



**INERTGAS  
TECHNOLOGY**

**UNI lab<sup>®</sup>**  
**Workstation**  
**Operator Manual**





# **UNI**lab**<sup>©</sup> Workstation**

## **Operator Manual**

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## **1. General Information**

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### **1.1 General Information**

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This technical documentation is not liable to any obligations on the part of the manufacturer. The manufacturer MBRAUN GmbH reserves the right for technical and optical modifications as well as functional modifications on the systems or system's components described therein. Any duplication of this documentation, even in form of excerpts, is only permitted after having obtained the manufacturer's information and concession.

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### **1.2 Liability**

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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 and improved due to innovation, legal requirements and standards. Consequently, the information given in this documentation may not accurately reflect every detail of the system actually delivered. Please contact the manufacturer in cases of uncertainty.

Products mentioned in this manual are eventually trademarks and are used for identification purposes only.

### **1.3 Warranty**

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

This warranty will expire in case of:

- Interference into or modification and relocation 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.



#### **NOTE!**

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

## **1.4 Entries Referring to the System**

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

This documentation is part of the system:

Designation / Type: .....

Serial number (s): .....

**Person(s) in charge  
of the system:** .....

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

## **1.5 Service Address**

**MBRAUN InertGas Systems GmbH**

Dieselstrasse 31

85748 Garching

## Germany

Tel: ..... +49 (0)89 32669-230  
Fax: ..... +49 (0)89 32669-235

E-mail: ..... [service@mbraun.de](mailto:service@mbraun.de)  
Internet: ..... [www.mbraun.com](http://www.mbraun.com)

## 1. General Information

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### 1.6 Transport, Storage and Site Location

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Prior to installation and operation of the system, the Operating Instructions must be read and observed. Contact the **MBRAUN** Service Department with any questions.



#### NOTE!

If the system is part of another system line, the instructions of this system line are also valid.

#### 1.6.1 Transport

Preparations for transporting an **MBRAUN** system should be carried out by an **MBRAUN** technician only. The transport of the system or any part of a multi-unit system should be performed by a forwarding agency offering specialized transportation services.



#### WARNING

##### Danger of injury and damage!

- The system is extremely heavy and awkward, if not handled properly tipping or overturning may occur. Use caution when transporting a system and ensure all parts are securely fastened prior to relocation.
- The system must be handled carefully, and must not be exposed to shock. (Adhesive shockwatch label on packaging)
- The transport may only be performed with vehicles equipped with air suspension.

#### 1.6.2 Storage

The system can be stored safely under the following conditions:

- Free of liquids or substances (e.g. process chemicals, etc.);
- Room temperature between +10°C and +40°C with a relative humidity ≤80% and no condensation;
- Protected from dust and contamination.



#### NOTE!

After moving the system from storage conditions to final site location allow sufficient time for the system to adapt to the new environment.

### 1.6.3 Site Location

Selecting the site for an **MBRAUN** system or any part of a multi-unit system should be carried out by **MBRAUN** technicians only.

#### Prerequisites:

<b>Room:</b>	<ul style="list-style-type: none"><li>▪ Dry atmosphere with a temperature between +15 °C and +30 °C;</li><li>▪ Well ventilated.</li></ul>
<b>Surface Conditions:</b>	<ul style="list-style-type: none"><li>▪ Firmly structured floor; Level positioning.</li></ul>
<b>Clearance:</b>	<ul style="list-style-type: none"><li>▪ Minimum distance of 600 mm from surrounding walls</li><li>▪ Allow sufficient working area where glove ports, antechambers, etc. require access.</li></ul>
<b>Room volume</b>	<ul style="list-style-type: none"><li>▪ Room size (volume) significantly larger than enclosure volume of glove box</li></ul>

### 1.7 Scope of Delivery

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- Glove box
- Antechambers: see *Chapter 9 Antechambers*
- Gas purification system MB20-G
- PLC with Touch Panel TP 170b monochrome (integrated into the housing of the gas purification system)
- Dust Filter MB-BF-L-1
- Foot switch
- Operator Manual
- Specific Components: see *Chapter 10 Customer Specific Components*.

#### Optional components:

- Solvent vapour filter LMF
- Refrigerator
- Auto purge function

### 1.8 Conventions Used in this Manual

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#### Representation:

- instructions begin with the symbol ►
- prerequisites begin with the symbol >
- Marking of notices and safety warnings: see *Chapter 2 Safety*

### 1.9 Modifications

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Changes and/or modifications of any kind to **MBRAUN** systems should be made by **MBRAUN** technicians only. Any unauthorised change or modification to the system will cause the warranty to expire. However, exceptions can be made with prior written confirmation from **MBRAUN** (*Refer to section 1.3 Warranty for additional information*).

## 1. General Information

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### 1.10 Standards, CE Conformity

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This system corresponds in its technical design to various international and national standards listed below, as well as other standards, directions and regulations.

All **MBRAUN** Standard Systems are covered exclusively by the EC Directive 73/23/EEC, because the risks are mainly of electrical origin.

<b>!</b>	<b>NOTE!</b> <b>A complete listing of all applied harmonized norms are available upon request from <a href="#">MBRAUN Service Department</a>.</b>
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#### Noise Emissions

- **Sound Pressure**      The A-weighted sound pressure level at the system does not exceed 70 dB(A).

#### EC declaration of conformity



The system complies with all the essential health and safety requirements of the applicable EC harmonized technical directives.

The EC declaration of conformity is forwarded to the user.

The system bears the CE marking.

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## 2. Safety

### 2.1 Safety Warnings 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:

	<b>Warning</b> Indicates the possibility of minor injury, the possibility of damage to the system or its accessories and of possible problems related to the quality of the inserted materials or processes.	
	<b>Warning of hazardous electrical voltage</b> Indicates the possibility electrical hazards such as shock, involuntary muscle reaction, muscle paralysis, burnt tissues and organs, or death.	
	<b>Pressurized gas hazard</b> Indicates the possibility of injury, the possibility of damage to the system or its accessories due to gas supplies or hoses carrying pressurized media.	
		
► Wear safety mask	► Wear safety goggles/glasses	► Wear protective gloves

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.

### 2.2 Safety Warnings in the Manual

The safety warnings in the manual are marked according to European standards as well as the ANSI standard.

Marking of safety warnings adhering to European standards:

	<b>Hazard</b> Indicates the possibility of very serious injury or fatality, and the possibility of considerable damage to property.
	<b>Warning</b> Indicates the possibility of minor injury, the possibility of damage to the system or its accessories and of possible problems related to the quality of the inserted materials or processes.
	<b>Warning of hazardous electrical voltage.</b>
	<b>Risk of squeezing, shearing and cutting, catching and winding, stretching of extremities.</b>

Marking of safety warnings adhering to the ANSI standard:

	<b>DANGER</b>
Indicates an imminently hazardous situation that, if not avoided, will result in death, serious injury or serious damage to the system, other equipment or surrounding environment.	

		<b>WARNING</b>
Indicates a potentially hazardous situation that, if not avoided, could result in death, serious injury or serious damage to the system, other equipment or surrounding environment.		
		<b>CAUTION</b>
Indicates a potentially hazardous situation that, if not avoided, may result in minor or moderate injury or damage to the system, other equipment or surrounding environment.		

The safety warnings in this manual generally utilize a combined marking. An example:

		<b>WARNING</b>
Risk of squeezing, shearing and cutting, catching and winding, stretching of extremities!		
Freely moving parts may cause injury.		
► Keep hands and arms out of the hazard area.		

## 2. Safety

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### 2.3 Safety Concept

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Under normal operation condition the box may be operated between -15 mbar and +15 mbar (corresponding to - 1500 Pa to + 1500 Pa). In the unlikely case of a failure of a valve the box may be exposed to extreme pressures. For this reason the fixture of the glove has been designed in a way that the glove will be dismounted before any damage is caused to the box.

The system is equipped with safety light curtains which inhibit the pumping-filling process when the operator reaches out into the box.

	 <b>WARNING</b>
	<p><b>Risk of injury and damage!</b></p> <p><b>Due to extreme pressures the glove may be dismounted or the screen may break if the glove port are sealed:</b></p> <ul style="list-style-type: none"><li>▪ <b>The process materials may be polluted and exposed to ambient air.</b></li><li>▪ <b>The ambient air may be polluted by process chemicals.</b></li></ul> <p><b>Adhere to the following guidelines:</b></p> <ul style="list-style-type: none"><li>▶ <b>Keep at least one glove port in normal operation: glove fixed and glove port not sealed with an inner or outer glove port cover.</b></li><li>▶ <b>If the application requires that material handled inside the box must not be exposed to ambient air in case of an overpressure situation, additional safety measures are required. Please contact the MBraun Service Department.</b></li></ul>

### 2.4 Intended Use

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The purpose of the **MBRAUN** gas purification system, together with a glove box, is for the enabling and maintaining a pure inert gas atmosphere inside a hermetically sealed enclosure. Materials that are sensitive to moisture and/or oxygen are handled by using the attached gloves or additionally specially designed handling systems. The system is intended for professional use only.

The system may only be utilized according to the specifications.

	 <b>WARNING</b>
	<p><b>Risk of injury and damage!</b></p> <p><b>The system is designed to be operated with inert gas.</b></p> <ul style="list-style-type: none"><li>▶ <b>Only use the system as described in the Operating instructions.</b></li><li>▶ <b>The system will require modification for working with delicate or dangerous materials, such as</b></li><li>▪ <b>pharmaceutical or nuclear applications</b></li><li>▪ <b>working with substances that will lead to dangerous situations if exposed to air in case of a failure of the system</b></li><li>▪ <b>strongly poisonous materials</b></li><li>▪ <b>very expensive materials that might be destroyed if exposed to air in case of a failure of the system</b></li></ul> <p><b>These application types must be discussed with MBRAUN prior to operating the system.</b></p>

## 2.5 Improper Use

	 <b>WARNING</b>
	<p><b>Risk of injury and damage!</b></p> <p>The system and the accessories are only allowed to be commissioned by <b>MBRAUN</b> service personnel.</p> <ul style="list-style-type: none"><li>▶ Maintenance work other than that described in the chapters Trouble Shooting, Maintenance and Service and Spare Parts List is only permitted to be performed by <b>MBRAUN</b> service personnel.</li><li>▶ The system and the accessories are not allowed to be modified or changed without authorisation.</li><li>▶ In normal operation the system is only permitted to be operated if all safety devices are present, correctly installed and fully functional.</li><li>▶ The bridging of limit switches, valves, and other control components is forbidden.</li><li>▶ All malfunctions and damage indicated by the system or determined by other means must be reported and rectified without delay.</li><li>▶ None of the operating conditions defined in the operating instructions, such as pressures, dimensions, weights, etc. or materials are permitted to be changed.</li><li>▶ As a matter of principle, working on the system without the personal safety equipment stipulated in the Operating instructions for this task is forbidden.</li><li>▶ Only personnel who meet the requirements defined in the Operating instructions are permitted to be employed on the unit.</li><li>▶ The safety warnings on the system must always be clearly kept visible and readable.</li></ul>

## 2. Safety

### 2.6 Basic Safety Instructions

#### 2.6.1 Emergencies

	 <b>WARNING</b> Risk of injury and damage! In an emergency immediately shut down the system: <ul style="list-style-type: none"><li>▶ Turn the main power switch to the off-position.</li><li>▶ Disconnect the system from all gas supplies.</li><li>▶ If working with toxic, explosive, noxious materials 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.</li></ul>
	 <b>CAUTION</b> Risk of damage! <ul style="list-style-type: none"><li>▶ Do not disconnect the water supply for systems containing components requiring a cooling water source.</li></ul>

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

#### 2.6.2 National Rules and Regulations

In addition to the guidelines and information contained within this manual; 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 that may be injurious to health.

#### 2.6.3 On-Site Requirements

	 <b>CAUTION</b> Risk of injury and damage! For data on the on-site requirements, e.g. Ambient conditions <ul style="list-style-type: none"><li>▪ Floor characteristics, floor loading capacity</li><li>▪ Mains electricity, compressed gas, cooling and other connections</li></ul> see <i>Chapter 1.6. Transport, Storage and Site Location</i>
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	 <b>WARNING</b>
	<p><b>Risk of injury!</b></p> <p>There is a risk of suffocation when working with high inert gas concentrations. High concentration of inert gas may lead to unconsciousness, injury or death.</p> <p><b>Adhere to the following guidelines:</b></p> <p>The selected location should have a “room” volume that is significantly larger than the glove box interior volume.</p> <ul style="list-style-type: none"> <li>▶ 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.).</li> <li>▶ All exhaust fumes should be vented through an adequate disposal/ventilation system.</li> <li>▶ Contact <b>MBRAUN</b> if it is not possible to adhere to all the recommendations mentioned above.</li> </ul>

#### 2.6.4 Observe the Operating Instructions

	 <b>WARNING</b>
	<p><b>Risk of injury and damage!</b></p> <ul style="list-style-type: none"> <li>▶ The personnel must read, understand and always work to the operating instructions: This includes any person charged with operation, transport, storing, installation, commissioning and maintenance.</li> <li>▶ Always keep the manual within reach on the machine.</li> </ul>

In addition to the safety instructions in this manual, also observe the safety instructions in all other manuals provided with the system.

To ensure safe operation of the system and to maintain a safe working environment, the information contained within “Chapter 2 Safety” 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.

## 2. Safety

### 2.6.5 Qualification of the personnel

		<b>WARNING</b>
<p><b>Risk of injury and damage!</b></p> <ul style="list-style-type: none"><li>▶ The system is permitted to be operated and maintained by personnel trained and specially instructed by MBRAUN and who have reached the minimum age stipulated by law.</li><li>▶ Work on electrical equipment on the machine and the related accessories is only permitted to be performed by suitably qualified electricians or by instructed persons under the supervision of an electrician as per electrical regulations.*</li><li>▶ Personnel operating the system temporarily or who are to be trained, instructed, or taking general training are only permitted to work on the system under the continuous supervision of an experienced person.</li></ul>		
<p>* A suitably qualified person is anyone who due to his/her specialist training, as well as knowledge of the applicable stipulations, can assess the work assigned to him/her and can recognize possible hazards.</p>		

### 2.6.6 Disposal

		<b>WARNING</b>
<p><b>Risk of injury!</b></p> <p><b>Risk of polluting the environment!</b></p> <p>The components and materials identified in the following may be polluted with toxic substances and harm the environment, if not properly disposed of.</p> <p>In case toxic substances were used within the system, adhere to the following safety measures:</p> <ul style="list-style-type: none"><li>▶ Wear protective gloves</li><li>▶ Wear a full face mask with filter and eye protection</li></ul> <p>None of the components and substances is permitted to enter mains drainage, ground water, or soil.</p> <ul style="list-style-type: none"><li>▶ Filters Dispose of used filters at the local collection point for hazardous waste or in accordance with the locally applicable national regulations.</li><li>▶ Gas Purification System Dispose of all components and compressor oil as per the applicable national regulations.</li><li>▶ Solvent Vapour Filter Dispose of the polluted filter medium (charcoal) as per the applicable national regulations depending on the substances used within the glove box and/or as specified in the material safety data sheets.</li></ul>		

## 2.7 Hazards and Safety Measures

### 2.7.1 Risk of Suffocation

		<b>WARNING</b>
		<p><b>Risk of injury!</b></p> <p>There is a risk of suffocation when working with high inert gas concentrations. High concentration of inert gas may lead to unconsciousness, injury or death.</p> <p>Do not enter or reach out into the active glove box via the antechamber.</p> <ul style="list-style-type: none"> <li>▶ During purging, ensure a good ventilation of the ambient air.</li> <li>▶ Before maintenance of the interior of an active glove box it is necessary for the glove box atmosphere to be completely replaced with ambient room air.</li> <li>▶ To release the inert gas, remove one glove to allow a slow equalization of the glove box interior atmosphere with the ambient room air.</li> </ul>

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

### 2.7.2 Hot Surface

		<b>WARNING</b>
		<p><b>Danger of Injury and Damage!</b></p> <p>Process materials treated in a process oven may still have a hot surface when the oven cover opens. Touching hot materials may result in burned tissues and damaged gloves.</p> <ul style="list-style-type: none"> <li>▶ Wait until the process material has cooled down or use heat resistant instruments designed to handle the process materials.</li> </ul>

### 2.7.3 Mechanical

		<b>WARNING</b>
		<p><b>Risk of squeezing, shearing and cutting, catching and winding, stretching of extremities!</b></p> <p>Freely moving parts may cause injury.</p> <ul style="list-style-type: none"> <li>▶ Keep hands and arms out of the hazard area.</li> </ul>

## 2. Safety

	 <b>WARNING</b>
	<p>Risk of injury!</p> <p>When handling materials with mechanical, pneumatic or vacuum systems it is possible that materials may be ejected.</p> <ul style="list-style-type: none"><li>▶ Keep hands and arms out of the hazard area.</li><li>▶ Avoid contact with ejected materials.</li></ul>
	 <b>WARNING</b>
	<p>Risk of injury!</p> <p>The system may not be opened during processing or power failures.</p> <ul style="list-style-type: none"><li>▶ Do not remove safety covers, panels, panes, windows or doors.</li><li>▶ Do not open the antechamber during process or power failure.</li><li>▶ If any safety facility fails or is not present: decommission the system and inform the service personnel.</li></ul>

Recommendation: To reduce the cause of hazards, a single person must operate the system. In case the system needs to be operated by two or more persons, conduct the operation in such a way as to ensure each individual's respective task does not influence other tasks in any way.

### 2.7.4 Electrical

	 <b>WARNING</b>
	<p>Hazardous electrical voltage!</p> <p>Risk of electric shock on direct and indirect contact with live parts with the possibility, involuntary muscle reaction, muscle paralysis, burnt tissues and organs, or death.</p> <ul style="list-style-type: none"><li>▶ The electrical cabinet is only allowed to be opened by an electrician or trained maintenance personnel. Prior to opening the switching cabinet, the main switch must be turned to the off-position.</li><li>▶ There are still live parts and charged capacitors when the main switch is off.</li><li>▶ All works on the electrics is only allowed to be performed by an electrician. This includes the connection to the main power supply. Prior to working on the electrics, disconnect from the power supply.</li><li>▶ Never operate the system with the electrical cabinet door open.</li></ul>
	 <b>WARNING</b>
	<p>Hazardous electrical voltage and current!</p> <p>Risk of electric shock and damage to the system.</p> <ul style="list-style-type: none"><li>▶ Never use makeshift fuses and/or short circuit fuse holders.</li><li>▶ Never interchange current bearing wires.</li></ul>

Connection to the main power supply has to meet the demands of local area guidelines. All neutral and ground wires must be connected accordingly. See Chapter 13 *Wiring Diagrams*.

## 2.7.5 Electrostatic Discharge

	 <b>WARNING</b>
	<p><b>Risk of damage or injury due to electrostatic discharge!</b></p> <p>Electrostatic discharge can occur while touching and working with plastic parts, hoses and pipes, wiring and the system as a whole. This can cause solvents and process chemicals to ignite when not within an inert gas atmosphere.</p> <p>► To prevent electrostatic charges, ensure sufficient grounding of the entire system, see <i>Chapter 11 Wiring Diagrams</i></p>

## 2.7.6 Handling of Electronic Components

	 <b>CAUTION</b>
	<p><b>Risk of damage to electronic components of the system due to electrostatic discharge!</b></p> <p>► Wear a grounded wrist strap or work on a grounded static-dissipating work surface. If this is not possible touch an adjacent earth ground (i.e. central heaters or water pipes) before handling electronic components or printed circuit boards.</p> <p>► Leave electronic components and printed circuit boards in their original packaging until final installation.</p> <p>► Handle electronic components by their body or case, avoid touching of leads.</p> <p>► Keep electronic components and printed circuit boards away from such static generating materials as vinyl, plastic bags, etc.</p>

## 2. Safety

### 2.7.7 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, solvents and gases is the user's **responsibility**.

   	 <b>WARNING</b>
<p><b>Risk of damage or injury!</b></p> <p><b>Materials used may be flammable, explosive, toxic.</b></p> <p><b>Released chemicals may react with each other, leading to unwanted and/or unknown substances, which may cause additional risks.</b></p> <p><b>Adhere to the following guidelines:</b></p> <p>Ensure the all relevant Control of Substance Hazardous to Health guidelines such as DIRECTIVE 98/24/EG, COSHH (UK) or any other applicable Rules are followed;</p> <ul style="list-style-type: none"><li>▶ Observe relevant safety regulations as well as material safety data sheets (MSDS) and additional advice provided by the supplier;</li><li>▶ Wear proper protective safety masks, gloves and eyewear whenever working with chemicals, corrosives or solvents;</li><li>▶ Mark all containers and supply lines of chemicals (i.e. containers of media and waste) with appropriate labels and warning signs;</li><li>▶ Ensure proper ventilation and exhaustion of vapours;</li><li>▶ Keep away from ignition sources;</li><li>▶ Do not smoke</li></ul>	

### 2.7.8 Fire Fighting

	 <b>WARNING</b>
<p><b>Hazardous electrical voltage!</b></p> <p><b>Risk of electric shock when extinguishing fires on the system when it is still live if conductive extinguishing media are used.</b></p> <ul style="list-style-type: none"><li>▶ Match the extinguishing medium and the extinguishing equipment to the general conditions on site.</li><li>▶ During fire fighting observe the locally applicable national regulations.</li><li>▶ Turn the main switch to the off-position.</li></ul>	

## 2.8 Residual Hazards and Safety Warnings

	 <b>WARNING</b>
	<p><b>Risk of injury and damage!</b></p> <p>The system is considered unsafe for operation if:</p> <ul style="list-style-type: none"><li>▪ there is any visible damage;</li><li>▪ it fails to perform according to specification;</li><li>▪ it has been subject to prolonged storage under unfavourable conditions;</li><li>▪ it has been subjected to severe transport stress.</li></ul> <p>If the system meets any or all of the above:</p> <ul style="list-style-type: none"><li>▶ make it inoperable;</li><li>▶ secure it against any unauthorized or unintentional operation;</li><li>▶ contact the <b>MBRAUN</b> Service Department.</li></ul>

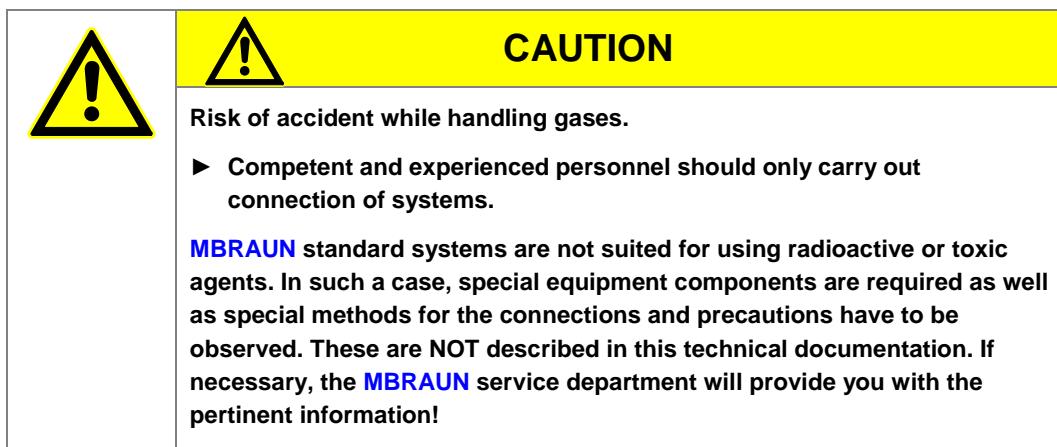
## **2. Safety**

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### 3. Connecting the System

The accessories described in this chapter are required for connecting the system. They are not included in the system's delivery package.



See also 2.6 Intended Use and 2.7 Improper Use.

#### 3.1 Installation and Commissioning of the Glove Box System

##### Preparation:

Before delivery and installation of the system, the customer receives a checklist "Delivery and Installation Preparation" to determine the premises for transport and the conditions for media connections.

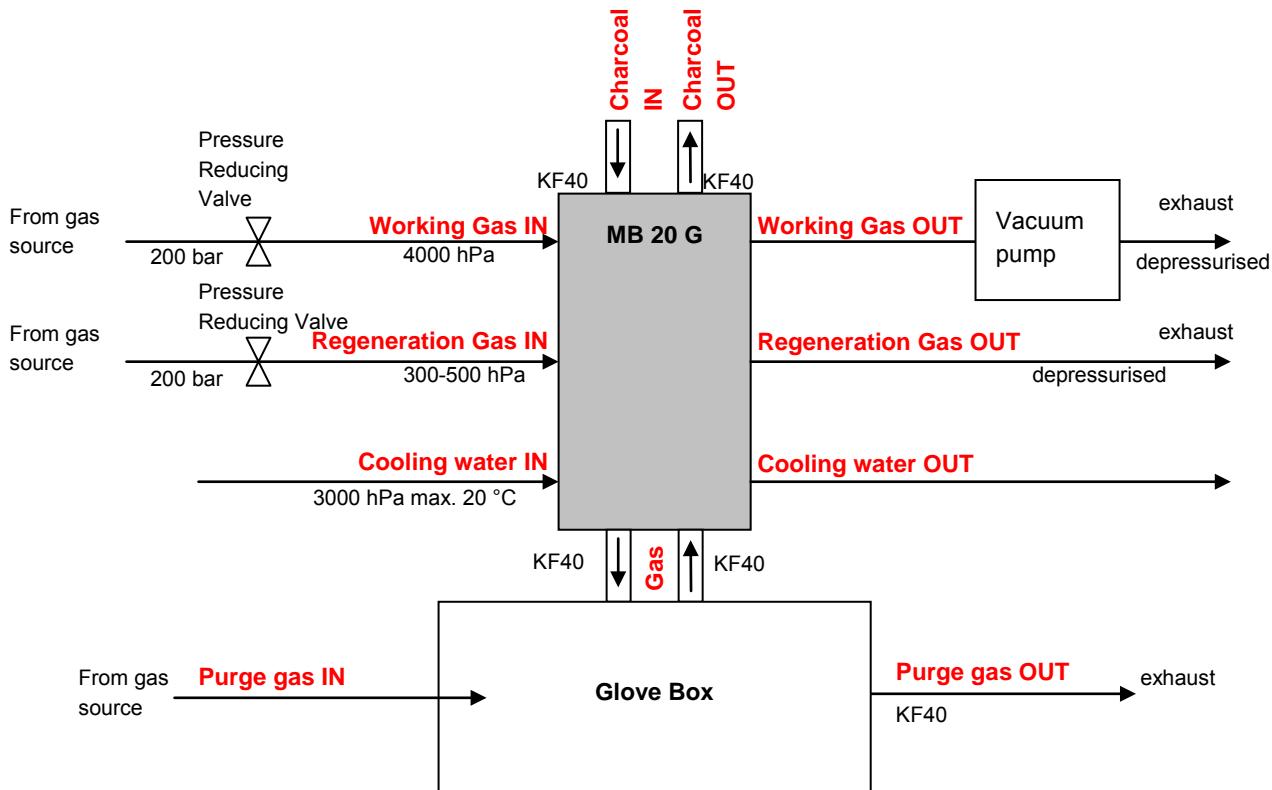
The customer provides all media connections required by the system.

##### Installation and Commissioning:

An **MBRAUN** technician installs the system and takes care of the first commissioning

##### Final Inspection:

A final inspection and specification test is performed by an **MBRAUN** technician on request.



## 3.2 Gases Used by the System

### 3.2.1 Working Gas

<b>Use</b>	<ul style="list-style-type: none"> <li>▪ Building up and maintaining the ultra pure gas atmosphere: pressure regulation &amp; purging.</li> <li>▪ Pressure gas for electro pneumatic valves and pneumatic drives.</li> </ul>
<b>Gas type*</b>	Nitrogen, Argon or Helium
<b>Purity</b>	Medium Purity (4.8 or better); from bottles or other gas supplies.
<b>Quantity</b>	Permanent supply for the system's operation (e.g. for pressure compensation, control of electro-pneumatic valves, and automated purging).

### 3.2.2 Additional Purge Gas

<b>Use</b>	Purging and filling the system with the desired inert working gas (when commissioning for the first time and after servicing or repairs of the system.)
<b>Gas type*</b>	Same as Working Gas
<b>Purity</b>	Medium purity (4.8 or better); from bottles or other gas supply facilities.
<b>Quantity</b>	Approx. 10 - 12 m <sup>3</sup> /m <sup>3</sup> box volume for purging the system when commissioning the system for the first time or intermediately purging the system.

### 3.2.3 Regeneration Gas

<b>Use</b>	Reprocessing saturated H <sub>2</sub> O/O <sub>2</sub> purifier columns.
<b>Gas type*</b>	<p>Nitrogen/Hydrogen mixture (90-95% N<sub>2</sub> with 5-10% H<sub>2</sub>- portion) when Nitrogen is used as the working gas.</p> <p>Argon/Hydrogen mixture (90-95% Ar<sub>2</sub> with 5-10% H<sub>2</sub>- portion) when Argon is used as the working gas.</p> <p>Helium/Hydrogen mixture (90-95% He with 5-10% H<sub>2</sub>- portion) when Helium is used as the working gas.</p>
<b>Purity</b>	Medium Purity (4.8 or better); from bottles or other gas supplies.
<b>Quantity</b>	Approx. 3,500 Litres for each Regeneration.

Gas Type\* – Other gas mixtures, including those with carbon dioxide and hydrogen, are possible. These require special preparation by **MBRAUN**. Preparation to facilitate the use of such gases is not included in the standard system – therefore only gas mentioned in table above should be used.

	<b>NOTE!</b> <b>MBRAUN</b> recommends that the same base for both regeneration and working gases are used (e.g. when using Argon as the working gas, then the addition purge gas must be Argon; likewise, the regeneration gas should be an Argon/Hydrogen mixture).
--	---

### 3. Connecting the System

#### 3.3 Equipment for Connections

##### Preparation:

Before delivery and installation of the system, the customer receives a checklist to determine the premises for transport and set up.

Prior to delivery of the system, the user will receive an information sheet specifying the necessary accessories required to make the connections. The following specifications are a general overview.

##### 3.3.1 Equipment for Working Gas Connections

Pressure Reducing Valve for Working Gas:

<b>Use</b>	Working gas pressure control system.
<b>Pressure, Flow rate</b>	200 bar primary, 6000 hPa (6,0 bar) secondary, flow rate of 250 l/min
<b>Connection Type</b>	Ø 10 mm Swagelok® fitting.

Supply Piping for Working Gas:

<b>Use</b>	Connecting the working gas source with the "Working Gas INLET" system connection.
<b>Material</b>	Optional (length as required): either: Ø 10 mm copper pipe and Ø 10 mm Swagelok® fitting Or: Ø 10 mm stainless steel pipe and Ø 10 mm Swagelok® fitting.
<b>Connection Type</b>	Ø 10 mm Swagelok® fitting.

	 <b>CAUTION</b>
	<b>Risk of damage!</b> ► Exact pressure setting required. Overpressure will damage the system - low pressure will cause malfunction.

##### 3.3.2 Equipment for Additional Purge Gas Connections

###### Pressure Reducing Valve for Purge Gas

Required only for the "manual purging" method.

When using the optional "**MBRAUN** QuickPurge" purging method no preparations are required, in this case the working gas connection is used.

<b>Use</b>	Pressure control of the purge gas when manual purging is applied.
<b>Pressure, Flow rate</b>	200 bar primary, 6000 hPa (6 bar) secondary, flow rate of 200 l/min
<b>Connection type</b>	Ø 10 mm Swagelok® fitting.

#### Supply Piping for Purge Gas

Required only for the “manual purging” method.

When using the optional “**MBRAUN** QuickPurge” purging method no preparations are required, in this case the working gas connection is used.

<b>Use</b>	Connecting the purge gas source to the purge hose.
<b>Material</b>	Ø 9 mm reinforced hose, 3 mm wall thickness length as required.

#### 3.3.3 Equipment for Regeneration Gas Connections

<b>!</b>	<b>NOTE!</b> <b>MBRAUN</b> recommends the use of a special pressure reducing valve fitted with a non-standard secondary gauge that is calibrated between 0 – 1.5 bar. This is available from <b>MBRAUN</b> – Part No. 2411006.
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Pressure Reducing Valve for Regeneration Gas:

<b>Use</b>	Regeneration pressure control system.
<b>Pressure, Flow rate</b>	200 bar primary, 300-500 hPa (0,3-0,5 bar) secondary, flow rate of 30 l/min
<b>Connection Type</b>	Ø 10 mm Swagelok® fitting.

Supply Piping for Regeneration Gas:

<b>Use</b>	Connecting the working gas source with the “Regeneration Gas INLET” system connection.
<b>Material</b>	Optional (length as required): either: Ø 9 mm reinforced hose, 3 mm wall thickness and adapter, Ø 9 mm hose nozzle with Ø 10 mm Swagelok® fitting or: Ø 10 mm copper /stainless steel pipe and Ø 10 mm Swagelok® fitting
<b>Connection Type</b>	Ø 10 mm Swagelok® fitting.

Exhaust Outlet for Waste Regeneration Gas:

<b>Use</b>	Connecting the “Regeneration Gas OUTLET” system connection with the customer’s disposal facility (exhaust outlet).
<b>Material</b>	Optional (length as required): either: Ø 9 mm reinforced hose, 3 mm wall thickness and adapter, Ø 9 mm hose nozzle with Ø 10 mm Swagelok fitting or: Ø 10 mm copper/ stainless steel pipe and Ø 10 mm Swagelok fitting
<b>Connection Type</b>	KF 25

### 3. Connecting the System

#### 3.3.4 Equipment for Vacuum Pumps

##### Disposal Piping for Vacuum Pump Waste Gas

<b>Use</b>	Connecting the vacuum pump exhaust (oil mist and waste gas) with the customer's waste gas disposal facility (depressurized exhaust outlet).
<b>Material</b>	Optional (length as required): either: Ø 16 mm reinforced hose and Ø 16 mm hose nozzle or: Ø 16 mm copper pipe as well as flange and clamp or: Ø 16 mm stainless steel pipe as well as flange and clamp.

#### 3.3.5 Equipment for Water Cooling

##### Cooling Water:

<b>Use</b>	<b>System Cooling</b>
<b>Data</b>	<b>Mains water</b>  Temperature: max. 20°C Flow rate: 2-3 l/min Inlet pressure: 3000 hPa (3 bar) Outlet pressure: Depressurised (max 0,5 mbar) Conductivity (at 25°C) 0.3 – 10 mS/cm [resisitvity (at 25°C)] [3 – 0.1 MΩ/cm] pH 7 - 8 particulate contamination: filtered to a particle size (diameter) of ≤ 30 µm  Micro-biologicals (algae, bacteria, fungi): none Total dissolved solids: ≤ 50 ppm

##### Supply Piping for Water Cooling (supply and drain piping):

<b>Material</b>	Optional (length as required):  either: Ø 9 mm reinforced hose, 3 mm wall thickness and adapter, Ø 9 mm hose nozzle with Ø 10 mm Swagelok fitting or: Ø 10 mm copper/ stainless steel pipe and Ø 10 mm Swagelok fitting
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#### 3.3.6 Equipment for Exhaust

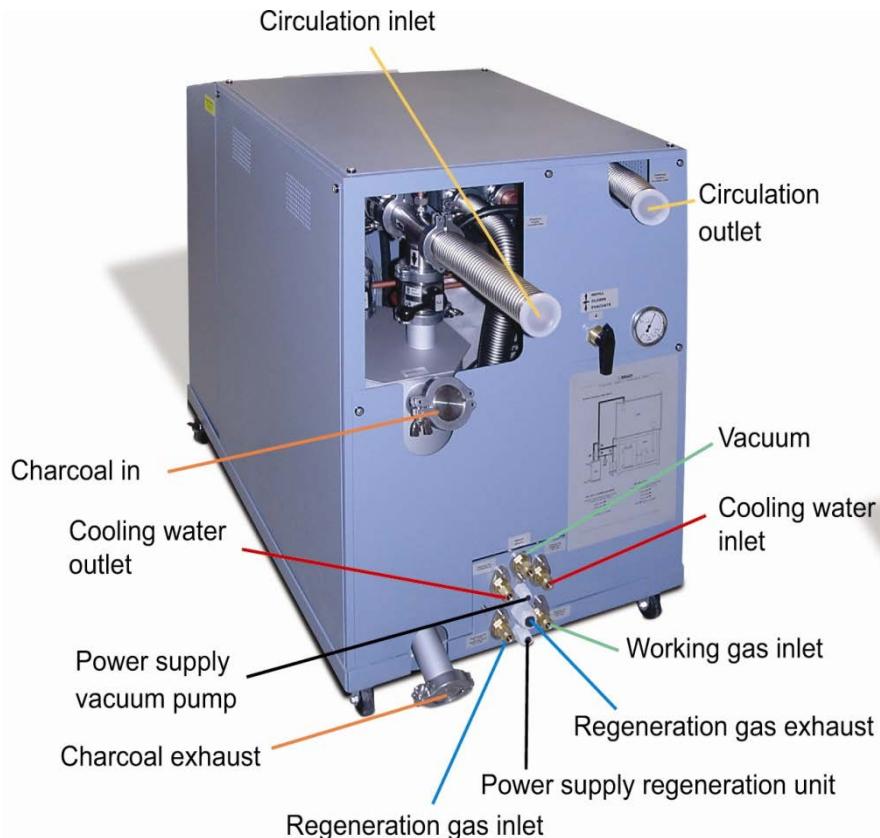
<b>Use</b>	Connecting the system exhaust (e.g. from oil mist filter and waste gas) with the customer's waste gas disposal facility (depressurized exhaust outlet).
<b>Material</b>	Optional (length as required, supplied by customer)
<b>Connection Type</b>	KF40 flange.

#### 3.3.7 Power Connection

The required values for connection should be taken from the type plate.

### 3.4 Connecting the System

	<b>CAUTION</b>
	<b>Risk of damage!</b> <ul style="list-style-type: none"> <li>▶ Exact pressure setting required. Overpressure will damage the system - low pressure will cause malfunction.</li> </ul>



#### 3.4.1 Connecting the Working Gas

- ▶ Connect the pressure-reducing valve to the working gas source  
(Follow the manufacturer's given instructions for its connection)
- ▶ Make a supply line between the working gas source and the "Working Gas - INLET" system connection. (The "Working gas INLET" system connection is labelled with the exact value for the supply pressure)
- ▶ Set pressure reducing valve to this value and open valve.

#### 3.4.2 Connecting the Regeneration Gas

- ▶ Connect the pressure reducing valve to the regeneration gas source:  
(Follow the manufacturer's given instructions for its connection)
- ▶ Connect the regeneration gas source with the "Regeneration Gas INLET" system connection using the supply pipe (The "Regeneration Gas INLET" system connection is labelled with the exact value for the supply pressure)
- ▶ Set pressure reducing valve to this value and open valve.

### 3. Connecting the System

		<b>CAUTION</b>
		<p><b>Risk of injury!</b></p> <p>A bad smell may be noticed when spent regeneration gas escapes to the surroundings. <b>MBRAUN</b> is unaware of environmental pollution or effects detrimental to health caused by the spent regeneration gas, but these cannot be excluded. It is the customer's responsibility to ensure that any required exhaust system is provided. The manufacturer does not assume any liability.</p> <p><b>When using toxic or radioactive material, there must be no discharge of the gas to surroundings.</b></p>

#### 3.4.3 Connecting the Disposal Piping for Used Regeneration Gas

- ▶ Connect disposal piping between the "Regeneration gas OUTLET" system connection and the customer's disposal facility (exhaust).

Connection must be depressurised.

#### 3.4.4 Connecting the Disposal Piping for Vacuum Waste Gases

- ▶ Connect disposal piping between the vacuum pump exhaust and the customer's disposal facility (exhaust).

Connection must be depressurised.

#### 3.4.5 Connecting the Cooling Water

- ▶ Connect the "Cooling water INLET" system connection to the cooling water source.
- ▶ Connect the "Cooling water OUTLET" system connection to the depressurised water disposal.
- ▶ Turn on the cooling water.  
(The cooling water flow rate setting depends on the available water temperature)

#### 3.4.6 Power Connection

The connection needs to be made to protected (fused) power supply that is equipped with a CPC (earth conductor). The required values for connection should be taken from the type plate.

		<b>WARNING</b>
		<p><b>Hazardous electrical voltage!</b></p> <p><b>Risk of electric shock on direct and indirect contact with live parts with the possibility, involuntary muscle reaction, muscle paralysis, burnt tissues and organs, or death.</b></p> <ul style="list-style-type: none"><li>▶ The electrical cabinet is only allowed to be opened by an electrician or trained maintenance personnel. Prior to opening the switching cabinet, the main switch must be turned to the off-position.</li><li>▶ All works on the electrics is only allowed to be performed by an electrician. This includes the connection to the main power supply.</li></ul>

<b>4.1</b>	<b>Operating Principle .....</b>	<b>2</b>
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4.1.2	<i>Controls .....</i>	3
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## 4. Functional Description

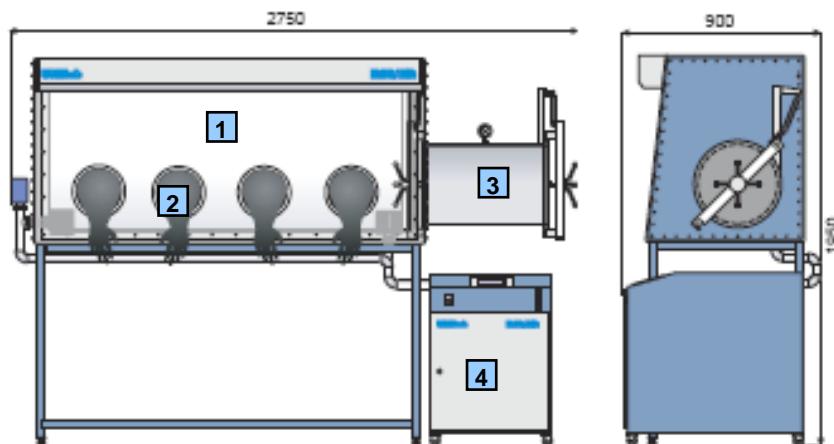
### 4.1 Operating Principle

#### 4.1.1 Main Components

A glove box is a hermetically sealed enclosure. It provides a working space in its inner side that is completely segregated from the outside. As an inert gas glove box it is designed to maintain in its inside an artificial atmosphere, typically consisting of pure nitrogen or pure argon with a concentration of oxygen and water vapour typically below 1 ppm. It is used to protect the product, which is handled inside the box from the outside, in particular from unwanted reaction with oxygen and/or water vapour (product protection).

The box itself is mainly made from stainless steel, the window from poly carbonate and the gloves from butyl. Other materials for the window or gloves are available on request.

The basic components are shown in the figure below:



No.	Item	Function
1	Glove Box	sealed working space
2	Glove Ports and Gloves	allow to directly work with materials inside the box.
3	Antechamber	transferring materials into and out of the Glove Box without contaminating the atmosphere inside the box.
4	Gas Purification System MB 20-G with Control Panel	To remove water and oxygen from the inert gas by continuous circulation. Control Panel for central controlling and monitoring the system
	Vacuum Pump	<ul style="list-style-type: none"><li>▪ to evacuate the antechamber</li><li>▪ to reduce the box pressure</li><li>▪ during the regeneration cycle</li></ul>

### 4.1.2 Controls



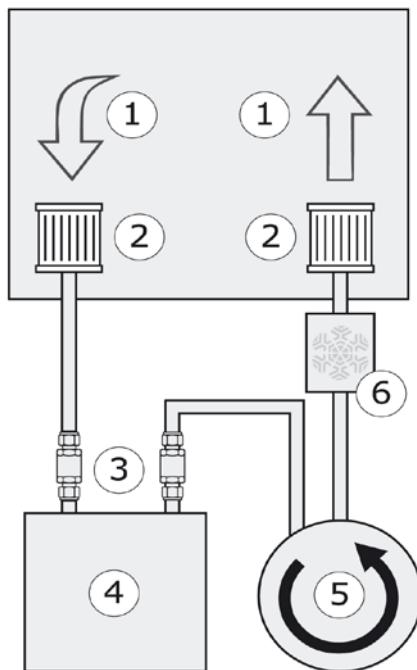
No.	Item	Function
1	Main Switch	Turning the system on and off
2	Control Panel	Accessing system functions and system parameters
3	Electrical Cabinet	Contains electrical and electronic components. To be opened by maintenance personnel only
4	Flow Meter	Indicates the flow level of the regeneration gas
	Footswitch	Increasing and decreasing the box pressure

## 4. Functional Description

### 4.1.3 Technology and Application

The Glove Box System works by the principle of gas circulation: the working gas permanently circulates between the Glove Box and the Gas Purification System.

The Gas Purification System removes moisture and oxygen from the inert gas Glove Box atmosphere. It utilizes a proprietary reactive agent to withdraw oxygen from the inert gas. A proprietary adsorbent removes water. When the Gas Purification system becomes exhausted, it can be regenerated in a PLC-controlled process by passing a regeneration gas through it.



No.	Item	Function
1	Gas flow	Circulation between box and purifier.
2	Exhaust filter	Inlet/outlet of the circulation tubes are protected by aerosol filters: The filters supply particle-free atmosphere and separate the box from the purifier and tubes.
3	Valves	Electropneumatical valves, PLC controlled.
4	Purifier Unit	Oxygen: Chemical binding by a proprietary reactive agent Moisture (water vapor): Adsorption on a proprietary adsorbent.
5	Blower (circulation unit)	Performs the circulation of gas flow; it is encapsulated in a gas tight enclosure.
6	Cooling (heat exchanger)	Electric heat as well as compression heat generated within the gas purification system increases the gas temperature. The cooling reduces the temperature of the purified inert gas.

The circulation mode is PLC-controlled and is operated and displayed via the operation Panel.

The ultra pure gas atmosphere allows working with materials or performing processes, which are sensitive to oxygen and/or water vapour.

### 4.2 Typical operation

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#### 4.2.1 Starting Up the System

After installation and commissioning the system usually stays turned on, to preserve a clean inert gas atmosphere with the desired concentration of oxygen and moisture. This also guards the sensors to work within the specified measuring range.

The following steps are necessary for setup:

- ▶ Turning on the main switch and self test

**See Chapter 5: Activating and Deactivation the System**

- ▶ Purging the glove box, if the clean inert gas atmosphere inside the box was not maintained due to a broken seal or as in the following instances:
  - ▶ at commissioning
  - ▶ after the fixing of a leakage (air influx due to faulty operation or damage)
  - ▶ after a shut down for an extended period of time.

**See Chapter 8: Purgung**

- ▶ Setting parameters on the PLC, typically
  - ▶ regeneration intervals
  - ▶ maximum evacuation time
  - ▶ alarm setpoints for oxygen and moisture

**See Chapter 7: Glove Box Parameter Settings**

- ▶ Waiting, until the sensors work properly and the desired conditions for the atmosphere exist. This usually takes 30 minutes for O2-Sensor and up to 24 hours for the H2O-Sensor.

#### 4.2.2 Setting Up the System for a New Process

In order to prepare the system for a new process it might be necessary to adapt the settings of the parameters on the PLC:

- ▶ regeneration intervals
- ▶ maximum evacuation
- ▶ alarm setpoints for oxygen and moisture

**See Chapter 7: Glove Box Parameter Settings**

#### 4.2.3 Transferring Materials into or out of the Inert Glove Box

Materials are being transferred into the glove box via the antechamber. During the transfer process, the ambient air within the antechamber is being replaced with inert gas: The process requires several cycles of evacuating and filling with inert gas.

**See Chapter 9: Antechamber Operation**

#### 4.2.4 Monitoring Moisture, Oxygen and Box Pressure

While working at the glove box system, the reading of the sensors on the PLC for

- Pressure
- Moisture H2O
- Oxygen O2

must be observed continuously. Setting adequate alarm setpoints helps to maintain the desired conditions of the box atmosphere.

## **4. Functional Description**

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In case the box pressure needs to be varied or adapted frequently, a foot switch is provided to increase or decrease the box pressure.

**See Chapter 7: Glove Box Parameter Settings**

### **4.2.5 Regenerating the Gas Purification Reactors**

If the gas circulation (mode) was maintained for a long period of time the purification system becomes exhausted. This leads to increasing values for oxygen and moisture. For this reason, the purifier should be regenerated regularly or at the latest when there is a drop in performance.

In 2-purifier column systems, the gas circulation does not have to be interrupted during regeneration.

**See Chapter 8: Gas Purification Reactors (RKM)**

### **4.2.6 Turning the System off**

The system may be shut down for the purpose of

- in case of an emergency or
- extended maintenance (changing filter medium or valves) or
- if the system is not in use for a longer period of time (4 weeks and longer).

**See Chapter 5: Activating and Deactivation the System**

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<b>5.3</b>	<b>Start Messages.....</b>	<b>2</b>
<b>5.4</b>	<b>Deactivating the System .....</b>	<b>3</b>

## 5. Activating and Deactivating the System

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### 5.1 Prerequisites

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- > All previous chapters observed
- > Working gas connection properly made
- > Purge gas connection properly made (if required)
- > Regeneration gas connection properly made
- > Exhaust facility for waste regeneration gas properly made
- > Exhaust facility for vacuum pump waste gas properly made
- > Cooling water connection properly made
- > Power connection properly made
- > All piping and connections checked for its condition and firm mounting.

### 5.2 Activating the System

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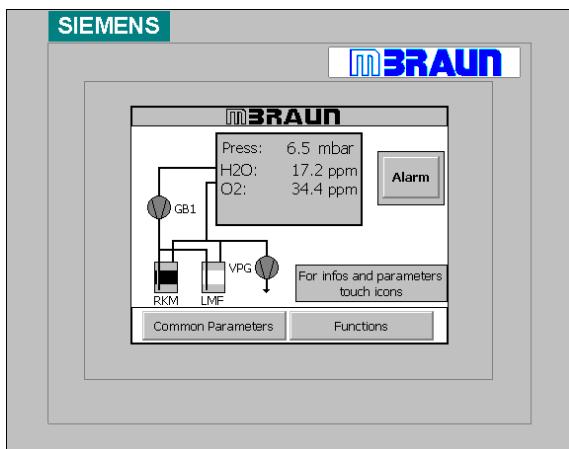
The main switch is located at the system's electrical cabinet.

Activating the system:

- Turn the main switch from the **O OFF** to position **I ON**

### 5.3 Start Messages

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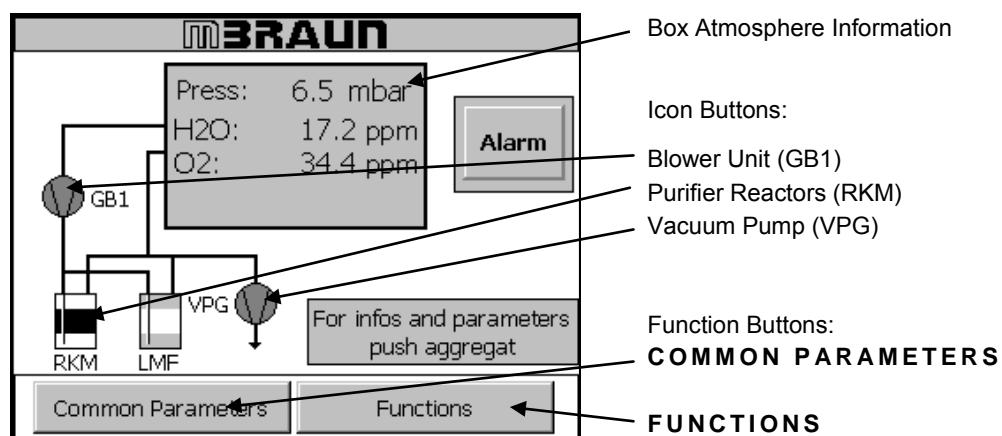


**MBRAUN**-System provided with the TOUCH Panel have the panel located at MB 20-G cabinet.

After activation, the system runs a self-test.

Upon start-up, the Start Screen is displayed.

The Start Screen displays an overview of the Box status in an information field.  
The Functions are controlled by means of "Function Buttons" or "Icon Buttons".



### 5.4 Deactivating the System

The system should not be deactivated until all running procedures, such as circulation and regeneration have been completed and deactivated.

Deactivating the system:

- ▶ Turn all main switches from **I ON** position, to **O OFF** position.

## **5. Activating and Deactivating the System**

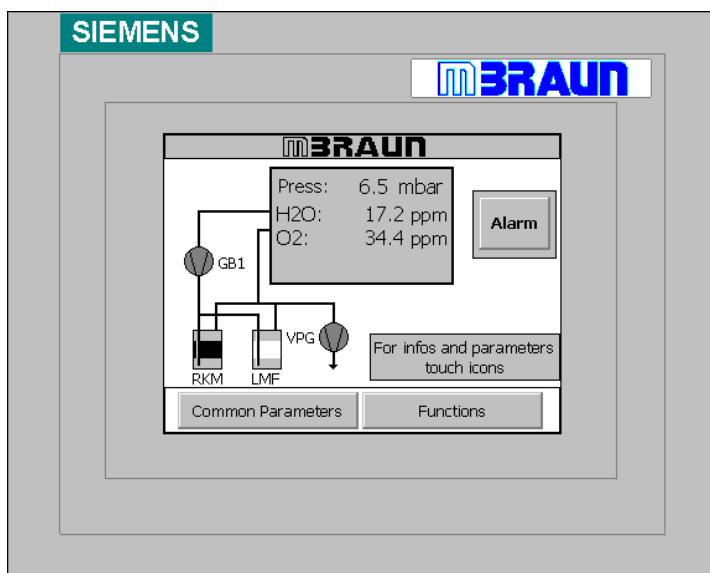
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<b>6.1.</b>	<b>Overview .....</b>	<b>2</b>
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<b>6.4.</b>	<b>Input Fields and Buttons .....</b>	<b>4</b>

## 6. Operating the TOUCH Panel

### 6.1. Overview

The *TOUCH* Panel is the system's central operation and display unit. This unit is located at a clear and well accessible position.

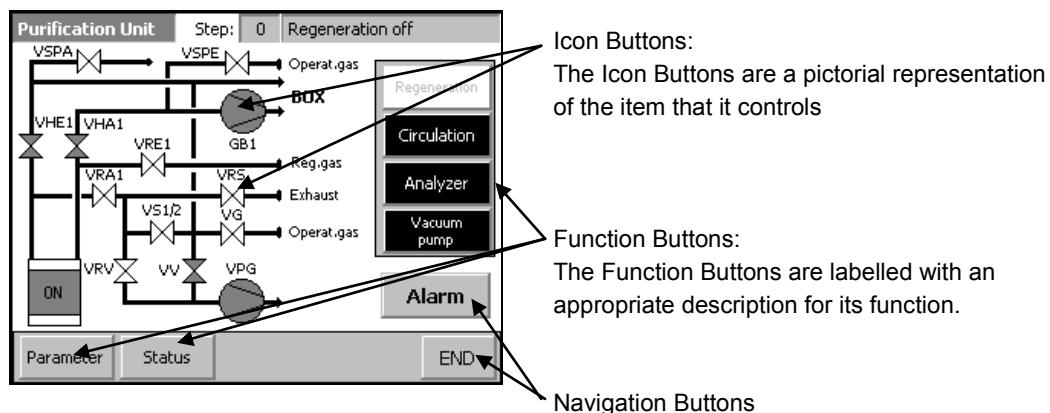


### 6.2. Display

The *TOUCH* Panel consists of a pictorial representation of the System.

### 6.3. Buttons

The Functions can be controlled by means of "Function Buttons" or "Icon Buttons".



#### 6.3.1 Function Buttons

The *TOUCH* panel allows the Function status to be displayed. This feedback is relayed to the user by varying the colour of the Function Button as below:

Circulation Purifier	GREY	Not Active
Circulation Purifier	BLACK	Active
Circulation Purifier	WHITE	Function not available (Function Locked)

### 6.3.2 Icon buttons

The Icon Buttons are a pictorial representation of the item that it controls.



RKM Filter (Purifier)



Blower (GB)



Valve (VSE or VSA) Grey: valve is open White: valve is closed

#### Status of Purifier Filters:

The statuses of the Purifier Filters, including those for the Solvent Trap (LMF) Filter, if applicable, are indicated by the icon colour.



WHITE Not Active

RKM



BLACK Active – Filter in Circulation Mode (see Circulation Section)

RKM



GREY Regeneration – Filter in Regeneration Mode (see Regeneration Section)

RKM

### 6.3.3 Navigation Buttons

The *TOUCH* panel utilises the same colours and labels for navigation from screen to screen throughout. The buttons and their function are as below:

**NEXT**

NEXT – If this button is displayed within a screen then there are more screens to follow. Selecting this button will present you with a new screen of options within the function series.

**BACK**

BACK – This button will always take you to the previous screen in the function series. The last step backwards will return you to the Start Screen.

**END**

END – This button will always return you to the Start Screen.

**Alarm**

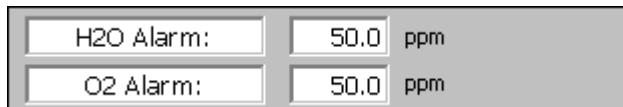
Alarm – This button will always open the Alarm/Error Message Screen. If the Alarm button is flashing then there is a message that needs to be acknowledged on the Alarm/Error Message Screen.

## 6. Operating the TOUCH Panel

### 6.4. Input Fields and Buttons

All input fields are shown with blue text on a light grey background.

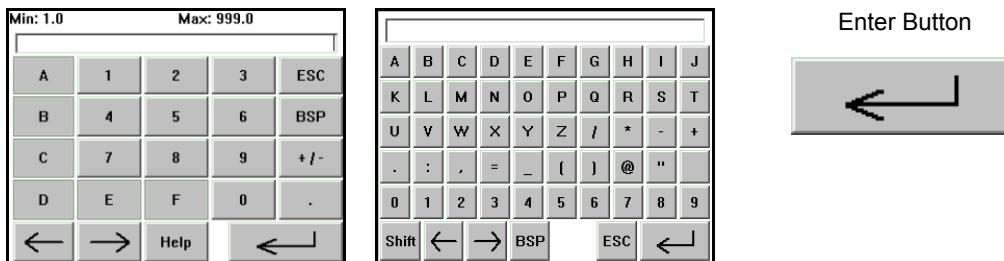
For entering Passwords, setting the system parameters or alarms, or selecting certain options the *TOUCH* panel utilises Input field as shown below.



There are two types of Input field.

The first type, shown in figure 2, has a pull-down menu. If the screen area for this field is touched in the input area then an options menu will be displayed. The required option is selected by touching the screen. The entry is confirmed by the pull-down menu being removed from the display, and the required selection being displayed in the input field. E.g. "yes" or "no" appears in the input field.

The second type, shown in figure 2, is an alpha/numeric input field. If the screen is touched in the input area then an alpha/numeric pad will be displayed, see Figure 3. Entry of the required data is made by pressing each button and then must be confirmed by selecting the "Enter Button". On confirmation that the data is correct, the keypad is removed from the display and the up-dated value is entered into the input field.



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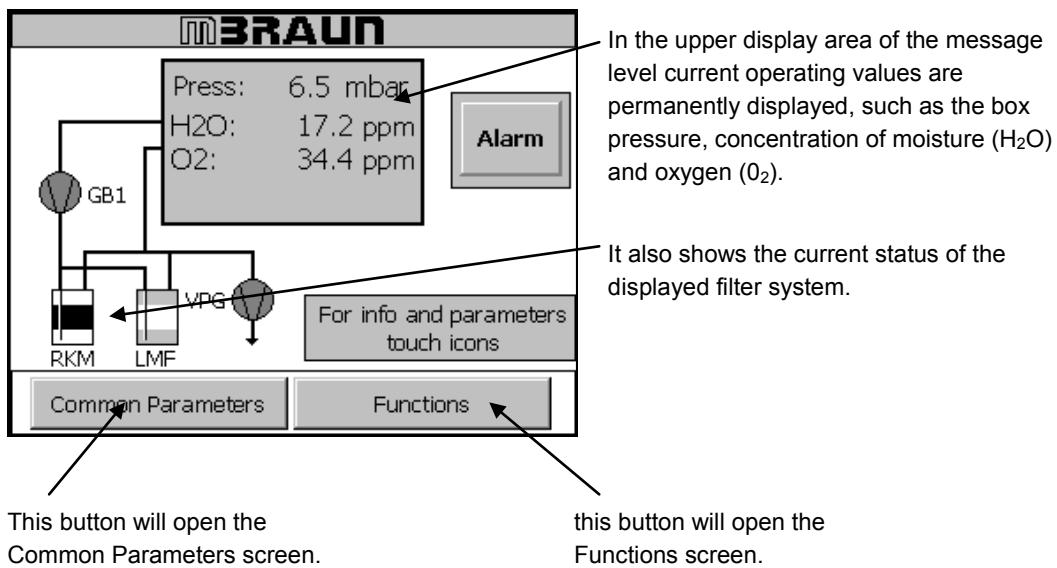
## 7. Parameter and Display Patterns

On the TP170B Operation Panel (TOUCH Screen) display all messages, values and parameters of the system can be displayed.

The manufacturer for optimum operation of the system has set the parameters. If required, the user may change them.

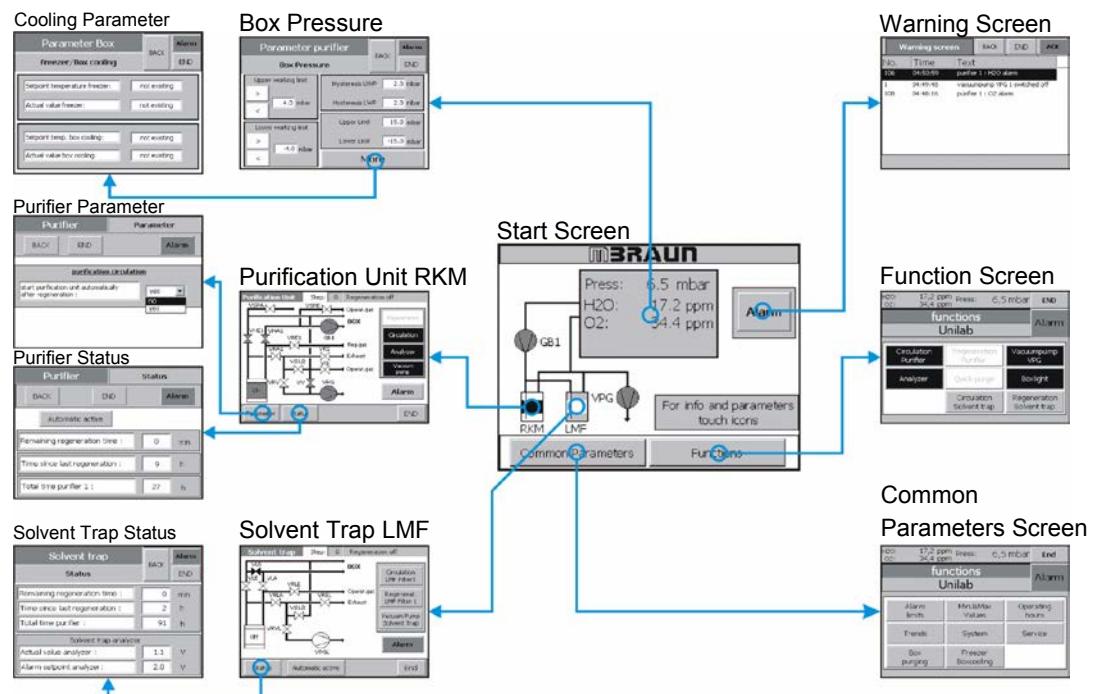
### 7.1. Start Screen

When the system is activated the Touch Screen will display the "Start Screen". This screen displays an overview of the system and reports reading for various sensors.



### 7.2. Display Overview

The diagram below shows how each screen may be accessed.

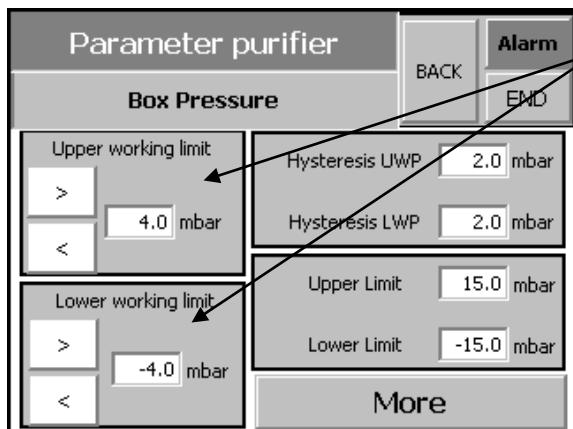


## 7. Parameter and Display Patterns

### 7.3. Box Parameters

#### 7.3.1 Setting the Box Pressure

- Open Parameter purifier Screen:  
on the Start Screen, touch the field displaying the box pressure



Upper and lower working limit:

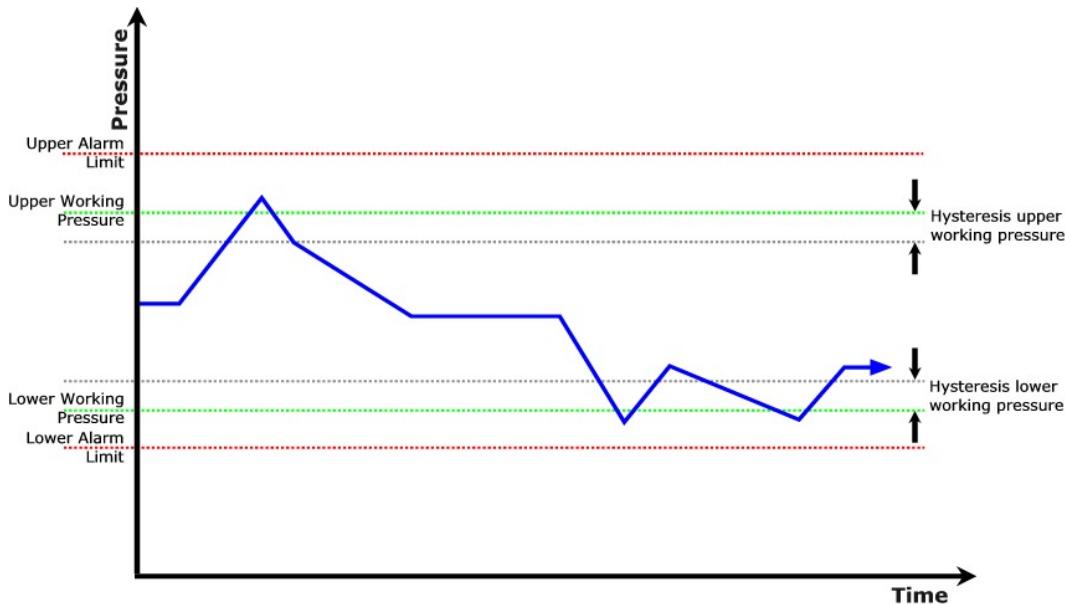
- Enter via the arrow-buttons > and < or
- Selecting the numeric box and then entering the value with the alpha/numeric keypad.

When this display selected, the box pressure control is deactivated.

The upper working limit cannot be set higher than the upper limit, and likewise the lower working limit cannot be set lower than the lower limit.

How the box pressure control works is visible in the chart shown below.

If the working limit is exceeded or the pressure falls below the lower limit, evacuation takes place for a short time or gas is refilled, until the pressure falls within the working limit of the value of the adjusted hysteresis. The hysteresis for the upper and the lower limit can be set independently from each other.



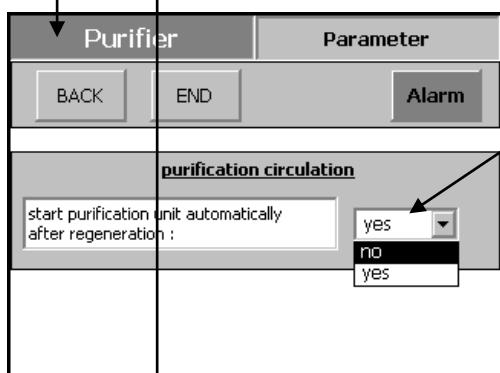
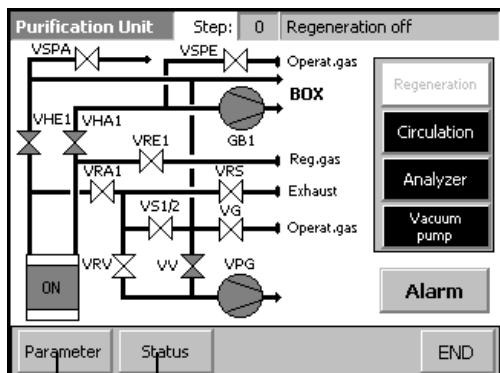
#### 7.3.2 Freezer / Box Cooling Parameters (Option)

- Open Freezer/Box cooling Parameter Screen:  
on the Parameter purifier Screen, touch button **MORE**

See Chapter 10 Specific Components

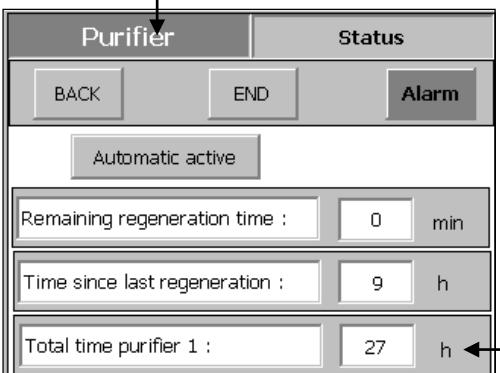
### 7.3.3 Parameters for Gas Purification System

- Open Purification Unit Screen:  
on the Start Screen, touch the Icon button **R KM**



The screen displays the parameters for the gas purifier (RKM) automatic start.

The options and parameters are entered by selecting the input fields to the right of the screen.



This screen displays the time status for the gas purifiers (RKM).

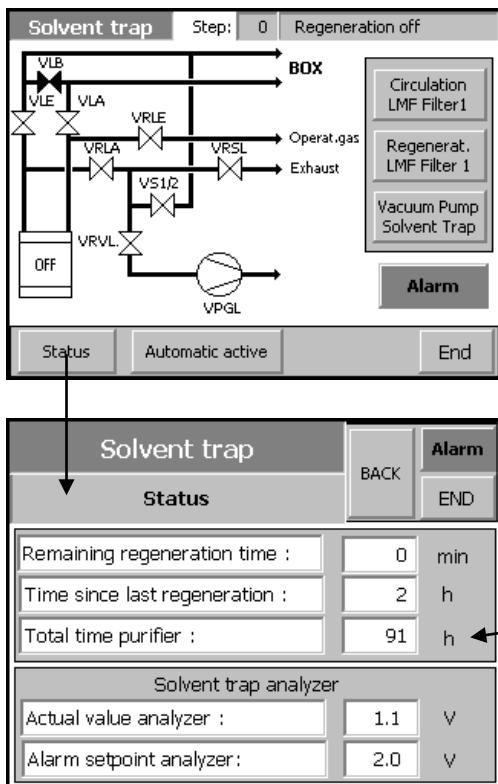
The numeric values are system generated.

The total time purifier is the time, since insulation, that the purifier has been in active service. This figure would only be reset in the event of **MBraun** service technicians replacing the filter medium.

## 7. Parameter and Display Patterns

### 7.3.4 Parameters for Solvent Vapour Filter LMF (Option)

- Open Solvent Trap Screen:  
on the Start Screen, touch the Icon button **LMF**



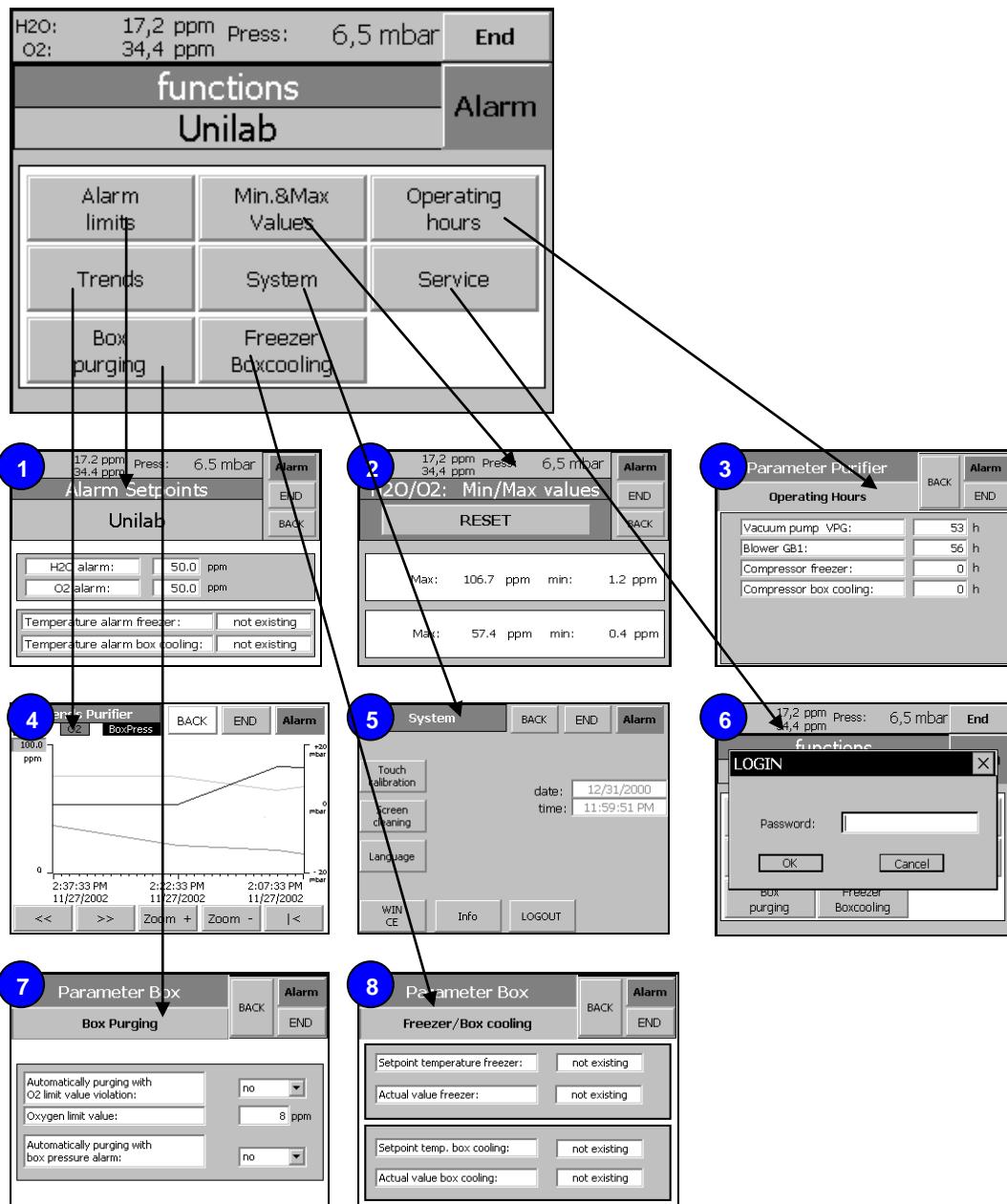
This screen displays the time status and the alarm parameters for the solvent filter (LMF). The numeric values are system generated.

The total time purifier is the time, since insulation, that the purifier has been in active service. This figure would only be reset in the event of **MBraun** service technicians replacing the filter medium.

### 7.4. Common Parameters

- Open Common Parameters Screen:  
on the Start Screen, touch the Icon button **COMMON PARAMETERS**

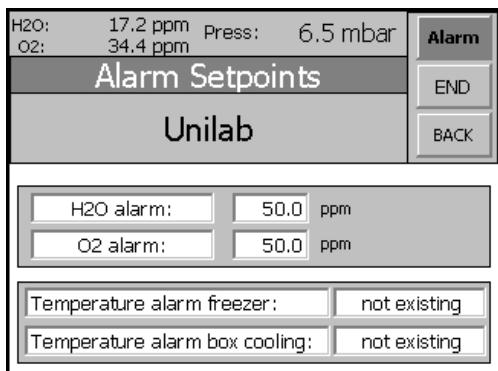
Below is an overview of the screens that may be accessed from the Common Parameters Screen. Each purpose and function of each numbered screen is explained in the following section.



## 7. Parameter and Display Patterns

### 7.4.1 Alarm Setpoints

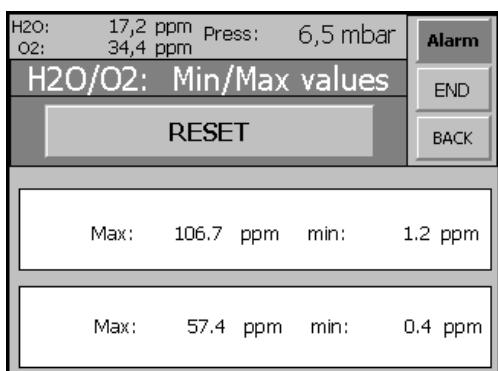
- Open Alarm Setpoints Screen:  
on the Common Parameters Screen, touch the button **ALARM LIMITS**



Gas Purification Alarm limits may be entered by selecting the numeric field and then by using the alpha/numeric keypad. As soon as the limits are exceeded a message is issued.

### 7.4.2 H<sub>2</sub>O / O<sub>2</sub> Min/Max Values

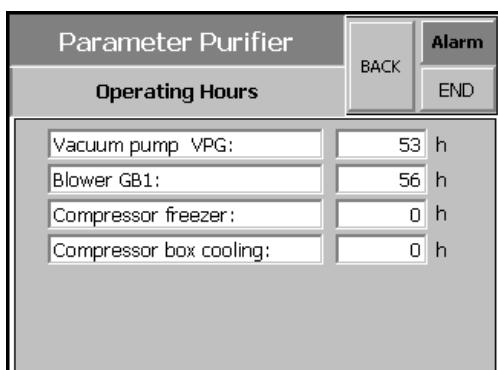
- Open H<sub>2</sub>O / O<sub>2</sub> Min/Max Values Screen:  
on the Common Parameters Screen, touch the button **MIN & MAX VALUES**



This display shows the highest and lowest measured gas readings for the box atmosphere. The RESET button will clear these values and save the current value set until the atmosphere has altered to a new high or low and then that reading will be stored.

### 7.4.3 Purifier Operating Hours

- Open Purifier Operating Hours Screen:  
on the Common Parameters Screen, touch the button **OPERATING HOURS**



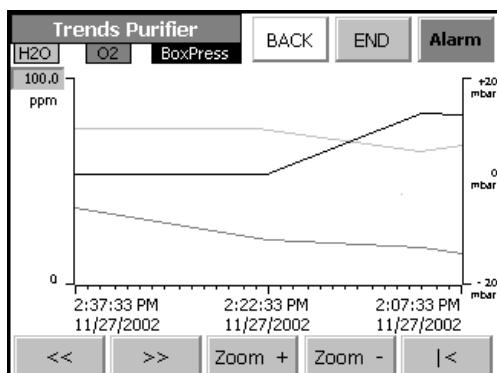
Information regarding the total operation time of the system components can be seen on the "Operating Hours" Screen.

Information displayed is the total amount of hours that the components have been in use.

!	<b>NOTE!</b> The times can only be reset by <b>MBRAUN</b> Service personnel e.g. upon replacement of a spare part by <b>MBRAUN</b> Service Technicians.
!	<b>NOTE!</b> See also section "Status of Purifier Filters" in "Gas Purification" Chapter.

### 7.4.4 Purifier Trends

- Open Purifier Trends Screen:  
on the Common Parameters Screen, touch the button **TRENDS**



The trends screen is in the form of a time graph.

The Y-axis may be calibrated between 50 and 1000 ppm by selecting the input field shown on the axis.

The smallest time frame for the X-axis is 1 minute.

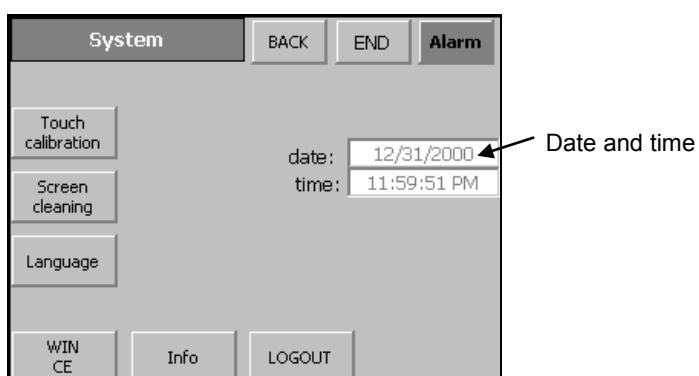
back <<, forward >>: you can move along the time axis.

**ZOOM+** and **ZOOM-**: you can select a narrower or broader time frame.

|< button: returns to the current time.

### 7.4.5 System Settings

- Open System Settings Screen:  
on the Common Parameters Screen, touch the button **SYSTEM**



#### 7.4.5.1 Date and Time

The Date and time may be set to local setting by the customer.

To change the time, selecting the numeric box and then entering the value with the alpha/numeric keypad.

#### 7.4.5.2 Touch Calibration

##### Purpose:

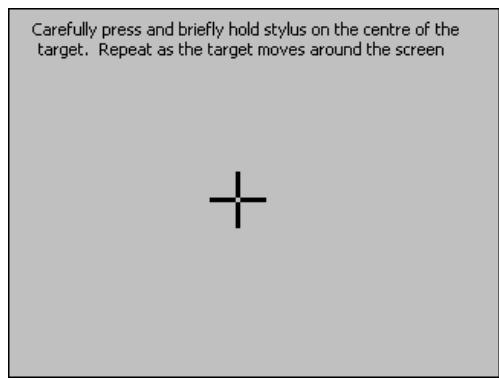
Depending on the fitting position as well as the viewing angle the touch screen may need to be calibrated to avoid any operating errors.

- You can calibrate the screen by selecting the **TOUCH CALIBRATION** button.

##### Procedure:

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.

## 7. Parameter and Display Patterns



### Performing calibration:

With the calibration procedure completed, touch the screen at any point for accepting the latest calibration data.

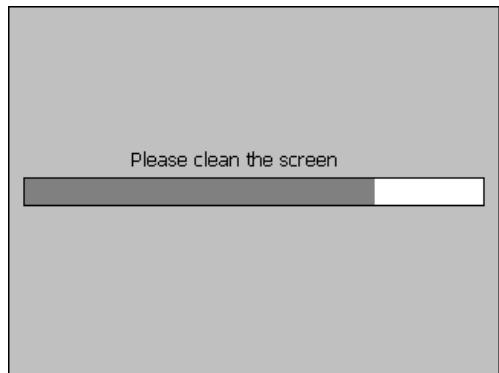
### Rejecting calibration:

Wait for 30 seconds, until the overlaid timer-bar has reached zero, for rejecting the latest calibration data. In case calibration has been carried out incorrectly the latest values are not accepted.

#### 7.4.5.3 Screen Cleaning

- Touch the **SCREEN CLEANING** button.

After cleaning display has been started, all inputs via the touch screen are locked for 30 seconds. A run bar indicates the remaining time.



### Protective foil

:For the Touch-Screen a protective foil is available. However this protective foil is not included in delivery of the TP170.

The self-adhesive protective foil protects the screen against scratches and grime.

In addition, the matt surface of the foil reduces any kind of reflection.

If required the protective foil can be removed at any time without leaving residual glue on the screen. If required a new foil would need to be applied.

### Caution:

For removing the protective foil do not use any sharp or pointed objects, such as knives, which may result in damage to Touch Screen.

		<b>CAUTION</b>
		<b>Risk of damage!</b> <b>For removing the protective foil do not use any sharp or pointed objects, such as knives, which may result in damage to Touch Screen..</b>

#### 7.4.5.4 Language

The Touch Operation Panel (TP170b) enables the user to select between preloaded languages.

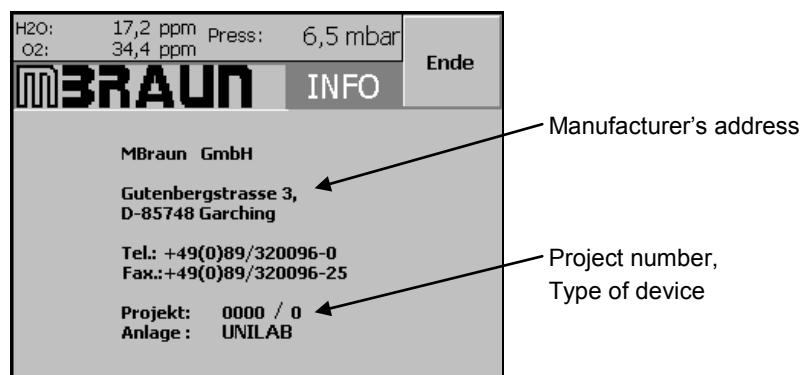
**MBRAUN** systems are currently loaded with German and English.

- To change between languages touch the **LANGUAGE** button.

### 7.4.5.5 WIN CE

With the **WIN CE** button activated, the Run-time program is completed and the panel is run down to the operating system level. If important filing procedures are running in the background, this is the safest way of completing the filing procedures before the device is deactivated.

### 7.4.5.6 Info



### 7.4.5.7 LOGIN / LOGOUT



Selecting the **LOGOUT** button will log the user out of the current "Password" level. That is the password level will be set to "zero".

### 7.4.6 Service Functions

- Open Service Functions Screen:  
on the Common Parameters Screen, touch the button **SERVICE**



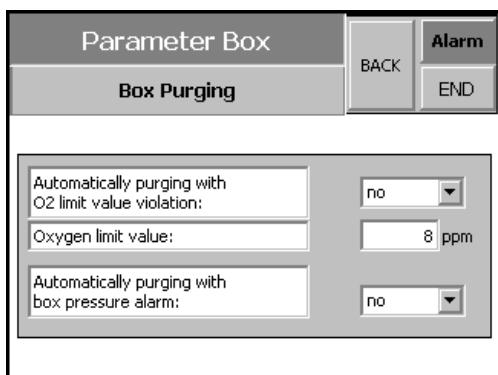
No Operating instructions are given for the service function. Information about the settings within the service mode is reserved for **MBRAUN** Service personnel only.

## 7. Parameter and Display Patterns

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### 7.4.7 Box Purging Parameters

- Open Box Purging Parameters Screen:  
on the Common Parameters Screen, touch the button **BOX PURGING**



Two types of automatic purging options are available on the screen.

The purging methods are selected by choosing either **YES** or **NO** in the relevant input field on the right of the screen.

**Automatically purging with O<sub>2</sub> limit value violation** – will purge the glove box atmosphere as soon as the **Oxygen limit value** is over stepped

e.g. if the oxygen limit value is 50 ppm and the sensor reading is 51 ppm then the Automatic purging will bring the oxygen content of the glove box atmosphere to below 50 ppm.

**Automatically purging with box pressure alarm** – will either refill or evacuate the glove box by 5 mbar if the box pressure alarm setpoint is overstepped.

e.g. A system is required to be used with an under pressure and the pressure upper pressure alarm parameter is set at -1mbar. If the pressure increases above -1mbar then the box atmosphere will be evacuated by 5 mbar bringing the pressure down to -6mbar.

Like wise if the under pressure setpoint is over stepped then the glove box will be filled by 5 mbar.

### 7.4.8 Freezer / Box Cooling Parameters (Option)

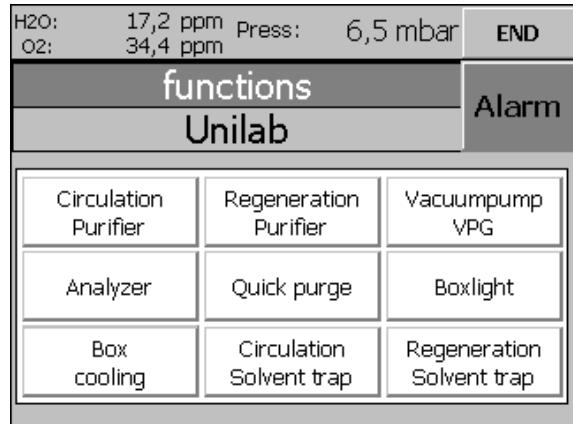
See Chapter 7.3.2

### 7.5. Functions

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Via the Functions button in the Start Display, all existing functions can be selected and the status can be controlled. The individual displays comprise the functions in the form of buttons so that these functions are selectable within the individual function groups.

Below are the normal function screens showing the location of all the common function buttons.



### 7.6. Warnings and Error Messages

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The **ALARM** Button appears in each screen.

On occurrence of a fault or an error the "Alarm" button will flash. To view the error messages, push the **ALARM** button. This will open the Warnings Screen.

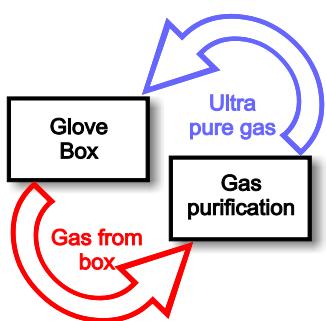
## **7. Parameter and Display Patterns**

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## 8. Gas Purification

### 8.1 General Information



The **MBRAUN** H<sub>2</sub>O/O<sub>2</sub> Gas Purification System is designed to remove moisture and oxygen from an inert gas glove box atmosphere. The system works by the principle of gas circulation, i.e. the working gas permanently circulates between the glove box and the H<sub>2</sub>O/O<sub>2</sub> gas purification system. This process guarantees stable values of gas purity and cost-efficient processing. The circulation mode is PLC-controlled and is operated and displayed via the Operation Panel.

Figure 8.1: Circulation Principle

		<b>CAUTION</b>
		<p><b>Risk of damage to process materials</b></p> <p>When operating the Glove Box system the circulation mode should always be activated. Only in this case the atmosphere within the glove box is continuously purified to values down to &lt; 1 ppm with regard to moisture and/or oxygen.</p>

When used for quite a long period in the circulation mode the purification unit becomes exhausted resulting in a drop of the purification performance leading to increasing H<sub>2</sub>O/O<sub>2</sub> values. For this reason, the purifier column should be regenerated regularly or at the latest when there is a visible drop in performance. Refer to the "Regeneration" section.

The circulation and regeneration mode for a purifier cannot be active concurrently.

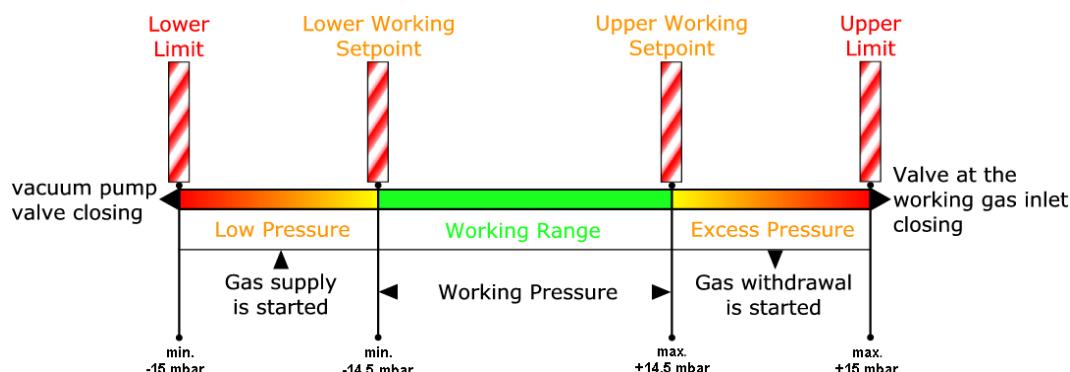
	<p><b>NOTE!</b></p> <p><b>For 2-purifier column systems:</b></p> <p>In 2-purifier column systems, circulation mode can run via one purifier column while the other purifier column is undergoing regeneration.</p> <p>The principle for circulation is the same for both 1 and 2 reactor systems. The 2-purifier column system allows greater flexibility in operation of the box by allowing one reactor to be regenerated whilst the other is in circulation (purifying) mode.</p>
	<p><b>NOTE!</b></p> <p>Solvent Vapour Filters, designed to remove solvent vapours from the Glove Box Atmosphere are available as an option.</p> <p>In this case, the working gas permanently circulates between the glove box, the H<sub>2</sub>O/O<sub>2</sub> gas purification system and the solvent removal system.</p> <p>Systems fitted with dual filter Solvent Vapour Filters (LMF Auto) require circulation over one of the solvent filters (LMF) whenever the gas purification (LMF) circulation is used.</p>

## 8.2 Box Pressure Control

### 8.2.1 Definitions of Terms

<b>Box Pressure</b>	Current pressure prevailing within the glove box.
<b>Working Pressure</b>	Box pressure desired.
<b>Working Range</b>	A fixed range within the working set points of which the working pressure may travel between under automatic control.
<b>Working Set points</b>	<p>Adjustable set points of the working range from -14.5 to +14.5 mbar. If these set points are exceeded automatic pressure compensation is started. The upper working set point value should at least be 1 mbar higher than the lower working set point value.</p> <p>The manufacturer's settings: upper working set point +4.0 mbar; lower working set point -4.0 mbar.</p> <p><i>For alarm set point modifications refer to "Operating the Touch Panel" Chapter.</i></p>
<b>Limit set points</b>	<p>Adjustable maximum pressure set points outside working range for the system's safety (-15 mbar to +15 mbar), if these set points are exceeded the gas supply valves or gas withdrawal valves are closed immediately.</p> <p>The manufacturer's settings: upper limit set point -15 mbar; lower limit set point +15 mbar.</p> <p><i>For alarm set point modifications refer to "Operating the Touch Panel" Chapter.</i></p>

**MBRAUN** Glove Box systems are equipped with a PLC-controlled pressure control system that starts automatically with the main system's activation.



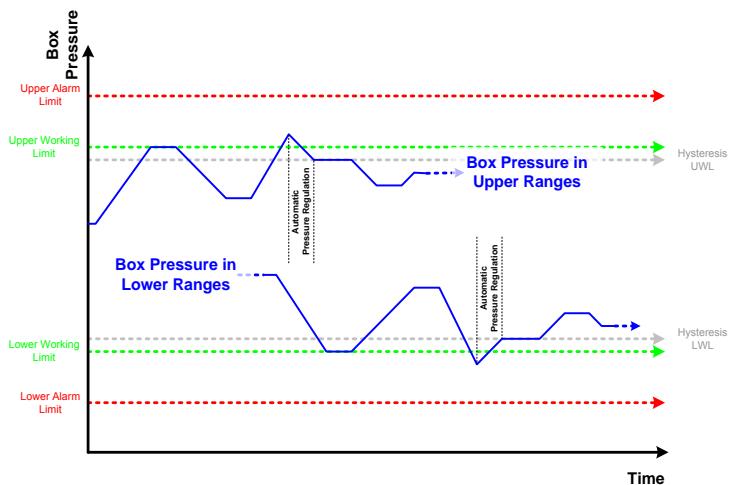
Actual values may differ due to customisation.

Figure 8.2: Example of Box Pressure Control Set points

If the working limit is exceeded or the pressure falls below the lower limit, evacuation takes place for a short time or gas is refilled, until the pressure falls within the working limit of the value of the adjusted hysteresis. The hysteresis for the upper and the lower limit can be set independently from each other.

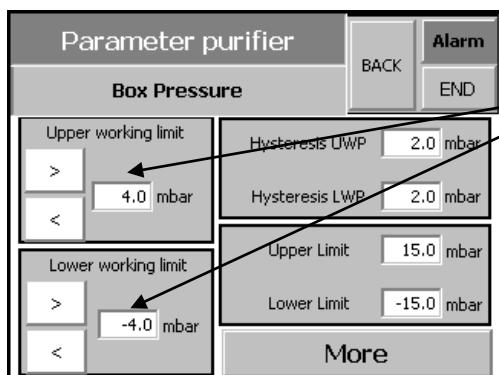
## 8. Gas Purification

How the box pressure control works is visible in the chart shown below.



### 8.2.2 Setting the Box Pressure

- ▶ Setting the box pressure: on the start screen, touch the field displaying the box pressure.



- Upper and lower working limit:
- ▶ Enter via the arrow-buttons > and < or
  - ▶ Selecting the numeric box and then entering the value with the alpha/numeric keypad.

When this display selected, the box pressure control is deactivated.

The upper working limit cannot be set higher than the upper limit, and likewise the lower working limit cannot be set lower than the lower limit.

### 8.2.3 Adjusting Box Pressure within the Working Range

**MBRAUN** Glove Box systems of this series are equipped with a foot switch. The box pressure can conveniently be changed within the working range by actuating the foot switch.

Operation of the Foot Switch:

- ▶ Increase pressure (within working range): press right pedal
- ▶ Decrease pressure (within working range): press left pedal



Figure 8.3: Footswitch

## 8.3 Purging

Glove-Box systems that are either newly installed or have been opened for reasons of service contain ambient air. The prerequisite for the gas purification is a pure inert-gas atmosphere of nitrogen, argon or helium. Thus, at the beginning of the system's commissioning the ambient air should be replaced by medium purity inert gas of (e.g. nitrogen, argon or helium).

	<b>NOTE!</b> <b>To ensure a pure atmosphere, closed areas such as the freezer interior, as well as areas of low gas movement such as around fixtures or in corners, are given special attention during the commissioning purge process as residual ambient air will lead a decreased quality of the box atmosphere.</b>
--	--

Displacing the ambient air from the system is called purging. Working gas is used as purging gas.

On principle, a system should be purged when the oxygen portion in the box atmosphere exceeds 100ppm.

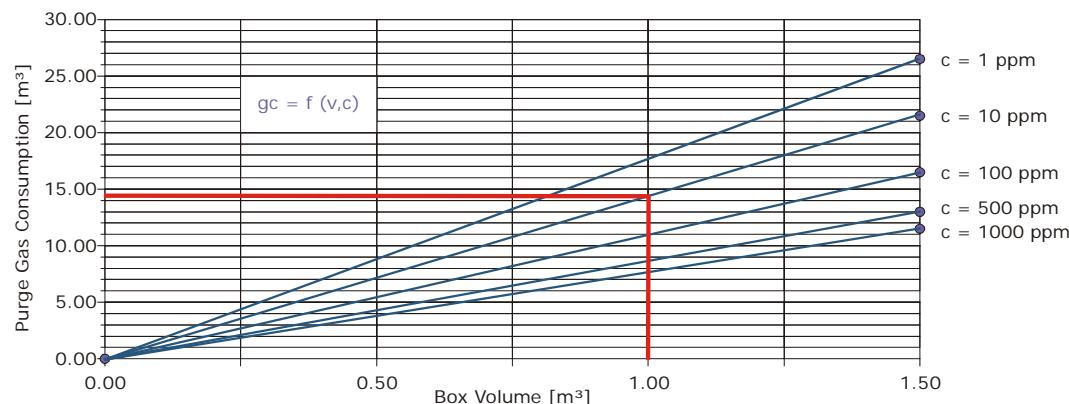
The reasons for too high oxygen values are as follows:

- first commissioning of a system
- servicing
- air influx due to faulty operation
- air influx due to damage (leaks)

		<b>CAUTION</b>
<b>Risk of damage to the system</b> <ul style="list-style-type: none"> <li>▶ A Glove Box system should be purged using working gas until the O<sub>2</sub> portion within the box atmosphere has decreased to a value of &lt;100 ppm. Operating the system with higher oxygen value may result in damaging the gas purification system.</li> </ul>		

### 8.3.1 Purge Gas Consumption

The operator must ensure that there is sufficient purge gas for commissioning the system. The chart below provides a guideline for estimating the amount of purge gas required.



In the example above, it shows that if a purity of 10 ppm is required, then about 14.50m<sup>3</sup> of purge gas is required for 1 m<sup>3</sup> box volume.

Figure 8.4: Purge Gas Consumption

## 8. Gas Purification

### 8.3.2 Manual Purging

The manual purging has to be applied to all the system including build in options such as a freezer etc. In addition special attention must be given to areas of low gas movement due to the inbuilt components creating pockets to trap the ambient air.

	 <b>CAUTION</b>
	<p><b>Risk of injury and pollution of environment!</b></p> <ul style="list-style-type: none"><li>▶ It is the customer's responsibility to ensure that any required exhaust system is provided. The manufacturer does not assume any liability.</li><li>▶ When using toxic or radioactive material, there must be no discharge of the gas to surroundings.</li></ul>

#### Prerequisites for Manual Purging:

- > Having observed all previous chapters.
- > All connections have been properly made.
- > The system functions "Circulation" and "Regeneration" are not activated
- > All antechamber doors are closed.
- > The connections for manual purging have been made; refer to chapter "Preparations for connections".
- > Sufficient working gas (i.e. purge gas) is available.  
Required quantity approx. 10 – 12 m<sup>3</sup>/m<sup>3</sup> box volume.

#### Manual Purging Procedure:

- ▶ Set-up purge gas source (working gas) with pressure reducing valve.
- ▶ Connect reinforced hose to purge gas source.
- ▶ Open "blind flange" on Glove Box.
- ▶ Feed one end of the reinforced hose through the open flange into the glove.
- ▶ Set the pressure-reducing valve on the purge gas source between 3-5 bar and open valve.
- ▶ Using the gloves, take hold of the reinforced hose and purge the box interior from top to bottom using a circular motion. Carefully purge corners, edges and box fittings.
- ▶ Systems equipped with freezers, or have areas that may be protected by covers, will need to be open during the purging process (ensure that freezers are switched off and at room temperature.)
- ▶ Air and excess purge gas escapes through the flange opening.
- ▶ Purge until the box O<sub>2</sub> value has reached <100 ppm.

To reach this value it may require between 10 - 12 m<sup>3</sup>/m<sup>3</sup> box volume of purge gas

With systems that have analysers the actual O<sub>2</sub>-value can be precisely controlled. It is recommended that the O<sub>2</sub> analysers be switched on for a short time to allow a reading to be taken during the purge process. The measurement may settle at a higher H<sub>2</sub>O/O<sub>2</sub>-concentration.

After reaching an O<sub>2</sub>-value of <100 ppm the reinforced hose may be removed from the box and the flange immediately closed.

- ▶ Turn off purge gas flow.

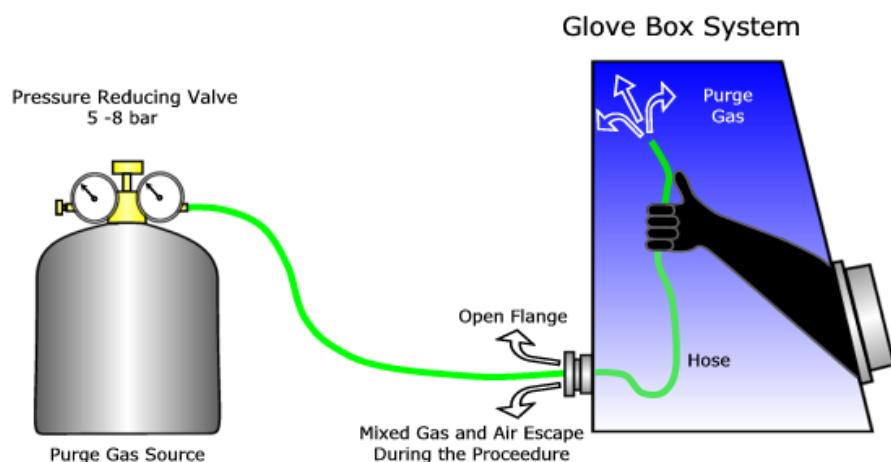
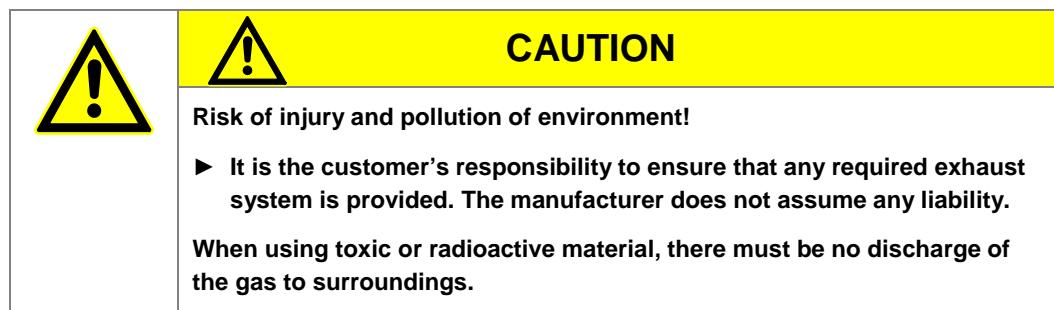


Figure 8.5: Manual Purging Procedure

### 8.3.3 Automatic Purging (Option)

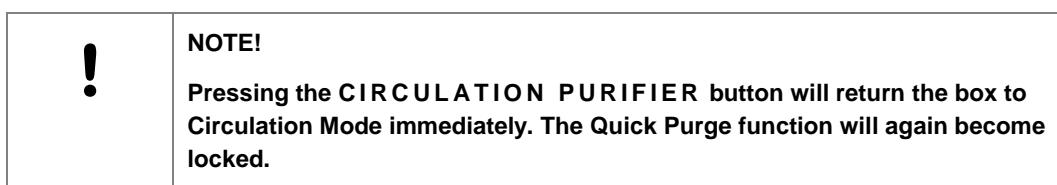
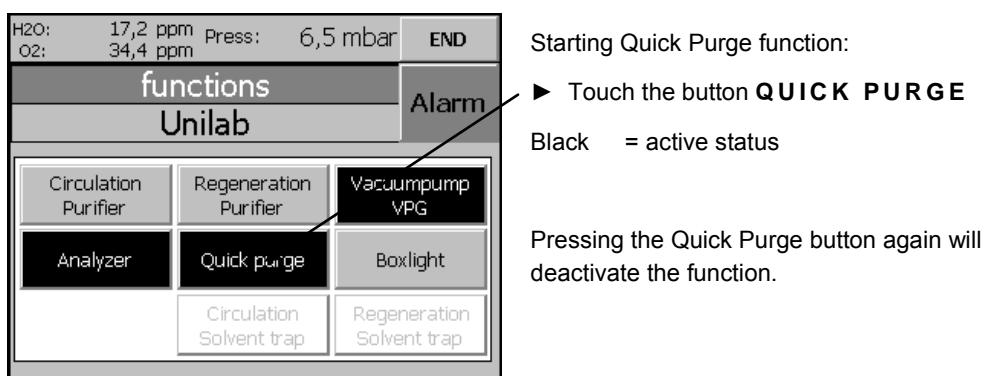
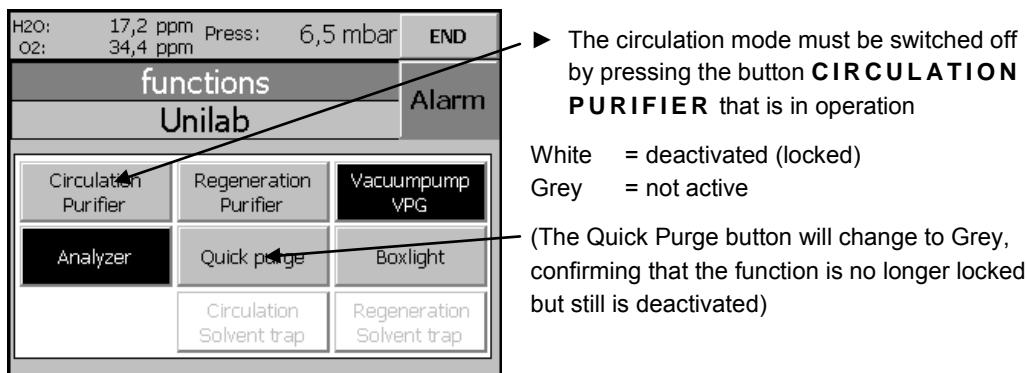
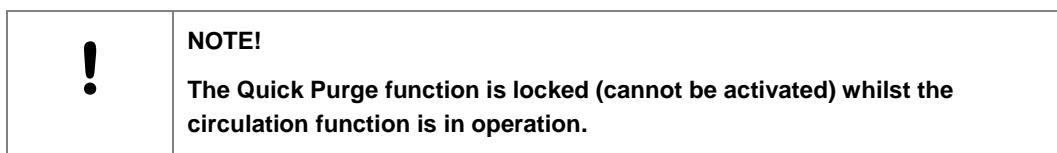
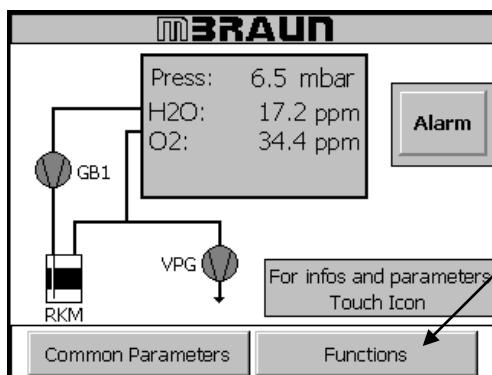
The **MBRAUN** “QuickPurge” automatic purging system is an optional component.



- > Having observed all previous chapters.
- > All connections have been properly made.
- > The working gas connection has been made.
- > The system is activated; refer to Chapter “Activating the system”.
- > The system function “Regeneration” is not activated.
- > All antechamber doors are closed.
- > Sufficient working gas (i.e. purge gas) is available.

## 8. Gas Purification

### "Quick Purge" Procedure:



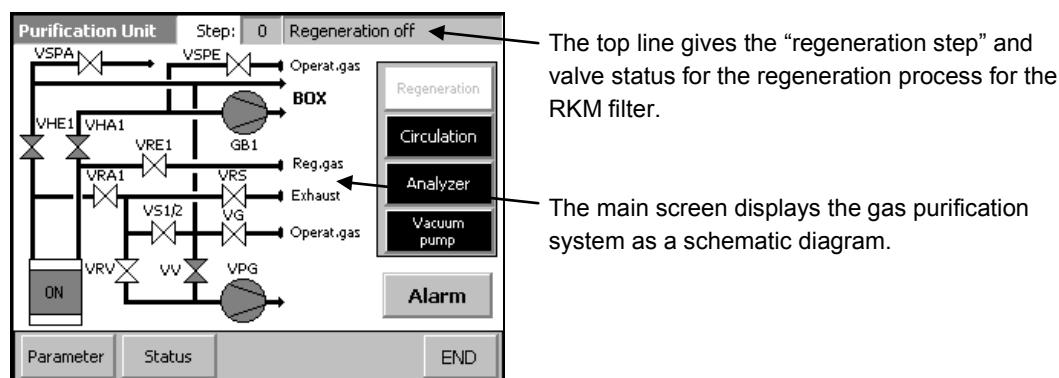
## 8.4 Gas Purification Reactor (RKM)

### 8.4.1 Function status of the gas purification system

The Status of the Reactor can be seen at all times on the Start screen. The Icon for the Reactor differs for each mode.

	WHITE	Not Active
	BLACK	Active – Filter in Circulation Mode (see Circulation Section)
	GREY	Regeneration – Filter in Regeneration Mode (see Regeneration Section)

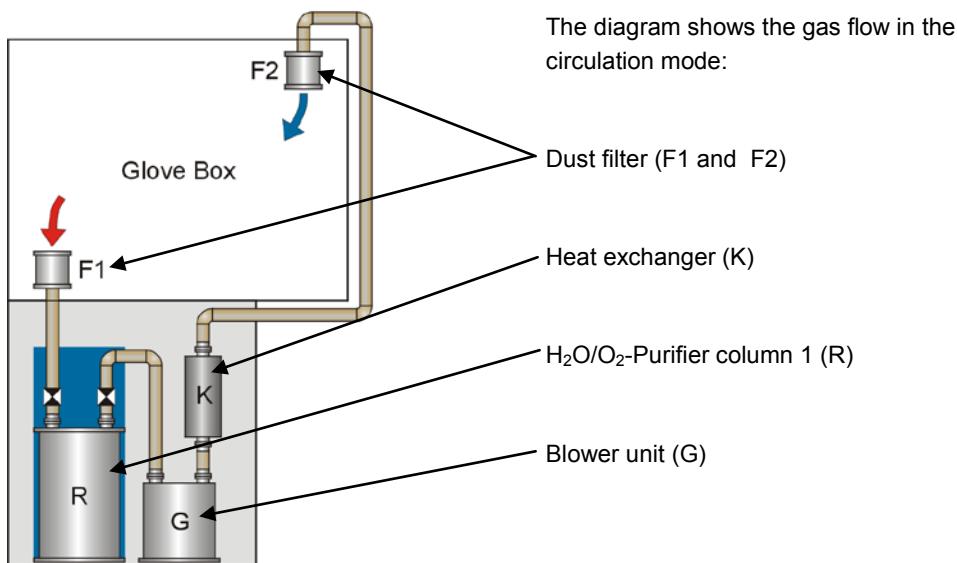
- Open Purification Unit Screen:  
on the Start Screen, touch the Icon button **RKM**



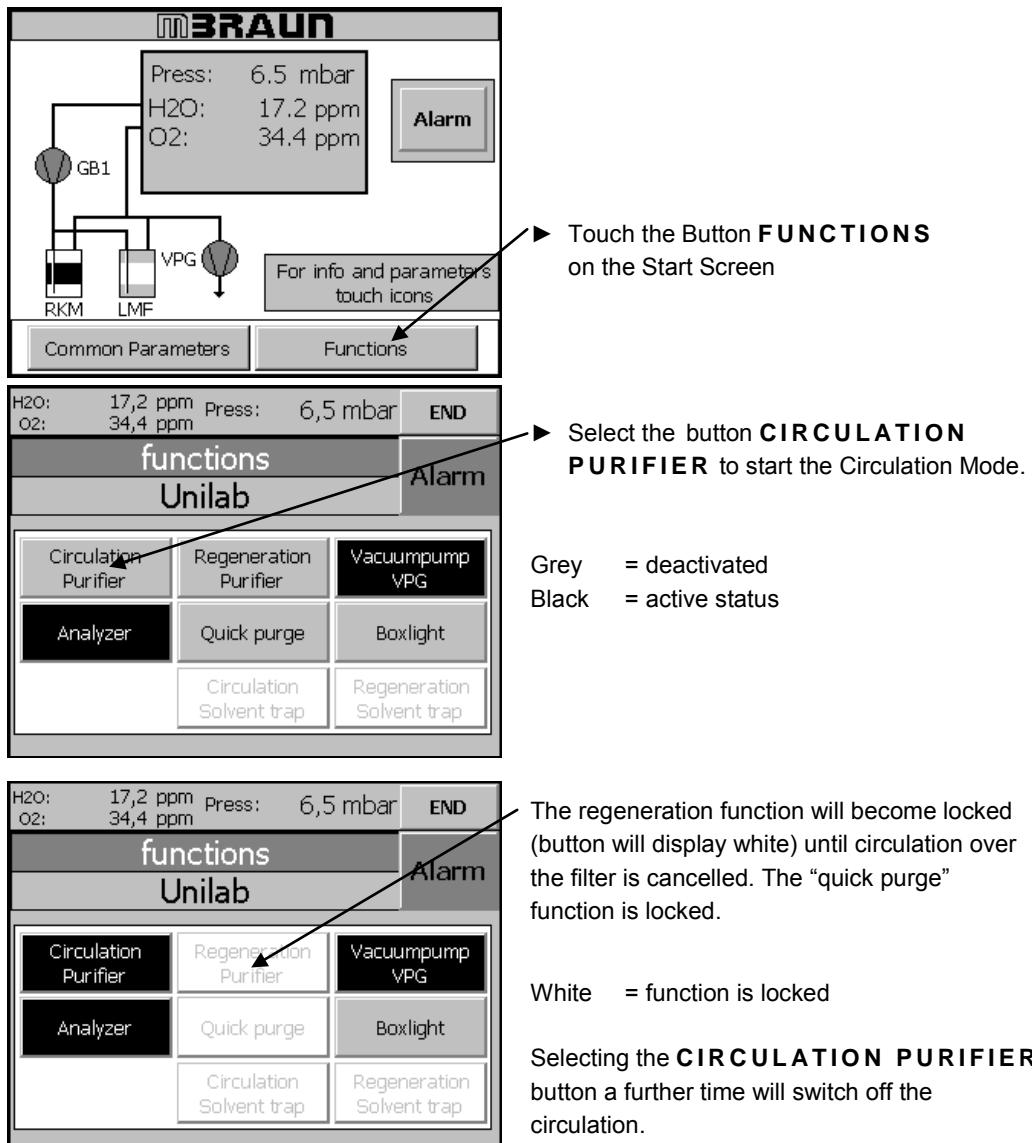
## 8. Gas Purification

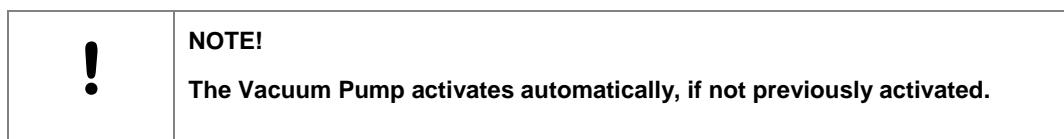
### 8.4.2 Circulation Mode

Gas flow in the circulation mode:



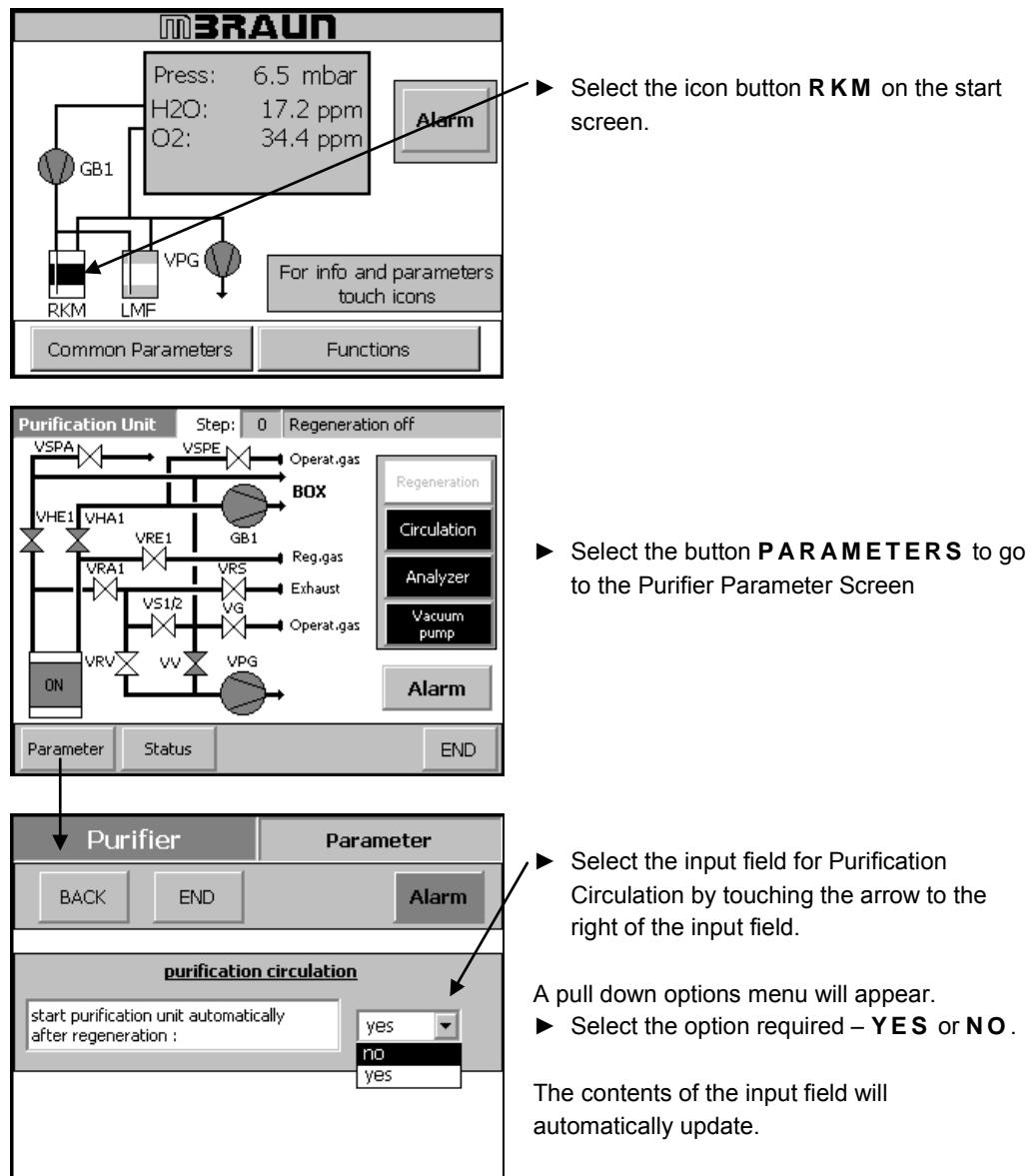
#### 8.4.2.1 Activating and Deactivating the Gas Purification System





#### 8.4.2.2 Automatic Start of Circulation Mode

After regeneration of a reactor has completed (see section Regeneration), it is possible to have this reactor switched into Circulation Mode automatically.



#### 8.4.3 Regeneration Mode

## 8. Gas Purification

If a purifier column is saturated after having been used for a longer period, using the standard regeneration process will reactivate the column.

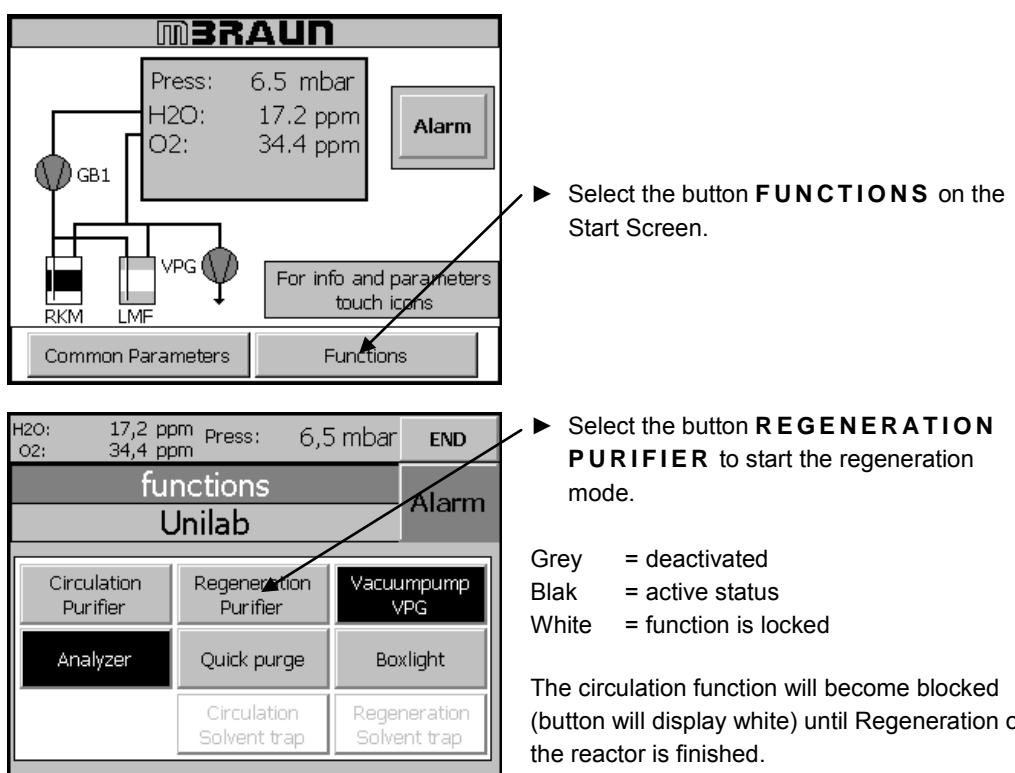
Regenerating the purifier column in regular intervals is recommended. Do not wait, until a drop in the purification performance is visible. These intervals between the respective regeneration procedures result from an experimental value, which differs depending on the respective system, way and time of use.

<b>!</b>	<b>NOTE!</b>  Apply the following method for determining the reasonable intervals for regeneration: Regenerate the purifier column after its first commissioning only when a drop of performance is visible. If such a drop occurs, write the operating hours run down. The operating hours reading minus 10 hours can be used as a reference value for the intervals between the respective regeneration procedures.
----------	---

The principle for selecting regeneration of the Gas Purification Reactor is the same as that for the circulation mode. However once regeneration has been started it cannot be deactivated until the programme sequence has completed.

### 8.4.3.1 Activating the Regeneration Program

<b>!</b>	<b>NOTE!</b>  ► Ensure that there is enough regeneration gas before selecting the regeneration program. A screen message will appear as a reminder to check the regeneration gas flow.  <b>Prove flow of the regeneration gas! If OK --&gt; Confirm this button</b>
----------	---



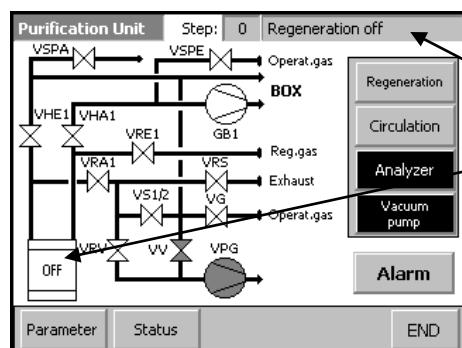
### 8.4.3.2 Executing the Regeneration Program

The following table explains the various steps of the regeneration cycle. On activation of the program, all the steps are run automatically.

Step	Time	Action
0	↓ Start 0 min.	Regeneration deactivated
1		Regeneration gas test ON
2		Regeneration gas test OFF
3 - 16	↓	Activation of the regeneration program with proprietary intermediate steps
17	↓ after 960 min.	Program completed

	<b>CAUTION</b>
	<b>Risk of damage!</b> <b>By no means the regeneration program should be interrupted. Before activating the regeneration program make sure that sufficient gas supply is available.</b>
	<b>NOTE!</b> <b>In case of power failure the Automatic Regeneration System switches back to the activation level, which means, with the power supply restored, the complete regeneration procedure is rerun - regeneration levels already executed will be repeated. Therefore, prior to the restoration of power, make sure that sufficient gas supply is available! The program will restart automatically.</b>

#### 8.4.3.3 Regeneration Program Completed



After successful execution of the regeneration program:  
- the Status field at the top of the screen will read "regeneration off" and  
- the status indicator of the Purification Reactor changes to White

The status of the reactor is repeated on all relevant screens.

#### 8.4.3.4 Auto-Start after Regeneration

## 8. Gas Purification

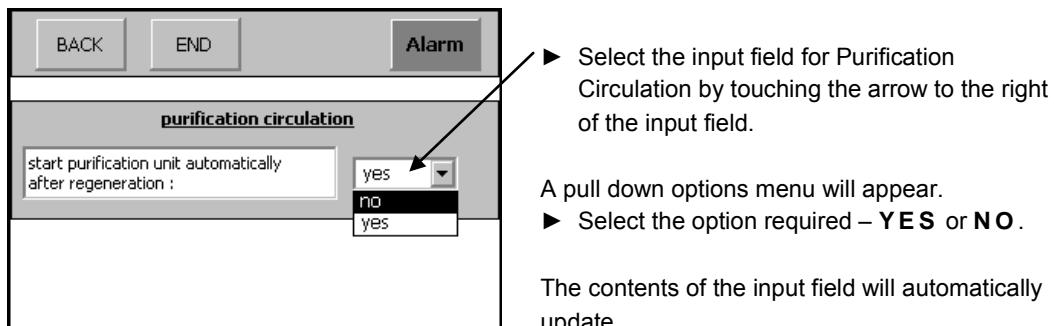


### NOTE!

**MBRAUN** recommends that for single column systems that the auto-start of the circulation after regeneration is selected.

Select the "Auto Start" function:

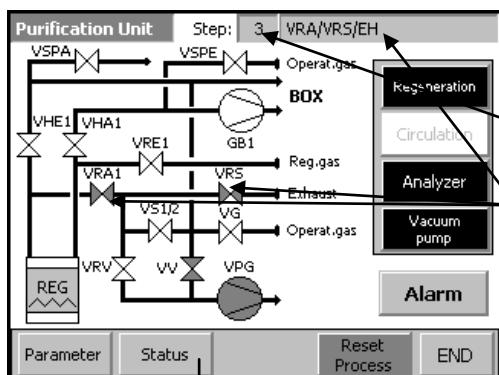
- ▶ Select the Purification Filter Icon from the "Start Screen"
- ▶ Select the button **PARAMETERS**



### 8.4.3.5 Status of Regeneration

The current status of the regeneration of the purifier reactor can be seen in two ways

#### Step Status



At the top of the screen is an information bar for the regeneration status of the filters.

In the diagram, you can see that the regeneration process is in its third step.

Also indicated are the components that are active for each stage of regeneration (VRA/VRS/EH) (in the information bar and as icon on the screen)

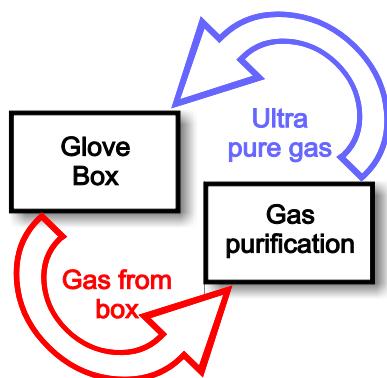
#### Time Status

Remaining regeneration time :	0	min
Time since last regeneration :	9	h
Total time purifier 1 :	27	h

This screen displays the total times for the Purification.

The **AUTOMATIC ACTIVE** button is Password protected – for use by **MBRAUN** service personnel.

## 8.5 Solvent Vapour Filter LMF (Option)



The Solvent Vapour Filter is available as an option.

It is designed to remove solvent vapours from the Glove Box Atmosphere.

The Solvent Vapour Filter works in the same manner and in series with the H<sub>2</sub>O/O<sub>2</sub> gas purification system.

The working gas permanently circulates between the glove box, the H<sub>2</sub>O/O<sub>2</sub> gas purification system and the solvent removal system. This process guarantees absolutely stable values of gas purity and cost-efficient processing.

Figure 8.6: Principle of Circulation

		<b>CAUTION</b>
		<p>Risk of damage to process materials!</p> <p>The Solvent Vapour Filter can only remove the solvent vapour when both the Solvent Vapour Filter (LMF) and the H<sub>2</sub>O/O<sub>2</sub> gas purification (RKM) are both in circulation mode.</p>

There are two different types of Solvent removal systems:

- Manually operated Solvent Vapour Filter.
- PLC controlled Solvent Vapour Filter.

In systems with 2 Solvent Vapour Filter removal columns circulation mode can run via one column while the other column is undergoing regeneration.

The retention capability and capacity of the Solvent Vapour Filter depends on the type of solvent vapour to be removed from the box atmosphere.

The retention characteristics also depend upon the type of catalyst used to within the Solvent Vapour Filter.

Single-column Solvent Vapour Filters and two-column Solvent Vapour Filters without the regeneration option are filled with activated carbon.

Regenerable Solvent Vapour Filters are filled will a certain type of molecular sieve.

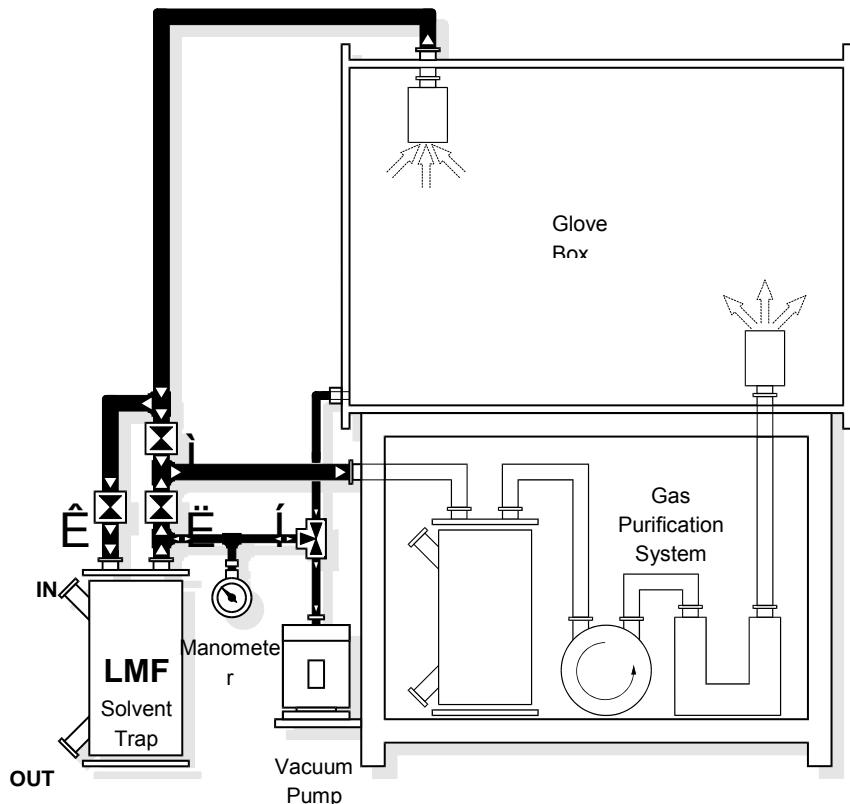
**MBRAUN** Solvent Vapour Filters are optimised for the removal of certain aromatic organic solvents, as well as, a variety of aliphatic organic solvents.

### Technical data:

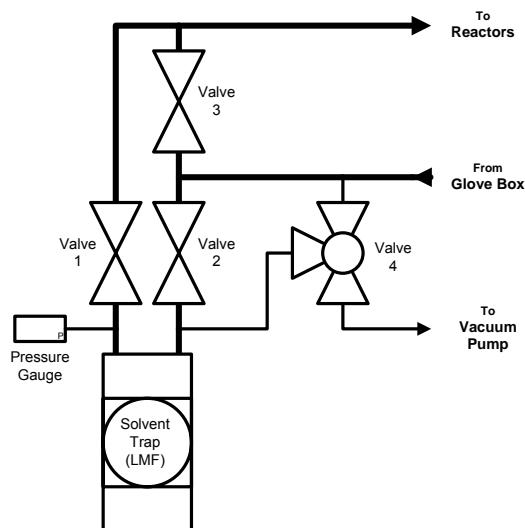
<b>Amount of filling:</b>	5 kg of activated carbon (article no. 2182000)
<b>Suitably:</b>	for aromatic and aliphatic as well as halogenated organic solvents; petrol, kerosene, butyric acid; in other cases the suitability must be confirmed by <b>MBRAUN</b> .
<b>Absorption capacity:</b>	ca. 100 g solvent per kg of activated carbon. The exact quantity depends on the type of the solvent and the ambient conditions - in particular the ambient temperature.

## 8. Gas Purification

### 8.5.1 Manually Operated Solvent Vapour Filter



The diagram below shows the valve positions for operation of the Solvent Vapour Filter Unit.



MB-LMF: OPERATION MODE	MB-LMF: BYPASS MODE
Operation: Gas purification system (RKM) and solvent absorber (LMF)	Operation: Gas purification system (RKM) without solvent absorber (LMF)
► Open valve 1	► Open valve 3
► Open valve 2	► Close valve 1
► Close valve 3	► Close valve 2
Valve 4 position "CLOSED"	Valve 4 position "CLOSED"

## 8.5.2 Changing the Filter Medium

	<b>WARNING</b>
	<p><b>Danger of injury!</b></p> <ul style="list-style-type: none"> <li>► Wear protective mask, glasses and gloves whilst changing the activated carbon.</li> </ul> <p>Safe operation of the system is only possible with activated carbon, obtainable from <b>MBRAUN</b> (article no. 2182000).</p>
	<b>CAUTION</b>
	<p><b>Risk of damage to the system!</b></p> <p>Using a system with a saturated solvent filter can lead to a damage of O-rings, the copper pipe work and other components of the gas purification as well as of the glove box system. It may result in actual loss of the gas impermeability for the overall glove box system.</p>
!	<p><b>NOTE!</b></p> <p><b>MBRAUN</b> recommends that the Solvent Vapour Filter medium is changed at least annually. However, in cases of high solvent uses this may need to be more frequent.</p> <p>1 kg of charcoal can adsorb approximately 100 g organic solvents. However, the exact quantity depends on the type of the solvent and the ambient conditions - in particular the ambient temperature. <b>MBRAUN</b> offers an optional solvent sensor. This sensor monitors the solvent concentration in the gas flow leaving the solvent filter, thereby giving a prompt warning of saturation of the filter.</p>

- Switch the gas purification system into the bypass mode by setting the valves in the following positions:
- Open valve 3
- Close valve 1
- Close valve 2
- Valve 4 - position "CLOSED"
- Open outlet flange (OUT) at the solvent absorber (LMF) and empty the exhausted carbon in a tub.  
Please dispose the exhausted activated carbon correctly – observing all applicable environmental, safety and health guidelines.
- After the emptying the Vapour Filter close the outlet flange (OUT) and open the inlet flange (IN) at the solvent absorber (LMF).
- Fill in new activated carbon; filling amount 5 kg. Afterwards close the inlet flange (IN) again.

## 8. Gas Purification

- ▶ Set hand valve 4 on "EVACUATE" position.  
The minimum duration of the evacuation is 6 hours.
- ▶ After the evacuation set the hand valve 4 on "REFILL" position.  
Wait until the pressure indication at the pressure gauge has reached the value "0".
- ▶ After the refilling set the hand valve 4 on "CLOSED" position.  
The solvent absorber (LMF) is again ready for operation.

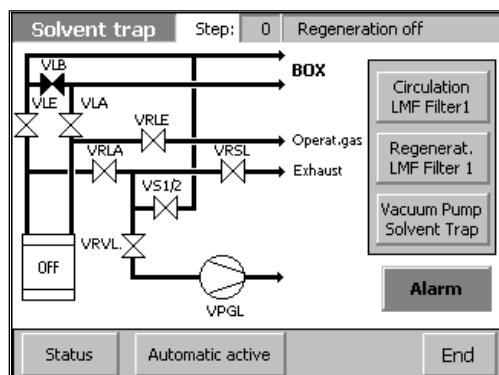
### 8.5.3 PLC Controlled Solvent Vapour Filter

#### 8.5.3.1 Status of Solvent Vapour Filter (LMF) Filters

The Status of the Filters can be seen at all times on the start screen. The Icon for the filter differs for each mode.

	WHITE	Not Active
	BLACK	Active – Filter in Circulation Mode
	GREY	Regeneration – Filter in Regeneration Mode

- ▶ Open Solvent Trap Screen:  
on the Start Screen, touch the icon button **LMF**



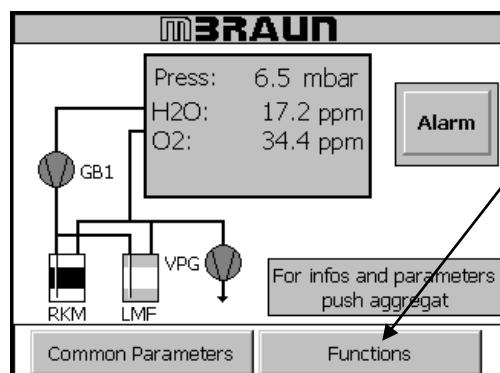
The screen left shows the function status of the solvent filter (LMF).

The top line gives the "regeneration step" and valve status for the regeneration process for each LMF filter.

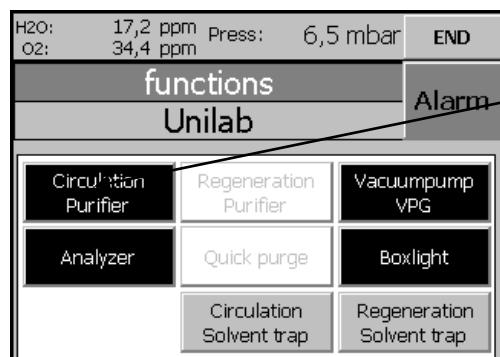
The main screen displays the solvent filter system as a schematic diagram.

At the bottom of the screen are buttons for navigating to further screens.

### 8.5.3.2 Activating and Deactivating the Solvent Vapour Filter Mode

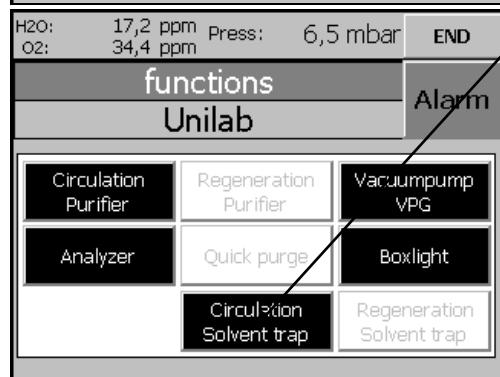


Select the button **FUNCTIONS** on the Start screen.



► Select the button **CIRCULATION PURIFIER** to start the circulation of the purifier filter (RKM)

Grey = deactivated  
Black = active status  
White = function is locked



► Select the button **CIRCULATION SOLVENT TRAP** to start the circulation

The regeneration function for the selected filter will become blocked (button will display white) until Circulation of the filter is cancelled.

Selecting **CIRCULATION SOLVENT TRAP** button a further time will switch off the circulation over the purifier column.

	<b>NOTE!</b> The Vacuum Pump activates automatically, if not previously activated. The Vacuum Pump remains activated until it is deactivated by selecting its function button.
--	--

## 8. Gas Purification

### 8.5.3.3 Regeneration of the Solvent Vapour Filter

The principle for regeneration of the Solvent Vapour Filter is the same as for the H<sub>2</sub>O/O<sub>2</sub> gas purification system (see also chapter Regeneration).



#### NOTE!

Systems that are equipped with one Solvent Vapour Filter are fitted with a by-pass valve to allow the filter to be regenerated while the system operates over the H<sub>2</sub>O/O<sub>2</sub> gas purification system.

### 8.5.4 Solvent Vapour Analyzer (Option)

The solvent vapour analyser is available as an option.

Access to the Solvent Vapour Filter analyzer Screen:

- ▶ Select the Icon button for the LMF on the Start Screen
- ▶ Select the button **P A R A M E T E R S**

Solvent trap		Alarm	
Status		BACK	END
Remaining regeneration time :	0	min	
Time since last regeneration :	21	h	
Total time purifier :	106	h	
Solvent trap analyzer			
Actual value analyzer :	1.2	V	
Alarm setpoint analyzer:	5.4	V	

The solvent vapour analyzer reading is proportional to the concentration of the solvent vapour after passage over the Solvent Vapour Filter.

The sensitivity of the solvent vapour analyser depends upon the type of solvent being handled. Therefore, the reading returned to the control panel is in the form of a voltage measurement (between 0V and 10V).

The **MBRAUN** solvent vapour analyser can be calibrated for a specific solvent upon request.



#### NOTE!

The Alarm set point Analyzer setting will differ for various solvents.

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## 9. Antechamber Operation

### 9.1. General Information

Antechambers are designed for transferring material into or out of the inert Glove Box System without polluting the box internal atmosphere during the respective procedures.

### 9.2. Principle

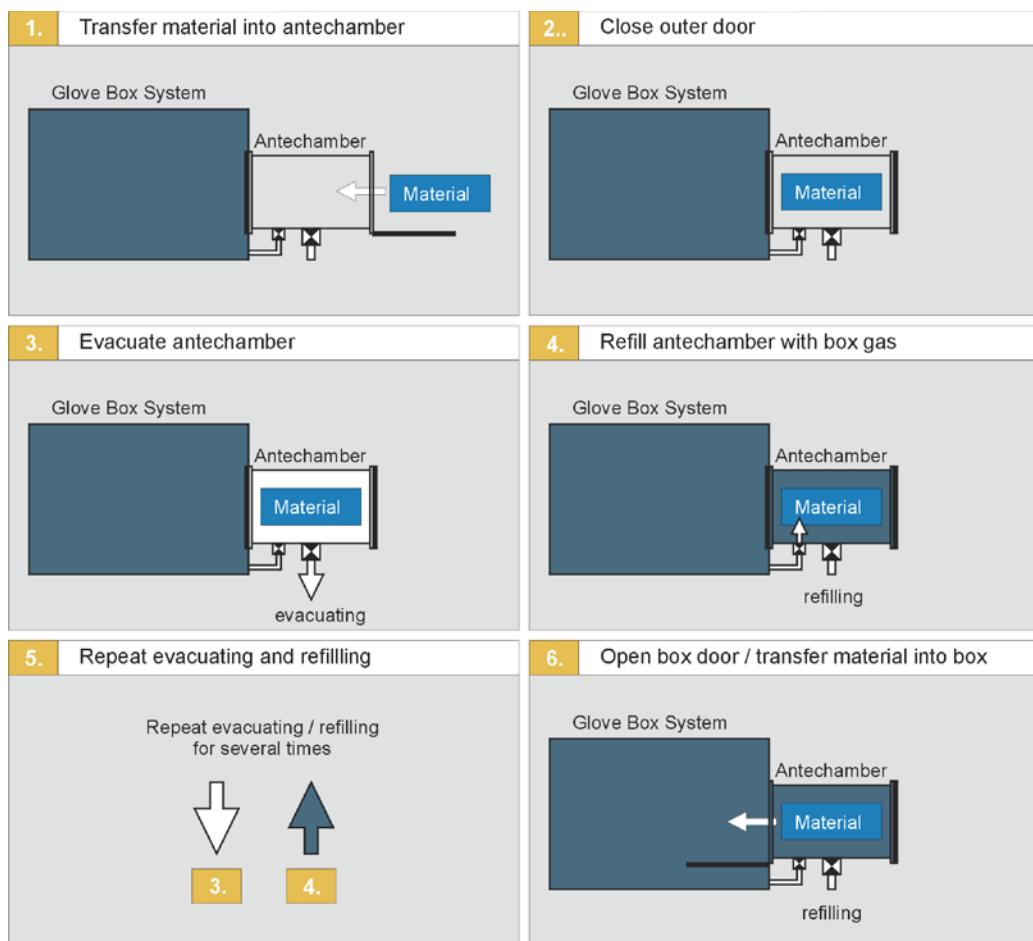


Figure 1: Principle of Antechamber Operation

### 9.3. Important Notes

The pressure within the antechamber may be given by a manometer mounted onto the antechamber.

	<b>CAUTION</b>
	<p><b>Risk of damage!</b></p> <ul style="list-style-type: none"> <li>▶ Never open box and outer antechamber doors simultaneously. An evacuated antechamber cannot be opened. Attempting to open an evacuated antechamber may damage the door locking mechanism.</li> <li>▶ Never open a box door of an antechamber filled with ambient atmosphere. This would result in pollution of the box atmosphere and possibly in damage of measuring instruments and material within the box. Mechanical parts and seals should be checked regularly and protected against any contamination.</li> </ul> <p><b>When handling gases always keep to the national and international guidelines.</b></p>
!	<p><b>NOTE!</b></p> <p>If the system is equipped with a separate pump, <b>MBRAUN</b> recommends that the pump is deactivated using the control panel) when not required. The pump will be restarted automatically on the next evacuation/refill cycle.</p>

	<b>CAUTION</b>
	<p><b>Risk of damage!</b></p> <p>Antechamber under vacuum cannot be opened. If you try to open the antechamber under vacuum the opening mechanism can be damaged.</p>
	<p><b>CAUTION</b></p> <p><b>Risk of damage of process material!</b></p> <p>By no means open the inner door of an antechamber filled with air. This will result in polluting the inert box atmosphere and possibly in damaging measuring instruments and any material.</p>

## 9. Antechamber Operation

### 9.4. Transferring Material into the Box

- > Observe Item "Important Notes" in this chapter.
- > The antechamber door located inside the box is closed.

#### 9.4.1 Transferring Material into the Antechamber

- Open outer antechamber door
- If a sliding tray is available:  
Pull out sliding tray; lay material on tray; then slide the tray together with the material into antechamber.
- If no sliding tray is available: Transfer the material directly into antechamber.

#### 9.4.1.1 Circular Antechamber



- Turn the locking mechanism until the antechamber door is free.



- Carefully open the antechamber door in upward direction.  
The antechamber door is held in position by the spring mechanism.
  - Carefully pull out sliding tray.
- Closing the outer door is done in reverse order.

#### 9.4.1.2 Mini Antechamber



- Remove the cover.



- Insert material into the antechamber.



- Put the cover back on (please pay attention to the slide-ways) and turn the locking mechanism to close it.

### Closing outer door

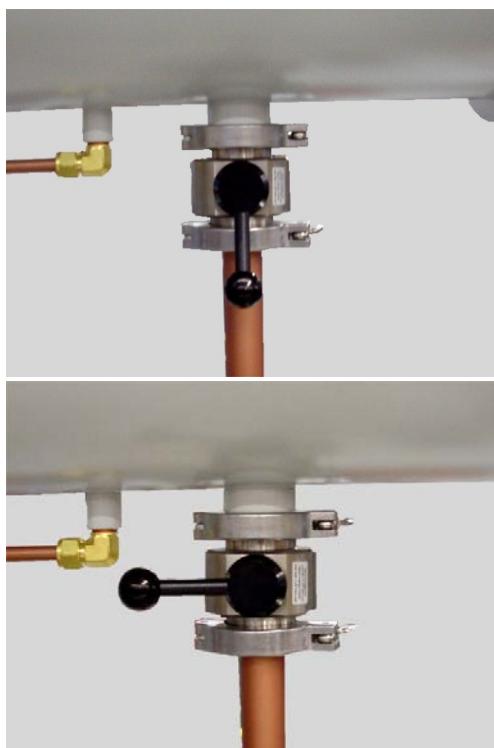
- Close the outer antechamber door.

	 <b>CAUTION</b>
	<p><b>Risk of damage!</b></p> <p>If you transfer material with enclosed gaseous volume into the box.</p> <p>The material should be able to withstand the pressure difference during the antechamber purge process (evacuation and refilling cycles). If possible open up any seals to enclosed gaseous volume – e.g. lids of bottles – so that the enclosed gases will also be exchanged during the pump/fill cycle.</p>

## 9. Antechamber Operation

### 9.4.2 Evacuation and Refilling

#### 9.4.2.1 Circular Antechamber



- ▶ Open hand-valve on the evacuation piping (DN 40).

- ▶ Close hand-valve.



#### NOTE!

**MBRAUN** recommends an evacuation of the antechamber to a pressure of < 0.5 mbar.



- ▶ Open red hand-valve at the refill piping (DN 10).



#### CAUTION

##### Risk of damage!

- ▶ Refill antechamber until pressure compensation between glove box and antechamber is attained.



- ▶ Close hand-valve.

### 9.4.2.2 Mini Antechamber



1. Turn the hand valve to the position **EVACUATE**

The antechamber will be evacuated.

2. Evacuate until the manometer shows a pressure of -0.9 up to -1.0 mbar.

3. Turn the hand-valve to the position **REFILL**.

The antechamber is purged with box gas.

- ▶ Purge until there is a pressure balance between the box and the antechamber.



#### NOTE!

Please pay attention to the description on the antechamber.

## 9. Antechamber Operation



- ▶ Please process the described work cycle (Point 1. – 3.) at least twice,
- ▶ Then the hand valve can be turned to the position close.

### 9.4.3 Repeating Evacuation and Refilling

	CAUTION
	<p>Risk of damage to process material!</p> <p>For obtaining a high degree of purity, the antechamber should undergo repeated evacuation and refilling procedures.</p> <p>In this case for intermediate refilling a pressure of approximately 200 mbar is sufficient. The last refilling step always has to be back to box pressure.</p>

### 9.4.4 Opening door inside the box

- ▶ Open the antechamber door located inside the box.

#### 9.4.4.1 Circular Antechamber



- ▶ After execution of the evacuation / refill cycles:  
Opening and closing of the antechamber door inside the box is done in the same way as described for the outer door.

### 9.4.4.2 Mini Antechamber



- ▶ Turn the locking mechanism until the cover is free.



- ▶ Remove the cover.

### 9.4.5 Removal of Material from Antechamber

- ▶ If a sliding tray is available:  
Pull out sliding tray; remove material from tray; then slide the tray back into antechamber.
- ▶ If no sliding tray is available:  
Transfer the material directly into box.
- ▶ Then close the antechamber door located inside the box.

<b>!</b>	<b>NOTE!</b>  Ensure that both outer and inner doors of the antechamber are closed when material is not being transferred through the antechamber.  After having the outer antechamber door opened, it is recommended that at least one evacuation and refill cycle is completed for the antechamber to prevent possible condensation being deposited on the interior antechamber walls.
----------	--

## 9. Antechamber Operation

### 9.5. Transferring Material out of the Box

#### 9.5.1 Preparation

- > Observe Item "Important Notes" in this chapter.
- > The outer antechamber door is closed.
- > The antechamber door located inside the box is open.
- > If a sliding tray is available:  
Pull out sliding tray; lay material on tray; then slide the tray together with the material into antechamber.
- > If no sliding tray is available:  
Transfer the material directly into antechamber.
- Close inner antechamber door.

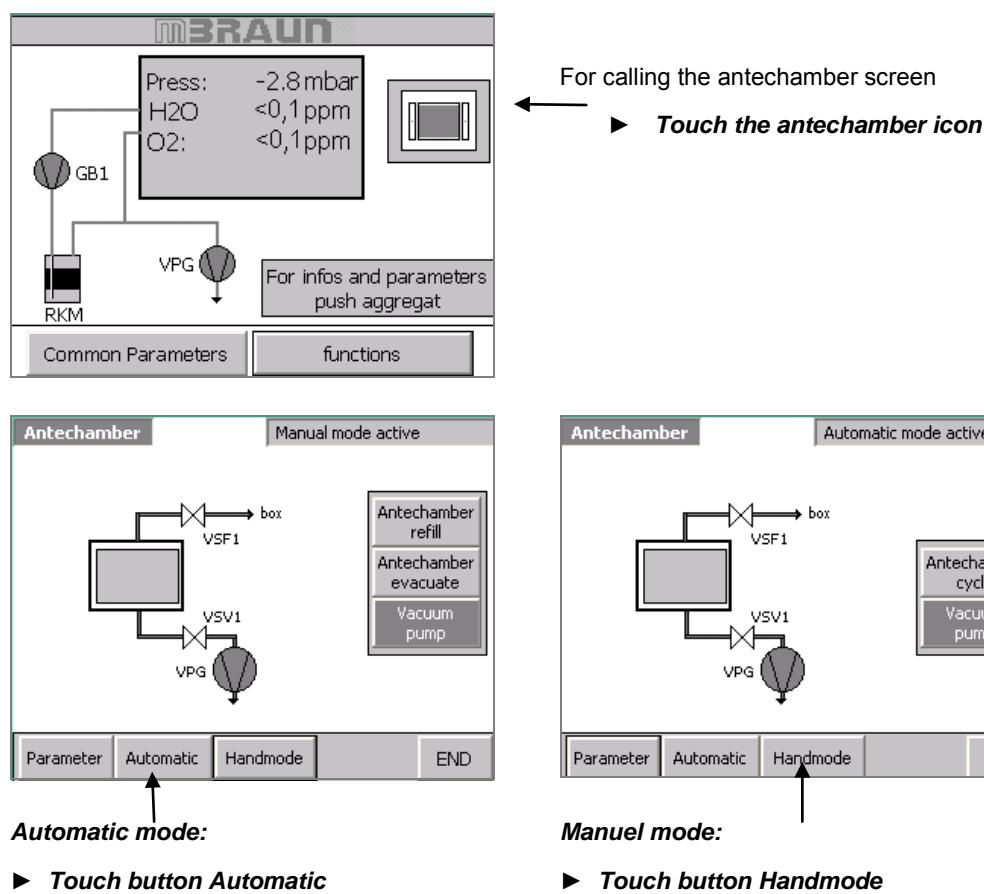
#### 9.5.2 Removal of Material from the Antechamber

- Open the antechamber door located outside the box.
- If a sliding tray is available:  
Pull out sliding tray; remove material from tray; then slide the tray back into antechamber.
- If no sliding tray is available:  
Transfer the material directly out of the antechamber.
- Then close the outer antechamber door.

	 <b>CAUTION</b>  Risk of injury and pollution of environment!  Annoyance by bad smell is expected as soon as any waste purge gas is escaping to the surroundings. Environmental pollution and effects detrimental to health, however, are not known, but cannot be excluded. The manufacturer does not assume any liability.  ► When using toxic or radioactive material manual, ensure, that the gas escapes by no means to the environment.  Information about pertinent alternative methods: service@mbraun.de
	 <b>CAUTION</b>  Risk of damage to process materials  ► Ensure that both outer and inner doors of the antechamber are closed when material is not being transferred through the antechamber.  After having the outer antechamber door opened, it is recommended that at least one evacuation and refill cycle is completed for the antechamber to prevent possible condensation being deposited on the interior antechamber walls.

## 9.6. Antechamber Functions

### 9.6.1 Navigation



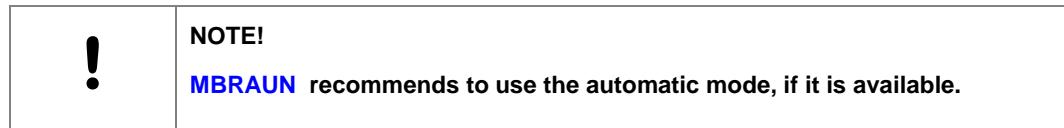
### 9.6.2 Manual mode

Manual operation of the antechamber means that the functions of "Antechamber Evacuation" and "Antechamber Refilling" are started and stopped manually by touching the corresponding buttons on the control panel. Observe the pressure within the antechamber at the manometer.

To avoid an accidental pollution of the box atmosphere, the function "Antechamber Refilling" is switched off automatically after 10 minutes by the PLC.

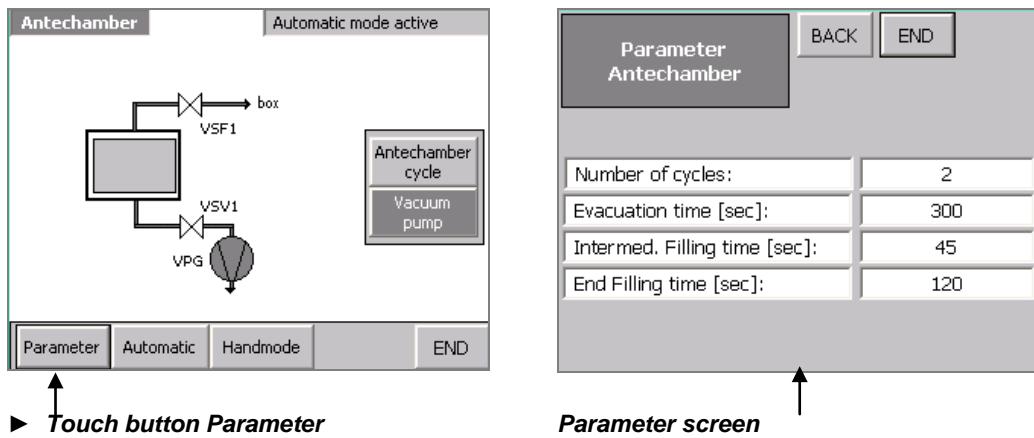
### 9.6.3 Automatic mode

The automatic antechamber control is available as a control software option. With this option available the evacuating/refilling cycles are automatically executed and controlled.



## 9. Antechamber Operation

### 9.6.4 Parameters



#### Parameters definitions

<b>Number of cycles</b>	Number of refilling and evacuation cycles Range: 0 .. 8
<b>Evacuation time</b>	Evacuation time till refilling starts Range: 10 .. 1000 seconds
<b>Intermediate Filling time</b>	Time to next evacuation Range: 0 .. 300 seconds
<b>End Filling time</b>	Refilling time until antechamber pressure is equal to box pressure Range: 30 .. 600 seconds

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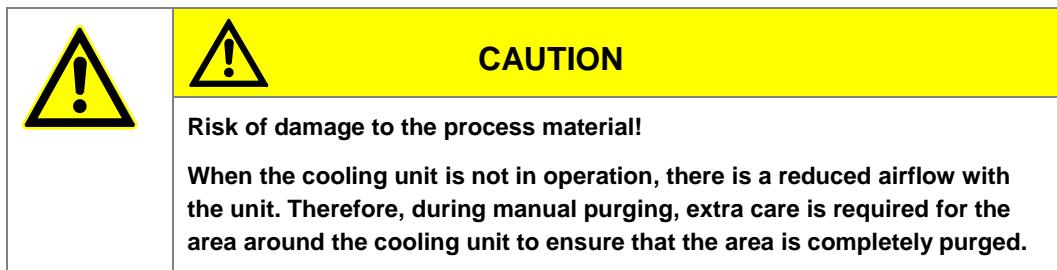
## 10. Customer Specific Components & Accessories

### 10.1 Box Cooling Unit

#### 10.1.1 General Information

The purpose of the cooling unit is to cool the Glove Box atmosphere after being exposed to excess heat. This heat source may be from an oven/furnace, welding or from plasma burning within the system etc.

The cooling unit directs a cooling airflow to a specific area, therefore allowing the maximum cooling effect on items that are placed in the current. The normal Glove Box circulation will cause an overall cooling effect within the system.

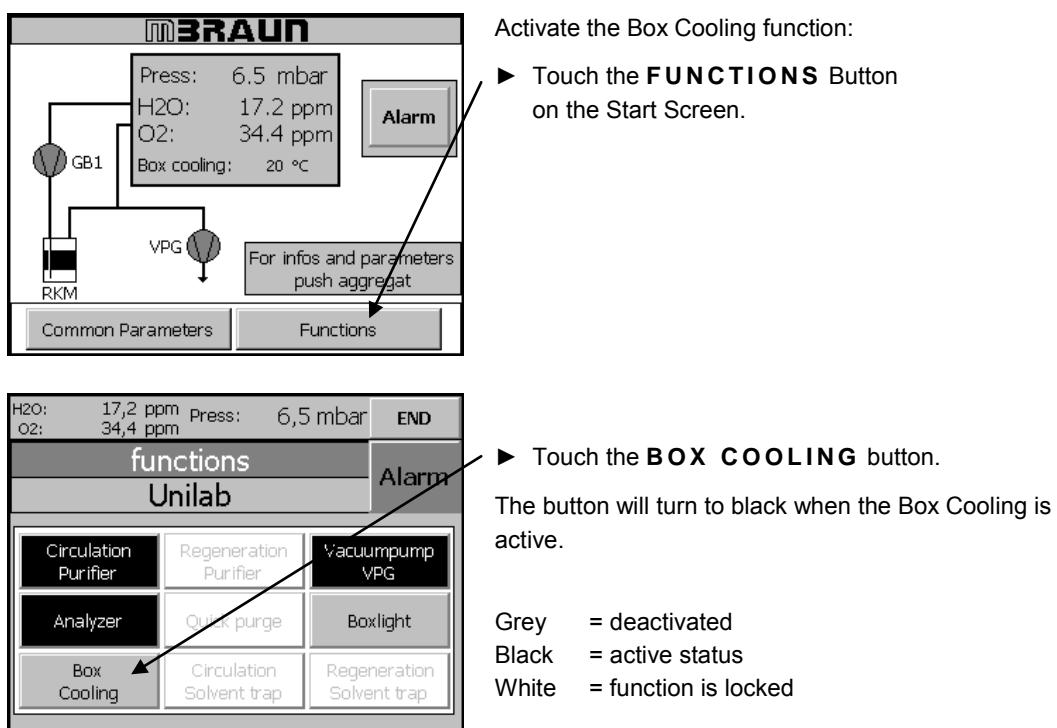


The range of the Box Cooling Temperature is +10°C to +40°C



#### 10.1.2 Operation of the Box Cooling Unit

The cooling unit is controlled by the Touch Panel.

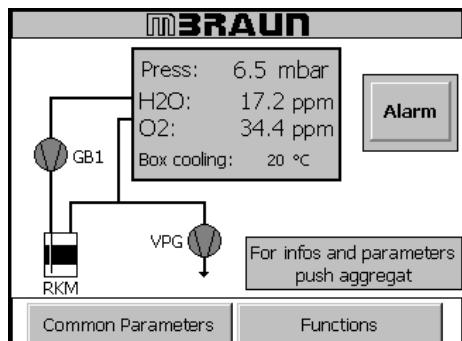


To deactivate the Box Cooling select the button

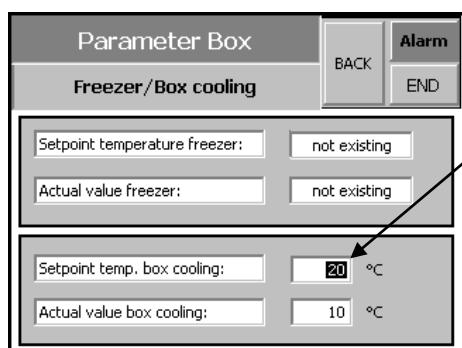
again – the button will return to grey.

### 10.1.3

#### Setting the Box Cooling Parameters



- ▶ Touch the **COMMON PARAMETERS** button on the Start Screen.
  - ▶ Touch the **FREEZER/BOX COOLING** button
- or
- ▶ Touch the field displaying the box pressure
  - ▶ Touch the **MORE** button



The Temperature may be set by selecting the input field "Setpoint temp. box cooling:"

- ▶ Enter the desired temperature and press the **ENTER** button.

The range for the box cooling is from +10°C to +40°C.

If the unit is active, the cooling unit will start cooling when the setpoint temperature is over-stepped.

### 10.2 Freezer

#### 10.2.1 General Information



##### Inner dimensions

Height.....423.0 mm

Width .....266.0 mm

Depth.....162.5 mm

**Inner volume** .....±18.3 litres

##### Cooling Function

Cooling Range.....+10°C to -35°C

.....(-30°C if ambient temp > 30°C)

Ambient Temp. Range.....0°C to +32°C



##### NOTE!

If the Glove-Box is equipped with a Freezer the current temperature will be displayed on the Start Screen.

#### 10.2.2 Purging the Freezer

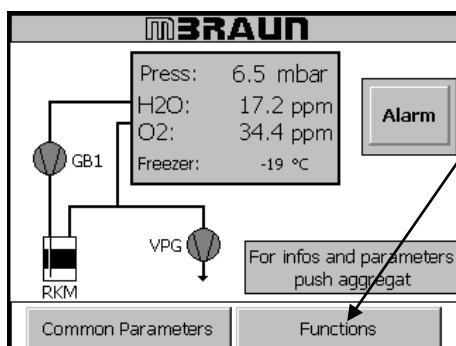
	<b>CAUTION</b>
	<p><b>Risk of damage to the process material!</b></p> <p>It is important that the interior of the freezer is fully purged of ambient atmosphere before the Glove Box is used. Failure to purge this area could cause the box atmosphere to become polluted upon opening of the freezer door, thus causing damage to the box equipment, and/or material within the Glove Box.</p>

- Before the Glove Box is used the System must be purged (see Chapter 8 – Purgung).

During the Glove Box purging process it is important that all areas are fully purged of ambient atmosphere. With the freezer in the Glove Box it is important that not only the area around the freezer unit is purged but also the area within the Freezer.

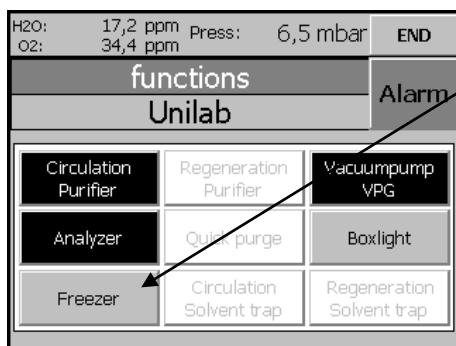


### 10.2.3 Operation of the Freezer



Activate the Freezer function :

- Touch the **FUNCTIONS** Button on the Start Screen



- Touch the **FREEZER** button.

The button will turn to black when the Freezer is active.

Grey = deactivated  
Black = active status  
White = function is locked

To deactivate the Freezer select the button again – the button will return to grey.

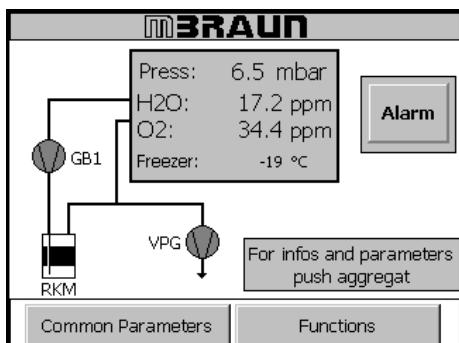
The inner temperature of the freezer is controlled by the Touch Panel.  
(see *Setting of Freezer Parameters below*)

The door for the freezer is opened, closed and secured by a lever attached on the door. For additional security the door may be locked with a key.

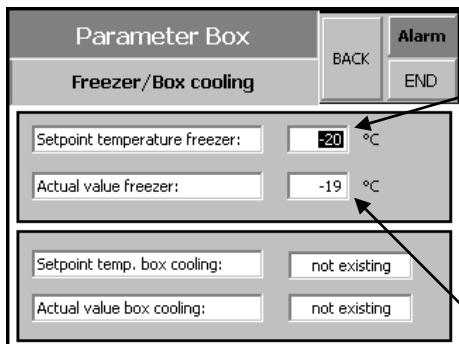
Within the Freezer compartment there are shelf supports to give a range of settings for additional shelving.

### 10.2.4

#### Setting the Freezer Parameters



- ▶ Touch the **COMMON PARAMETERS** button on the Start Screen.
  - ▶ Touch the **FREEZER/BOX COOLING** button
- or
- ▶ Touch the field displaying the box pressure
  - ▶ Touch the **MORE** button



The Temperature may be set by selecting the input field "Setpoint Temperature Freezer:"

- ▶ Enter the desired temperature and press the **ENTER** button.

Range for freezer temperature is from -40°C to +20°C.

The "actual value freezer" field returns the current temperature within the freezer – the value is generated by the system.

### 10.3 MRAUN Glove Box Accessories

**MBRAUN** is able to offer a range of products that may be fully integrated into the glove box system.

The following list of **MBRAUN** glove box accessories and components gives an overview of solutions available from MBRAUN, for more information or enquiries about how MBRAUN can meet your glove box requirements, please contact **MBraun** Service.



Re-Circulating Chiller Unit



Ovens



Box Cooling



Cold Storage



Analysers



Particle Removal



Shelving



Micro-Scope



Gloves



Glove Port Covers



#### NOTE!

The description and instructions on use and maintenance for **MBRAUN**

## 10. Customer Specific Components & Accessories

accessories are given in the appendix of this documentation.

### 10.4 Bespoke Components and Non-MBRAUN Glove Box Accessories

If possible, **MBRAUN** will seek to integrate customer specific components into the glove box system. These components may include certain items of hardware that are for a unique operation task within the box, or for specific control or safety features.



#### NOTE!

**It is possible that the customer has instructed **MBRAUN** to install or facilitate bespoke process systems within the Glove Box. It cannot be assumed that **MBRAUN** has any technical knowledge in respect for such processes.**

**The responsibility for such processes, including documentation and training, lies with the customer.**

The customer, together with the respective companies, is responsible to supply the operation manuals and provide the required training for all non-**MBRAUN** customer specific components.

**MBRAUN** is not responsible for third party documentation content.

For known safety reasons it may be necessary for **MBRAUN** to control the activation of third party components.



#### NOTE!

**If necessary, the description for release of non-**MBRAUN** components is given in the appendix of this documentation.**

The control for the integrated third Party components is made from its own separate input/output devises that are located near to the component.



#### CAUTION

**EMERGENCY STOPs located on the third party component panel is to isolate or switch off the 3<sup>rd</sup> party component ONLY.**

See also Chapter 15: 3<sup>d</sup> Party Documentation.

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## 11. Maintenance and Service

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### 11.1. Regular Maintenance and Service

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	 <b>WARNING</b>
	<p><b>Risk of damage or injury!</b></p> <p>Failure to complete routine inspection, maintenance and servicing could lead to serious damage to the system and/or personal injury (see also documentation from third-party manufacturers).</p> <p>All claims for liability or warranty will cease in the event of poor or insufficient maintenance.</p>
	 <b>CAUTION</b>
	<p><b>Risk of damage or injury!</b></p> <p><b>MBRAUN</b> service personnel or properly trained/qualified individuals may only perform maintenance, repair and service other than described in this manual.</p>

#### 11.1.1. Components of Third-Party Manufacturers

**MBRAUN** Glove Box systems are partly equipped with third-party manufacturers' components such as:

- Vacuum pump(s)
- PLC control components (Siemens)
- TOUCH Screen Operation Panel (Siemens)
- Compressor(s) for the system's compressor cooling
- Compressor(s) for refrigerator systems

The original third-party manufacturers' documents describing maintenance and service of the components are included in the systems delivery.

	 <b>CAUTION</b>
	<p><b>Risk of damage or injury!</b></p> <p><b>The third-party manufacturers' maintenance and service instructions should be followed.</b></p>

## 11.1.2.

**Regular Maintenance and Service**

<b>Main glove box and window</b>	► Clean the exterior using conventional detergents (do not use caustic detergents); for this purpose use a soft, lint free cloth; or a vacuum cleaner if available, using a brush attachment.
<b>Gloves</b>	► Check the gloves for damage; in addition, use linen gloves to avoid humidity in the box gloves.

	 <b>CAUTION</b>
<p><b>Risk of damage!</b></p> <p><b>Do not use powder within the box or within a clean room environment. Replace gloves when damaged - by no means attempt to repair gloves.</b></p>	

<b>Ante-chambers</b>	► Check antechamber seals for damage. If the antechamber doors are difficult to open or to close, grease or lubricate threads lightly.
----------------------	--

	 <b>CAUTION</b>
<p><b>Risk of damage!</b></p> <p><b>Some areas of the system must be left without grease or lubrication. In this case, grease or lubricants should not be used.</b></p>	

<b>Connections</b>	► Check connections for firm seat and are leak free.
<b>Components</b>	<ul style="list-style-type: none"> <li>► Observe the maintenance instructions of the optional equipment components, such as analyser and refrigerator.</li> <li>► Observe the third-party manufacturers' maintenance instructions.</li> </ul>

## 11. Maintenance and Service

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### 11.1.3. Quarterly and Annual Maintenance and Service

Type of System	Quarterly	Annually
Glove Box	<ul style="list-style-type: none"><li>▪ Check the Omega sealing for the windows</li><li>▪ Check the gloves and glove ports</li><li>▪ Check the magnetic valves</li><li>▪ Complete leakage test</li><li>▪ Function test</li></ul>	<ul style="list-style-type: none"><li>▪ Check and if necessary replace the sealing for the windows</li><li>▪ Check the Omega sealing of the windows</li><li>▪ Check the gloves and glove ports</li><li>▪ Check the illuminating equipment</li><li>▪ Check and if necessary replace the dust filters</li><li>▪ Check and if necessary replace the magnetic valves</li><li>▪ Complete leakage test</li><li>▪ Function test</li></ul>
Gas Purification System	<ul style="list-style-type: none"><li>▪ Check the magnetic valves</li><li>▪ Check the blower</li><li>▪ Check the vacuum pump</li><li>▪ Complete leakage test</li><li>▪ Function Test</li></ul>	<ul style="list-style-type: none"><li>▪ Check the vacuum pump</li><li>▪ Check and if necessary replace the circulation blower</li><li>▪ Check and if necessary replace the filter medium</li><li>▪ Dismantle pipe-work and clean it. Replace all Viton seals</li><li>▪ Check and if necessary replace the valve seals</li><li>▪ Check the cooling system</li><li>▪ Check the cooling fluid</li><li>▪ Complete leakage test</li><li>▪ Function test</li></ul>

Analysers	<ul style="list-style-type: none"> <li>▪ Check the sensors</li> <li>▪ Check the flow rate meter</li> <li>▪ Complete leakage test</li> </ul>	<ul style="list-style-type: none"> <li>▪ Check and if necessary replace sensors</li> <li>▪ Check the vacuum pump</li> <li>▪ Leak test piping</li> <li>▪ Complete leakage test</li> <li>▪ Check calibration</li> </ul>
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## 11.2. MBRAUN Sensors

### 11.2.1. General Information

<b>!</b>	<p><b>NOTE!</b></p> <p>The measured H<sub>2</sub>O and/or O<sub>2</sub> values are shown on the operation panel display.</p>
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MB-OX-SE-1



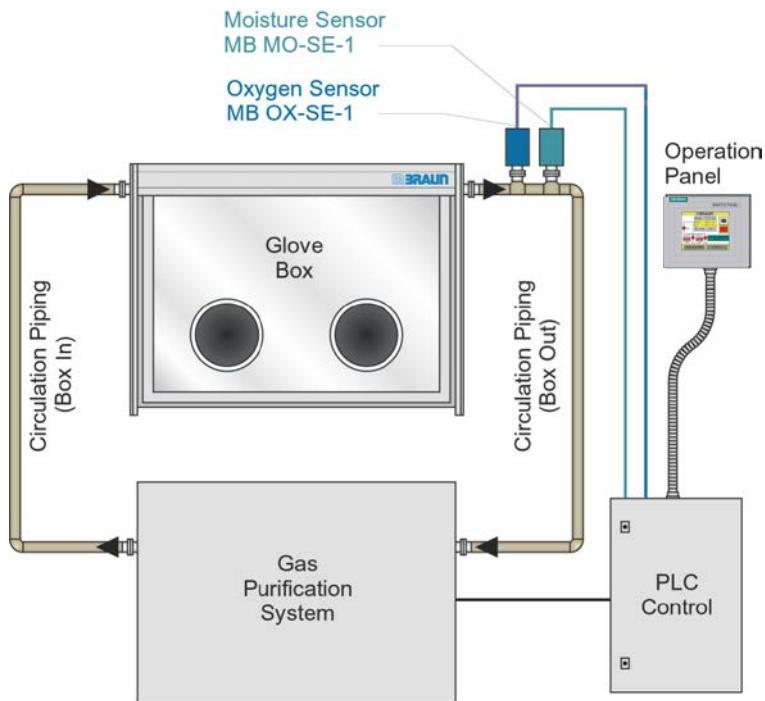
MB-MO-SE-1

Figure 11.1: Types of Sensor

### 11.2.2. Connection of Analysers

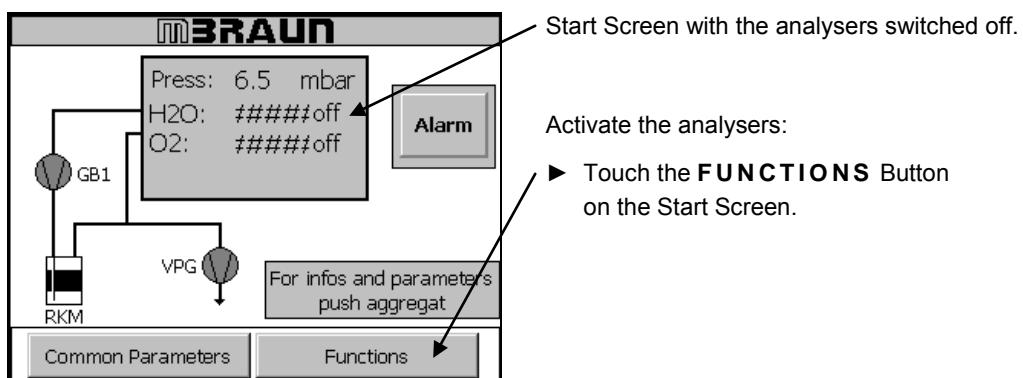
The position of the analysers is always at the gas outlet of the box. This would mean that the readings from the analysers are at the most contaminated levels thus further ensuring the quality of the box atmosphere.

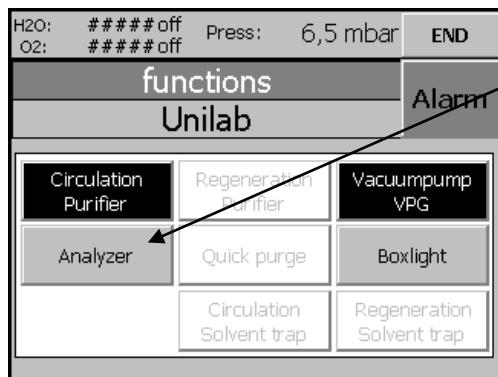
## 11. Maintenance and Service



### 11.2.3. Activating the Analyser(s)

<b>!</b>	<b>NOTE!</b>  High levels of ambient atmosphere within the box could damage or pollute the measuring instruments, the box atmosphere and any materials within the box. Ensure that the antechamber atmosphere has been purged, as required, before opening the inner antechamber door.  Do not open both doors of an antechamber at the same time causing the ambient atmosphere to enter the box.
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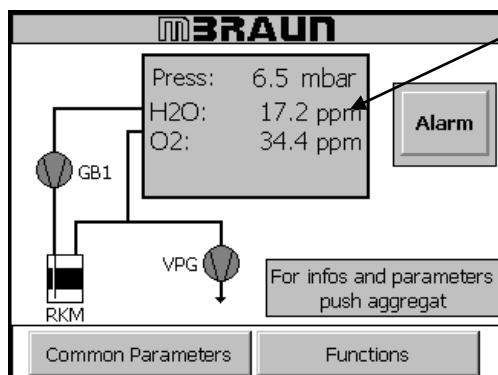




► Touch the **ANALYSER** button will activate the connected analysers.

The button will display the status change by changing from grey (not active) to black (active).

Grey = deactivated  
Black = active status  
White = function is locked



The reading from the analysers can now be seen on the Start Screen. The readings are also repeated on various other screens.

The analyser readings are in the following format:

Press:	xxx mbar
H2O*:	xxx ppm
O2**:	xxx ppm

- \* Is displayed only when the system is provided with a moisture analyser.
- \*\* is displayed only when the system is provided with an oxygen analyser.

### 11.2.4. Deactivating the Analyser(s)

Deactivating the Analysers is carried out by the same procedure as activation.

The Analyser button will display the status change by changing from black (active) to grey (not active).

### 11.2.5. Calibration of Sensors

All **MBRAUN** sensors have a certified calibration before shipping.

The calibration cycle depends on the demand for accuracy as well as on the conditions of the gas to be measured (purity, spurious gases etc.).

<b>!</b>	<b>NOTE!</b>  <b>MBRAUN</b> recommends that sensors are calibrated annually by <b>MBRAUN</b> technicians. Quotation on request from <b>MBRAUN</b> Service Department.
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### 11.2.6. Oxygen Analyser (MB-OX-SE-1)

## 11. Maintenance and Service

The MB-OX-SE-1 sensor has been designed to control the atmosphere of MBRAUN Systems for residual Oxygen content. The measuring range is 0 to 1000 ppm. The measuring range from 0 – 100 ppm is linear. The measurement range is calibrated for use below 1000 ppm as the sensor output, above 100 ppm, not truly linear.

The semiconductor sensor made of Zirconium dioxide is specific for oxygen, but because of the high sensor temperature and the catalytic activity of the platinum coating of the sensor there are low cross-sensitivities for hydrogen as well as possible reactions with aggressive gaseous substances, that can reduce the operational life of the sensor.

	 <b>CAUTION</b>
	<p><b>Risk of damage to process materials due to faulty measurement!</b></p> <p><b>Operating the sensor at oxygen levels of &gt;1000 ppm (e.g. in air) does not damage the sensor element irreversibly, but it should be avoided. If exposed to air, it will take several hours until the sensor will measure low oxygen levels correctly in Inert Gas.</b></p>

### 11.2.6.1. Construction

The MB-OX-SE1 consists of the sensor and the special electronics separated by a gas-tight NW40 clamp flange. The sensor is protected against physical damage by a protective cage. The sensor leads are connected to the electronics by a vacuum-tight feed-through. The electronics are contained in an airtight box mounted directly to the back of the NW40 flange.

Electronics and Sensor Element have been factory-calibrated with certified calibration gases; there are no user-accessible adjustment points.

	<b>NOTE!</b> <b>On special request <b>MBRAUN</b> may, on our decision, supply a calibration procedure that allows trained technicians to recalibrate the sensor sensitivity in the low range up to 100 ppm.)</b>
---	---

### 11.2.6.2. Connection

The connection for the Oxygen Sensor is made with an RJ45 (8-pole) Socket Connector. The pin layout is shown in the table below.

Pin-No.	Contact
1	Supply Ground
2	Switching ON/OFF 24 V
3	Signal Ground
4	Livebit (O2)
5	Not Connected
6	Signal 0 - +10 V
7	Supply +24 V
8	Supply Ground

### 11.2.6.3. Technical Data

#### Mechanical

Length over all: 190 mm, height 80 mm, depth 58 mm  
Sensor-part: length 45 mm, diameter 26 mm  
Flange: NW 40 KF  
Weight: 0.7 kg

**Electrical**

Supply voltage: 24 VDC ± 10%

**Environment**

Ambient temperature: +15 to +27 °C  
 Pressure: 800 to 1200 mbar (Differential pressure sensor to electronics max. ≈100 mbar)

**Measuring**

Range: 0 - 1000 ppm oxygen  
 Sensitivity: 10 mV / ppm  
 Response time (0 - 90 %): approximately 10 sec (0 - 90 %)  
 Warm-up time: 10 min (for < 10 ppm approx. 6 hr)  
 Accuracy<sup>1)</sup>: 2 % of displayed value ±1 ppm up to 100 ppm  
 Drift at 10 ppm: 10 % / year  
 Sensor life<sup>2)</sup>: ca. 5 years

- 1) In clean argon-atmosphere, without interfering gases like H<sub>2</sub>O or CO<sub>2</sub>  
 2) In absence of reactive gases (contact MBRAUN Service for further advice)

## 11.2.6.4. Installation

The oxygen probe is mounted on an appropriate vacuum-tight NW40 flange by means of a centring ring and a clamp. The plug connection to the control unit should not be made before the whole box-system has been purged sufficiently with inert gas. The operation of the probe as well as the display of the measured values is controlled from the operator panel.

## 11.2.6.5. Trouble-shooting

The oxygen probe does not contain user-serviceable parts. Therefore, in case of defects the probe has to be returned complete and unopened to **MBRAUN** or the authorized representative. On request, **MBRAUN** may offer exchange probes.

Description of Malfunction	Possible Solution
The display measuring value comes very slowly below 10 ppm, whereas it is certain that the real value is much lower (Check, whether this is really the case or the display is correct).	The sensor is still charged with oxygen by a previous operation at high oxygen concentrations or long storage in air. In this case operate the sensor for some hours in clean inert atmosphere and it will come down. The sensor has a very stable zero-point, so before sending the probe for repair you must exclude the possibility that e.g. hydrogen in ppm-levels is present or was present in higher levels.

## 11. Maintenance and Service

### 11.2.7.

#### Moisture Analyser (MB MO-SE-1)

	<b>CAUTION</b>
Risk of damage to process materials!  The Moisture Analyser must be cleaned every 2000 hrs. A reminder is given as a warning when this service work is due. <i>See also Section 11.2.7.5 – Sensor Cleaning.,</i>	

##### 11.2.7.1. General

The MB-MO-SE1 has been designed to control the atmosphere of the MBRAUN Systems for residual moisture content. The measuring range is 0 to 500 ppm. The measuring range from 0 – 50 ppm is linear. The measurement range is calibrated for use below 500 ppm, as the sensor output above 50 ppm, is not truly linear.

The sensor element is a “double helix” made of platinum wire fixed on a special insulation material, or printed ceramic. The sensor is coated with phosphoric acid that is totally dehydrated. Water molecules in the gas penetrate the acid layer and the electrolysis of the resulting H+ and OH- ions to H2 and O2 produces an electric current. Therefore, the water molecules coming to the sensor surface are removed and the resulting current is depending on the concentration of the water molecules in the gas. The primary signal is compensated for temperature and amplified.

##### 11.2.7.2. Construction

The MB-MO-SE1 consists of the sensor and the special electronics separated by a gas-tight NW40 clamp flange. The sensor is protected against physical damage by a protective cage. The sensor leads are connected to the electronics by a vacuum-tight feed-through. The electronics are contained in an airtight box mounted directly to the back of the NW40 flange. Electronics and Sensor Element have been factory-calibrated with certified calibration gases; there are no user-accessible adjustment points.

##### 11.2.7.3. Technical Data

###### Mechanical

Length over all: 205 mm, height 80 mm, depth 58 mm  
Sensor-part: length 42 mm, diameter 14 mm  
Flange: NW 40 KF  
Weight: 0.7 kg

###### Electrical

Supply voltage: 24 VDC ±10%

###### Environment

Ambient temperature: +15 to +27 °C  
Pressure: 800 to 1200 mbar  
(Differential pressure sensor to electronics max. ≈100 mbar)

###### Measuring

Range: 0 - 500 ppm moisture  
Sensitivity: 20 mV / ppm  
Response time (0 - 90 %): approximately 120 sec. (0 - 90 %)  
Warm-up time: 10 min (for < 10 ppm approx. 6 hr)  
Accuracy1:  
High precision range better than 5 % of value  
(0 - 10 ppm):  
Wide range (10 - 100 ppm): better than 20 % of value

Drift at 10 ppm                    10% / year  
Sensor life2):                    ca. 5 years

- 1) without interfering gases like NH<sub>3</sub>
  - 2) with regular maintenance

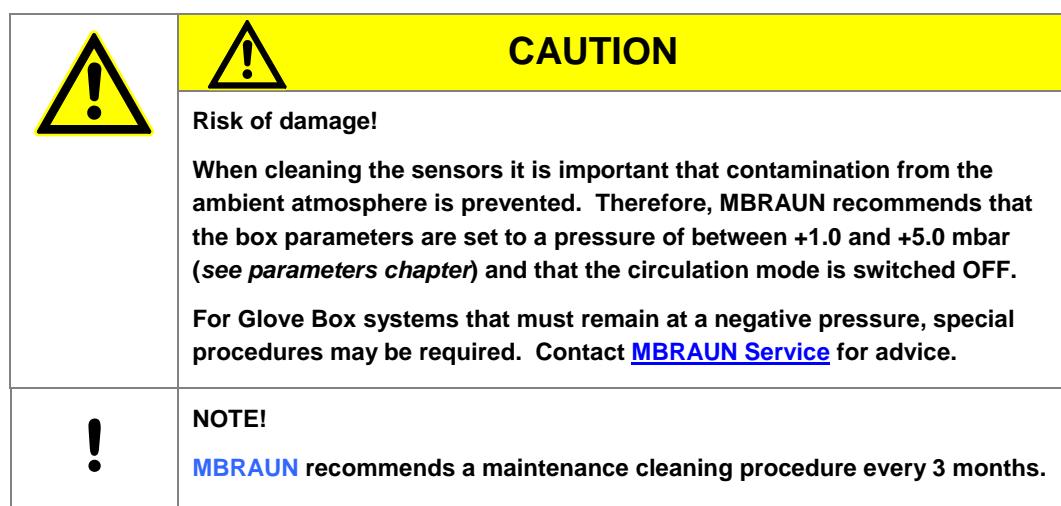
#### 11.2.7.4. Connection

The connection for the Moisture Sensor is made with an RJ45 (8-pole) Socket Connector. The pin layout is shown in the table below.

Pin-No.	Contact
1	Supply Ground
2	Switching ON/OFF 24 V
3	Signal Ground
4	Not Connected
5	Live bit (H2O)
6	Signal 0 - +10 V
7	Supply +24 V
8	Supply Ground

#### 11.2.7.5. Sensor Cleaning

To achieve optimal moisture measurements the sensor is recommended to be closely inspected within a period of three months.



This routine maintenance consists in cleaning the platinum winding of the MB MO-SE-1 and moistening it with phosphoric acid H<sub>3</sub>PO<sub>4</sub>. The following aids are required for disassembling and maintaining the MB MO-SE-1

## 11. Maintenance and Service

- Tool for disassembly (screwdriver)
- Soft, absorbent, lint free cloth (cotton)
- Small quantity of phosphoric acid (H<sub>3</sub>PO<sub>4</sub>).
- Protective clothing, including gloves and goggles
- One dummy plug for the open circulation piping (DN40)

	 CAUTION
 	<p><b>Risk of injury!</b></p> <p>► Be cautious when handling phosphoric acid. Wear protective gloves and goggles.</p> <p>► Any phosphoric acid getting in contact with your skin should immediately be rinsed off using running water.</p> <p>When getting in contact with your eyes, the acid should immediately be rinsed also using running water; afterwards you should immediately consult a doctor.</p>



1. Disconnect plug connector.



2. Loosen clamp.



3. Insert dummy plug.



5. Unscrew protective cover.

4. Tighten flange clamp.



6. Moisten sensor with distilled water.



7. Carefully clean and dry winding.



8. Moisten winding with phosphoric acid.



9. Remount protective cover.



10. Remove clamp and dummy plug.



11. Insert measuring probe and re-clamp.



12. Tighten clamp.



## 11. Maintenance and Service

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13. Insert plug connector.

*Figure 11.2: Procedure for Cleaning Moisture Sensor*

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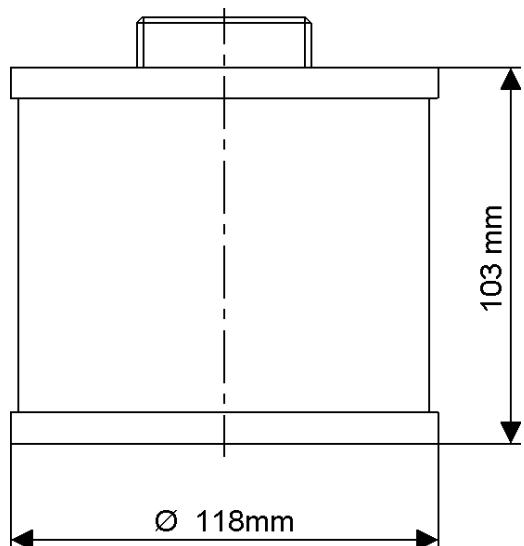
### 11.3. Dust Filters

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**MBRAUN** glove boxes are equipped with dust filters at the gas outlet, as well as, at the gas inlet piping. The former protects the gas purification system against dust particles the maybe generated by the user inside the glove box. The latter filter ensures optimal particle free incoming gas.

#### 11.3.1. Technical Data

The filter that is commonly used within the M.Braun Glove Box system has the following characteristics:



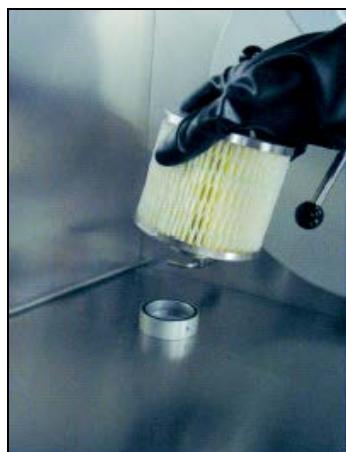
The standard filter is of a HEPA format (class H13)- i.e. filtering 99.95% of particles – typically down to 0.2 microns.

### 11.3.2. Exchanging Dust Filters

Depending on the usage of the glove box system the filters need to be exchanged at least once a year.

#### Method for Exchanging the Filter:

## 11. Maintenance and Service



- Unscrew used dust filter.

- Screw new dust filter in place.

Figure 11.3: Exchanging the Filter

		<b>WARNING</b>
		<p><b>Risk of injury!</b></p> <p><b>Risk of polluting the environment!</b></p> <p>The components and materials identified in the following may be polluted with toxic substances and harm the environment, if not properly disposed of.</p> <p>In case toxic substances were used within the system, adhere to the following safety measures:</p> <ul style="list-style-type: none"><li>► Wear protective gloves</li><li>► Wear a full face mask with filter and eye protection</li></ul> <p>None of the components and substances is permitted to enter mains drainage, ground water, or soil.</p> <p><b>Filters</b></p> <p>Dispose of used filters at the local collection point for hazardous waste or in accordance with the locally applicable national regulations.</p>

### 11.4. Gloves

**MBRAUN** exclusively uses gloves made of butyl. A feature of this flexible material is the good comfortable grip even at low temperatures (Temperature range from -40 to +90°C). The following graphic chart shows, that butyl compared to hypalon and neoprene evidently has the most favourable values regarding the permeability for different gases and for water vapour.

	<b>NOTE!</b> For working with higher temperatures <b>MBRAUN</b> also offers gloves made of butyl with a hypalon layer.
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### Gas Permeability Constant Comparison Chart

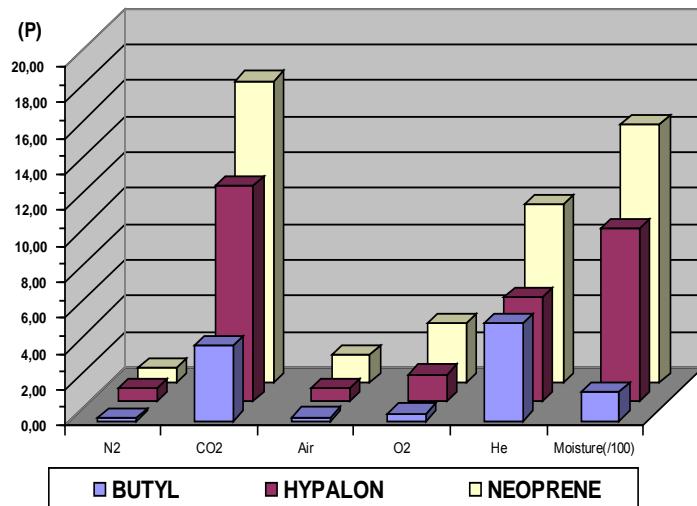


Figure 11.4: Gas Permeability Constant Comparison Chart

	<b>NOTE!</b> <b>Permeability Constant (P) =</b> gas flow through a material of 1cm thickness at a standard pressure and temperature. It is measured at a rate of $10^{-9}\text{cm}^3\text{ gas/s}$ .
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#### 11.4.1. Technical Data

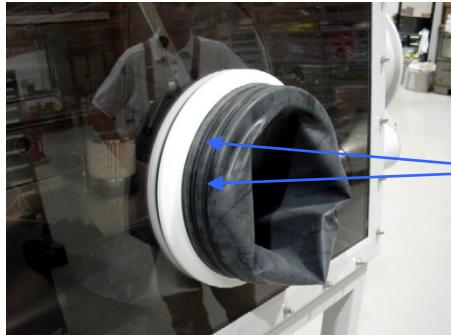
- Product:** MB Gloves.  
**Type:** Special gloves made of brom-butyl for Glove Box Systems.  
**Design:** Various diameters, sizes and shapes.

#### 11.4.2. Replacing Gloves

		<b>WARNING</b>
<b>Risk of injury and damage!</b>		

## 11. Maintenance and Service

	<p>A damaged glove may cause the following risks:</p> <ol style="list-style-type: none"><li>1. Influx of ambient air may pollute process materials.</li><li>2. Process chemicals may pollute the ambient air.</li><li>3. Skin contact with process chemicals may cause injury</li></ol> <p>Adhere to the following guidelines:</p> <p>► Replace gloves at regular intervals.</p> <p>At the latest, the must be changed upon signs of wear and tear that may or have caused a leak.</p>
	<p><b>CAUTION</b></p> <p>Risk of injury!</p> <p>► Before changing gloves ensure that the glove box is atmosphere is safe to breathe. If necessary purge and fill the glove box with ambient air before attempting to change gloves.</p>



- To remove the gloves remove the O-rings and removes the glove as shown



- To replace the glove -
   
place the glove over the port so that the rim of the glove locates in the port's innermost groove  
(the outer 2 grooves are for locating the O-rings that secure the glove).

*Figure 11.5: Exchanging Gloves*

		<b>CAUTION</b>
<p><b>Risk of Injury and damage!</b></p> <p><b>Influx oder escape</b></p> <p><b>Ensure that the correct type of glove is chosen e.g. left or right hand, or ambidextrous and of the correct size.</b></p>		



- Check that the glove is orientated correctly and replace with new O-rings.

	<p><b>NOTE!</b></p> <p><b>After the changing of gloves, the glove box atmosphere will require purging to remove any undesired oxygen and/or moisture. (see Chapter 8 Purging).</b></p>
--	--

## 11. Maintenance and Service

### 11.4.3. Glove Port Covers

**MBRAUN** glove port covers are available as an option. The glove port covers are for standard round glove ports and are available for either interior or exterior fitting.

The inner-glove port covers allow for the changing of gloves whilst preventing the influx of the outer-atmosphere into the glove box. The outer-glove port prevents un-required gloves from being an obstruction when operating the box above atmospheric pressure.

	<b>WARNING</b>
<p><b>Risk of injury and damage!</b></p> <p><b>Due to extreme pressures the glove may be dismounted or the screen may break if all glove port are sealed:</b></p> <ol style="list-style-type: none"><li><b>1. The process materials may be polluted and exposed to ambient air.</b></li><li><b>2. The ambient air may be polluted by process chemicals.</b></li></ol> <p><b>Adhere to the following guidelines:</b></p> <ul style="list-style-type: none"><li>► <b>Keep at least one glove port in normal operation: glove fixed and glove port not sealed with an inner or outer glove port cover.</b></li><li>► <b>If the application requires that all glove ports be sealed simultaneously, additional safety measures are required. Please contact MBRAUN Service Department.</b></li></ul> <p><b>See Chapter 2.3 Safety Concept and 2.6 Intended Use</b></p>	

### 11.4.4.

#### Standard Spare Parts and Accessories for MBRAUN Gloves

MBRAUN №	Description	Connection Diameter	Glove Thickness	Size
3000047	Brom-butyl anatomical Glove	220 mm	0.4 mm	Large
3000048	Brom-butyl anatomical Glove	220 mm	0.8 mm	Large
3240567	Brom-butyl ambidextrous Glove	220 mm	0.4 mm	Large
2340568	Brom-butyl ambidextrous Glove	220 mm	0.8 mm	Large
3000018	Brom-butyl anatomical Glove	220 mm	0.4 mm	Medium
3005010	Hypalon anatomical Glove	220 mm	0.4 mm	Large
3005009	Hypalon ambidextrous Glove	220 mm	0.4 mm	Large
2600239	O-Ring for Gloves	220 mm		
9002371	Internal Glove Port Cover	220 mm		
7019882	External Glove Port Cover	220 mm		
7070842	Glove Port Feed-Through	220 mm		
2400138	O-Ring (250*4) for Inner Glove Port Feed-Through	220 mm		
2400117	O-Ring (244*7) for Outer Glove Port Feed-Through	220 mm		

Other gloves, as well as O-Rings, are available by request from **MBRAUN** Service Department.

### 11.5. Returning Parts to MBRAUN

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Before returning any parts to **MBRAUN**, please

- ▶ fill out the Form “Declaration Concerning the Contamination of Gloveboxes, Blowers, Valves and Purifier Loading”
- ▶ send or fax it to **MBRAUN**: +49 (0) 89 / 32 669 235.

The Service Department will inform you, whether the parts can be accepted.

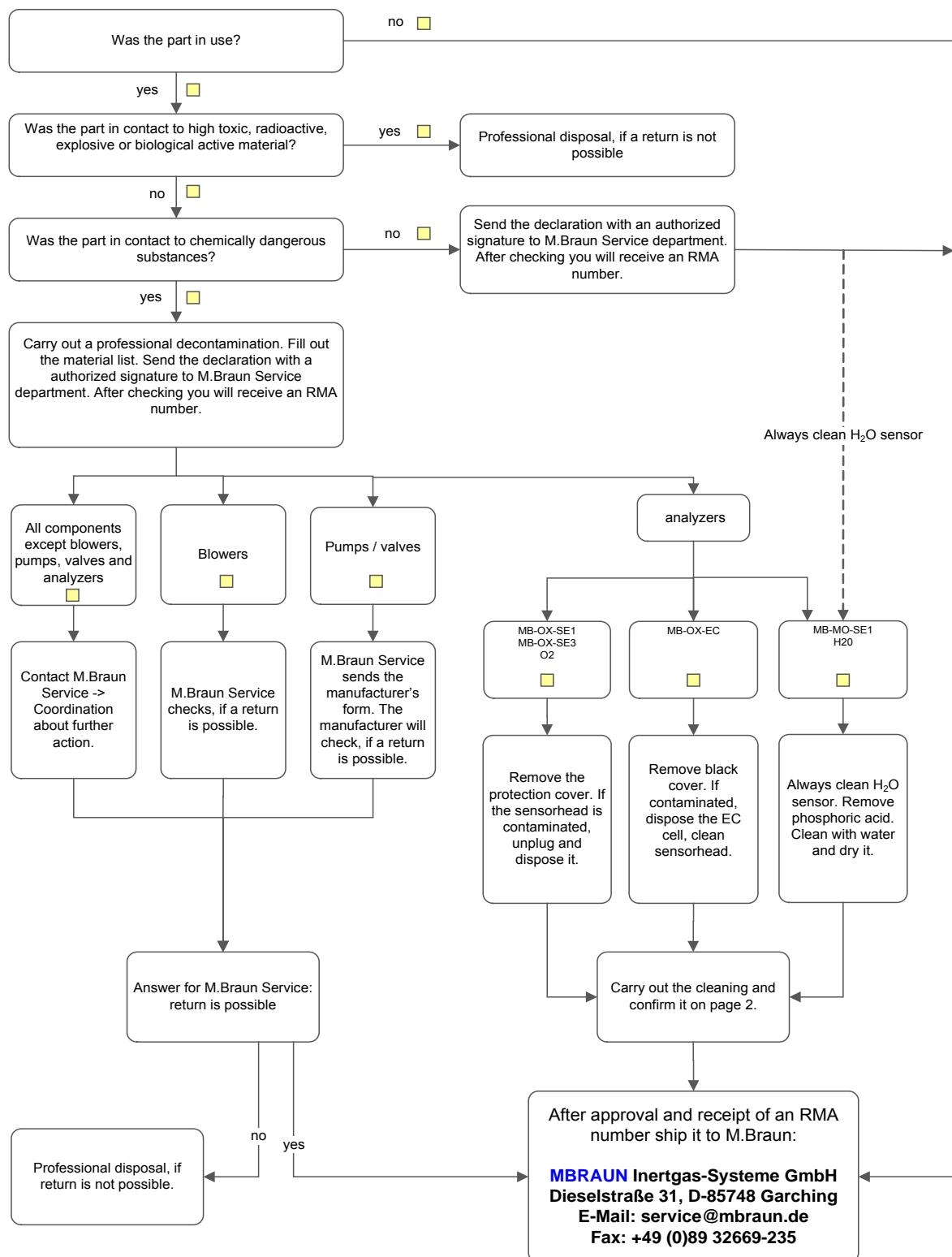
**MBRAUN** will reject any part being returned without the contamination declaration and parts, which are contaminated with substances detrimental to health or hazardous to the environment.

The Form “Declaration Concerning the Contamination of Gloveboxes, Blowers, Valves and Purifier Loading” is available overleaf.



# Declaration about Decontamination

**MBRAUN**



Legally binding declaration:

We hereby assure that the information in this statement is correctly determined, sincere and complete. The transport of the contaminated product is carried out in accordance with legal provisions. We know that we are liable to the contractor for damages caused by incomplete and incorrect information.

Name of the authorized person (Please print)	Date	Signature	Company stamp

## Declaration about Decontamination



The service and repair of M.Braun glove boxes and their components can only be performed after presentation of this filled form. The completed filled declaration must have been checked by M.Braun Service before a part can be accepted. After inspection and approval of the declaration you will receive a return material authorisation number (**RMA number**).

Note: The shipment of contaminated parts may be a violation of national and international laws.

1. Project number / year of manufacturing	6. Company / institute
2. Type of component: blower, analyzer....	7. Address
3. Type / name / serial number	
4. Special equipment installed (e.g. LMF)	
5. Reasons for return	

### List of hazardous materials and certification of decontamination

Enter all hazardous materials which the component was in contact with. Please print:

Pos.	CAS-Nr.	Name of chemical	Chemical formula	Class of risk
1				
2				
3				
4.				
5.				
6.				

Hereby we assure that the component has been cleaned and it is not contaminated.

Date

Signature

<b>12.1.</b>	<b>Alarm and Warning Messages.....</b>	<b>2</b>
<b>12.2.</b>	<b>Definition of Error Messages.....</b>	<b>3</b>

## 12. Trouble Shooting

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### 12.1. Alarm and Warning Messages

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#### Alarm

On all screen of the TP170B Operation Panel (*TOUCH* Screen) appears the **ALARM** button.

As soon as a fault or an error the **ALARM** button will flash

- To view the error messages, touch the **ALARM** button.

This will open the Warnings Screen.

Warning screen			BACK	END	ACK
No.	Time	Text			
106	12:48:16	purifier 1: H2O alarm			
108	12:15:49	purifer 1: O2 alarm			

The messages that appear in the screen are in order of occurrence. The most recent message is the uppermost.

Selecting the **BACK** button will return to the previous screen.

## 12.2. Definition of Error Messages

Warning Number	Warning Description	Possible Explanations	Solutions
1	vacuum pump VPG 1 switched off	Operator has not switched vacuum pump on	Operator have to switch on vacuum pump
2	motor protective switch vacuum pump VPG 1 activated	Vacuum pump faulty Coarse-leak in the piping (vacuum pump overworked due to size of the leak)	Replace vacuum pump Eliminate Coarse-leak Vacuum pump check from MBraun - Service
3	blower GB1: motor protective switch activated or error frequency controller	Main blower faulty Main piping stopped up	Replace main blower Eliminate Constipation Blower check from MBraun - Service
4	purifier 1: filter 1 input main valve not open	Main valve faulty Control pressure too low	Replace main valve Set control pressure to 6 bar
5	purifier 1: filter 1 output main valve not open	Main valve faulty Control pressure too low	Replace main valve Set control pressure to 6 bar
10	purifier 1: box purging outlet not open	Purging valve faulty Control pressure too low	Purging valve Replaces Set control pressure to 6 bar
11	purifier 1: box purging in operation	Operator-hint	No action required
33	Solvent trap: Main valve filter 1 inlet/outlet not open	Main valve Solvent trap faulty Control pressure too low	Replace Main valve Set control pressure to 6 bar
35	Solvent trap: Main valve filter 1 inlet/outlet not closed	Main valve Solvent trap faulty Control pressure not correct	Replace Main valve Set control pressure to 6 bar
37	Solvent trap: Bypass valve not open	Bypass valve Solvent trap faulty Control pressure too low	Replace Bypass valve Set control pressure to 6 bar
38	Solvent trap: motor protective switch vacuum pump VPGL	Vacuum pump faulty Coarse-leak in the piping (vacuum pump overworked due to size of the leak)	Replace Vacuum pump Eliminate Coarse-leak Vacuum pump check from MBraun - Service
49	compressor: motor protective switch activated	Compressor purifier faulty	Replace Compressor Compressor check from MBraun - Service
51	freezer: motor protective switch activated	Compressor freezer faulty	Replace Compressor Compressor check from MBraun - Service
52	compressor box cooling: motor protective switch activated	Compressor box cooling faulty	Replace Compressor Compressor check from MBraun - Service
55	oxygen-level too high: automatic box purging is active	Operator-hint :Oxygen-measurement over O2-limit level → Box purging starts automatically	No action required

## 12. Trouble Shooting

Warning Number	Warning Description	Possible Explanations	Solutions
65	vacuum pump off - box pressure too low	Vacuum valve antechamber has not closed Refill valve antechamber has not closed Vacuum valve purifier has not closed	Replace faulty valve and switch on vacuum pump
96	Clean the H2O-sensor - Refer to instruction manual	Maintenance time H2O-Sensor overstepped	Clean H2O-Sensor Reset maintenance time H2O-Sensor
97	purifier 1: filter 1 input main valve not closed	Main valve purifier 1 faulty Control pressure too low	Replace Main valve Set control pressure to 6 bar
98	purifier 1: filter 1 output main valve not closed	Main valve purifier 1 faulty Control pressure too low	Replace Main valve Set control pressure to 6 bar
99	purifier 1: regeneration filter 1 in operation	Operator hint	No action required
100	purifier 1: regeneration filter 1 service mode	Operating hint	No action required
101	Purifier 1: proof flow regeneration gas - ok?	Regeneration gas confirmation by the customer	Check gas flow regeneration gas and confirm condition
106	purifier 1: H2O alarm	H2O-Measurement exceeds alarm-threshold: Antechamber leaky , piping leaky Introduced item contains much moisture No cleaning effect of the active filter	Eliminate leakage Complete more pump-refill-cycles for the introduced item Regenerate filter, use regenerated filter
107	purifier 1: H2O sensor defective	H2O-sensor faulty H2O-sensor unplugged	Replace H2O-sensor Plug-in H2O-sensor
108	purifier 1: O2 alarm	O2-Measurement exceeds alarm-threshold: Antechamber leaky , piping leaky Introduced item contains much oxygen No cleaning effect of the active filter	Eliminate leakage Complete more pump-refill-cycles for the introduced item Regenerate filter, use regenerated filter
109	purifier 1: O2 sensor defective	O2-sensor faulty O2-sensor unplugged	Replace O2-sensor O2-sensor plug in
140	Solvent trap: Filter 1 inlet main valve not closed	Main valve solvent trap filter 1 faulty Control pressure too low	Replace Main valve solvent trap filter 1 Set control pressure to 6 bar
141	Solvent trap: Filter 1 outlet main valve not closed	Main valve solvent trap filter 1 faulty Control pressure too low	Replace Main valve solvent trap filter 1 Set control pressure to 6 bar

Warning Number	Warning Description	Possible Explanations	Solutions
142	Solvent trap: Prove purge gas flow for regeneration	Purge-gas confirmation by the customer	Check gas flow purge-gas and confirm condition
145	Solvent trap: alarm setpoint analyzer exceeded --> Regenerate solvent trap	Analyzer-measurement exceeds alarm-threshold:	Regenerate filter, use regenerated filter
205	Buffer battery CPU is empty - exchange! Do not switch off power supply!	Buffer battery of the PLC is empty	Do not switch off PLC Change battery
212	sensor box pressure defective	Box pressure-sensor faulty Box pressure -sensor unplugged	Replace Box pressure - sensor Box pressure -sensor plug in
213	box pressure too low	Vacuum valve antechamber has not closed Refill valve antechamber has not closed Vacuum valve purifier has not closed	Remove faulty valve
214	box pressure too high	Gas hose broken in the box If the mistake appears with box purging: gas supply too high	Disconnect leaky gas supply Throttle gas supply
215	freezer: temperature too high	Freezer does not run: Freezer unplugged Freezer faulty	Plug in freezer Replace Freezer
216	box cooling: error temperature sensor	Temperature-sensor faulty Temperature -sensor unplugged	Replace Temperature - sensor Plug-in Temperature - sensor
217	freezer: error temperature sensor	Temperature-sensor faulty Temperature -sensor unplugged	Replace Temperature - sensor Plug-in Temperature - sensor
218	Solvent trap: alarm setpoint exceeded ---> Start regeneration LMF	Analyzer-measurement exceeds alarm-threshold:	Regenerate filter, use regenerated filter

## **12. Trouble Shooting**

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### 13.1 Wiring Diagrams



### 14.0 Ersatzteile / Spareparts

**mBRAUN MB 20 / 200 – Labmaster Glovebox System**



#### 14.1. System Übersicht / Scheme ..... 2

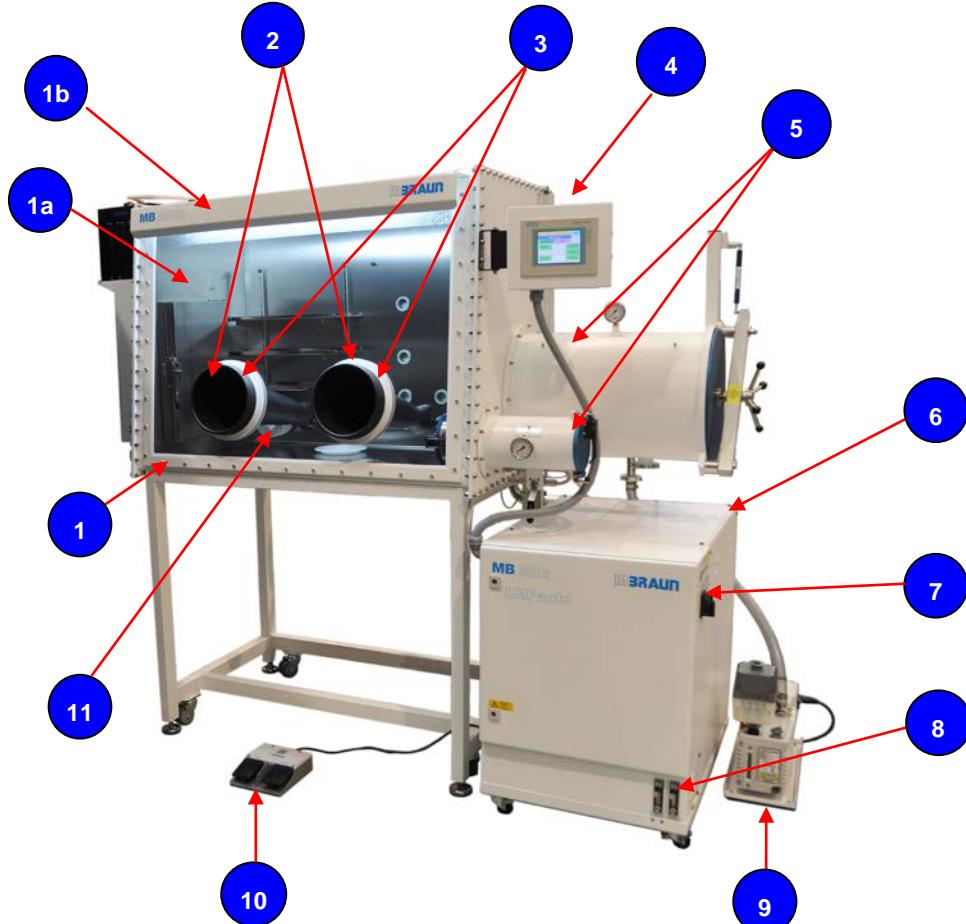
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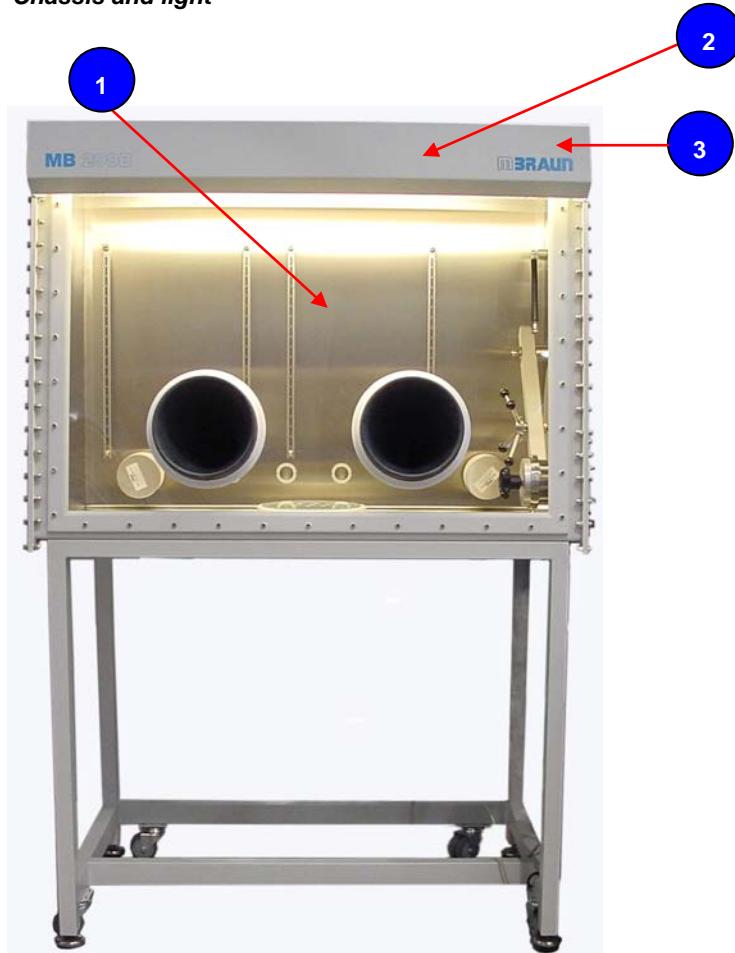
## 14.1. System Übersicht / Scheme



**Abb. 1 Typische Komponenten eines Standard-Glove Box-Systems/  
Fig. 1 Typical Components of a Standard Glove Box System**

Nr.	Beschreibung	Description	Kapitel/ Chapter
1	Glovebox	Glovebox	14.2
1a	Scheibe Polycarbonat	Window polycarbonate	14.2.1
1b	Leuchtstoffröhre	Fluorescent tube	14.2.1
2	Handschuhdurchführungen	Glove Feedthrough	14.2.2
3	Handschuhe	Gloves	14.2.2
4	Bedienpanel	Touch panel	14.3.7
5	Schleusen	Antechamber	14.2.3
6	Gasreinigung	Gas purifier	14.3
7	Hauptschalter	Main switch	14.3.1
8	Durchflussmesser komplett (mit Rückschlagventil)	Flowmeter with non-return-valve	14.3.1
9	Vakuumpumpe	Vacuum pump	14.3.5
10	Fußschalter	Foot switch	14.3.8
11	Staubfilter	Dust filter	14.2.5

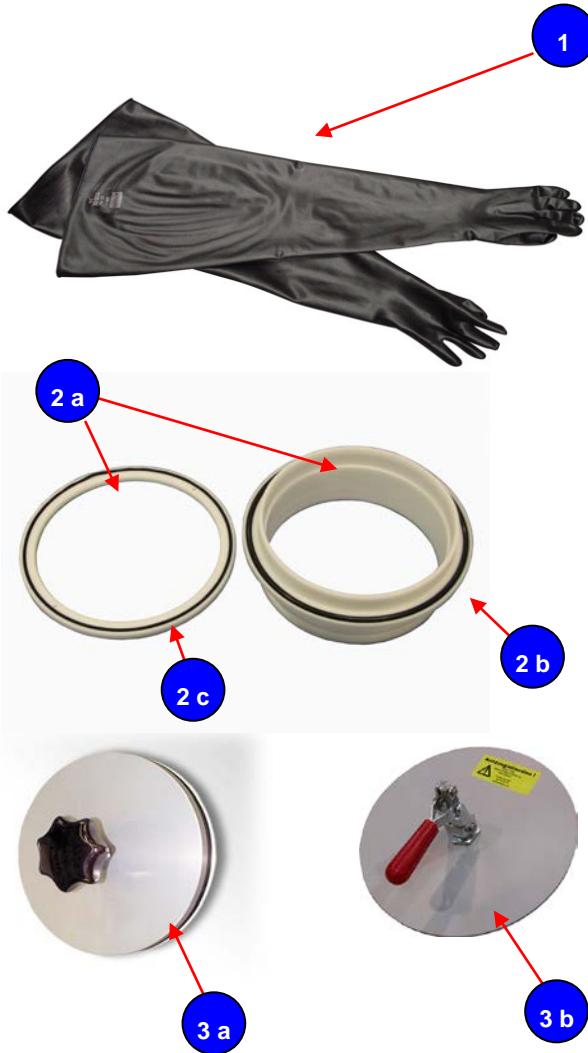
## 14.2. Glovebox

14.2.1 Gehäuse und Beleuchtung /  
Chassis and light

Nr.	Bestell-nummer	Beschreibung	Description
1	7002195	Scheibe Polycarbonat (Weitere Artikel bei <b>mBRAUN</b> erfragen)	Window polycarbonate (For further articles ask <b>mBRAUN</b> )
2	7070758	Beleuchtung komplett L1	Lightening complete
2A	7075061	Beleuchtung komplett L2	Lightening complete
3	2603476	Leuchtstofflampe L1 30W (Tageslicht weiß, ohne Abbildung)	Fluorescent lamp (cool white, not shown)
3A	2603916	Leuchtstofflampe L2 58W (Tageslicht weiß, ohne Abbildung)	Fluorescent lamp (cool white, not shown)

### 14.2.2

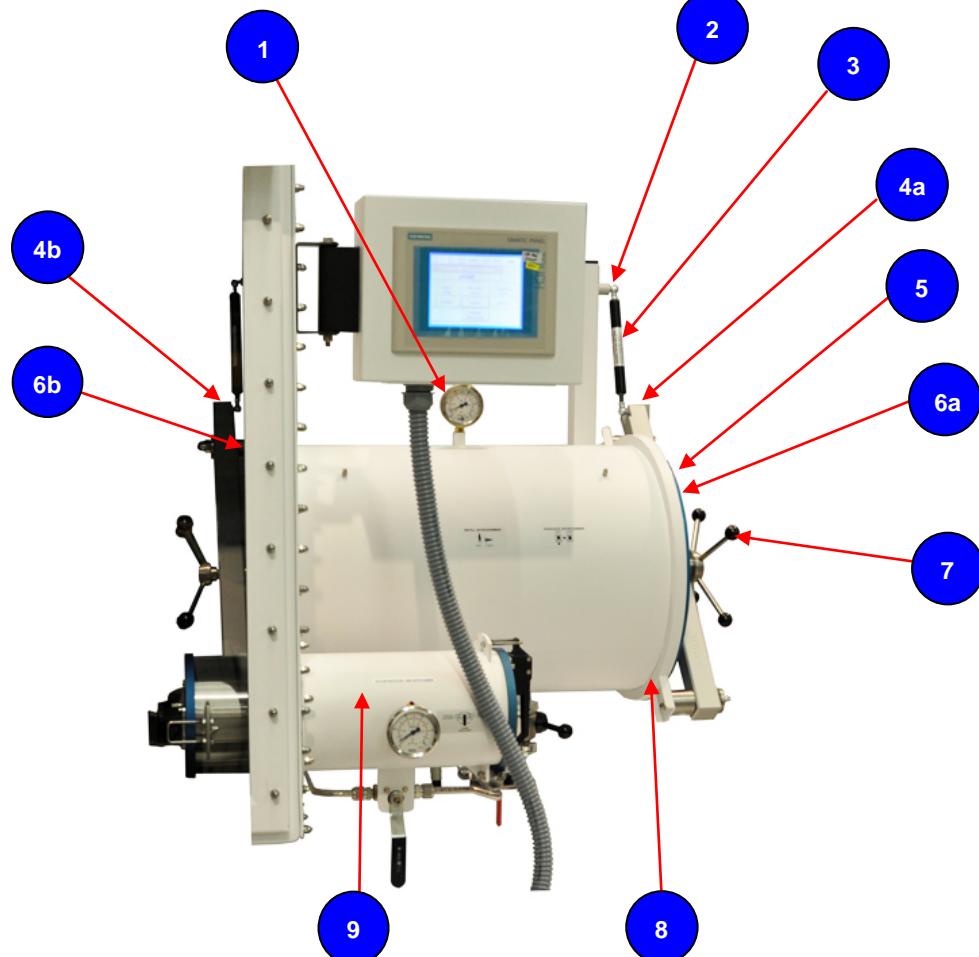
#### Handschuhe und Zubehör / Gloves and Accessories



Nr.	Bestellnummer	Beschreibung	Description		
			Weite / Connection value	Stärke / Thickness	Größe / Size
1	<b>Handschuhe</b>		<b>Gloves</b>		
	3000047	Brom-Butyl, anatomisch (Standard)	Brom-Butyl, anatomical	220 mm	0.4 mm
	3240567	Brom-Butyl, beidhändig (Standard)	Brom-Butyl, ambidextrous	220 mm	0.4 mm
	3000048	Brom-Butyl, anatomisch	Brom-Butyl, anatomical	220 mm	0.8 mm
	3000018	Brom-Butyl, anatomisch	Brom-Butyl, anatomical	220 mm	0.4 mm
	3240568	Brom-Butyl, beidhändig	Brom-Butyl, ambidextrous	220 mm	0.8 mm
	3005010	Hypalon, anatomisch	Hypalon, anatomical	220 mm	0.4 mm
2	<b>Handschuhdurchführungen</b>		<b>Gloveport Feedthrough</b>		
	2 a	7070842	Handschuh-Durchführung inkl. O-Ring	Gloveport feedthrough inkl. O-Ring	220 mm
	2 b	2600239	O-Ring für Handschuhe (ohne Abb.)	O-Ring for Gloves (not shown)	220 mm
	2 c	2603048	O-Ring (239x7) für äußere Handschuhdurchführungen	O-Ring (239x7) for outer gloveport feedthrough	220 mm
	3 a	2400138	O-Ring (250x4) für innere Handschuhdurchführungen	O-Ring (250x4) for inner gloveport feedthrough	220 mm
3	<b>Verschlüsse für Handschuhdurchführungen</b>		<b>Covers for Gloveport Feedthrough</b>		
	3 a	9002371	Handschuh-Innenverschlussdeckel, Ø 210 mm	Inner Glove Port Cover Ø 210 mm	
	3 b	7019882	Handschuh-Außenverschlussdeckel Ø 210 mm	External Glove Port Cover Ø 210 mm	

14.2.3 Schleusen / Antechamber

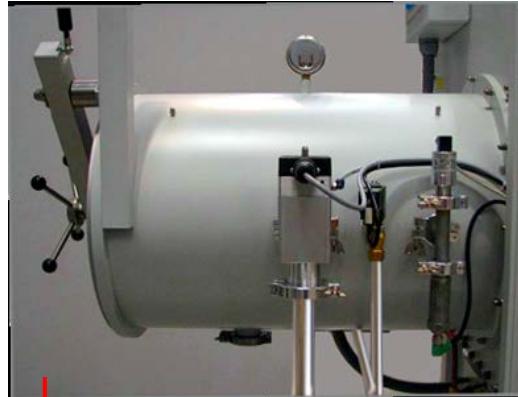
1. Rundschleuse / Round Antechamber



Nr.	Bestell-nummer	Beschreibung	Description
1	2405004	Manometer	Manometer
2	7003702	Gewindebuchse	Door shock spacer
3	2179000	Gasdruckfeder	Gaspiston for antechamber
4a	6000034	Schleusenbalken Türhalter (rechts)	Door arm complete (right)
4b	6000035	Schleusenbalken Türhalter (links)	Door arm complete (left)
5	7003674	Schleusendeckel	Antechamber door
6a	9005225	Schleusendeckel komplett (rechts)	Antechamber door complete (right)
6b	9005226	Schleusendeckel, komplett (links)	Antechamber door, complete (left)
7	7040131	Schaltkreuz	Antechamber door handle
8	2400309	O-Ring für Schleusendeckel (innen und außen) (ohne Abb.)	Inner and outer O-ring for Antechamber Door ( <i>not shown</i> )
9		<b>Minischleuse mit Zubehör (s. Pkt. 14.2.4)</b>	<b>Mini antechamber with equipment (s. Chap. 14.2.4)</b>

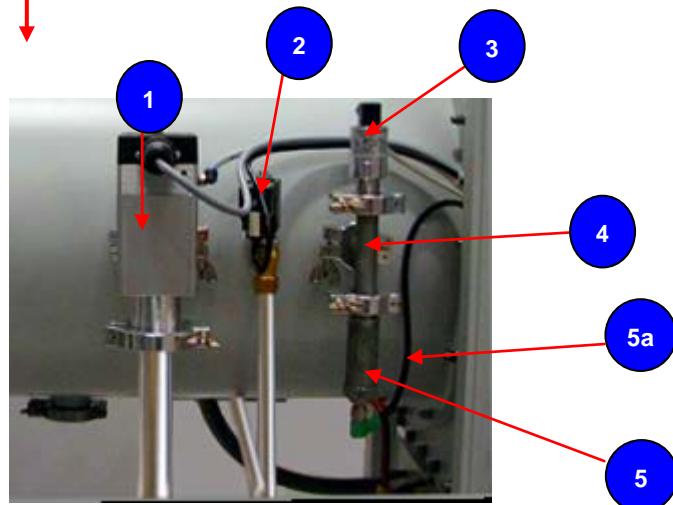
Nur bei LABMASTER / MB200B und MB20/200

### 2. Rundschleuse mit elektropneumatischen Ventilen / Antechamber with electropneumatic valves



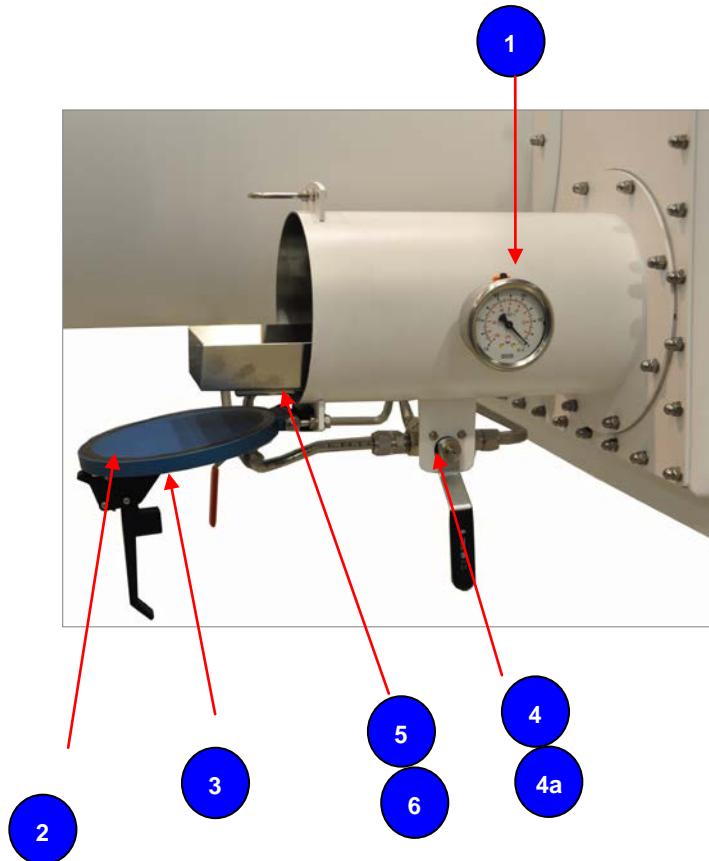
Ansicht Rückseite Schleuse /  
Rear side antechamber

*Detail*



Nr.	Bestellnummer	Beschreibung	Description
<b>1</b>	9002531-K	Eckventil MB-EPV-40 (Al)	HV Angle Valve MB-EPV-40 (Al)
	9002533-K	Eckventil MB-EPV-40 (vernickelt)	HV Angle Valve MB-EPV-40 (Ni-plated)
<b>2</b>	4600977	Magnetventil	Magnetic valve
<b>3</b>	3226006	Pirani-Messröhre	Vacuum pirani sensor
<b>4</b>	3201024	T-Stück DN16ISO-KF (Alu)	T-Piece DN16ISOKF (Alloy)
	3201050	T-Stück DN16ISO-KF (Edelstahl)	T-clamp DN16ISO-KF (Stainless steel)
<b>5</b>	4970007	Atmosphären-Drucksensor	Atmospheric pressure sensor
<b>5a</b>	5008018	Anschlusskabel M12, 5m	Connection cable M12, 5m

### 14.2.4 Minischleusen / Mini Antechamber



Nr.	Bestellnummer	Beschreibung	Description
1	3240762	Manometer 0/-1bar	Manometer 0/-1bar
2	7077297	Profildichtung	Gasket
3	7077293	Schleusendeckel komplett	Cover mini antechamber
4	2603906	3-Wege-Kugelhahn	3-Way Ball Valve
4a	2602336	Anlaufscheibe (ohne Abb.)	Washer Disk ( <i>not shown</i> )
5	7075485	Tablett	Tray
6	7077301	Teleskopschiene (ohne Abb.)	Rail, Telescopic ( <i>not shown</i> )

### 14.2.5 Partikelfilter / Partikelfilter



Nr.	Bestellnummer	Beschreibung	Description
1	9004513	Staubfilter <a href="#">MB-BF-L-03</a> (H13)	Dustfilter <a href="#">MB-BF-L-03</a> (H13)

### 14.2.6 Messgeräte / Sensors



Nr.	Bestellnummer	Beschreibung	Description
1	1500686	Sauerstoffmessgerät <b>MB-OX-SE1</b> (0 – 1000 ppm O <sub>2</sub> )	O <sub>2</sub> -Sensor <b>MB-OX-SE1</b> (0 – 1000 ppm O <sub>2</sub> )
2	1500700	Sauerstoffmessgerät <b>MB-OX-EC</b> (0 – 1000 ppm O <sub>2</sub> )	O <sub>2</sub> -Sensor <b>MB-OX-EC</b> (0 – 1000 ppm O <sub>2</sub> )
-	2604966-S	blaues Anschlußkabel 10m	blue Connection cable 10m
3	1500685	Feuchtemessgerät <b>MB-MO-SE1</b> (0 – 500 ppm H <sub>2</sub> O)	H <sub>2</sub> O-Sensor <b>MB-MO-SE1</b> (0 – 500 ppm H <sub>2</sub> O)
-	2604967-S	Grünes Anschlußkabel 10m	Green Connection cable 10m
4	4970009	Boxdrucksensor +/- 20mbar	Box pressure sensor +/- 20mbar
4a	5008018	Anschlusskabel M12, 5m	Connection cable M12, 5m

## 14.3. Gasreinigung / Gaspurifier

## 14.3.1 Standard

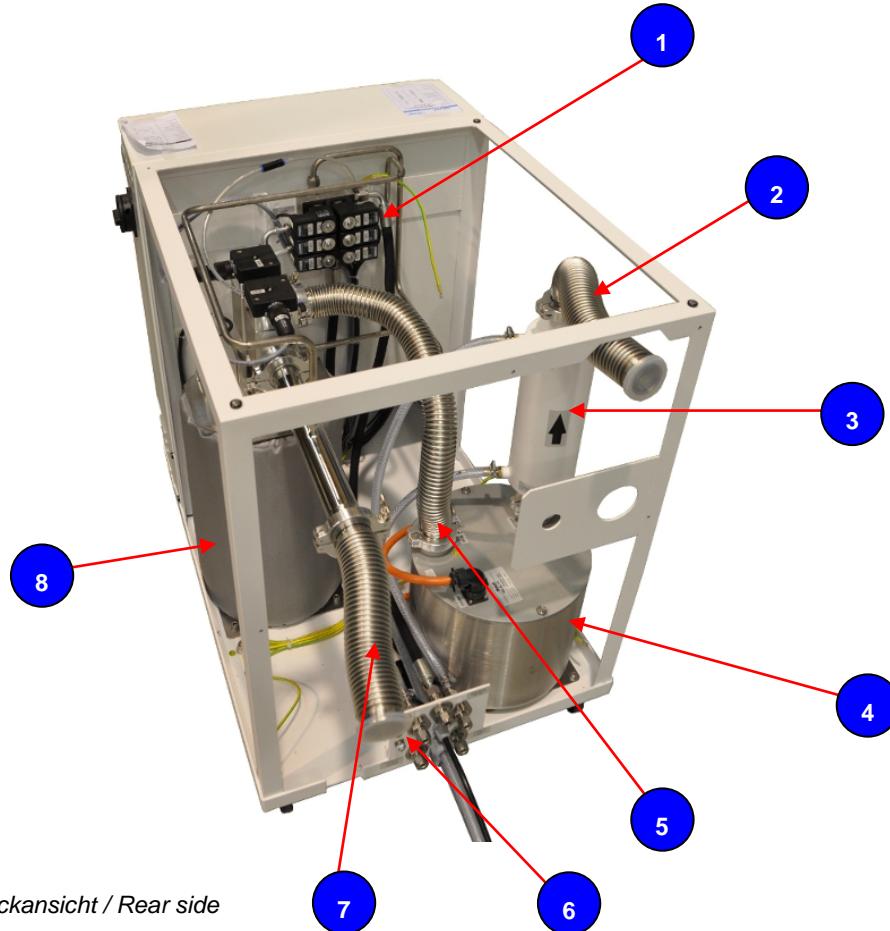
## a) Vorderansicht / Front view



Vorderansicht Gasreinigung  
(externes Bedienpanel) /  
Front view Gaspurifier  
(external Touchpanel) (s. 14.3.7)

Nr.	Bestellnummer	Beschreibung	Description
1		Schalschrank (elektrische Komponenten siehe Schaltbild, Kap. 13))	Control cabinet (Components see electrical schematic, Chapter 13)
1a	2602675	Hauptschalter	Main switch
2	2600027	Durchflussmesser komplett (mit Rückschlagventil)	Flowmeter with non-return- valve

b) Innenansicht Rückseite/ Interior view, rear side



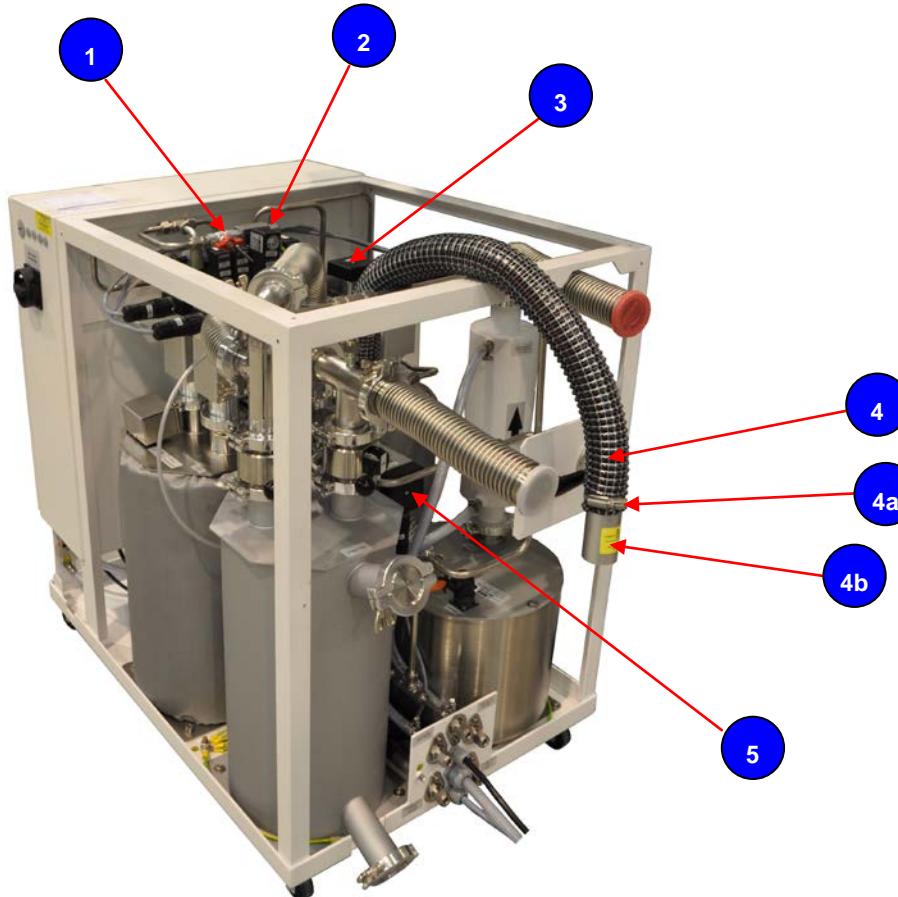
Nr.	Bestellnummer	Beschreibung	Description
1	2600793	Ventil-Set (Spule, Kern, Feder)	Valve set (Core, spool, spring)
	4600978 *)	Ventil-Block 6-fach (Spule, Kern, Feder)	Valve Block- with 6 valves (Core, spool, spring)
	4600979 **)	Ventil-Block 10-fach (Spule, Kern, Feder)	Valve Block- with 10 valves (Core, spool, spring)
2	3203000	Wellschlauch DN40KFx350	Flexline, DN40KFx350
3	7016893	Kühler	Heat Exchanger
4	9002832	Gebläse MB-BL-01	Blower - MB-BL-01
5	3200072	Wellschlauch DN40KFx500	Flexline, DN40KFx500
6	2603712	Haupterdungsanschluss 10mm² / 5meter	Main grounding connection 10 sqmm / 5meter
7	3240545	Wellschlauch DN40KFx250	Flexline, DN40KFx250
8	9002043-KF	Reaktor Gasreinigung H <sub>2</sub> O / O <sub>2</sub> , komplett 230 V	Reactor H <sub>2</sub> O/O <sub>2</sub> complete 230V
	9002044-KF	Reaktor Gasreinigung H <sub>2</sub> O / O <sub>2</sub> , komplett 115 V	Reactor H <sub>2</sub> O/O <sub>2</sub> complete 115V
	2600839	Kupferkatalysator (4.5kg)	Cu-Catalyst (4.5 Kg)
3240262	Molekularsieb (5.5kg)	Molecular Sieve (5.5kg)	
2603710	Erdungssatz für Labmaster	Groundig-Set for Labmaster	
2603711	Erdungssatz für MB20 / MB200	Groundig-Set for MB20 / MB200	

\*) MB 20

\*\*) MB 200

### 14.3.2

*Optional: Gasreinigung mit Boxspüleinrichtung /  
Gaspurification with Box Purging*



Nr.	Bestellnummer	Beschreibung	Description
1	3240521	Kugelhahn 2-Wege 3/8" V2A	2-way ball valve 3/8" SS
	5017016	Kugelhahn 2-Wege 3/8" MS	2-way ball valve 3/8" BS
2	4600977	Magnetventil (VSE)	Magnetic Valve Set
3	9002531-K	Eckventil MB-EPV-40 (Al)	HV Angle Valve <a href="#">MB-EPV-40</a> (Al)
	9002533-K	Eckventil MB-EPV-40 (vernickelt)	HV Angle Valve <a href="#">MB-EPV-40</a> (Ni-plated)
4	2602195	PVC-Schlauch 800mm (Spülen Ausgang)	PVC-Hose 800 mm (Purging Outlet)
	2501116	Schlauchklemme	Hose clamp
	2300221	Al-Rohr 42x1 L=100mm	Al-Tube 42x1 L=100mm
5	7024588	Rückschlagventil DN40 komplett (Ausgangventil)	Non-return valve DN40, complete (Purging out)

### 14.3.3 Optional: Gasreinigung mit zusätzlichem Lösemittelfilter / Gaspurifier with additional Solvent filter

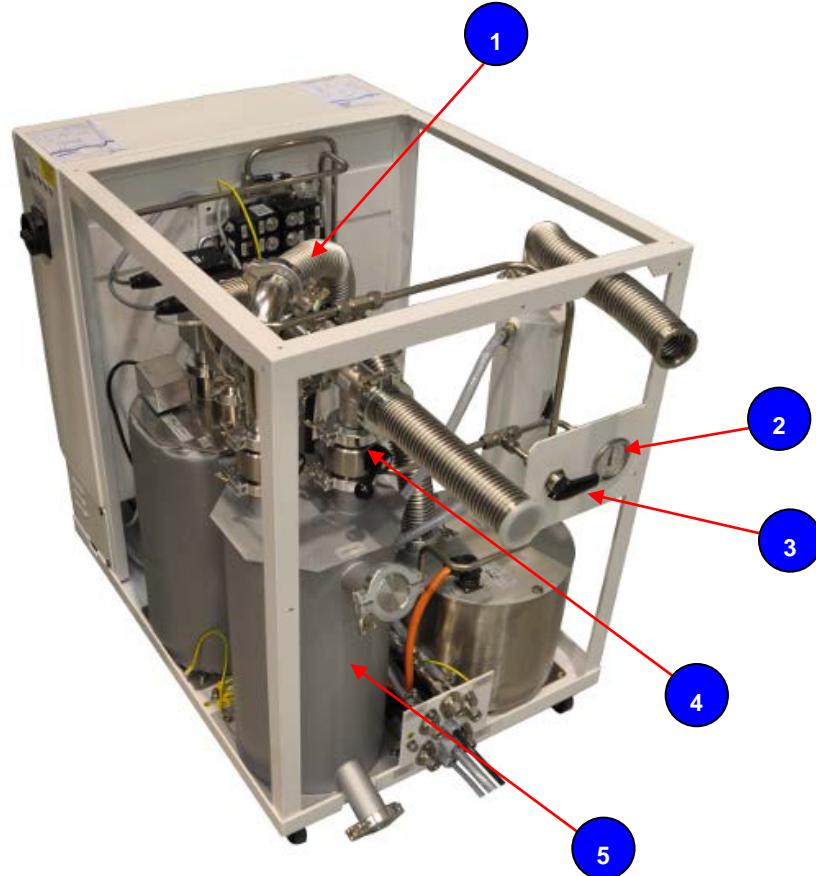


Abb Gasreinigung mit Lösemittelfilter (und Boxspülen) /  
Figure: Gaspurifier with solvent filter (and box purging)

Nr.	Bestellnummer	Beschreibung	Description
1	3200072	Wellschlauch DN40KFx500	Flexline, DN40KFx500
2	3000072	Manometer	Manometer
3	2200480	3-Wege-Ventil 10mm MS	3-Way Ball Valve - 10mm BS
4	9004501	Handventil (DN40KF VA)	Manual valve (DN40KF SS)
5	9007091	Lösungsmittelfilter (LMF)	Solvent Filter (LMF)
	2182000	Aktivkohle (5.5 kg)	Activated Carbon (5.5kg)
	2210480	3-Wege-Ventil 10mm Edelstahl	3-Way Ball Valve - 10mm SS

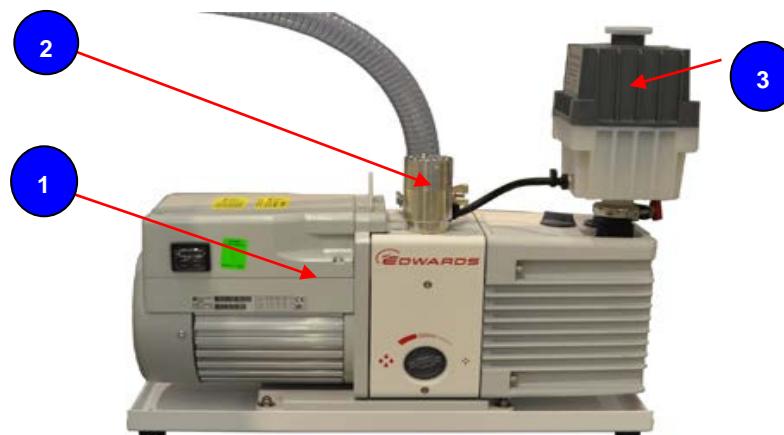
### 14.3.4 Optional: Regenerierbare Lösungsmittelfilter / Regenerable solvent filter



Nr.	Bestellnummer	Beschreibung	Description
1	4601276	Druckregler 1/8"	Pressure controller 1/8"
2	2600027	Durchflussmesser komplett (mit Rückschlagventil)	Flowmeter complete (with non-return-valve)
--	7038320	Reaktor regenerierbar (ohne Abb.)	Reactor regenerable (not shown)
--	3240262	Molekularsieb (ohne Abb.)	Molecular sieve (not shown)

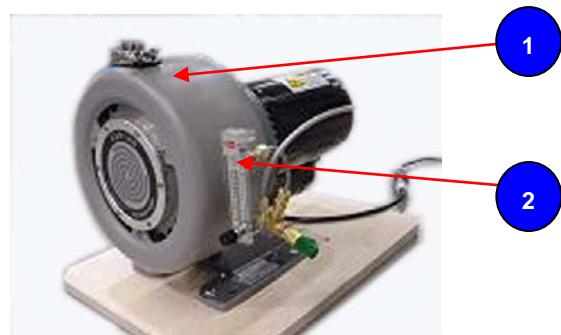
14.3.5 Vakuumpumpe / Vacuum pump

1. Standard-Vakuumpumpe / Standard Vacuum pump



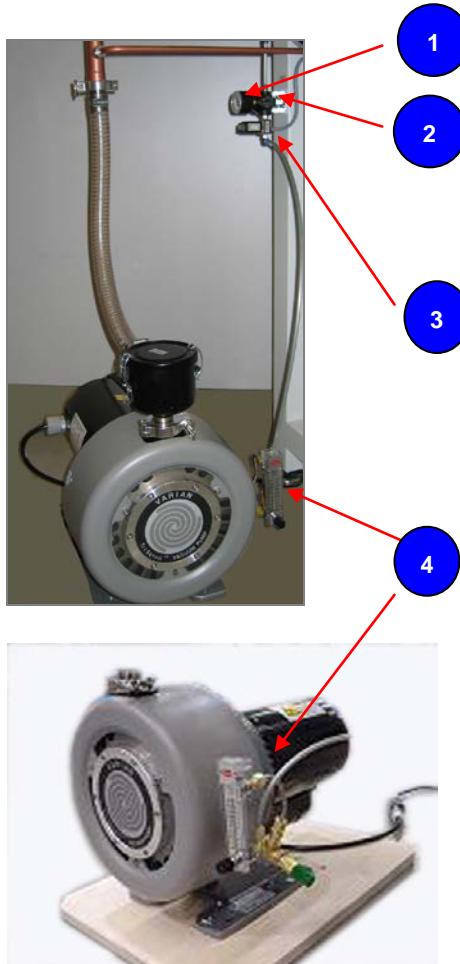
Nr.	Bestellnummer	Beschreibung	Description
1	3240487	Vakuumpumpe – RV12	Vacuum Pump - RV12
2	3240540	Gasballast-Ölrückführung	Gas Ballast Filter for RV3-
3	3240539	Ölnebelfilter – EMF20	Oil Mist Filter EMF20

2. Tri-Scroll-Vakuumpumpe / Tri-Scroll Vacuum pump



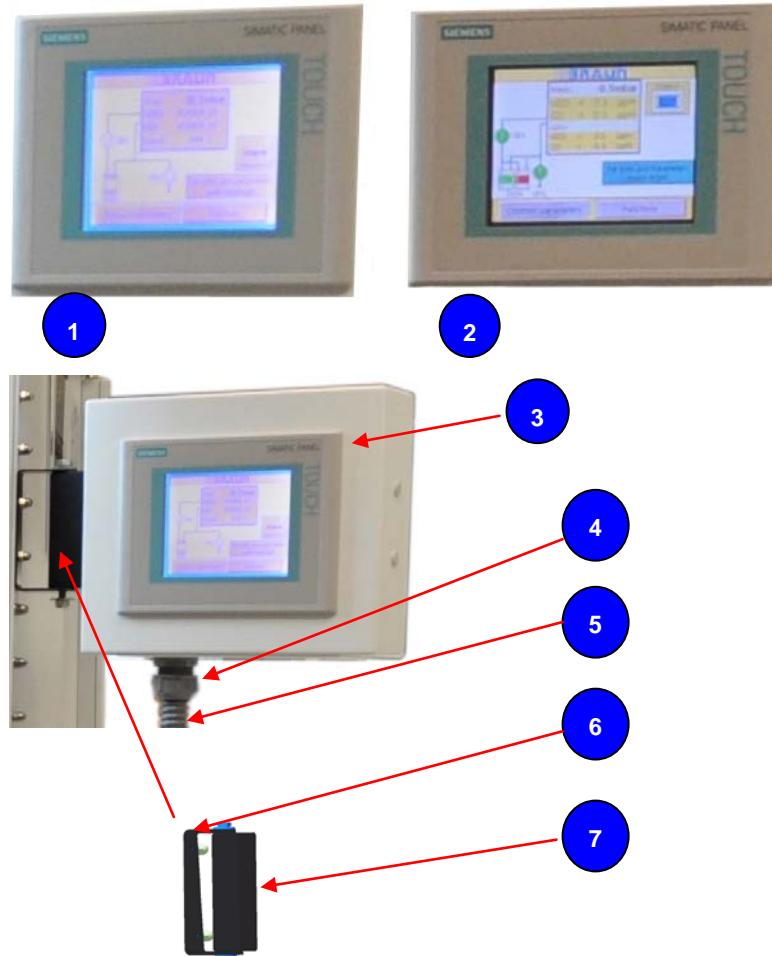
Nr.	Bestellnummer	Beschreibung	Description
1	2193001	Vakuumpumpe TriScroll PTS 310, 1 phasig	Vacuum pump TriScroll PTS 310, single phase
	2193000	Vakuumpumpe TriScroll, 3 phasig	Vacuum pump TriScroll, three phases
2		Spülkit für TriScrollpumpe (s.14.3.6)	Purge Kit for TriScroll Vacuum pump (see 14.3.6)

### 14.3.6 Optional: Spülen der Pumpe / Pump purging



Nr.	Bestellnummer	Beschreibung	Description
1	4601278	Manometer	Manometer
2	4601276	Druckregler	Pressure controller
3	3210017-A	Magnetventil	Magnetic Valve
4	3000053	Spülkit für TriScrollpumpe	Purge kit for TriScroll Pump

14.3.7 Bedienpanel / Touch Panel



Nr.	Bestellnummer	Beschreibung	Description
1	2600253-V1	Bedienpanel TP177B (Schwarz / Weiss)	Touch panel TP177B (Monochrome)
2	2600254-V1	Bedienpanel TP177B (Farbe)	Touch Panel TP177B (Color)
3	7023898	Gehäuse TP177 (Rechts/Links) (extern)	Cabinet for Touch panel (Right/Left) (extern)
4	2600272	Schlauchverschraubung	Straight grommet
5	5003044	Kabelschutzschlauch	Gray wire track
6	7070745	Panelhalter	Metal bracket
7	7070761	Zwischenteil	Plastic OP bracket

### 14.3.8 Fußschalter / Foot switch



Nr.	Bestellnummer	Beschreibung	Description
1	5007021	Fußschalter	Foot switch

**15.1. Third Party Documentation ..... 2**

## 15. Third Party Documentation

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### 15.1. Third Party Documentation

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No.	Manufacturer	Art.No. MBraun	Description	Type	Language	PDF <sup>1)</sup>
1	BOC Edwards	3240487	Rotary Vane Pump	RV3/5/8/12 A652-01-880	English	x
2		3240539	Oil Mist Filters	EMF3, EMF10, EMF 20 A462-26-880	English	x
3		3240540	EMF Adjustable Gas Ballast Oil Drain Kit for RV3 to RV12 Pumps	A505-23-880	English	x
4		-----	Vacuum Leadthroughs and Accessoir	Model 6EK25, 7EK10, 10EK25, TL8K25, Earth Electrical Leadthrough, Model 4RK 10, 8RK25, 12RK25 Rotary Shaft Vacuum Seal 6EK25, 10EK25 Extension Accessory, Type 10, 25 Blanking Plug E-100-99-880	English	x
5	MBraun SEW Eurodrive	2700636	Parameter Settings for Frequency Inverter	LTE-B 200-240V	English	x

**16.1. Certifikate ..... 2**

## **16. Certifikate**

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### **16.1. Certifikate**

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<b>N°</b>	<b>Fabricant</b>	<b>Description</b>	<b>Type</b>	<b>Langue</b>
<b>1</b>	MBraun	CE-Declaration	LABMASTER SP/DP	EN



**EC Declaration of Conformity**  
according to EC- Machine Directive 2006/42/EC  
Appendix IIA

We hereby declare: **M. Braun Inertgas-Systeme GmbH**  
**Dieselstr. 31, 85748 Garching b. München Deutschland**

**that the machinery, assembly or sub-assembly described below**

UNILAB with gas purification, Gloveboxsystem without any integrations.

with serial number acc. to type plate: \_\_\_\_\_

together with its conception and design, fulfils the basic health and safety requirements of the EC Harmonized Technical Directives indicated below.

**The following harmonized technical directives were applied**

Safety of Machinery	Directive 2006/42/EC
Electromagnetic Compatibility	Directive 2004/108/EC

Should there be any alteration or modification of the machinery, assembly or sub-assembly without our consent this declaration is void.

**The following harmonized norms are applied:**

EN ISO 12100-1, 2	2004	Safety of Machinery – Part 1: Basic terminology, methodology; Part 2: Technical principles
DIN EN 60204-1	2007	Safety of Machinery – Electrical equipment of machines – Part 1: General Requirements
DIN EN 55011	2007	Limits and methods of measurement of radio disturbance characteristics of industrial, scientific and medical (ISM) radio-frequency equipment

**The following national norms, guidelines and specifications were applied:**

- None listed -

Additional Standards, national or technical specifications for detailing the construction are stored within a list on manufacturer site. Risk analysis according DIN EN ISO 14121-1 does exist and the technical Documentation according to Annex VII A was compiled.

The Manager of Development of M. Braun Inertgas-Systeme GmbH Dieselstr. 31, 85748 Garching, close to Munich Germany, is able to present the technical documentation of conformity to the declaration process upon request.

21.01.2010

**mBRAUN**  
Inertgas-Systeme GmbH  
Dieselstr. 31  
85748 Garching  
Tel.: 089/32669-0, Fax: 089/32669-105

date

Dr. M. Reinelt  
Company Director  
M. Braun Inertgas-Systeme GmbH

Company stamp







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