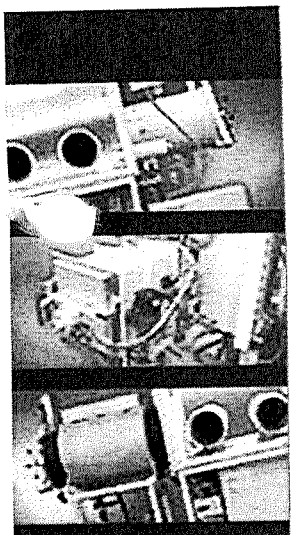


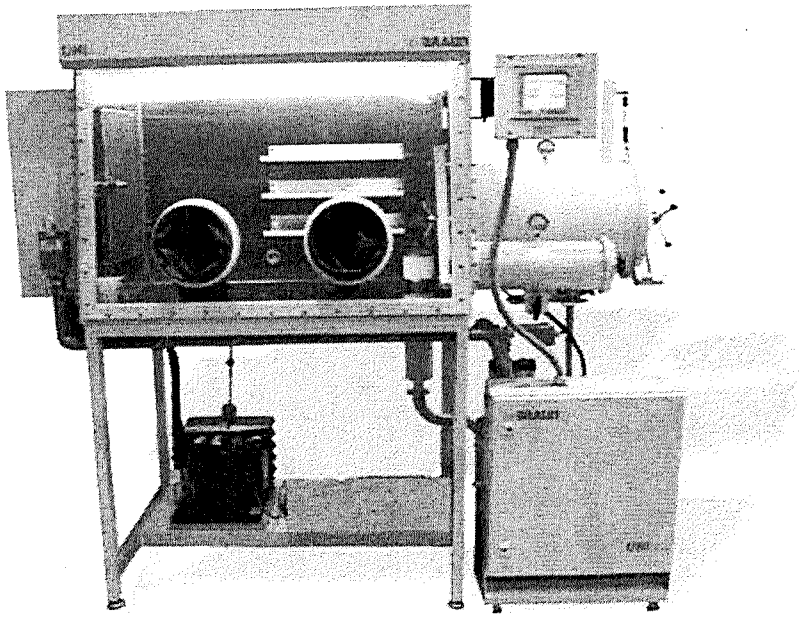
OPERATING INSTRUCTIONS

MBRAUN

Operating Instructions

UNIlab©

Glovebox System



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Chapter 1
General Information

CHAPTER 1: GENERAL INFORMATION

1.1 Entries Referring to the System

This documentation is part of the system:

Designation / Type:	
Series Number(s):	
Persons In Charge of System:	

Space left for notes on system settings, instructions for maintenance, etc.

1.2 Contact Information

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14 Marin Way
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Chapter 2
Liability, Warranty and Safety

CHAPTER 2: LIABILITY, WARRANTY & SAFETY

2.1 General Information

Prior to installation, initialization and operation of the system, this manual should be read in its entirety and positioned in a suitable area near the system to allow for easy reference. Any persons charged with the transport, storing, installation, commissioning, operating, maintenance and/or service of this system must be familiar with the entire contents of this manual.

To ensure safe operation of the system and to maintain a safe working environment, the information contained within this chapter must be adhered to by all users of the system. Advice contained in this chapter is intended to supplement, not supersede, the safety advice given in other chapters of this manual and the general safety regulations and guidelines prevailing in the user's workplace.

In addition to the guidelines and information contained within this manual all internal and local health, safety and environmental guidelines should be followed.

Safety instructions and pertinent information are marked in the following manner:

⚠DANGER	Indicates an imminently hazardous situation which, if not avoided, will result in death, serious injury or serious damage to the system, other equipment or surrounding environment.
⚠WARNING	Indicates a potentially hazardous situation which, if not avoided, could result in death, serious injury or serious damage to the system, other equipment or surrounding environment.
⚠CAUTION	Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury or damage to the system, other equipment or surrounding environment.
NOTICE	Indicates additional advice or recommendations for using the system or completing a task.

Please consider all instructions, in particular safety instructions, in order to achieve safe operation of the system.

2.2 Liability

The manufacturer will not take any liability of object, personal or secondary damage caused by improper use or ignoring of safety instructions as well as caused by the owner's manual due to missing updates after the system or its software have been modified, nor will the manufacturer take any liability of damages due to loss of data. In addition, the terms of business that are part of the order/contract will apply.

Our products are continuously modified an improved due to innovation, legal requirements and standards. Consequently, the information give in this documentation may not accurately reflect every detail of the system actually delivered. Please contact the manufacturer in cases of uncertainty.

2.3 Warranty

We guarantee the equipment as stated in the order/contract.

This warranty will expire in case of:

- Interference into or modification of the system without prior consent of the manufacturer;
- Improper use of the system;
- Insufficient maintenance of the system;
- Inappropriate operation of the system;
- Negligence of correct supply requirements;
- Application of third-part components to the system without prior consent of the manufacturer;
- Alteration of program or configuration write-ups without manufacturer's consent.

NOTICE	This applies to a single unit and multi-unit system types.

2.4 Operation Guidelines

MBRAUN glovebox systems are operated using inert gas enabling the user to handle substances which are sensitive to oxygen and/or moisture. It is the responsibility of the user to follow all local health, safety and environmental guidelines with regards to the handling and disposing of substances which may be injurious to health. This also applies to the disposal of vacuum pump oil and all components and filtering devices which come in contact with the gas flow.

⚠DANGER	There is a risk of suffocation when working with high inert gas concentrations.

On request, **MBRAUN** can recommend a personal measuring instrument that alerts the operator to a reduction of oxygen content in the ambient air.

The following general safety guidelines must be considered when working with inert gas concentrations:

- The selected location should have a "room" volume that is significantly larger than the glovebox interior volume.
- The system should be located in a well ventilated area. This is especially important during a purging procedure or when opening an active system (i.e. antechambers, etc.).
- All exhaust fumes should be vented through an adequate disposal/ventilation system.

NOTICE	Contact **MBRAUN** prior to the acquisition of the system if it is not possible to adhere to all the above recommendations. This way the system can be equipped with additional safety devices.

- Prior to performing maintenance or service inside an active system, remove one glove to allow a slow equalization of the glovebox interior atmosphere with the ambient room air.

⚠CAUTION	To better avoid the risk of suffocation, it is necessary for the glovebox atmosphere to be completely replaced with ambient room air prior to servicing the interior of an active glovebox.

⚠WARNING	Standard **MBRAUN** glovebox systems are not designed for the use of strongly poisonous or radioactive substances. Use of these types of materials must be coordinated with **MBRAUN** prior to the acquisition of a system.

2.5 Safety – General Hazards

This system has been designed and manufactured considering all relevant safety regulations. Improper use or operation by persons not qualified accordingly may result in danger to the:

- Life and health of the operator;
- System itself;
- Surroundings of the user;
- Performance and efficiency of the system.

General hazards of the system may arise in the following ways:

- Mechanical hazard caused by squeezing, shearing and cutting, catching and winding, stretching or by freely moving parts;
- Thrust caused by kinetic energy of moving mass;
- Sharp corners and edges;
- Electrical hazard caused by touching live parts (directly or indirectly);
- Thermal hazard causing burns;
- Chemical hazard causing poisoning, corrosion and explosion;
- Toxic hazard due to inhalation of vapours and gases;
- Gases under pressure;
- Liquids under pressure;
- Combination of hazards caused by:
  - faulty installation
  - incorrect loading
  - breakdown of power or media supply
  - breakdown and/or incorrect arrangement of preventive measures
  - combination of escaping media
- Hazards caused by:
  - human misconduct
  - noise
  - allergies, excitations of mucous membrane, unknown effects caused by media
  - ejection of parts
  - disturbance / malfunction of control system
  - leaking of hoses or pipes
  - combination of atmospheres or vapors
  - fire hazard
  - natural hazards e.g. lightning, flooding, environmental catastrophes etc.

2.6 Safety – Mechanical

⚠WARNING

Freely moving parts may cause squeezing, shearing and cutting, catching and winding, stretching of extremities. Extreme caution should be taken to avoid touching any moving parts of the system during operation.

When handling materials with mechanical, pneumatic or vacuum systems it is possible that materials may be ejected. Extreme caution should be taken to avoid any possible contact with the ejected materials without proper protection.

Only genuine parts supplied by **MBRAUN** should be used in the operation of the system. These parts are constructed in conformance with applicable safety regulations. No liability will be taken by **MBRAUN** in the event of installation of parts manufactured by companies other than **MBRAUN** which may result in additional and unknown hazards.

Simultaneous operation of the system by two or more persons is not recommended as this may cause hazards based on misconduct or mutual misunderstanding. In case of the system being operated by two or more persons, operation should be conducted in such a way as to ensure each individual's respective task does not influence other tasks in any way.

Safety covers, panels, panes, windows or doors may not be removed at any time, unless there is a need for service. The system may not be opened (i.e. antechambers, etc.) during processing or power failures. In the case of any safety deficiencies, the system must be decommissioned and the service personnel informed accordingly. During decommissioning compliance with all local health, safety and environmental guidelines must be followed.

2.7 Safety – Electrical

This system operates under high voltage. Risk of injury caused by high voltages exists anytime the system is connected to the power supply, this includes when the system is powered off. Capacitors within the system may be charged when the system is switched off and disconnected from main power supply.

⚠WARNING	Interchange of current bearing wires can result in electrical hazards such as shock, involuntary muscle reaction, muscle paralysis, burnt tissues and organs, or death.

Connection to the main power supply must be performed by a qualified electrician according to local area guidelines. All neutral and ground wires must be connected accordingly.

Opening the system or removing parts when the system is powered on, may result in exposure to live electrical connectors. Extreme caution should be taken to avoid directly or indirectly touching live connectors to avoid possible electric shock.

⚠CAUTION	Prior to performing any electrical service work on the system, ensure the system is powered off and disconnected from the power supply.

Service required while the system is in operation should only be performed only by qualified personnel trained in the knowledge and prevention of all potentially dangerous and hazardous situations.

The system must be grounded/earthed at all times. Do not remove or cut off any ground wire for the system or its components. In case of insufficient grounding or damaged ground conductor ensure the system will be inoperable and secure it against unauthorized or unintentional operation.

⚠DANGER	Insufficient grounding can cause electrostatic charging of plastic parts, hoses or pipes, wiring and/or the system as a whole, which could cause solvents and process chemicals to ignite.

Replacement of fuses should be of the same type and current rating.

⚠WARNING	Makeshift fuses and/or short circuit fuse holders should never be used in the operation of the system.

2.8 Safety – Handling of Electronic Components

Electrostatic discharges can cause damage to parts. When handling electronic components the following precautions should be observed:

a) Wear a grounded wrist strap or work on a grounded static-dissipating work surface. If this not possible touch an adjacent earth ground (i.e. central heaters or water pipes) before handling electronic components or printed circuit boards.
b) Leave electronic components and printed circuit boards in their original packaging until final installation.
c) Handle electronic components by their body or case, avoid touching of leads.
d) Keep electronic components and printed circuit boards away from such static generating materials as vinyl, plastic bags, etc.

NOTICE	Maintenance and repair work required, but not listed in this manual, should only be carried out by **MBRAUN** service or by persons of equivalent qualification.

2.9 Safety – Chemicals and Gases

Chemicals used in the system are not supplied by **MBRAUN**. Chemicals are provided and applied by the system user.

Proper handling of chemicals, corrosives and solvents is the user's responsibility. Materials used may be flammable, explosive, toxic.

Below are some guidelines to refer to when handling chemical substances:

- Ensure the all relevant Control of Substance Hazardous to Health (COSHH) guidelines are followed;
- Observe relevant safety regulations as well as material safety data sheets (MSDS) and additional advice provided by the supplier;
- Wear proper protective safety masks, gloves and eyewear whenever working with chemicals, corrosives or solvents;
- Mark all containers and supply lines of chemicals (i.e. containers of media and waste) with appropriate labels and warning signs;
- Ensure proper ventilation and exhaustion of vapours;
- Wear proper breathing protection to avoid the risk of suffocation;
- Keep away from ignition sources;
- Do not smoke;
- Do not ingest food or beverage while working with the chemicals, corrosives or solvents to avoid the risk of poisoning.

⚠CAUTION	Released chemicals may react with each other, leading to unwanted and/or unknown substances, which may cause additional risks.

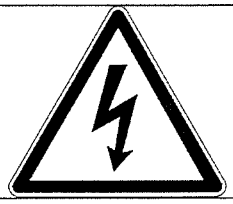
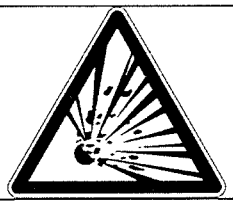
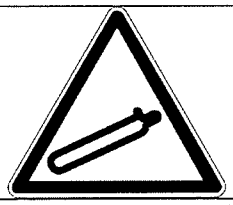
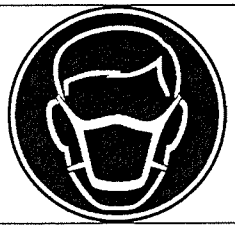
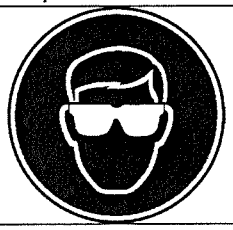
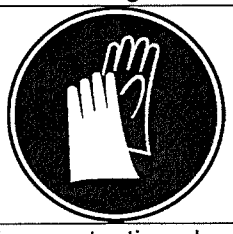
Proper handling of gases is the user's responsibility. Gases used may be flammable, explosive, toxic. Below are some guidelines to refer to when handling gaseous materials:

- Do not inhale the gas to avoid risk of suffocation.
- Prevent electrostatic charging and beware of ignition sources.
- Do not smoke.

NOTICE	When using corrosive, gassing or noxious materials, the safety of all employees must be ensured by whatever means necessary. Specifically, all employees must be trained in the safe handling of the materials to be used.

2.10 Safety – Symbols Used on the System

The following symbols refer to **MBRAUN** components and parts. However, components and parts of sub-suppliers may show other symbols, not expressly mentioned or referred to in this manual. The following caution and command symbols may be seen on the system:

		
General hazard	Electrical hazard	Fire hazard
		
Toxic hazard	Explosion hazard	Pressurised gas hazard
		
Wear safety mask	Wear safety goggles	Wear protective gloves

NOTICE	The owner of the system is responsible to place adequate danger signals and labels in suitable places. This applies in particular to signals and labels concerning process chemicals used. Regardless of the number of caution symbols and information placed on or around the system, all safety instructions of this manual must be observed!

2.11 Safety – Emergencies

In case of an emergency, please observe the following instructions:

1. Immediately shutdown the system using the main power switch.
2. Disconnect the system from all gas supplies.
3. Refer to the material safety data sheets for information on treating the emergency. Contact the appropriate emergency response personnel in the area and/or listed on the material safety data sheets.

⚠CAUTION	Do not disconnect the water supply for systems containing components requiring a cooling water source.

Prior to restarting, the system must be fully checked for safety, contact the **MBRAUN** Service Department after the emergency has been rectified.

NOTICE	In addition to the information contained in this manual all local health, safety and environmental guidelines must be followed.

2.12 Additional Information

The system is considered to be unsafe for operation if:

- there is any visible damage;
- it fails to perform according to specification;
- it has been subject to prolonged storage under unfavourable conditions;
- it has been subjected to severe transport stress.

If the system meets any or all of the above:

- make it inoperable;
- secure it against any unauthorized or unintentional operation;
- contact the **MBRAUN** Service Department.

⚠CAUTION	Do not perform any service or repair of the system or its components other than described in this manual.
NOTICE	Maintenance, repair and service other than described in this manual may only be performed by **MBRAUN** service personnel or properly trained/qualified individuals.

Chapter 3
Principles of Operation

CHAPTER 3: PRINCIPLES OF OPERATION

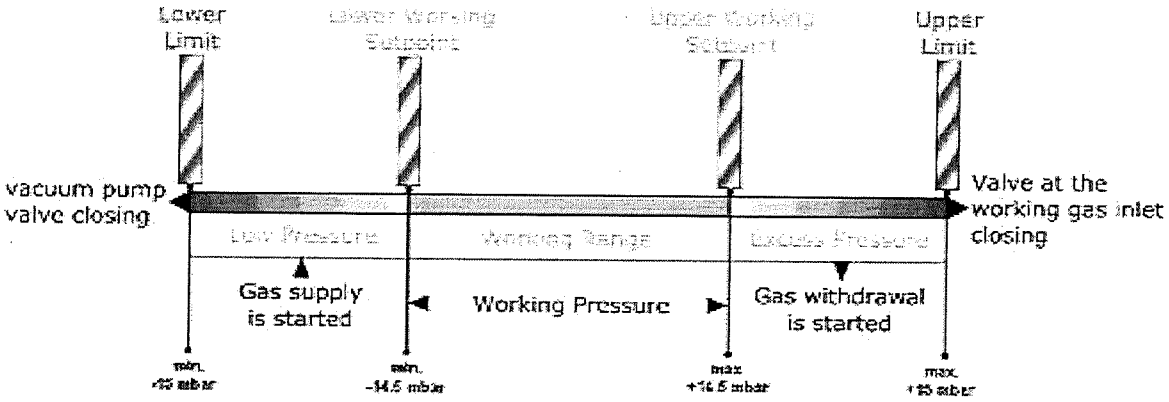
3.1 Description of the System

M.Braun glovebox systems, which are operated using a closed loop circulation method, provide the user with a non-reactive atmosphere of <1ppm moisture and oxygen content. The system has three major functions: Purging, Circulation and Regeneration. Each of these processes is explained in detail in the following sections. For information for operating the system functions, refer to Chapter 9 of this manual.

3.2 Pressure Control System

General Information

The system is equipped with a PLC operated pressure control system which starts automatically when the system is activated. Upper and lower working pressure parameters, which are set by the user, provide a comfortable range for the user to work in. Depending upon the application, the system can be operated in the positive or negative pressure state.



Definition of Terms

Box Pressure	Current pressure within the glovebox.
Working Range	The range within the working setpoints at which the box pressure fluctuates.
Upper Working Setpoint Lower Working Setpoint	Adjustable setpoint parameters used to establish the working range.
Limit Setpoint	The fixed value range between which the working parameters can be set. This is a factory established range which cannot be adjusted.

3.3 Purging the System

Purging the glovebox replaces the ambient air inside the box with the working gas by providing a constant flow of working gas into and out of the box. The purge function can be performed either manually by the user or automatically by the system. The automatic or "quick purge" function is not included with all systems but is an available option that can be purchased at any time after the glovebox has been installed and/or running for any period of time.

As a general guideline a system should be purged when the oxygen level inside the box exceeds 100ppm. Possible reasons for an elevated oxygen level are:

- Initial commissioning of the system;
- Recent service or repair made to the system;
- Room atmosphere entering the box due to improper use;
- Leaks in the system or other damage (e.g. torn gloves, etc.).

The purging process can be performed three (3) different ways:

Reverse Purge	Performed on systems with no manual purge valve or automatic purge function. This can also be performed on systems with either of the mentioned options if the user chooses to do so.

⚠CAUTION	The Reverse Purge method purges the working gas directly into the user's room environment, use caution when working in the vicinity of a glovebox undergoing reverse purge.

Manual Purge	Performed on systems with a manual purge valve located on the top of the glovebox system. This valve should be vented to a fume hood or facility exhaust system.
Automatic Purge	Performed on systems with this function incorporated into the PLC program via the VSA valve. This valve should be vented to a fume hood or facility exhaust system.

Both reverse purge and manual purge procedures require the user to enter box pressure setpoints in the PLC prior to beginning operation. The automatic purge function does not require any parameters to be set prior to beginning the operation.

Purge time and gas consumption varies and is based on glovebox volume and the level of purity required in the glovebox.

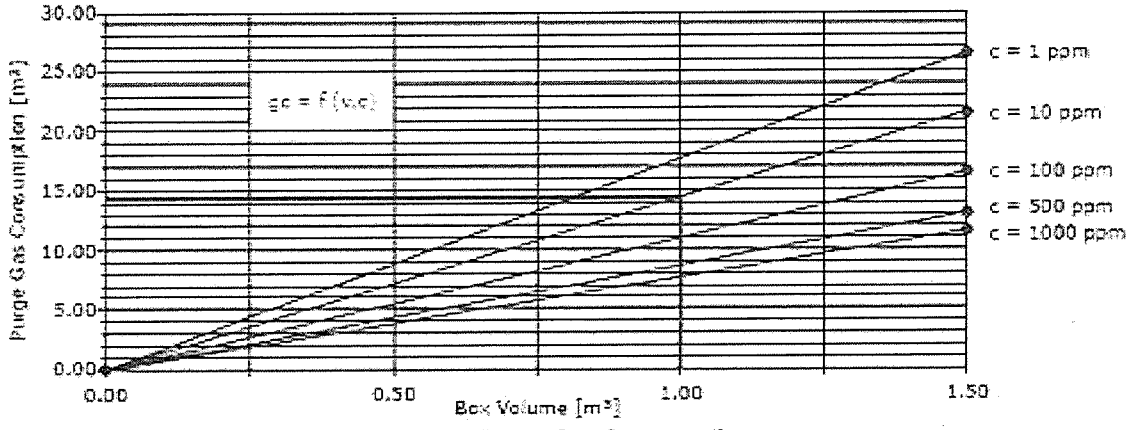
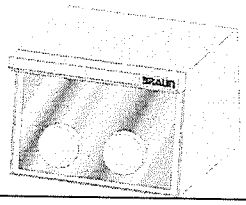
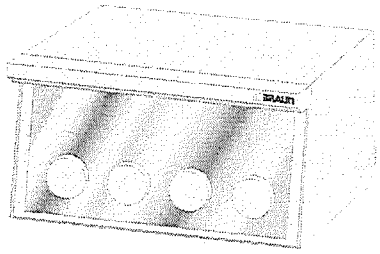


Figure 1 - Purge Gas Consumption

Figure 1 above shows that a desired box atmosphere purity of 10ppm requires approximately 14.50m³ of purge gas per cubic meter of box volume.

Below is the information regarding the glovebox volume for the two different size Unilab Systems. Use this chart to determine the amount of gas required for purging during the commissioning of the system.

System Type & Size (width/depth in mm)	Glovebox Volume (cubic feet/cubic meters)
Unilab 1200/780 	28.38f^3 / .08m^3
Unilab 2000/780 	44.77f^3 / 1.27 m^3

3.4 Circulation Mode

Circulation mode is the normal operation mode for working within the glovebox system. During normal operation working gas is continuously circulated between the glovebox and the gas purification system. As the working gas passes through the filter column the oxygen and moisture content is scrubbed from the gas. This provides the user with a consistent inert glovebox environment in which to work.

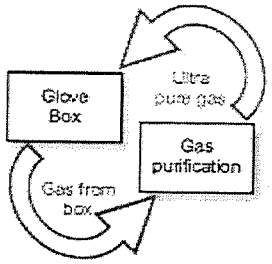


Figure 2 - Principle of Circulation

3.5 Regeneration Mode

When the glovebox is used for an extended period of time, oxygen and moisture begins to accumulate inside the purifier filter column which decreases the effectiveness of the circulation process. Regeneration is the process of removing the excess oxygen and moisture from the filter bed material inside the purifier column. This is a multi-step 16 hour process during which the glovebox cannot be used for normal operation (circulation).

⚠WARNING

The regeneration procedure should not be interrupted at any time during the process. If for any reason the process is terminated prematurely, do not restart any system processes. Contact the M.Braun Service Department immediately.

3.6 Antechamber Operation

General Information

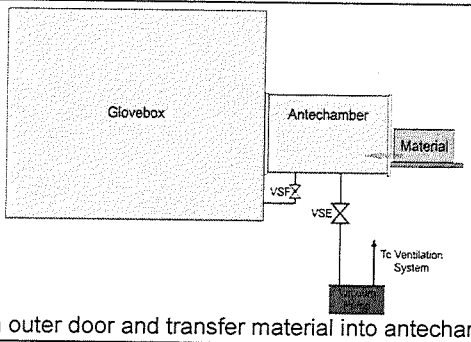
The system is equipped with a large (and/or small) antechamber designed for transferring material into or out of the glovebox without polluting the internal box atmosphere or the room atmosphere. The antechamber(s) is equipped with an inner door, outer door and sliding tray to ease in transferring materials.

Transferring material into and out of the box is a completely manual procedure which utilizes the antechamber components and the touch screen. The chamber undergoes several evacuation/refill cycles to clear the chamber of room or glovebox atmosphere prior to removing the material from the chamber.

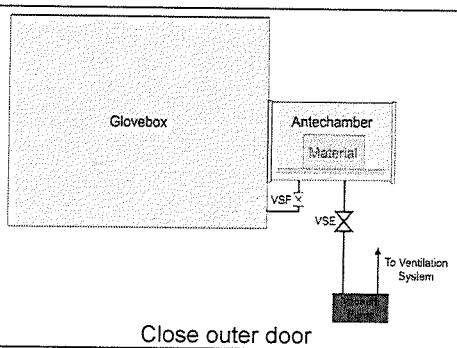
NOTICE

- An evacuated chamber cannot be opened. Attempting to open an evacuated antechamber may damage the door locking mechanism.
- Keep both antechamber doors closed when not transferring materials.

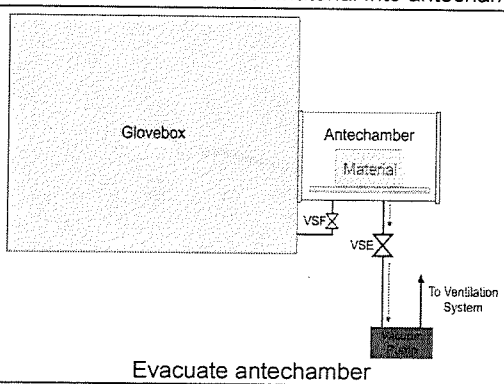
Method of Operation



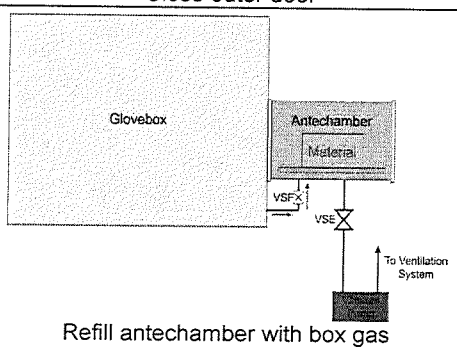
Open outer door and transfer material into antechamber



Close outer door

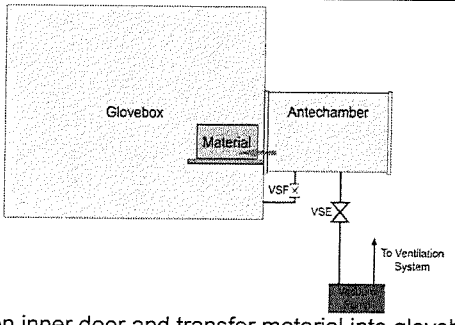


Evacuate antechamber



Refill antechamber with box gas

Repeat the Evacuate and Refill antechamber steps according to the guidelines listed in Chapter 9 Section 9.4 Antechamber Operation.



Open inner door and transfer material into glovebox

Important Notes

⚠CAUTION

- Never open the inner and outer antechamber doors simultaneously.
- Never open the inner door of an antechamber filled with room atmosphere. This would result in pollution of the box atmosphere which could cause damage to instruments and/or materials inside the box.
- Depending on the materials used inside the glovebox, vapors may be released into the room when material is transferred into or out of the glovebox.

⚠CAUTION

Material transferred between the glovebox and room atmosphere must be able to withstand the pressure difference during the antechamber purge process (e.g. partially filled vessels, etc.). Open the seal slightly (e.g. lids of bottles, etc.) to allow the vessel to be vented to prevent implosion.

3.7 Analyzers

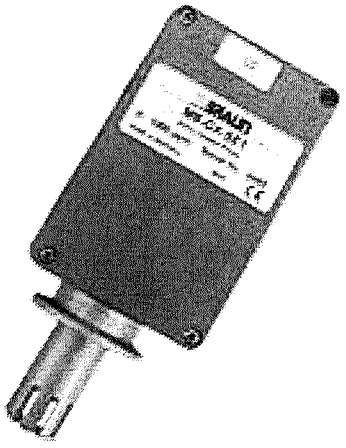
General Information

This section applies only to systems that are equipped with oxygen and/or moisture analyzers. Each analyzer contains a sensor head that is protected with a metal cap and electronics that are used to measure (depending on the analyzer type) the oxygen or moisture content of the working gas inside the glovebox. The analyzers are connected to the PLC via a cable with an RJ45 connector.

While not all systems are equipped with one or both analyzers at the time of initial installation they can be purchased at any time. Please contact the M.Braun Sales or Service Department for further information.

Oxygen Analyzer (MB OX-SE-1©)

The oxygen analyzer, with a measuring range of 0 – 1,000ppm, monitors the atmosphere inside the glovebox for residual oxygen content. The analyzer is designed to provide exact readings within the range of 0 – 100ppm. An estimated reading of the oxygen content is provided when the oxygen level rises above 100ppm.



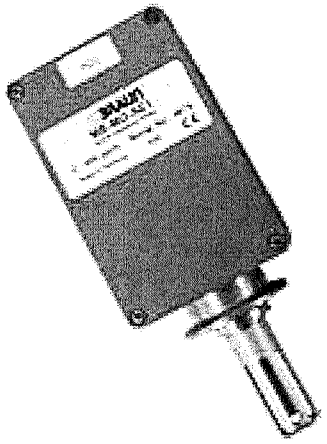
The sensor element is a miniaturized Zirconium Dioxide plate operated at elevated temperature that is controlled by a platinum resistor. The electronics are supplied with 24 V DC and deliver a 0 – 10V signal proportional to the concentration of Oxygen. An additional input for the electronics allows the switching on and off of the sensor heating by means of the PLC.[1]

⚠DANGER

Contact with Hydrogen, solvents and other aggressive gaseous substances will cause permanent damage to the sensor.

[1] M.Braun, Inc., Sales Literature, MB OX-SE1© Oxygen Probe, (Edition 2/2004)

Moisture Analyzer (MB MO-SE-1©)



The moisture analyzer, with a measuring range of 0 – 350ppm, monitors the atmosphere inside the glovebox for residual moisture content. The analyzer is designed to provide exact readings within the range of 0 – 50ppm. An estimated reading of the oxygen content is provided when the oxygen level rises above 50ppm.

The sensor element consists of two (2) parallel platinum coils coated with phosphoric acid, and a PT1000 temperature sensor. The electronics are supplied with 24VDC and deliver a 0 – 10V signal in proportion to the concentration of H_20.[2]

[2] M.Braun, Inc., Sales Literature, MB MO-SE1© Oxygen Probe, (Edition 2/2004)

Chapter 4
Touch Panel Operation

CHAPTER 4: TOUCH PANEL OPERATION

4.1 General Information

The Unilab Glovebox System utilizes a Touch Screen Display panel. All functions and/or selections are performed by lightly touching the button or icon on the screen.

NOTICE

An optional protective self adhesive foil is available for the touch screen. This protects the screen from scratches, dirt and grime.

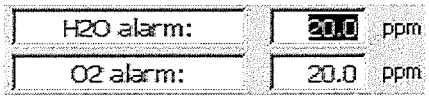
This protective foil also provides a matte surface to reduce glare and can be removed at any time without leaving any residue on the screen.

Do not use any sharp or pointed objects to remove the protective foil as this may result in damage to the touch screen.

4.2 Input and Password Fields

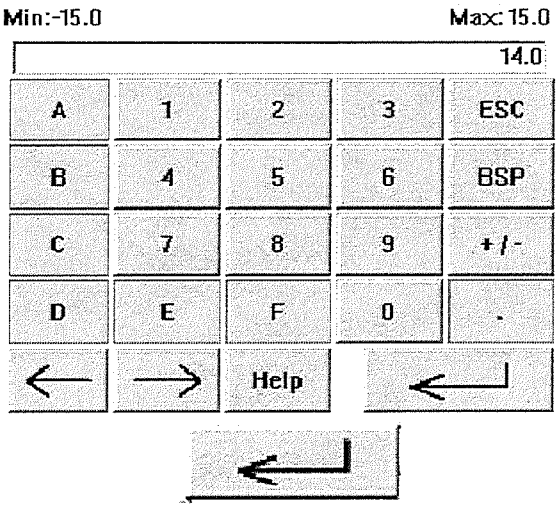
Input Fields

Certain screens contain information which can be changed by the user. This information is entered using an alphanumeric pad which is displayed when an input field is touched.



When an input field is activated, a keyboard is displayed on the screen.

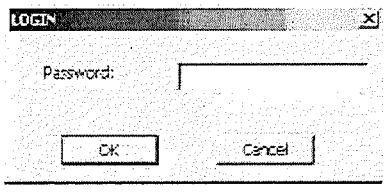
Using this keyboard, you can enter new values into an input field.



After completing the entry, press the enter key to confirm the value.

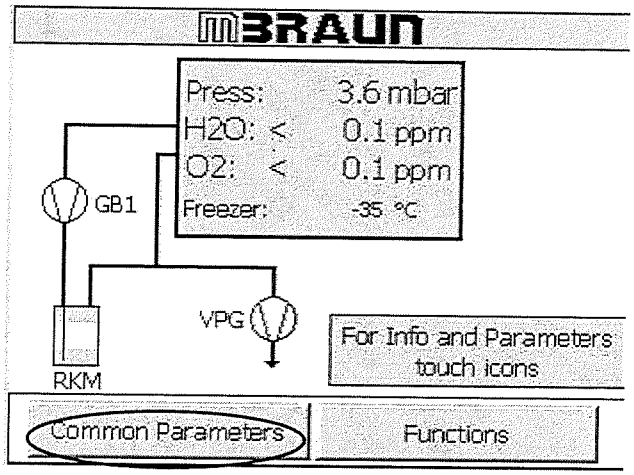
Password Fields

Certain input fields require a user password to be entered. When an input field requiring a password is touched, a password screen is displayed. To enter the password, touch the white area in the screen. Only authorized users can make changes to the input fields.

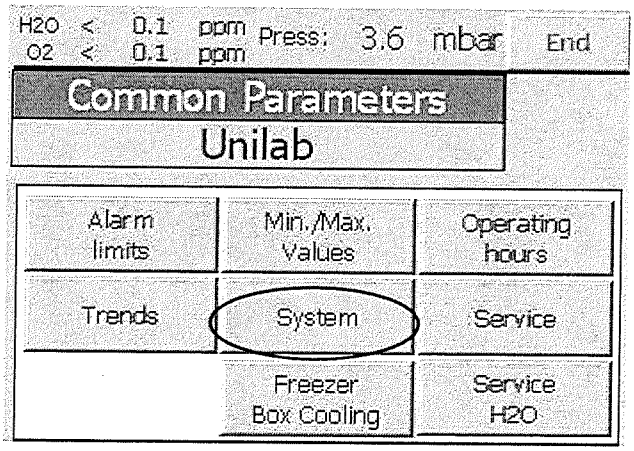


4.3 Displaying the System Information

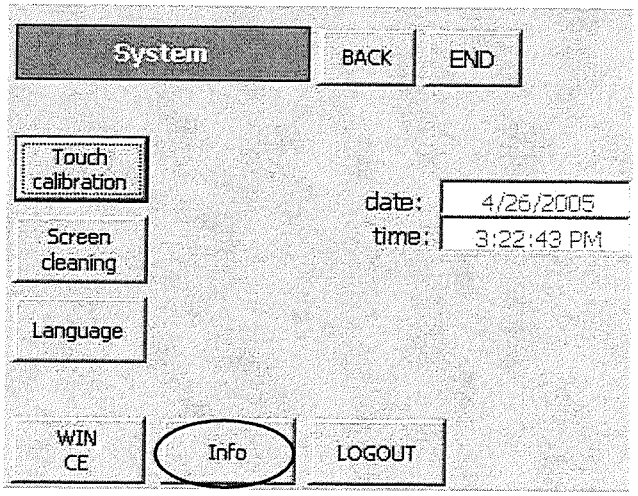
Touch the **Common Parameters** button on the Start Screen.



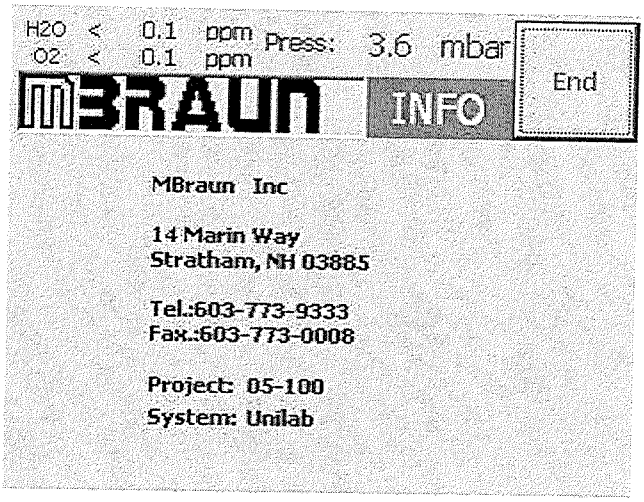
Touch the **System** button to access the System settings screen.



Touch the **Info** button.



The Information Screen is displayed providing M.Braun contact information and information regarding the project number or serial number for the system.



Service Password

User: admin

Psud: 6970

Chapter 5
System Screens

CHAPTER 5: SYSTEM SCREENS

5.1 General Information

The Unilab is operated using a Touch Screen located on the side of the system above the antechamber. This chapter provides an introduction to the various screens that the user will access during operation of the system.

To activate a component or operation touch the corresponding button. To deactivate a component or operation touch the corresponding button again.

Gray buttons represent inactive functions, black buttons represent active functions and white buttons represent functions which are temporarily unavailable.

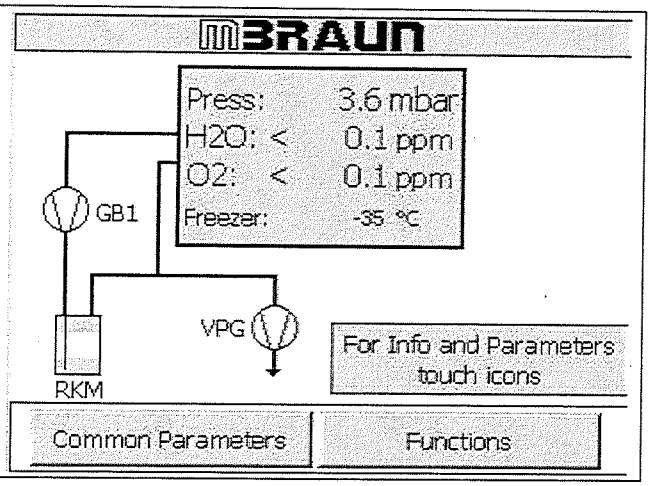
The list below displays the buttons and information fields which are located on multiple screens associated with the system.

Button / Information Field	Description
Alarm Alarm	Displays the Alarm Screen. Blinks black & gray when an alarm is present.
Press: 3.6 mbar	Displays the actual glovebox pressure.
H2O: < 0.1 ppm	Displays the moisture level inside the glovebox as detected by the analyzer.
O2: < 0.1 ppm	Displays the oxygen level inside the glovebox as detected by the analyzer.
BACK	Displays the previous screen.
END	Displays the Start screen.

5.2 Start Screen

Main screen displayed on the touch panel.

All functions and screens related to the operation of the glovebox and other components are accessed via the Start Screen.

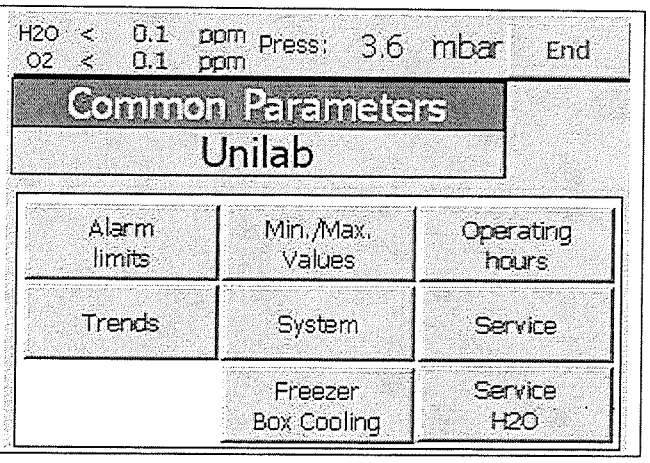


Graphic Reference Key

Icon / Button	Description
	Displays the status of the blower.
	Displays the status of the vacuum pump.
 Purifier Inactive / Circulation Active / Regeneration Active	Displays the status of the purifier. Used to access the Purifier Layout screen.
	Displays the actual freezer temperature. This field is not displayed when there is no freezer present on the system.

5.3 Common Parameters Screen

Accessed via the Start Screen by touching the Common Parameters button.

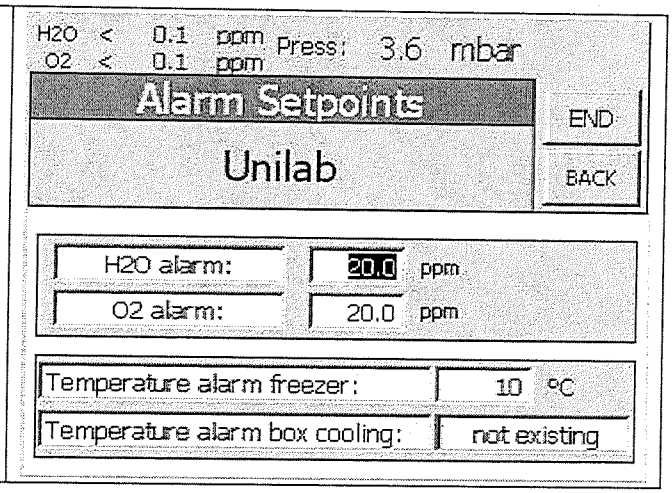


Graphic Reference Key

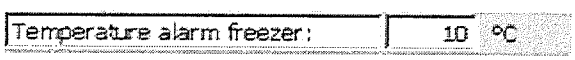
Button	Description
Alarm limits	Displays the Alarm Setpoints screen.
Min./Max. Values	Displays the analyzer Min./Max. Values screen.
Operating hours	Displays the Operating Hours screen.
Trends	Displays the Box Trends screen.
System	Displays the System information screen.
Service	Displays the Service screen.
Freezer Box Cooling	Displays the Freezer/Box Cooling parameters screen.
Service H2O	Displays the Service Moisture Analyzer screen. This button is only present when the actual operating hours of the analyzer reach 2000 hours.

5.4 Alarm Setpoints Screen

Accessed via the Common Parameters screen by touching the **Alarm Limits** button.



Graphic Reference Key

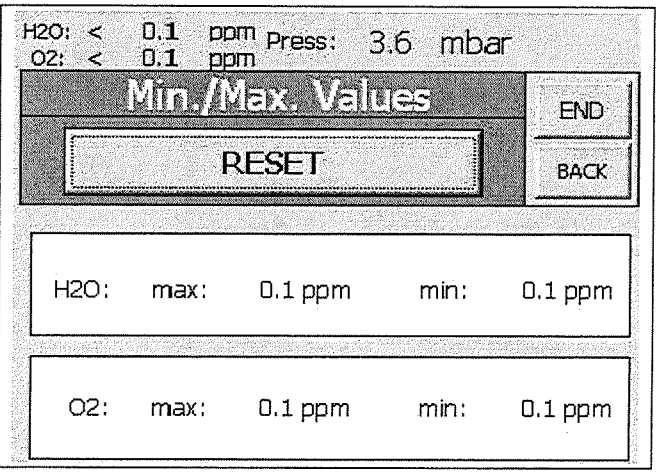
Button	Description
	Used to set the alarm parameter for the moisture analyzer when present on the system.
	Used to set the alarm parameter for the oxygen analyzer when present on the system.
	Used to set the alarm parameter for the freezer when present on the system.
	Used to set the alarm parameter for the box cooling unit when present on the system.

5.5 Min./Max. Values Screen

Accessed via the Common Parameters screen by touching the **Min./Max. Values** button.

This screen displays the highest and lowest oxygen and moisture levels as detected by the analyzers.

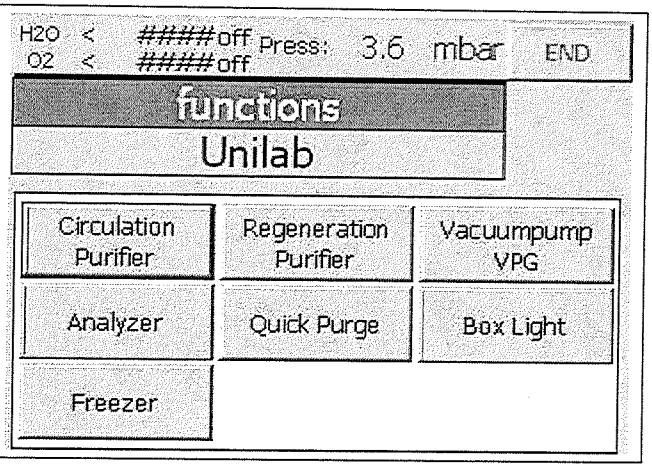
Use the **Reset** button to reset the displayed values to zero.



5.6 Functions Screen

Accessed via the Start Screen by touching the Functions button.

Not all functions shown on this screen are included with every system. In the event of a component or function not being included, the button will not be displayed on this screen.

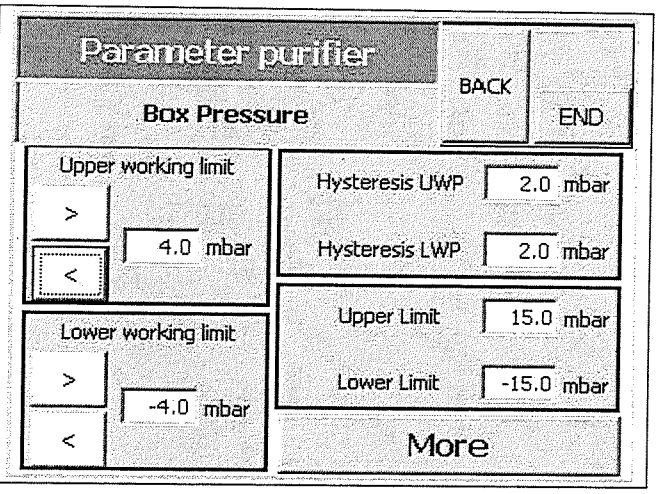


Graphic Reference Key

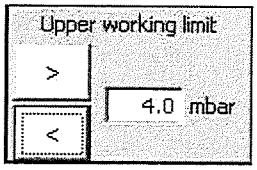
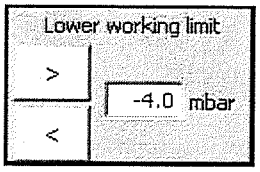
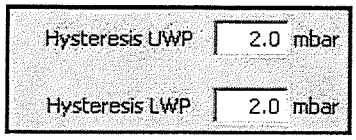
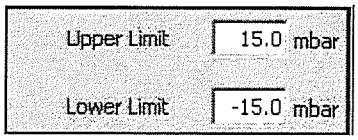
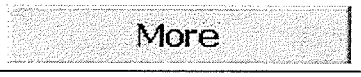
Button			Description
Circulation Purifier	Circulation Purifier	Circulation Purifier	Used to activate and deactivate the circulation process.
Regeneration Purifier	Regeneration Purifier	Regeneration Purifier	Used to activate the regeneration process.
Vacuumpump VPG	Vacuumpump VPG		Used to activate and deactivate the vacuum pump.
Analyzer	Analyzer	Analyzer	Used to activate and deactivate the analyzer(s). (This button is grayed out when analyzers are not present on the system.)
Quick Purge	Quick Purge	Quick Purge	Used to activate the automatic purge process.
Box Light	Box Light		Used to turn the light on and off.
Freezer	Freezer		Used to turn the freezer on and off. (This button is only present when there is a freezer on the system.)

5.7 Box Pressure Parameters Screen

Accessed via the Start Screen by touching the Pressure and Analyzer Details field.



Graphic Reference Key

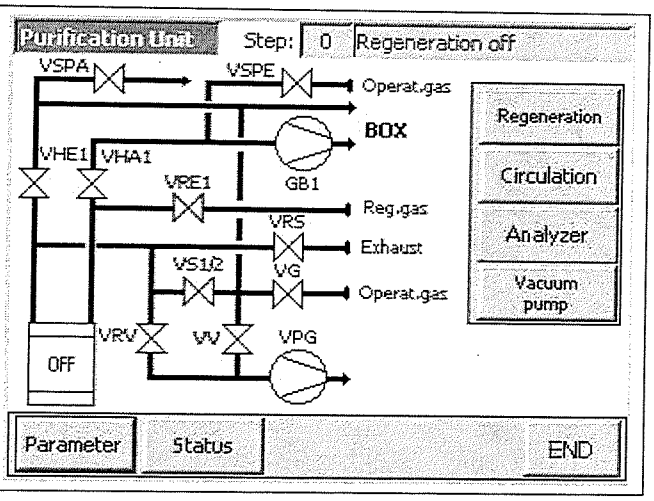
Information Field/ Button	Description
	Used to enter the upper working box pressure setpoint.
	Used to enter the lower working box pressure setpoint.
	Displays the setpoint at which the box pressure will rise or drop when the actual box pressure reaches the upper or lower working limit.
	Displays the default pressure alarm limits for the system.
	Displays the Freezer/Box Cooling screen.

5.8 Purifier Layout Screen

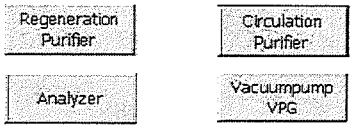
Accessed via the Start Screen by touching the **RKM** icon.

Valve Definitions

VSPA	-	Purge Outlet
VSPE	-	Purge Inlet
VHE1	-	Purifier Inlet
VHA1	-	Purifier Outlet
VRE1	-	Regen. Gas Inlet
VRS	-	Regen. Gas Outlet
VS1/2	-	Pressure Compensation
VG	-	Working Gas Inlet
VRV	-	Regen. Vacuum
VV	-	Box Vacuum
VPG	-	Vacuum Pump



Graphic Reference Key

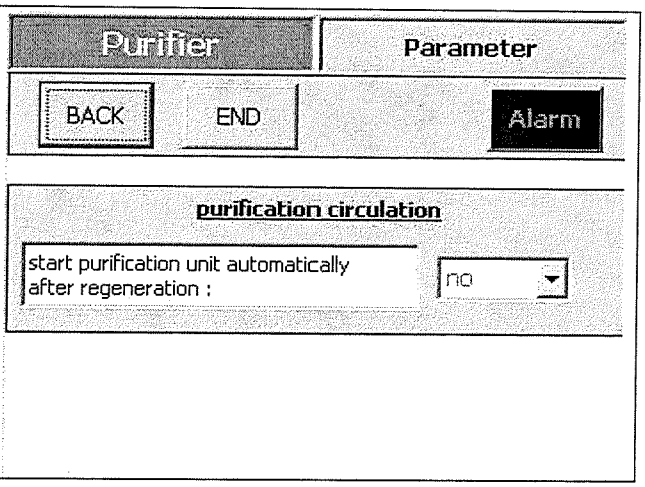
Information Field / Button / Icon	Description
 	Displays the status of the various valves throughout the system.
 GB1  GB1	Displays the status of the blower.
VPG  VPG 	Displays the status of the vacuum pump.
 Purifier Inactive  Circulation Active  Regeneration Active	Displays the status of the purifier.
	Displays the active step of the regeneration process.
	Used to activate and deactivate the various components and processes. These buttons work the same as the buttons located on the Functions screen.
	Used to access the purifier parameters screen.
	Used to access the purifier status screen.

5.9 Purifier Parameter Screen

Accessed via the Purifier Layout screen by touching the **Parameter** button.

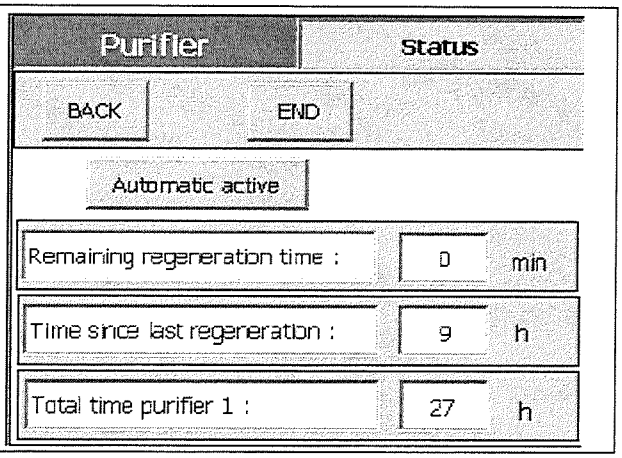
Choose **Yes** to have circulation start automatically after the regeneration process is completed.

Choose **No** to start circulation manually after the regeneration process is completed.



5.10 Purifier Status Screen

Accessed via the Purifier Layout screen by touching the **Status** button.



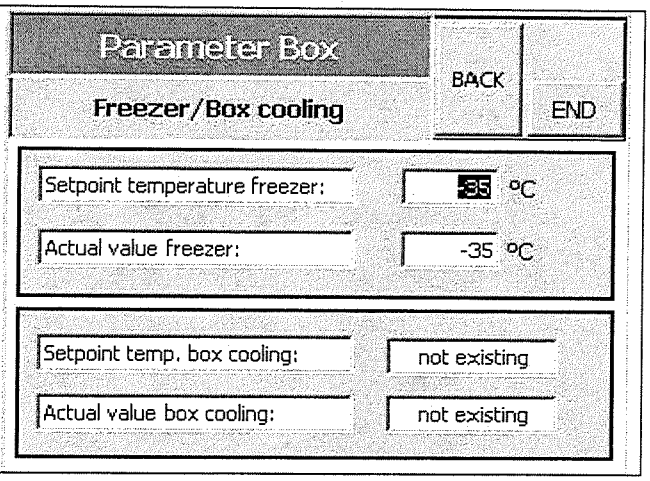
Graphic Reference Key

Information Field / Button	Description
Automatic active	Displays the current mode being used to operate the system.
Remaining regeneration time : 0 min	Displays the time remaining until the regeneration process is complete.
Time since last regeneration : 9 h	Displays the number of hours the system has been operating in circulation mode since the last regeneration process was performed.
Total time purifier 1 : 27 h	Displays the total hours the purifier has been in operation.

5.11 Freezer/Box Cooling Parameter Screen

Accessed via the Box Pressure Parameter screen by touching the **More** button.

This screen applies only to systems with a freezer and/or box cooling unit.



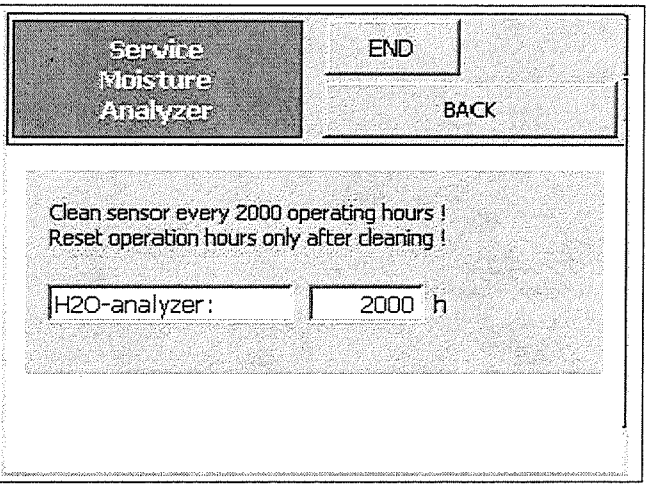
Graphic Reference Key

Information Field / Button	Description
Setpoint temperature freezer: -35 °C	Used to set the freezer operating temperature.
Actual value freezer: -35 °C	Displays the actual temperature inside the freezer.
Setpoint temp. box cooling: not existing	Used to set the box cooling unit operating temperature.
Actual value box cooling: not existing	Displays the actual temperature inside the glovebox.

5.12 Service Moisture Analyzer Screen

Accessed via the Common Parameters screen by touching the **Service H2O** button.

This button is only displayed when the moisture analyzer total operating time reaches 2,000 hours.

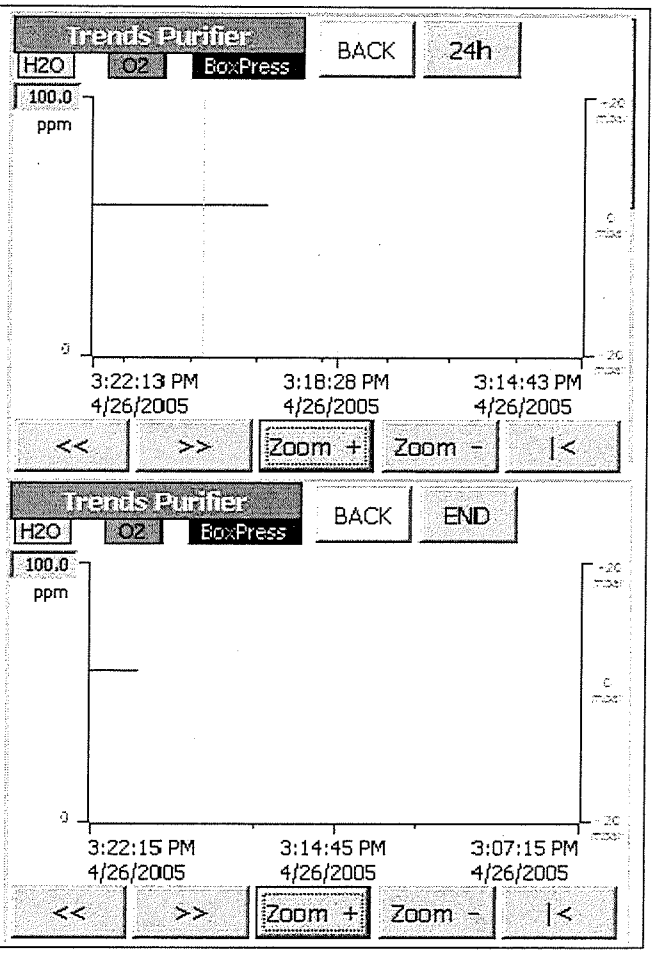


5.13 Trends Screen

Accessed via the Common Parameters screen by touching the **Trends** button.

Use the various buttons on the screen to scroll through the designated time period and also to zoom in on a selected range over a 4 hour period.

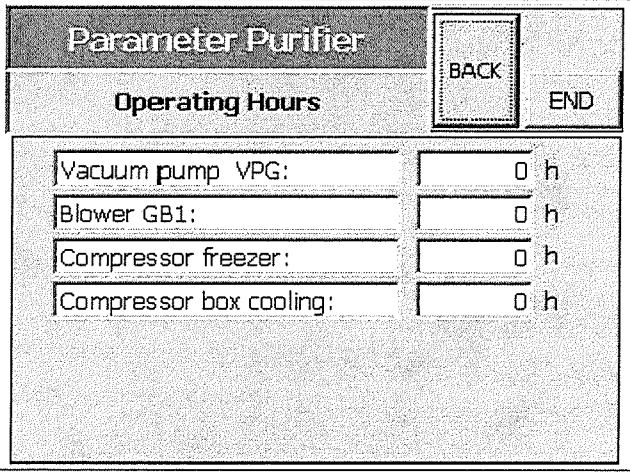
Touch the 24h button to change the display range to a 24 hour period.



5.14 Operating Hours Screen

Accessed via the Common Parameters screen by touching the **Operating Hours** button.

Displays the number of hours which the components have been running.

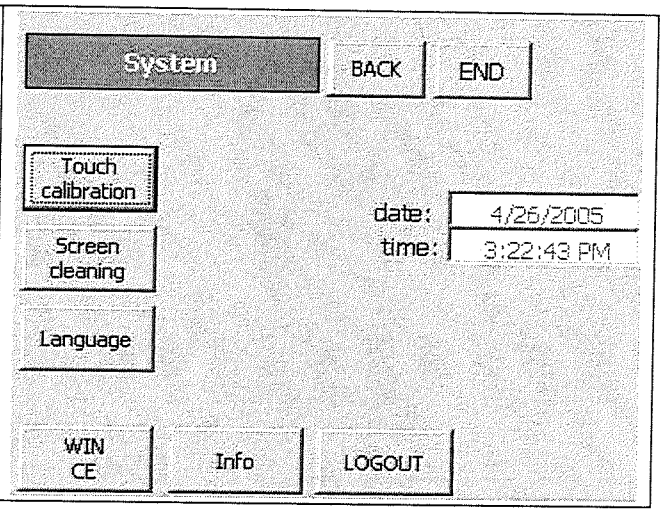


NOTICE Under normal use the vacuum pump oil should be changed every 3,000 hours per the manufacturer's recommendation.

5.15 System Screen

Accessed via the Common Parameters screen by touching the **System** button.

Used to display system information or perform maintenance on the touch screen.



5.16 Warning Screen

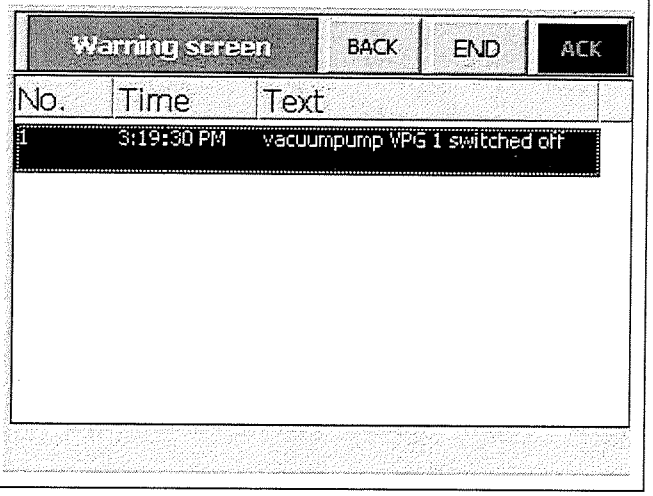
Accessed via any screen by touching the **Alarm** button when displayed.

This screen lists the:

- Warning number;
- Time the error occurred;
- Description of the error.

Depending upon the type of alarm, the message:

- Will disappear upon fixing the error;
- Must be acknowledged by touching the **ACK** button after the error has been fixed before it will disappear.



BRAUN

Chapter 6
Installation Requirements

CHAPTER 6: INSTALLATION REQUIREMENTS

6.1 Location

The room in which the glovebox will be used should be dry and well ventilated with a temperature between 59°F and 86°F (15°C to 30°C). The floor should be level and stable enough to support the weight of the glovebox system.

Position the glovebox in an area that allows the user to have adequate working space in and around the system (e.g. gloveports, antechamber(s), etc.). If positioned against or near a wall, the clearance should be a minimum of approximately 24 inches (600 mm) for the rear and side of the glovebox without antechamber(s).

6.2 Gas Supply and Connection Requirements

Working Gas

Use:	To establish and maintain the ultra pure gas atmosphere. Used as the operating gas for electropneumatic valves.
Gas Type:	Nitrogen, Argon, Helium supplied at 80psi.
Purity:	Industrial grade or better; from tanks or other facility gas supply source.
Quantity:	Permanent supply for the system's operation (e.g. pressure compensation, etc.).
Regulator Type:	Two (2) stage with a 0 – 100psi gauge.
Pressure:	80psi
Flow rate:	200 liters/minute
Material:	3/8" Braided Tygon™ hose (supplied with the system).
Connections:	¼" male NPT to 3/8" O.D. hose barb (connects Tygon™ hose to gas regulator).

Regeneration Gas

Use:	Reprocessing saturated purifier columns.
Gas Type[1]:	Nitrogen as the Working Gas: 90-97% Nitrogen with 3-10% Hydrogen balance Argon as the Working Gas: 90-97% Argon with 3-10% Hydrogen balance Helium as the Working Gas: 90-97% Helium with 3-10% Hydrogen balance
Quantity:	Approximately 3,500 liters for each regeneration process.
Regulator Type:	Two (2) stage Hydrogen regulator with a 0 – 20psi gauge.
Pressure:	5psi
Flow Rate:	15 – 20 liters/minute
Material:	3/8" Braided Tygon™ hose (supplied with the system).
Connection:	¼" male NPT to 3/8" O.D. hose barb (connects Tygon™ hose to gas regulator).

[1] Gas combination will vary depending upon the type of working gas used based on user's application.

6.3 Venting Requirements

Venting to the glovebox system and vacuum pump to the facility ventilation exhaust system is not mandatory but is recommended.

Vacuum Pump:	1" inner diameter braided Tygon™ (or similar type) hose.
Regeneration Exhaust Gas:	3/8" inner diameter braided Tygon™ (or similar type) hose.
Purge Valve†‡:	1¾" inner diameter braided Tygon™ (or similar type) hose.

† This is an optional item which is not included with all systems.
‡This applies to both automatic and manual purge valve types.

6.4 Electrical Connection Requirements

The power supply for the system will vary according to local area guidelines. Please refer to the system label located on the side of the box in the upper right hand corner above the antechamber for information specific to the system.

⚠CAUTION Type NEMA 5-20R non GFCI outlet(s) are required for all electrical connections.

6.5 Water Cooling Requirements

The glovebox system includes a heat exchanger which is required to be connected if the box atmosphere is to be cooled.

Temperature:	15°C - 25°C
Flow Rate:	2 liters/minute at 10°C, 5 liters/minute at 15°C
Inlet Pressure:	2.0 – 4.0 bar
Outlet Pressure:	Depressurized (maximum 0.5mbar)
Material:	3/8" Braided Tygon™ (or similar type) hose.

Chapter 7
Installation

CHAPTER 7: INSTALLATION

7.1 General Information

The M.Braun glovebox has been fully assembled, operated and tested at our production facility. The information binder contains the:

- Glovebox Project Checklist – Displays detailed information regarding the glovebox system
- Test Sheet – displays the various operations and components which were tested during production
- Product Identification and Traceability – Lists all serial numbers for the components included on the system
- Vendor Component Manuals – Operating instructions, etc. for components included on the system which are not manufactured by M.Braun.

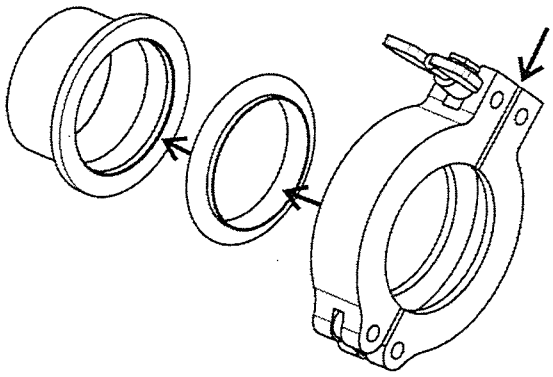
The glovebox and antechamber(s) have been fully tested for leaks under positive and negative pressure. The vacuum level during the regeneration process has also been tested to ensure that the glovebox purifier performs optimally.

This chapter provides information regarding the actual assembly of the glovebox prior to use. All instructions included in this chapter should be strictly adhered to. Any questions that arise during the installation process should be directed to the M.Braun Service Department.

The Unilab system comes complete and ready to assemble. The components, which have been numbered for ease in assembly, should be installed in the order listed in these instructions not in the order which they are numbered.

All clamp and o-ring assemblies used to attach pipes and hoses should be tightened finger tight.

Prior to tightening the clamp onto the flange, ensure the o-ring and other components are seated properly to avoid leaks.



NOTICE Use care not to cross thread brass to brass connections and stainless steel to stainless steel connections when fitting together and tightening.

7.2 Tools and Materials Required

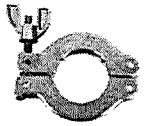
Tools (not supplied by M.Braun):

- 13mm Wrench
- 19mm Wrench
- Flathead Screwdriver
- 18mm wrench
- Adjustable Wrench

Materials:

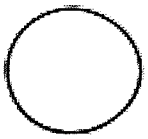
The quantity for each material or component listed below will vary depending upon the length of the system (i.e. 1250/780, 2500/1000, etc.). Please refer to the checklist included with the system for exact quantities.

Gloves



KF25 Clamp

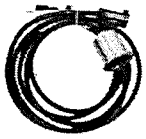
KF40 Clamp



Glove O-ring

KF25 O-ring

KF40 O-ring



Electrical Feedthrough

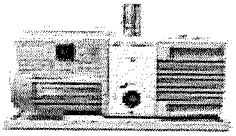
Power Strip

3/8" Braided Tygon® Tubing

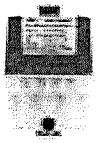
KF25 Stainless Steel
Flexible Hose

1" Pipe
(copper or stainless steel)

Hose Clamp



Vacuum Pump



Oil Mist Filter
Quantity (1) per vacuum pump

Funnel O-ring
Quantity (1) per vacuum pump

Oil
Quantity (1) bottle per vacuum pump

U-shaped clamp, O-ring, Bolt and Thumb Screw for Oil Mist Filter
Quantity (1) each per vacuum pump

O2 Analyzer
Optional Item

H2O Analyzer
Optional Item

Manual Purge Valve
Optional Item

7.3 Assembling the Glovebox

General Information

A packing checklist has been included with the system. Most components included on this checklist have been packed in the antechamber. Prior to beginning the installation process, unpack, unwrap and identify each component and ensure the appropriate number of items has been included with the shipment as indicated on this checklist. Contact the M.Braun Service Department if any of the items are missing or damaged.

Place all components in an easily accessible location close to the glovebox in an organized manner to ease in the assembly process.

NOTICE These installation instructions include all possible components for a Unilab system. Please note, not all components are included with every system.

Move the system into the permanent location but allow enough clearance during the installation process to work behind the box and purifier. Below is a rear view of the purifier showing the various components and cables which require connection to the glovebox. Please refer to these pictures when following the instructions.

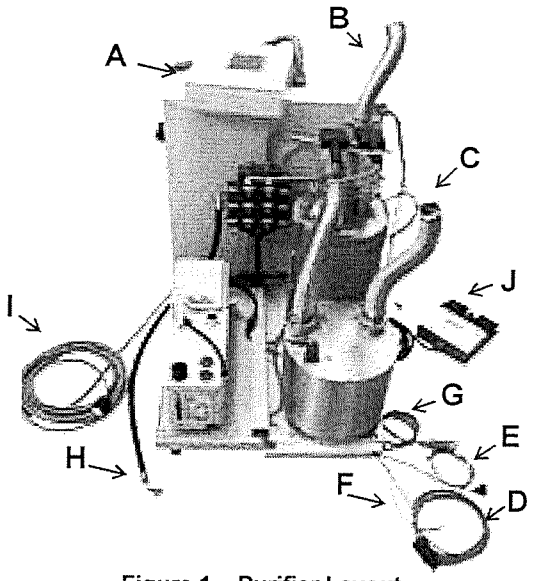


Figure 1 – Purifier Layout

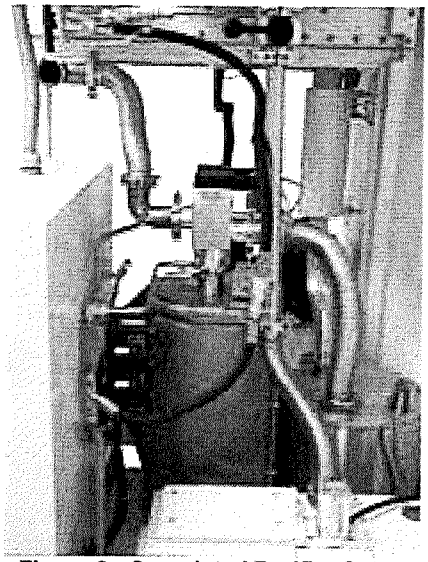


Figure 2 - Completed Purifier Setup

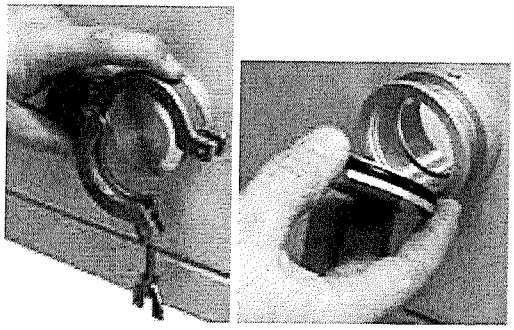
Purifier Cart

A. PLC-Touch Screen Panel and Housing
B. Inlet Hose from Glovebox to Purifier
C. Outlet Hose from Blower to Glovebox
D. Lighthood Cable
E. Pressure Sensor Cable
F. Ground Wire
G. Freezer Connection Cable
H. Purifier Vacuum Hose
I. Main Power Cable
J. Foot Pedal

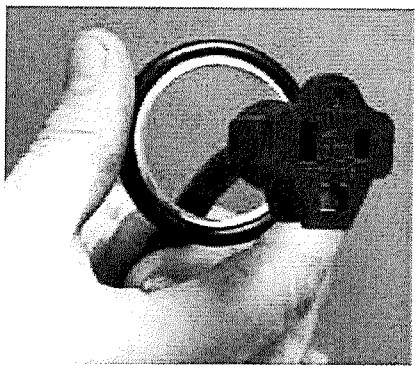
Electrical Feedthrough and Power Strip

There are multiple flanges located on the back of the glovebox which are used to attach feedthroughs to allow components to be used inside the glovebox. Any one of these can be used for the supplied electrical feedthrough.

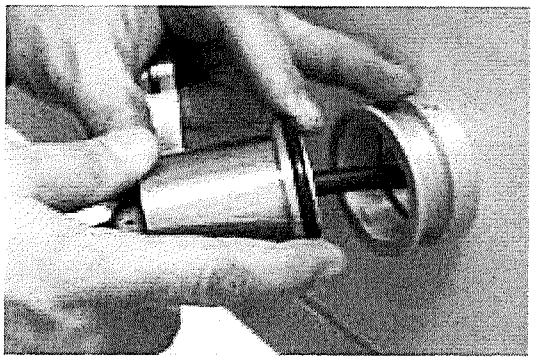
Select one feedthrough that is close to the main power supply (outlet) and remove the clamp, blank cap and o-ring.



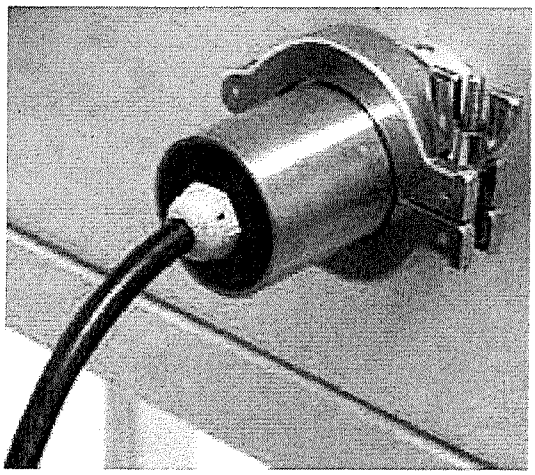
Place the o-ring on the female connector side of the feedthrough.



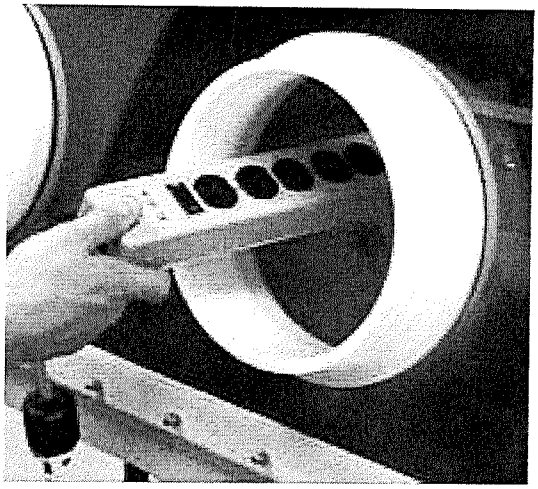
Place the female connector end of the feedthrough into the flange and feed into the box until the feedthrough flange is flush with the box flange.



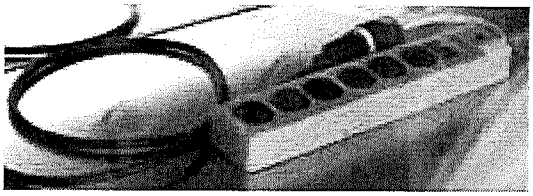
Place the clamp around the flange and tighten.



Place the 6 outlet power strip inside the glovebox through one of the gloveports located on the front of the box.



Plug the power strip into the feedthrough.

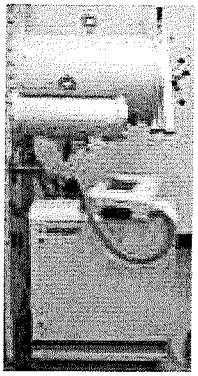


Connecting the Purifier

NOTICE

After the purifier is attached, it is possible to move the glovebox forward and backward (to allow additional connections to be made) but side to side will be extremely difficult. Therefore, it is recommended that prior to connecting the purifier, the glovebox be moved into the final location where it is to be used.

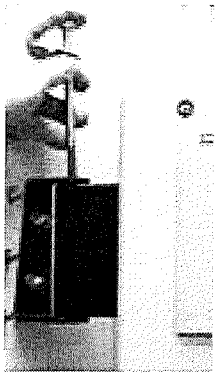
Roll the purifier cart into place under the antechamber. The recommended distance between the front leg of the stand and the electrical cabinet is 2 ½ "–3".



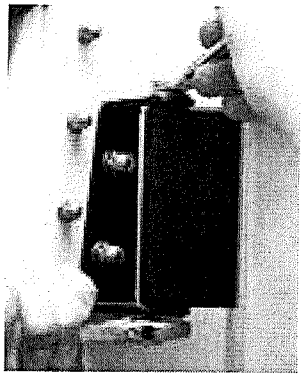
Remove the bolt from the black PLC bracket located on the end panel where the antechamber(s) is located.

Place the hinge side of the touch panel enclosure between the openings of the bracket.

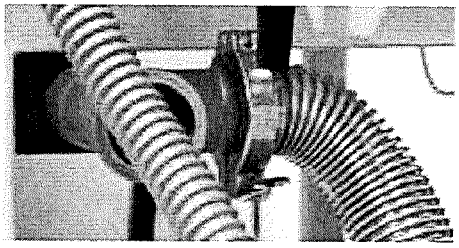
Affix the enclosure to the bracket using the bolt, by guiding it down and through the holes in the bracket and hinge.



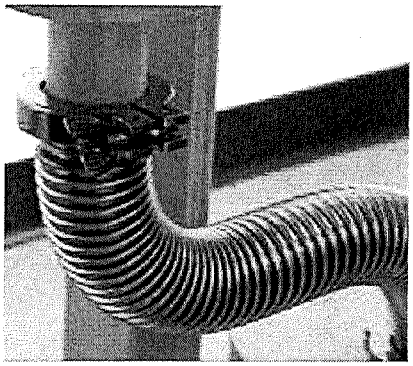
Secure the hinge by using the 13mm and adjustable wrenches.



Attach the KF40 stainless steel flexible hose (B) from the VHE valve on the filter column to the circulation pipe using a KF40 clamp and o-ring.

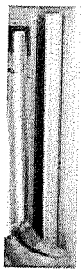


Attach the "Out" KF40 stainless steel flexible hose (C) on the blower to the bottom of the heat exchanger using a KF40 clamp and o-ring.

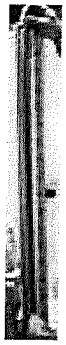


Connecting the Light hood and Pressure Sensor Cables

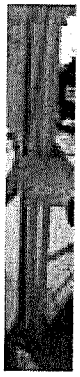
Remove the cover from the vertical wire track on the rear leg of the stand adjacent to the purifier cart.



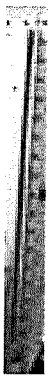
Remove the cover from the vertical wire track on the end panel above the section located on the rear leg of the stand.



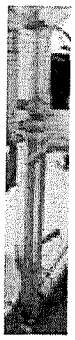
Run the light hood cable (D) vertically up the inside of lower wire track section.

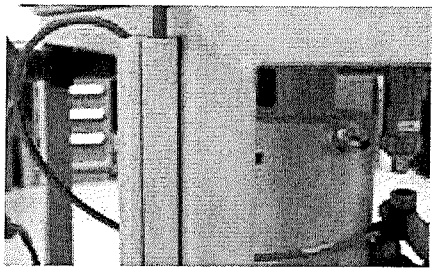


Run the light hood cable up inside of the upper wire track and place the excess light hood cable on the top of the glovebox.

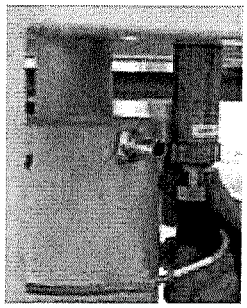


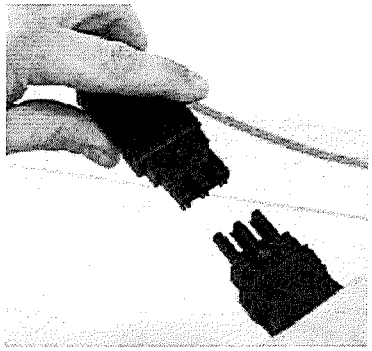
Replace the wire track covers.





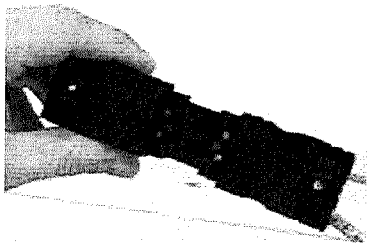
Screw the end of the pressure sensor cable (E) into the pressure sensor located on the underside of the box near the leg of the stand adjacent to the purifier.





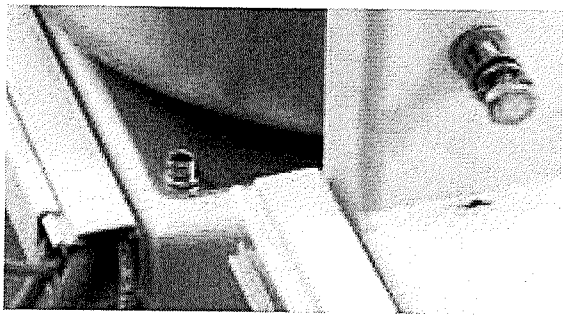
Locate the cable with plug leading from the light hood and plug this into the cable from the purifier cart.

Lay the connected plugs on top of the glovebox.



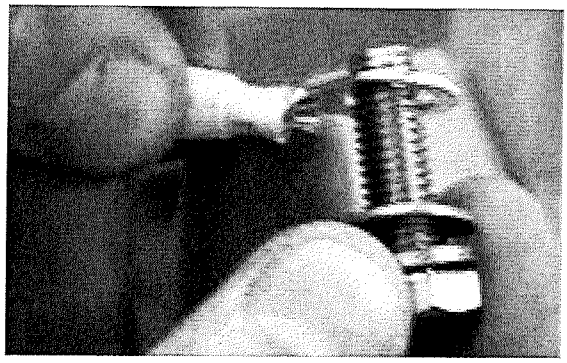
Connecting the Ground Wire

Using the 13mm wrench remove the grounding bolt located on the inside of the rear leg of the stand adjacent to the purifier cart by turning in a counterclockwise motion.



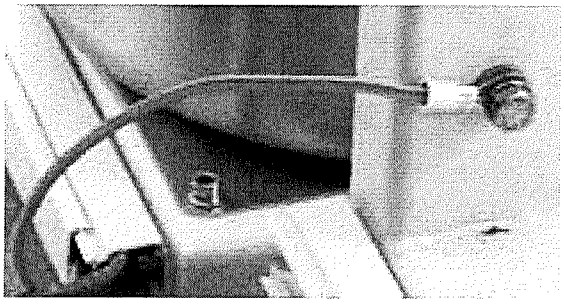
Remove the two bottom washers from the bolt.

Place the end of the ground wire (F) onto the bolt.



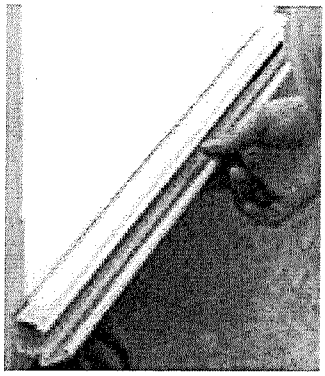
Place the washers onto the bolt with the toothed washer teeth pointing towards the leg of the stand.

Screw the bolt back into the leg by turning in a clockwise motion.



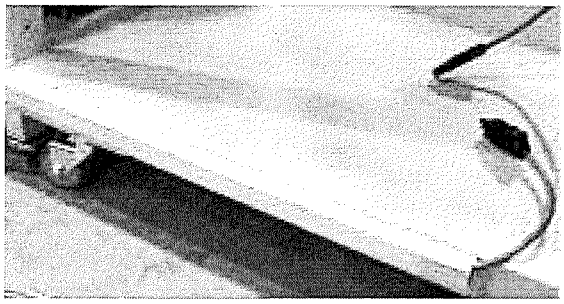
Connecting the Freezer and Compressor

Remove the cover from the horizontal wire track located on the rear of the stand.

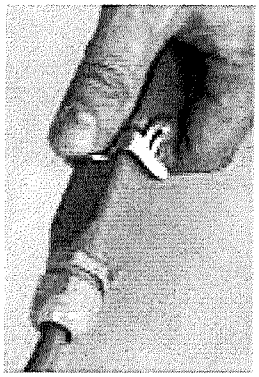


Run the freezer connection cable (G) along the inside of the wire track.

Place the end of the cable on the stand and replace the wire track cover.



Connect the power supply plug for the compressor.

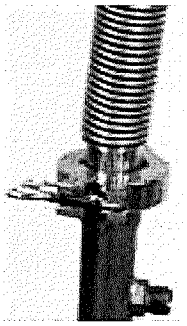


NOTICE

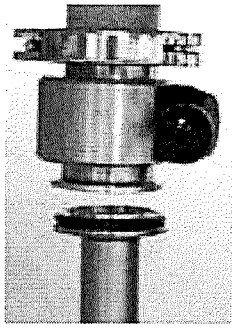
The connector type will vary from system to system. The picture shown above displays the two possible connector types that will be used. Contact the M.Braun Service Department with any questions.

Connecting the Vacuum Pump

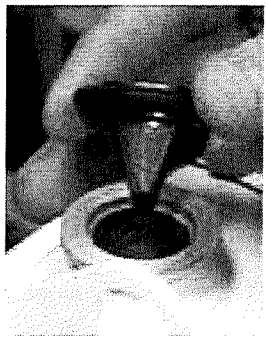
Attach the KF25 stainless steel flexible hose to the end of the 1" pipe with the port using a KF25 clamp and o-ring.



Attach the pipe to the manual hand valve located on the bottom of the large antechamber using a KF25 clamp and o-ring.

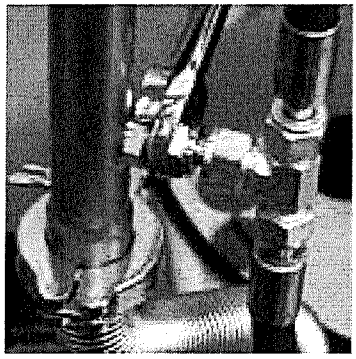


Attach the stainless steel flexible hose to the port on the vacuum pump with the funnel shaped o-ring using a KF25 clamp.



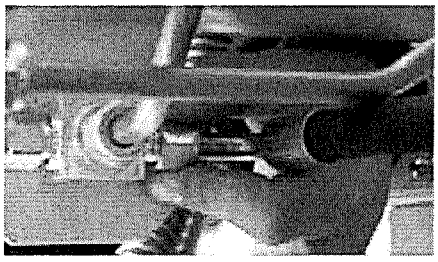
Attach the fitting on the purifier vacuum hose (H) to the port on the copper pipe and tighten hand tight.

Using the 19mm and 18mm wrenches Tighten an additional ¾ turn.



If system is equipped with a mini antechamber:

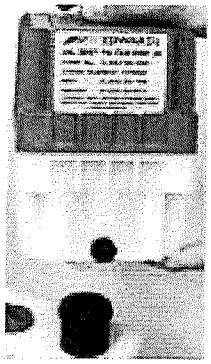
Attach the end of the vacuum hose (H) with the elbow to the port located on the rear side of the mini antechamber.



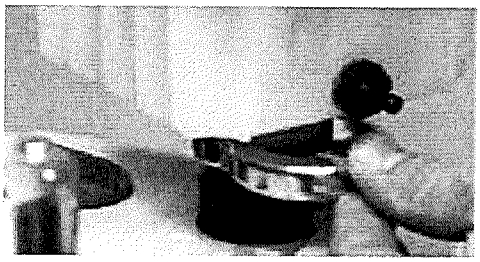
Attaching the Vacuum Pump Oil Mist Filter

Place the black o-ring onto the remaining port on the vacuum pump.

Place the oil mist filter onto the port.

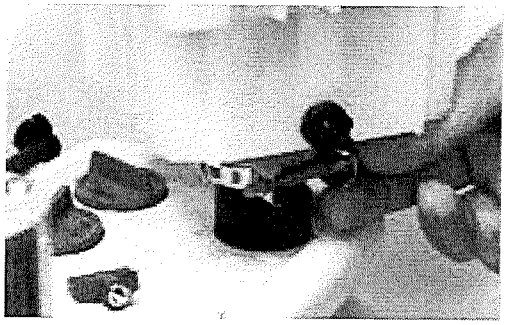


Push the u-shaped clamp onto the port making sure it covers both the port and filter flange.



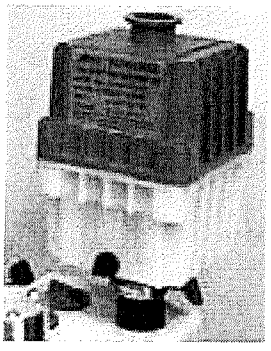
Turn the clamp so the open ends face out.

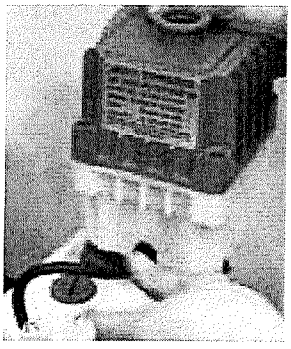
Secure in place with the bolt and red thumb screw. Tighten hand tight.



Turn the filter so the label faces the gas ballast on the top of the vacuum pump.

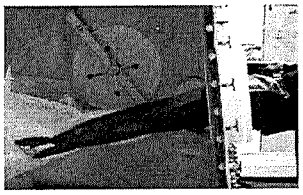
Push the black hose from the pump onto the port on the filter. Secure in place with black plastic clamp.



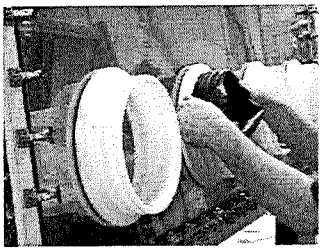


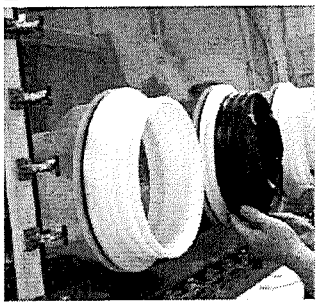
Attaching the Gloves

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



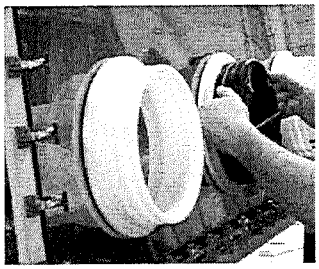
Slide hand out of the glove and work the cuff of the glove into the groove in the gloveport closest to the glass. At this time the thumb position can still be adjusted by rotating the cuff of the glove.



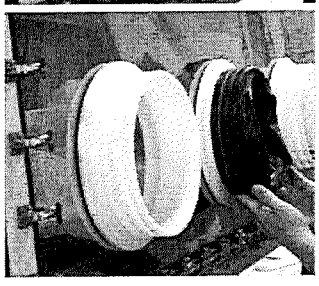


Secure the glove with two o-rings.

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.

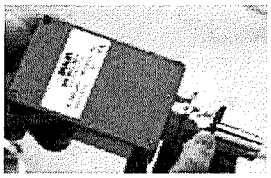


Repeat the process for the remaining glove(s) and o-ring(s).



Attaching the Analyzers

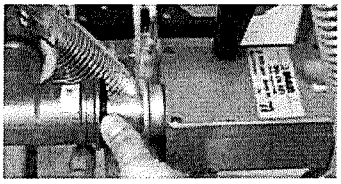
Carefully place a KF40 o-ring on the analyzer port.



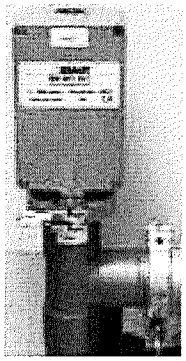
Carefully place the sensor end of the analyzer into the corresponding port on the circulation piping running the length of the system on the underside of the glovebox.

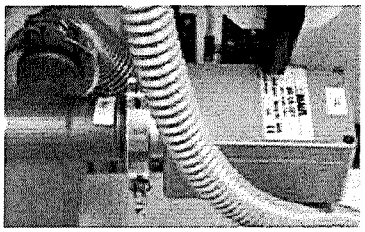
H2O analyzer is positioned on the side of the box opposite the antechamber(s).

O2 analyzer is positioned on the same side of the box as the antechamber(s).



Secure the analyzer to the pipe using a KF-40 clamp and o-ring.



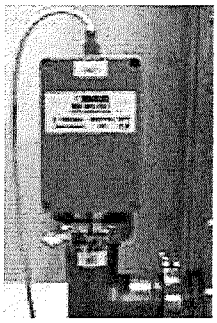


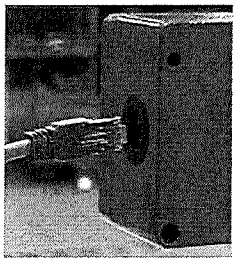
Repeat this process with the remaining analyzer(s).

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

The Green plug attaches to the H2O Analyzer.

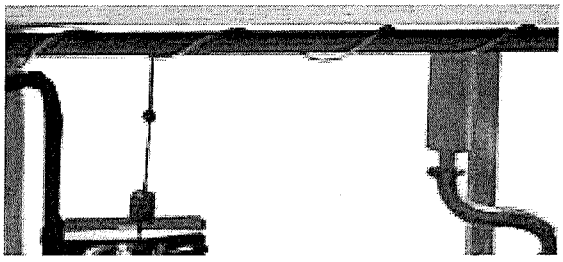
The Blue plug attaches to the O2 Analyzer.





NOTICE

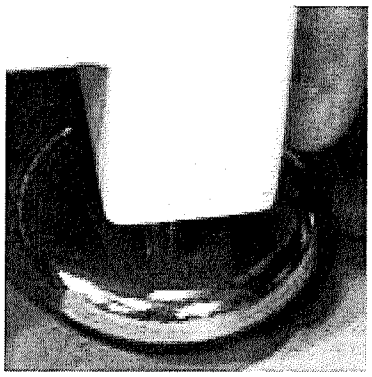
The green plug cable should be wrapped along the circulation pipe and then plugged into the moisture analyzer.



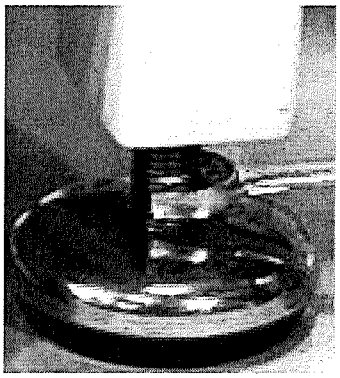
Lowering the Leveling Feet.

Move the system into its permanent location.

Lower each of the leveling feet by hand until they touch the ground.



Using a 13mm wrench continue to lower the leveling feet until the casters are raised off the ground.



Power and Gas Supply

Plug the main power cable (I) on the purifier into the main power supply outlet.

Attach the working gas line from the purifier to the working gas supply.

Attach the regeneration gas line from the purifier to the regeneration gas supply.

Place the foot pedal on the floor in front of the system in an easily accessible location.

The installation is now complete.