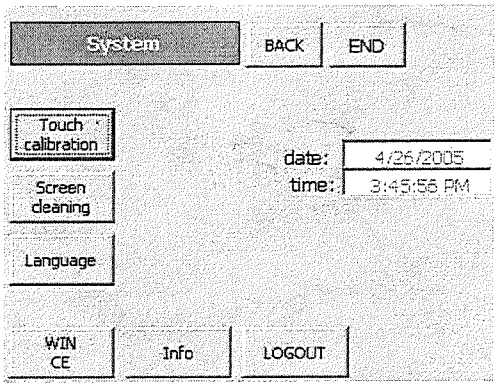


Touch the input field for the date and/or time to display an alphanumeric pad.

Enter the correct information according to the instructions detailed at the beginning of Chapter 4.



After making the appropriate changes, touch the **Main** or **Back** buttons to access the Start Screen and resume normal operation.



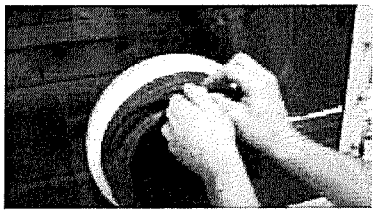
10.4 Replacing the Gloves

General Information

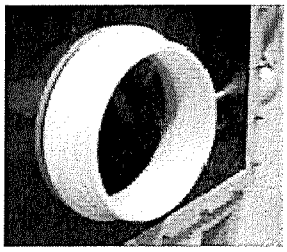
M.Braun recommends replacing the gloves at regular intervals. The gloves must be changed upon signs of wear and tear that may or have caused a leak.

⚠CAUTION	Before replacing the gloves ensure that the glovebox is atmosphere is safe to breathe. If necessary purge the glovebox to fill it with ambient air prior to changing the gloves.

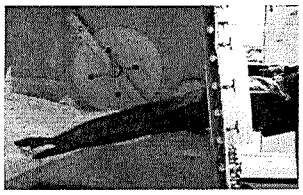
Carefully remove the two o-rings securing the glove in place.



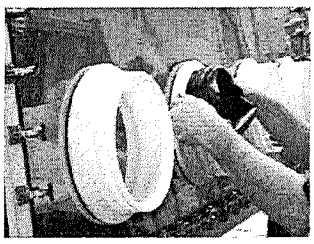
Carefully remove the glove from the gloveport.

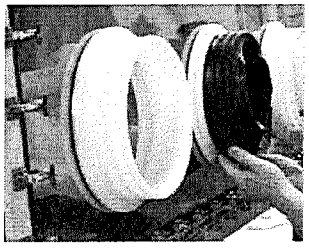


Slide the glove onto hand and insert arm into the box through the gloveport angling the thumb to a comfortable working position.



Slide hand out of the glove and work the cuff of the glove into the groove in the gloveport closest to the glass. At this time the thumb position can still be adjusted by rotating the cuff of the glove.

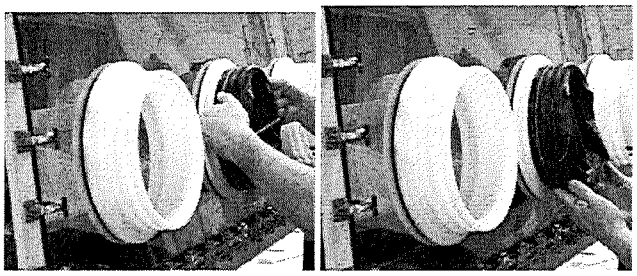




Secure the glove with two o-rings.

Place the o-ring in the top of the second groove from the glass and in one smooth motion pull down across the circumference of the gloveport.

Repeat the process for the remaining glove(s) and o-ring(s).



NOTICE	After replacing gloves, purge the glovebox to remove any undesired oxygen and/or moisture. (Refer to Chapter 8 Commissioning the System, Section 8.4 Purging)

Gloveport Covers

M.Braun gloveport covers, which are used to assist in replacing gloves or to block off an unused gloveport, are made for standard round glove ports and are available for either interior or exterior use.

Internal gloveport covers allow the user to replace gloves without contaminating the glovebox atmosphere with room air.

External gloveport covers allow the user to remove a glove(s) and continuing working within a glovebox without contaminating the glovebox atmosphere with room air.

Contact the Service Department for further information regarding price and availability of the gloveport covers.

⚠CAUTION	Do not seal off all gloveports at the same time. Sealing off all gloveports simultaneously could cause pressure to build up inside the glovebox which could cause the window to crack or rupture.

10.5 Moisture Analyzer Maintenance

General Information

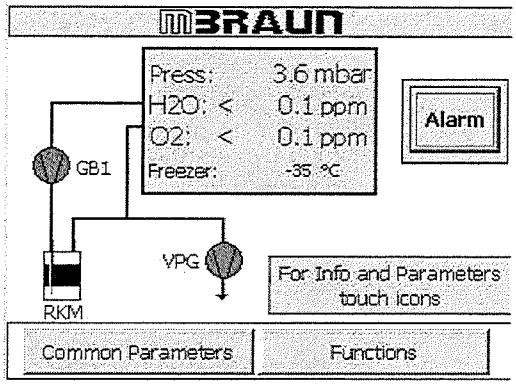
When the moisture analyzer reaches the 2,000 operating hours a button is displayed on the Common Parameters Screen. The Alarm icon will also be displayed until acknowledged. When these are displayed it is necessary to clean the probe on the analyzer. Follow the instructions carefully to avoid damaging the sensor probe.

Materials Required

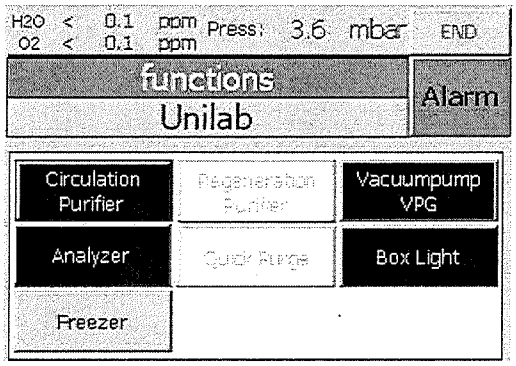
- Soft absorbent lint free cloth
- Phosphoric Acid
- Distilled Water
- Personal Protective Equipment (gloves, goggles, apron)

Instructions

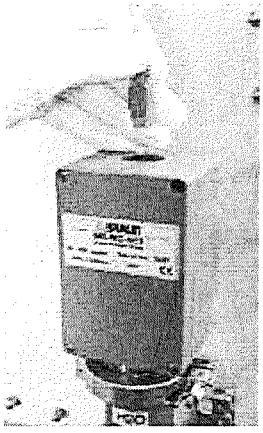
Touch the **Functions** button on the Start Screen.



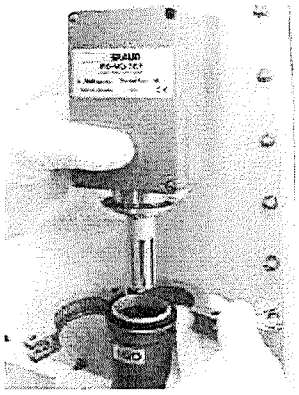
Touch the **Analyzers** button to deactivate the analyzers.



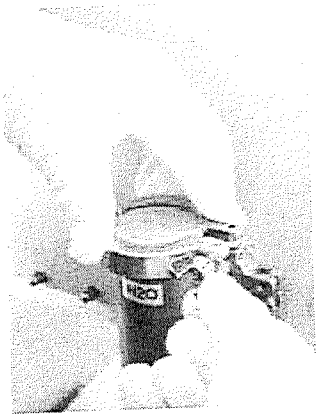
Remove the RJ45 plug connector from the analyzer.



Remove clamp and analyzer.

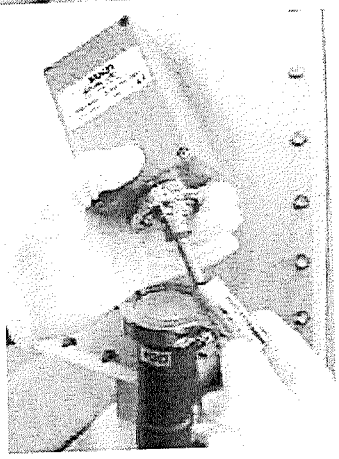


Place a blank KF40 cap over the pipe and secure in place with the clamp.

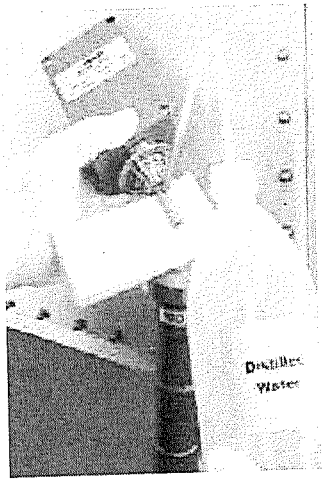


Separate the protective cover on the probe by turning in a counter clockwise direction.

Slowly and carefully remove the cover from the probe.

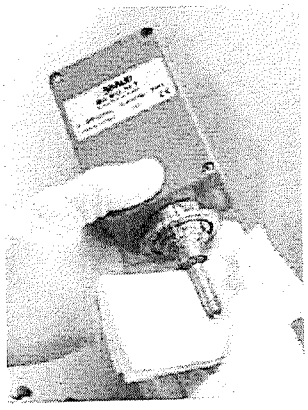


Place an absorbent lint free cloth under the probe and moisten the probe with distilled water.

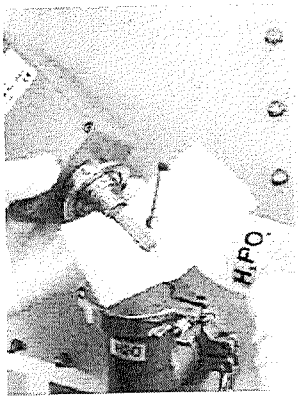


Wrap the moistened cloth around the probe. Gently spin the cloth in a clockwise direction to clean the probe.

Dry the probe in the same manner with a dry lint free cloth.



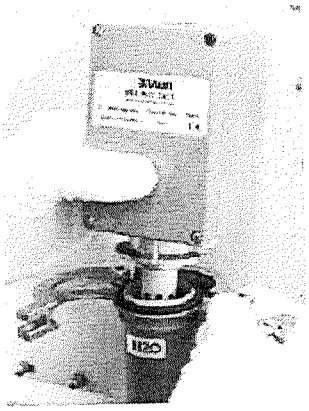
Place an absorbent lint free cloth under the probe and moisten the probe with Phosphoric Acid.



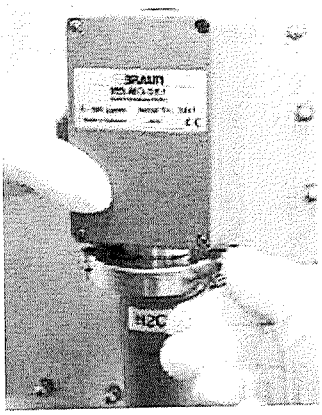
Carefully replace the protective cover and secure in place by turning a clockwise direction.

Remove KF40 clamp and blank cap.

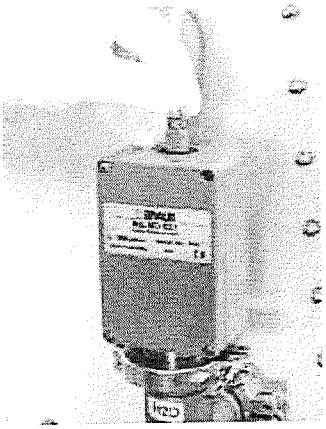
Carefully place the sensor end of the analyzer into the port on the circulation piping.



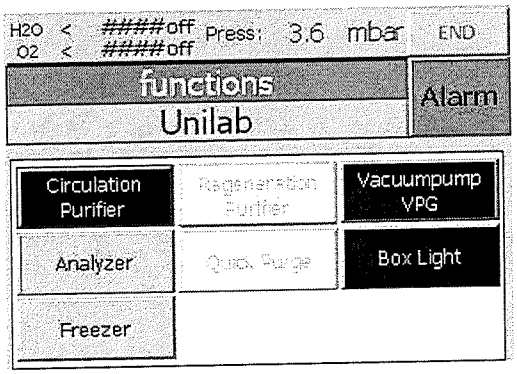
Secure in place with the KF40 clamp.



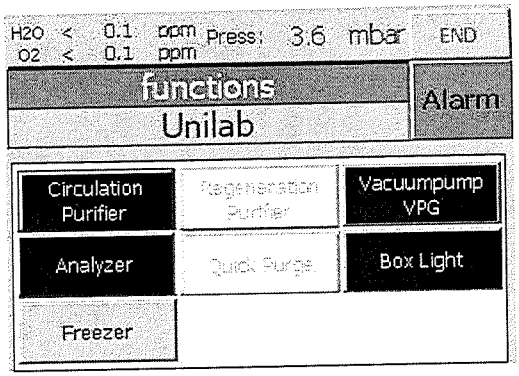
Insert the analyzer cable plug into the hole on the analyzer by pushing the plug into the hole gently until it snaps into place.



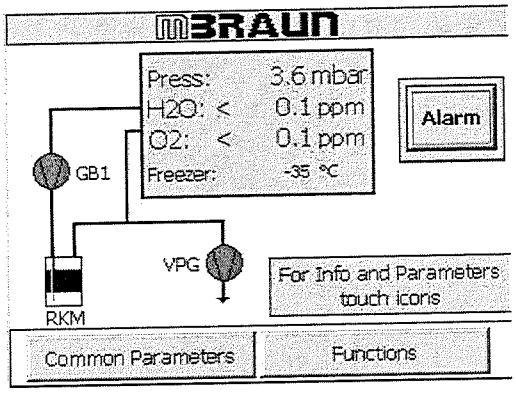
Touch the **Analyzers** button on the Functions screen to reactivate the analyzers.



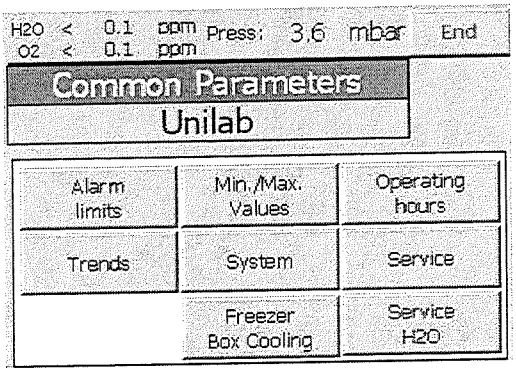
Touch the **End** button to return to the Start Screen.



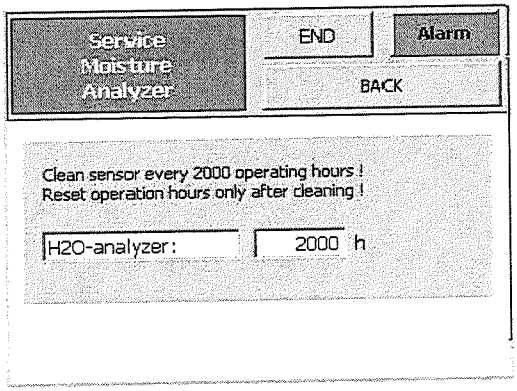
Touch the **Common Parameters** button on the Start Screen.



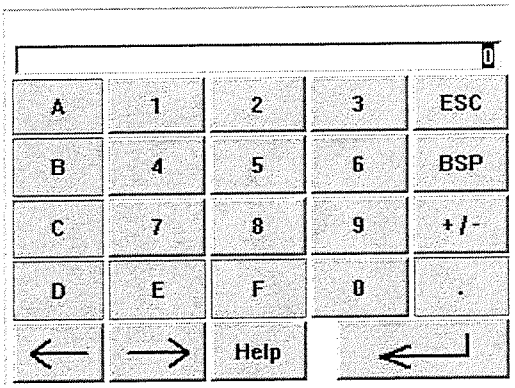
Touch the **Service H2O** button on the Common Parameters screen.



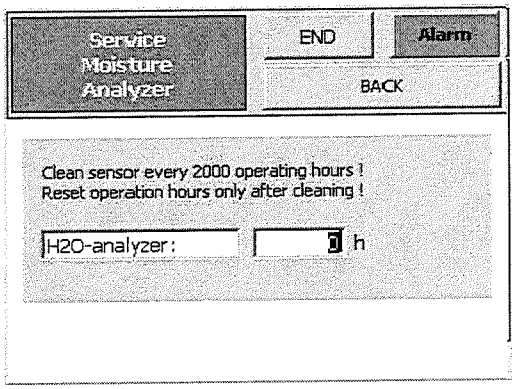
Touch the operating hours field to display the alphanumeric keypad.



Enter a value of **Zero (0)** and touch the  key to return to the Service Moisture Analyzer screen.



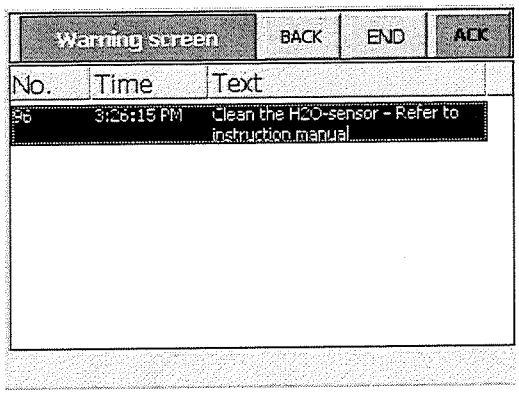
Touch the **Alarm** button to display the Warnings screen.



Highlight the alarm and touch the **ACK** button to delete the warning and acknowledge the alarm.

This will cause the **Service H2O** and **Alarm** buttons to disappear.

Touch the **End** button to return to the Start Screen and continue with normal operation.



10.6 Alarms

General Information

The following troubleshooting guidelines address the possible alarm warnings that the user may encounter during operation of the system.

⚠CAUTION	Contact MBRAUN directly with any questions that arise while attempting to troubleshoot the system or if an alarm message is displayed that is not included below. Do not attempt to resolve the problem.

Circulation Gas Flow

There is no gas flow to the experiment during circulation process.

Check the gas supply line. Is there gas from the main supply line into the system?	Yes – proceed to next step. No – turn on gas supply and continue normal operation. Proceed to next step if there is still no gas flow to the experiment.
Check the valve activation gas supply for correct flow rate (between 50 and 80psi) and adjust, if necessary. Did this correct the problem?	Yes – continue normal operation. No – Proceed to next step.
Check the connector plug on each VHA & VHE valve to ensure it is securely tightened to the valve body. Did the valve open?	Yes – continue normal operation No – contact M.Braun Service Department.

Regeneration Gas Flow

There is no gas flow through the system during regeneration process.

Check the gas supply line. Is there gas from the main supply line into the system?	Yes – proceed to next step. No – turn on gas supply and continue normal operation. Proceed to next step if there is still no gas through the system.
Check the gas supply for correct flow rate (between 5 and 10psi) and adjust, if necessary. Did this correct the problem?	Yes – continue normal operation. No – Proceed to next step.
Check the connector plug on each VRE and VRS valve to ensure it is securely tightened to the valve body. Did the valve open?	Yes – continue normal operation No – proceed to next step
Check each VRE and VRS valve on the active filter for a yellow LED which indicates there is a signal being sent to the valve from the PLC. Is the light on?	Yes, the light is on but the valve is not open and there is no flow to the experiment. – contact M.Braun Service Department. No – contact M.Braun Service Department.

Power Supply

The Main Power switch on the front of the system is set to the **On** position but the system is not functioning.

Is the system plugged into the main power supply?	Yes – proceed to next step No – Turn the main power switch to the **Off** position and plug the system in. Turn the switch to the **On** position and resume normal operation. Proceed to next step if this does not fix the problem.
Open the electrical cabinet located inside the system. Check main power breakers **F1**. Reset the blown breaker.	Did this correct the problem? Yes – continue normal operation No – contact M.Braun Service Department.

NOTICE If a breaker that has been reset blows again, contact the M.Braun Service Department.

Purifier Inlet/Outlet Not Open

One or both of the valves controlling circulation flow to and from the purifier bed fails to open. Possible reasons for failure are:

- The gas pressure required to open the valve is too low;
- The gas supply tanks are empty.

Reset the regulator on the gas supply to 80psi. Did the valve open?	Yes – continue normal operation No – contact the M.Braun Service Department.

Vacuum Pump VPG1: Motor Protective Switch Activated

The vacuum pump controlling antechamber evacuation is drawing too much current. Possible reasons for failure are:

- Debris in the vacuum pump;
- Vacuum pump oil is low or degraded;
- Vacuum pump is defective.

Check the vacuum pump oil level using the sight glass. Top off the oil level as needed. Did this fix the problem?	Yes – continue normal operation No – proceed to the next step.
Check the vacuum pump oil color using the sight glass, it should be clear. Change the oil in the vacuum pump. Did this fix the problem?	Yes – continue normal operation No – proceed to the next step.
Open the electrical cabinet and check the **F4** breaker. Reset it if it is blown. Did this fix the problem?	Yes – continue normal operation No – contact the M.Braun Service Department.

Sensor Box Pressure Defective

The main pressure sensor for the system has failed causing circulation, analyzers, gas in and gas out to be deactivated. Contact the M.Braun Service Department to obtain a replacement sensor.

O2 or H2O Sensor Defective

The oxygen or moisture analyzer is not displaying a numerical reading on the PLC screen. Possible reasons for failure are:

- The cable is damaged;
- The RJ45 connector is not inserted correctly;
- The sensor head is damaged or defective.

Check the RJ45 connector to ensure it is plugged into the analyzer properly. Adjust as necessary. Did this fix the problem?	Yes – continue normal operation No – proceed to the next step.
Unplug the RJ45 connector. Inspect the cable and plug for damage. Reinsert the connector back into the analyzer. Did this fix the problem?	Yes – continue normal operation No – contact the M.Braun Service Department.

Freezer Motor Protective Switch Activated
Box Cooling Motor Protective Switch Activated

The compressor used to operate the freezer or box cooling unit has exceeded current draw limit. Possible reasons for failure are:

- The compressor is drawing too much amperage;
- A power outage or power surge;
- System restart;
- The compressor is defective.

Open the electrical cabinet and check the **F7** breaker (freezer) or **F8** breaker (box cooling). Reset it if it is blown. Did this fix the problem?	Yes – continue normal operation No – contact the M.Braun Service Department.