

Operation Manual Index

For Systems with Touch Screen (TP170) Panel

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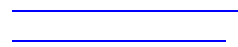
1.3. Addresses

Important service addresses:

Current Details

M.Braun, Inc.
14 Marin Way
Stratham, NH 03885

Telephone: 603-773-9333
Fax: 603-773-0008
E-Mail: info@mbraunusa.com
Internet: www.mbraun.com



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2.1. Transport of a System

The preparations for transporting an MBRAUN System should be carried out by an MBRAUN technician only.

The transport of the system should be done by a forwarding agency specialized solely for this purpose.

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

2.2. Site Selection for a System

Selecting the site for an MBRAUN System of the series should be carried out by MBRAUN technicians only.

If the system is part of a system unit in addition the instructions of the unit are also valid.

Prerequisites:

Room:	Room temperature +15 °C to +30 °C, dry and well ventilated.
Surface conditions:	Firmly structured floor, no oblique position.
Clearance:	Minimum clearance from the walls is 600 mm plus sufficient access and working space where glove ports, antechambers etc. require access.

2.3. Modification of a System

In principle changes and modifications of any kind on **MBRAUN** Glovebox Systems of the series should be made by **MBRAUN** technicians only.

For exceptions of any kind a written confirmation is required.

Any unauthorized change or modification to the system will cause all claims under warranty and those to liability to expire.

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

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3.1. General Information

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

3.2. Working Gases

3.2.1. Working Gas

<i>Use</i>	Building up and maintaining the ultra pure gas atmosphere and pressure gas for electro pneumatic valves.
<i>Gas type*</i>	Nitrogen, Argon or Helium.
<i>Purity</i>	Medium Purity; from bottles or other gas supplies.
<i>Quantity</i>	Permanent supply for the system's operation (e.g. for pressure compensation.)

3.2.2. Regeneration Gas

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

3.2.3. Purge Gas

<i>Use</i>	Getting the system filled up and purged with working gas (when commissioning for the first time and after servicing or repairs of the system.)
<i>Gas type*</i>	Working gas (nitrogen, argon or helium.)
<i>Purity</i>	Medium purity; from bottles or other gas supply facilities.
<i>Quantity</i>	Approx. 10 - 12 m ³ /m ³ box volume for purging the system when commissioning the system for the first time or intermediately purging the system.

Note:

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.

3.3. Equipment for Connections

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

<i>Use</i>	Working gas pressure control system.
<i>Material</i>	200 bar primary, 5.5-6.0 bar secondary, with a flow rate of 200 l/min
<i>Connection type</i>	Ø 9 mm hose or Ø 10 mm Swagelok® fitting.

Supply Piping for Working Gas

<i>Use</i>	Connecting the working gas source with the “Working Gas INLET” system connection.
<i>Material</i>	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 pipe and Ø 10 mm Swagelok® fitting or: Ø 10 mm stainless steel pipe and Ø 10 mm Swagelok® fitting.
<i>Connection type</i>	Ø 9 mm hose nozzle or Ø 10 mm Swagelok® fitting.

3.3.2. Equipment for Regeneration Gas Connections

Note:

MBRAUN recommends the use of a special pressure-reducing valve fitted with a non-standard secondary gauge that is calibrated between 0 – 1.5 mbar.
This is available from MBRAUN – Part No. 2411006.

Pressure Reducing Valve for Regeneration Gas

<i>Use</i>	Regeneration pressure control system.
<i>Material</i>	200 bar primary, 0.3-0.4 bar secondary, with a flow rate of 200 l/min
<i>Connection type</i>	Ø 9 mm hose or Ø 10 mm Swagelok® fitting.

Supply Piping for Regeneration Gas

<i>Use</i>	Connecting the working gas source with the “Regeneration Gas INLET” system connection.
<i>Material</i>	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 pipe and Ø 10 mm Swagelok® fitting or: Ø 10 mm stainless steel pipe and Ø 10 mm Swagelok® fitting.
<i>Connection type</i>	Ø 9 mm hose nozzle or Ø 10 mm Swagelok® fitting.

Exhaust Outlet for Waste Regeneration Gas

<i>Use</i>	Connecting the “Regeneration Gas OUTLET” system connection with the user's disposal facility (exhaust outlet).
<i>Material</i>	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 pipe and Ø 10 mm Swagelok® fitting or: Ø 10 mm stainless steel pipe and Ø 10 mm Swagelok® fitting.
<i>Connection type</i>	Ø 9 mm hose nozzle or Ø 10 mm Swagelok® fitting.

3.3.3. Equipment for Purge Gas**Pressure Reducing Valve for Purge Gas**

Required only for the “manual purging” method.

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

<i>Use</i>	Pressure control of the purge gas when manual purging is applied.
<i>Material</i>	200 bar primary, 5-6 bar secondary, with a flow rate of 200 l/min
<i>Connection type</i>	Ø 9 mm hose or Ø 10 mm Swagelok® fitting.

Supply Piping for Purge Gas

Required only for the “manual purging” method.

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

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

3.3.4. Equipment for Vacuum Pumps**Disposal Piping for Vacuum Pump Waste Gas**

<i>Use</i>	Connecting the vacuum pump exhaust (oil mist and waste gas) with the user's waste gas disposal facility (depressurized exhaust outlet).
<i>Material</i>	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 the Water Cooling

Not applicable for systems with no cooling or equipped with compressor cooling.

Cooling Water

<i>Use</i>	System cooling
<i>Material</i>	Mains water Temperature: 10 °C – 25 °C Flow rate: 2 l/min at 10 °C, 5 l/min at 15 °C Disposal: Depressurized (max 0.5 mbar)

Supply Piping for Water Cooling (supply and drain piping)

<i>Material</i>	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 pipe and Ø 10 mm Swagelok® fitting or: Ø 10 mm stainless steel pipe and Ø 10 mm Swagelok® fitting.
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3.3.6. Power Connection

Depending on the system, refer to Type Plate.

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4.1. Safety Instructions

It is recommended that only a competent MBRAUN technician complete the initial system installation.

Caution:

Risk of accident whilst handling gases. Connection of systems should only be carried out by competent and experienced personnel.

MBRAUN standard systems are not suited for using radioactive or toxic agents. In such a case, special equipment components are required as well as special methods for the connections and precautions have to be observed. These are NOT described in this technical documentation. If necessary, the MBRAUN service department will provide you with the pertinent information!

(info@mbraunusa.com)

4.2. Connecting the System

4.2.1. Connecting the Working Gas

1. Connect the pressure-reducing valve to the working gas source.
Follow the manufacturer supplied instructions for its connection.
 2. Make a supply line between the working gas source and the "Working Gas - INLET" system connection.
Follow "Preparing the Connections" chapter.
 3. The "Working gas INLET" system connection is labeled with the exact value for the supply pressure.
Set pressure reducing valve to this value and open valve.
-

Caution:

Exact pressure setting required.
Overpressure will damage the system - low pressure will cause malfunction.

4.2.2. Connecting the Regeneration Gas

1. Connect the pressure-reducing valve to the regeneration gas source.
Follow the manufacturer supplied instructions for its connection
 2. Connect the working gas source with the "Regeneration Gas INLET" system connection using the supply pipe.
Follow Chapter "Preparing the Connections"
 3. The "Regeneration Gas INLET" system connection is labeled with the exact value for the supply pressure.
Set pressure reducing valve to this value and open valve.
-

Caution:

Exact pressure setting required.
Overpressure will damage the system - low pressure will cause malfunction.

4.2.3. Connecting the Disposal Piping for Used Regeneration Gas

1. Connect the disposal piping between the "Regeneration gas OUTLET" system connection and the user's disposal facility (exhaust).
2. Connection must be depressurized.

Caution:

A foul bad smell is to be expected, as soon as any spent regeneration gas escapes to the surroundings. Neither environmental pollution nor effects detrimental to health are known. However, these cannot be excluded. The manufacturer does not assume any liability.
When using toxic or radioactive material, there should be no discharge of the gas to surroundings.

4.2.4. Connecting the Disposal Piping for Vacuum Waste Gases

1. Connect the disposal piping between the vacuum pump exhaust and the user's disposal facility (exhaust).
Follow the manufacturer supplied instructions for the vacuum pump connections.
2. Connection must be depressurized.

Note:

Depending on the place where the vacuum pump is used an oil mist filter can be used instead of the disposal piping. Important information and supply details may be obtained from: info@mbraunusa.com

4.2.5. Connecting the Cooling Water

Not required in systems without cooling or fitted with compressor cooling.

1. Connect the "Cooling water INLET" system connection to the cooling water source.
Follow "Preparing the Connections" chapter.
2. Connect the "Cooling water OUTLET" system connection to the depressurized water disposal.
Follow "Preparing the Connections" chapter.
3. Turn on the cooling water. The cooling water flow rate setting depends on the available water temperature, see "Preparing the Connections" chapter.

4.2.6. Electric 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.

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5.1. Prerequisites

- All previous chapters observed
- Working gas connection properly made
- Regeneration gas connection properly made
- Exhaust facility for waste regeneration gas properly made
- Purge gas connection properly made
- Exhaust facility for vacuum pump waste gas properly made
- Cooling water connection properly made; not required in systems with compressor cooling.
- Power connection properly made
- All piping and connections checked for its condition and firm mounting.

5.2. Activating the System

Figure 1: Main Switch



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

MBRAUN-Systems provided with the **TOUCH** Panel in the standard design have the panel located in a clearly visible central position.

After being activated, the system runs a self-test

Figure 2: Touch Panel

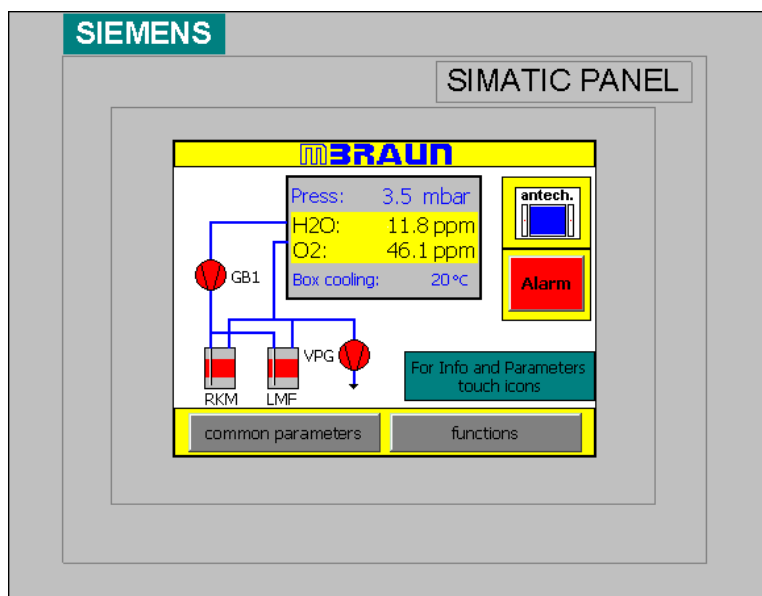
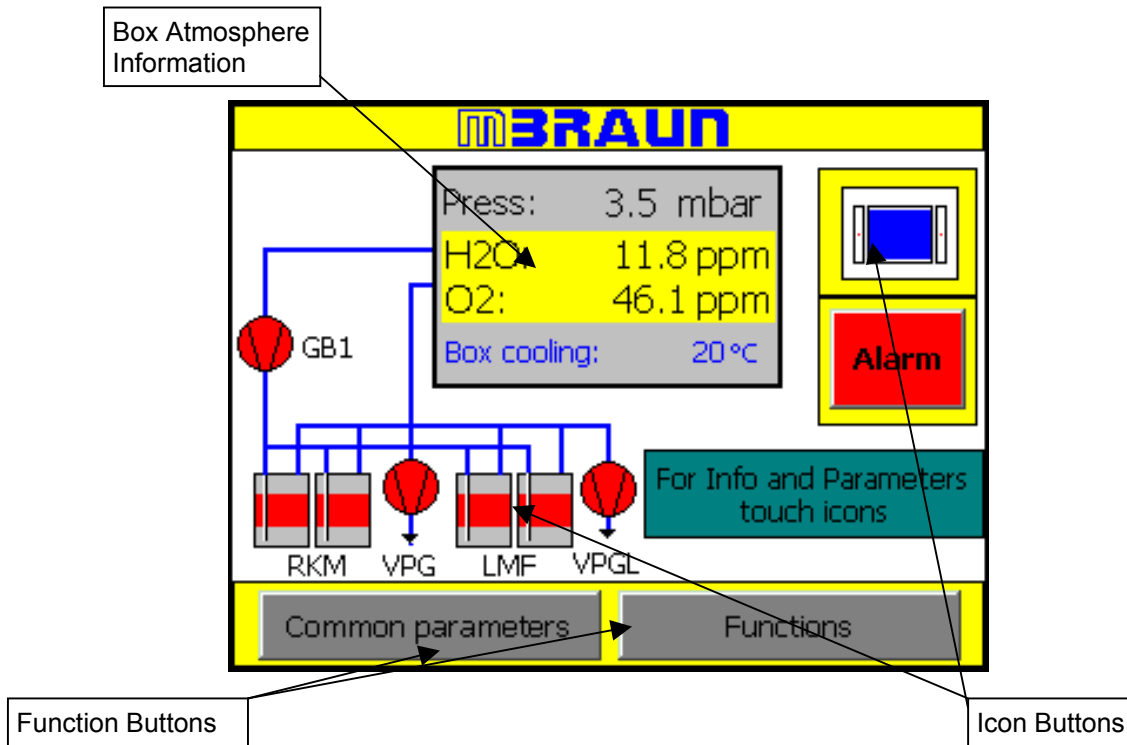


Figure 3: Start Screen



The Diagram above shows a typical “Start Screen”. The various icons will change depending on the system chosen.

The system above would have the following:

- 2 Purifier Filters
- 2 Solvent removal filters
- Cooling unit for the glove box
- Automatic antechamber controls.

The Touch Screen consists of a pictorial representation of the System.

The Functions are controlled by means of “Function Buttons” or “Icon Buttons”.

Upon start-up, the Start Screen is displayed. The Start Screen displays an overview of the Box status in an information field.

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.

Caution
Do not deactivate the system with procedures running (circulation, regeneration.)

The main switch is located on the system’s wiring cabinet, see subsection “Activating the system”.

Deactivating the system:

Turn main switch from “I ON” Position to “0 OFF”.

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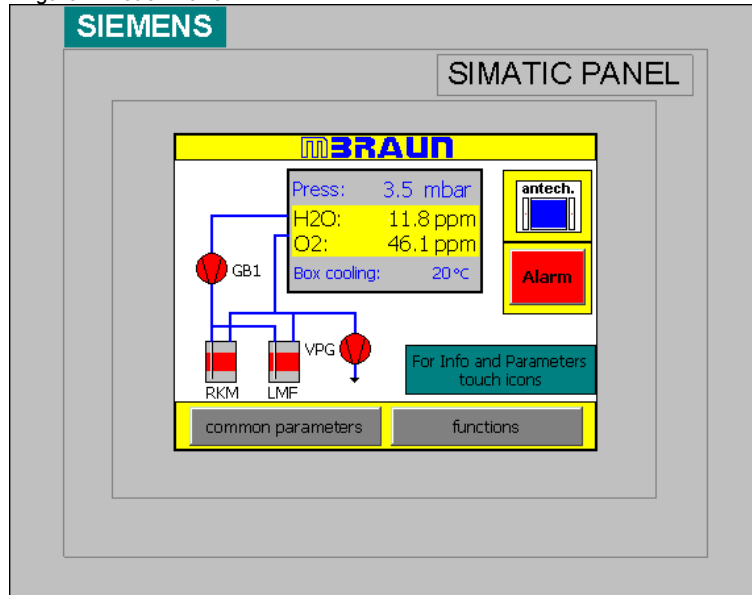
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6.1. Overview

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

Figure 1: Touch Panel



6.2. Display

The Touch Screen consists of a pictorial representation of the System.

6.3. Function Buttons

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

The Function Buttons are labelled with an appropriate description for its function. As shown below:


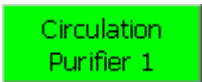
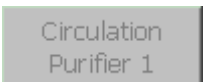
- Common parameters

 Common Parameters – this button will open the Common Parameters screen.
- Functions

 Functions - this button will open the Functions screen.

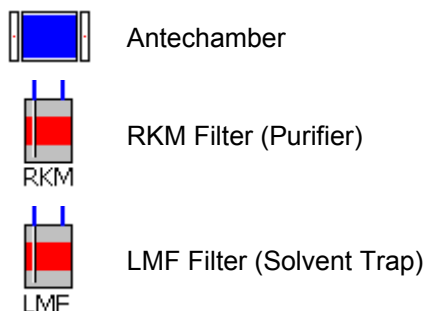
6.3.1. Status of Function

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

	RED	Not Active
	GREEN	Active
	GREY	Function not available (Function Locked)

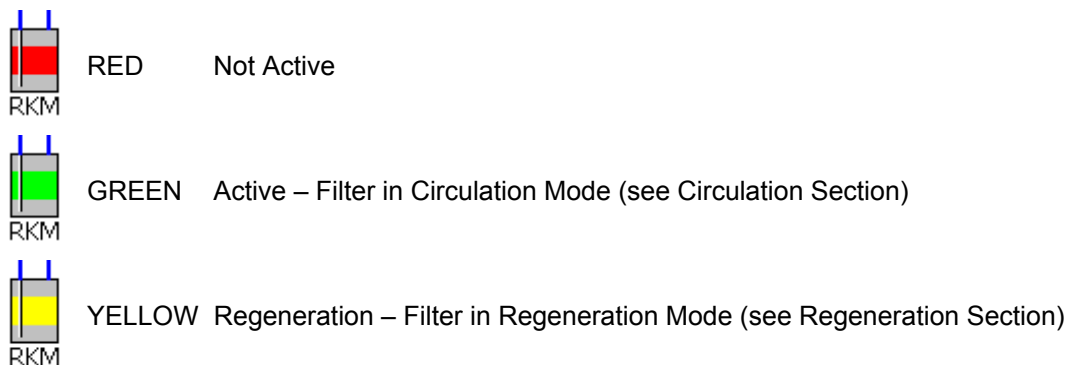
6.4. Icon buttons

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



6.4.1. 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 color.



6.5. Navigation Buttons

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

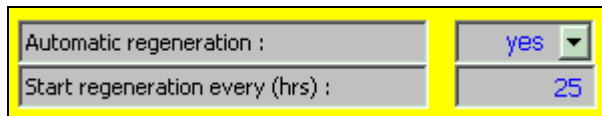
NEXT	NEXT – If this button is displayed within a screen then there are more screens to follow. Selecting this button will present you with a new screen of options within the function series.
BACK	BACK – This button will always take you to the previous screen in the function series. The last step backwards 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.

6.6. 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 utilizes Input field as shown below.

Figure 2: Input Fields

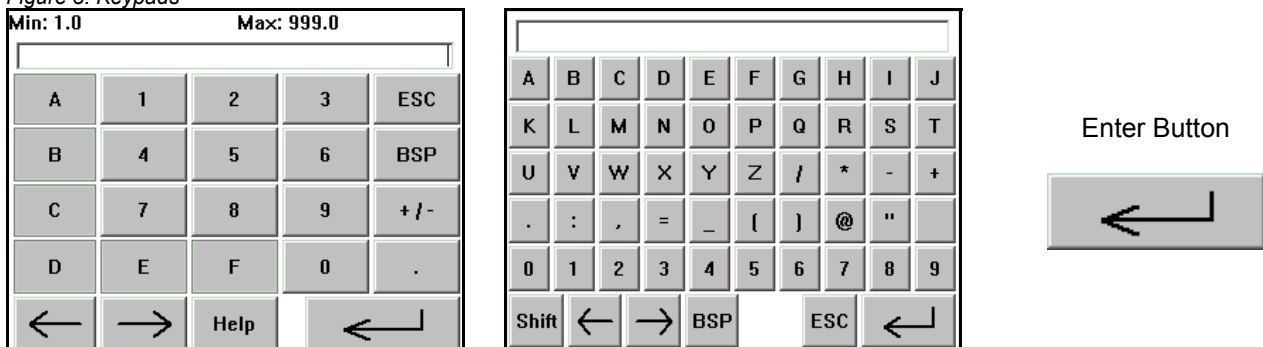


There are two types of Input field.

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 alphanumeric input field. If the screen is touched in the input area then an alphanumeric keypad 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.

Figure 3: Keypads



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7.1. General Information

Glovebox systems either newly installed or opened for reasons of service contain ambient air. The prerequisite for the gas purification is a pure gas atmosphere of nitrogen, argon or helium within the box. Thus, at the beginning of the system's commissioning the ambient air should be replaced by nitrogen, argon or helium of medium purity.

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

7.2. When is Purging Necessary?

On principle, a system should be purged, when the O₂ portion in the box atmosphere exceeds 100ppm.

The reasons for too high oxygen values are as follows:

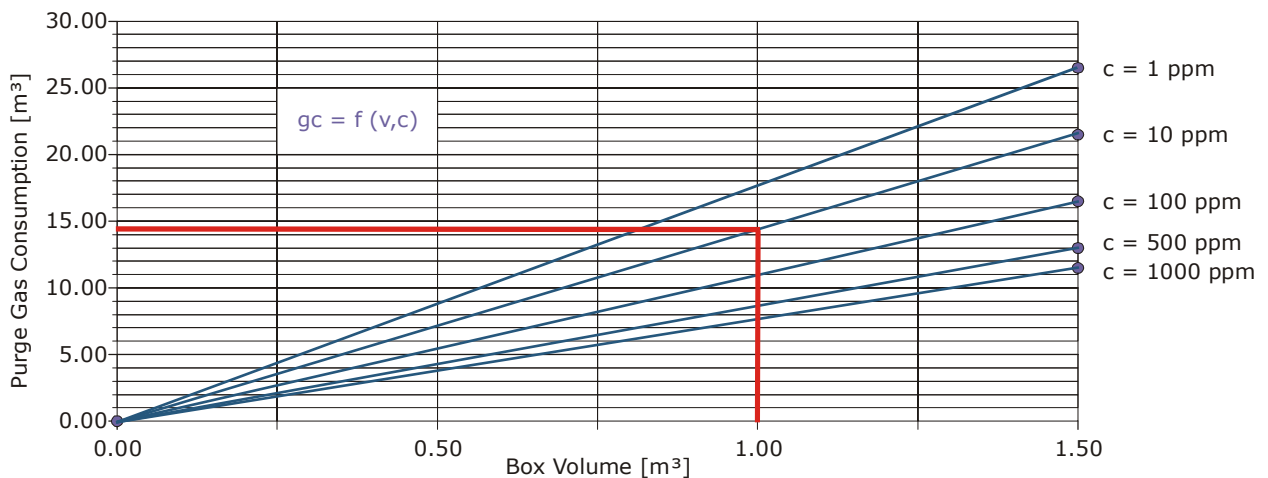
- first commissioning of a system
- servicing
- air influx due to faulty operation
- air influx due to damage (leaks)

Caution:
 A Glovebox system should be purged using working gas until the O₂ portion within the box atmosphere has decreased to a value of <100 ppm. Operating the system with higher oxygen value may result in damaging the gas purification system.

7.3. Purge Gas

Working gas is used for purging the system;
 Nitrogen, argon or helium - medium purity - from bottles or any gas supply facilities.

Figure 1: Example of Purge Gas consumption



In the example, it shows that if a purity of 10 ppm is required, then about 14.50m³ of purge gas is required for 1 m³ box volume.

7.4. Purging Methods

Manual Purging.
Automatic Purging.

7.5. Manual Purging

Caution:

Annoyance by bad smell is expected as soon as any spent purge gas escapes to the surroundings. However, environmental pollution and effects detrimental to health are not known, but cannot be excluded. The manufacturer does not assume any liability.

When using toxic or radioactive material manual a special purging facility is required.

7.5.1. Prerequisites:

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

7.5.2. Purging Procedure:

(See figure 2)

- Set-up purge gas source (working gas) with pressure reducing valve.
- Connect reinforced hose to purge gas source.
- Open "blind flange" on Glovebox.
- 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 O₂ value has reached <100 ppm.

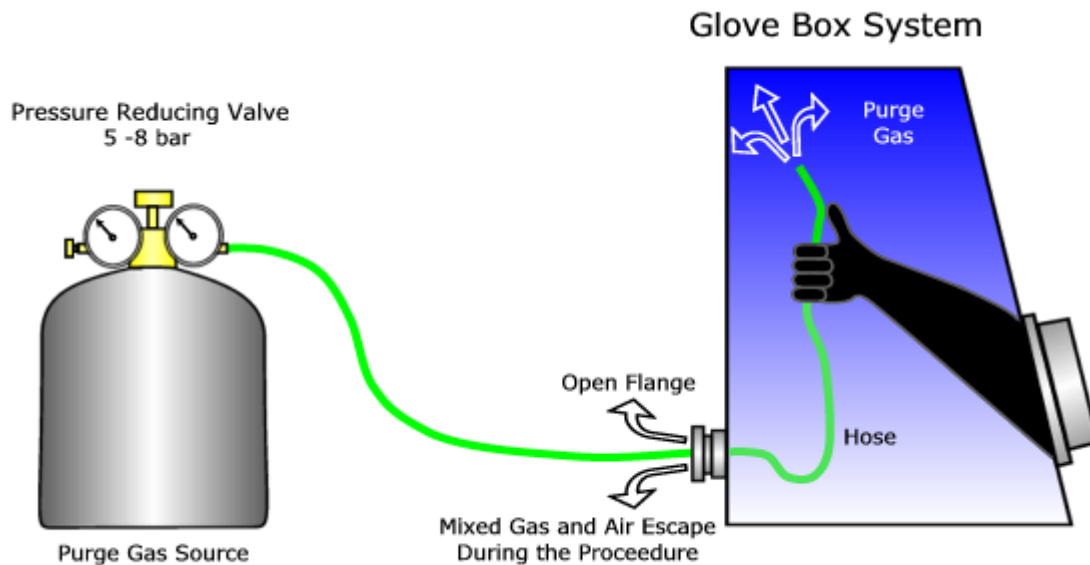
To reach this value it may require between 10 - 12 m³/m³ box volume of purge gas

With systems that have analyzers the actual O₂-value can be precisely controlled. It is recommended that the O₂ analyzers are switched on for a short time to allow a reading to be taken during the purge process. The measurement may settle at a higher H₂O/O₂-concentration.

After reaching an O₂-value of <100 ppm the reinforced hose may be removed from the box and the flange **immediately** closed.

- Turn off purge gas flow.

Figure 2: Manual Purging Procedure



7.6. Automatic Purging

The “MBRAUN Quick Purge” automatic purging system is an optional component for pleasurable operating of the system.

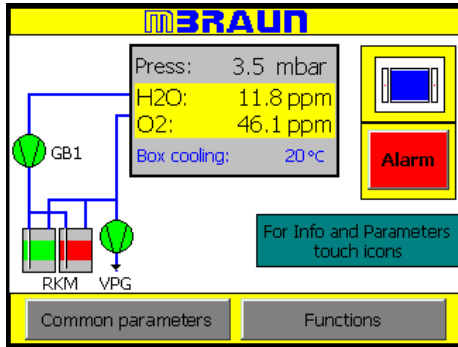
Caution:

Annoyance by bad smell is expected as soon as any spent purge gas escapes to the surroundings. However, environmental pollution and effects detrimental to health are not known, but cannot be excluded. The manufacturer does not assume any liability. When using toxic or radioactive material manual a special purging facility is required.

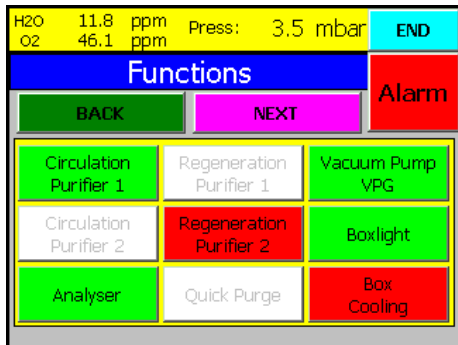
7.6.1. Prerequisites:

- Having observed all previous chapters.
- All connections have been properly made.
- The working gas connection has been made; refer to Chapter “Preparations for Connections” and Chapter “Installation”.
- The system is activated; refer to Chapter “Activating the system”.
- The system function “Regeneration” is not activated.
- All antechamber doors are closed.
- 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.)
- Sufficient working gas (i.e. purge gas) is available.
Required quantity approx. 10 - 12 m³ / m³ box volume.

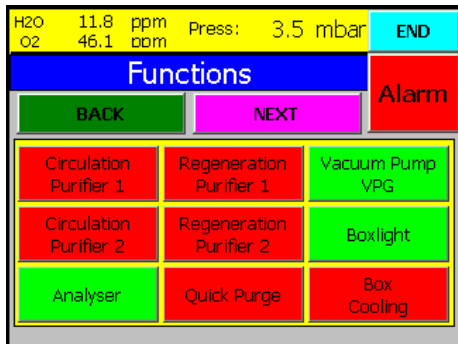
7.6.2. “Quick Purge” Procedure



From the Start Screen select the “Functions” Button



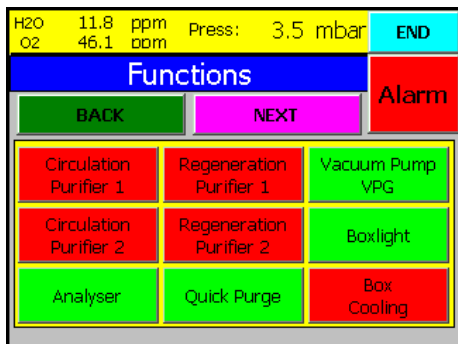
Note:
The Quick Purge function is locked (cannot be activated) while the circulation function is in operation.



To release the “Quick Purge” button the circulation mode must be switched off by pressing the Circulation Purifier button that is in operation

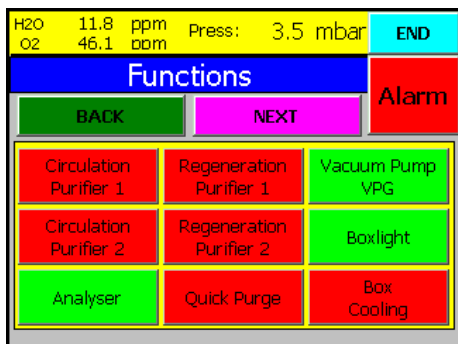
The Circulation Purifier buttons will change from green to red to indicate that the function has been deactivated.

The Quick Purge button will change to Red, confirming that the function is no longer locked but is still deactivated.



The Quick Purge function is activated but selecting the Quick Purge button. The button will change to its active status – green.

Pressing the Quick Purge button again will deactivate the function.



Note:
Pressing the Circulation Purifier button will return the glovebox to Circulation Mode immediately. The Quick Purge function will again become locked.

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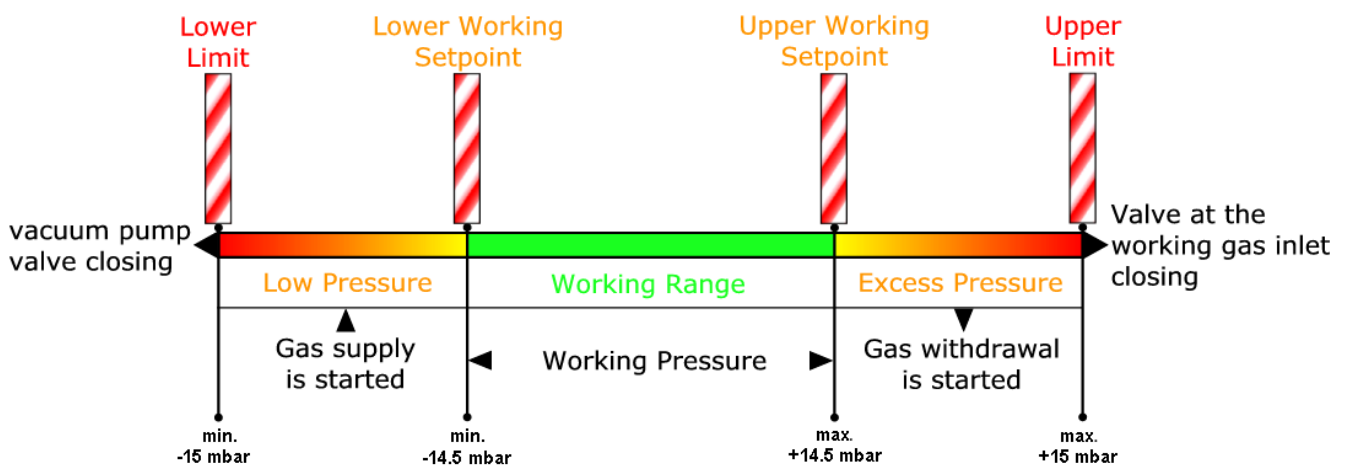
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<i>Figure 2: Footswitch.....</i>	<i>4</i>

8.1. General Information

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

8.2. Principles

Figure 1: Principles of Pressure Control



8.3. Definitions of Terms

Box pressure	Current pressure prevailing within the glove box.
Working pressure	Box pressure desired.
Working range	A fixed range within the working setpoints of which the working pressure may travel between under automatic control.
Working setpoints	Adjustable setpoints of the working range from -14.5 mbar to $+14.5$ mbar. If these setpoints are exceeded automatic pressure compensation is started. The upper working setpoint value should at least be 1 mbar higher than the lower working setpoint value. <i>The manufacturer's settings:</i> <i>upper working setpoint +4 mbar; lower working setpoint -4 mbar.</i> For working setpoints modifications refer to "Settings" chapter and display types.
Limit setpoints	Adjustable maximum pressure setpoints outside working range for the system's safety (-15 mbar to $+15$ mbar), if these setpoints are exceeded the gas supply valves or gas withdrawal valves are closed immediately. <i>The manufacturer's settings:</i> <i>upper limit setpoint +15 mbar; lower limit setpoint -15 mbar.</i> For alarm setpoint modifications refer to "Settings" Chapter.

8.4. Changing the Box Pressure within the Working Range

MBRAUN Glovebox 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.

8.4.1. Operation of the Foot Switch

Pressing the right pedal	Pressure increases within the working range.
Pressing the left pedal	Pressure decreases within the working range.

Figure 2: Footswitch



Foot switch

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9.2. Status of Purifier Filters 2

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9.4. Circulation Mode..... 3

 9.4.1. Activating and Deactivating the Circulation Mode 4

 9.4.2. Automatic Start of Circulation Mode 5

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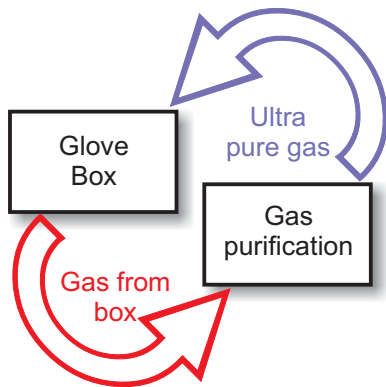
Figure 1: Principle of Circulation 2

Figure 2: Status of Purifiers 2

Figure 3: Circulation in Box 3

9.1. General Information

Figure 1: Principle of Circulation



MBRAUN systems work by the principle of gas circulation, i.e. the working gas permanently circulates between the glove box and the H₂O/O₂ gas purification system. This process guarantees absolutely stable values of gas purity and cost-efficient processing.

Caution:

When operating the Glovebox system, the circulation mode should always be activated. Only in this case the atmosphere within the glovebox is continuously purified to values down to < 1 ppm with regard to moisture and/or oxygen.

The circulation mode is PLC-controlled and is operated and displayed via the *TOUCH* Operation Panel (TP170b).

When used for quite a long period in the circulation mode the purification unit gets exhausted resulting in a drop of the purification performance leading to increasing H₂O/O₂ 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" chapter.

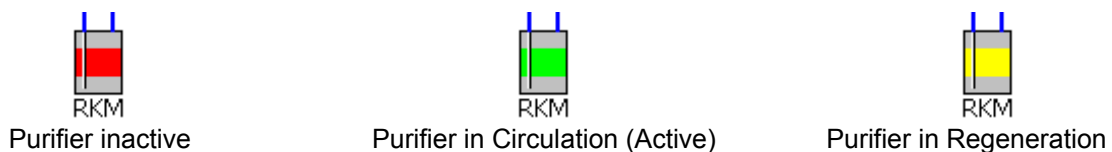
The circulation mode should be deactivated while the regeneration procedure is running.

In systems with 2 purifier columns circulation mode can run via one purifier column while the other purifier column is undergoing regeneration.

9.2. Status of Purifier Filters

The Status of the Purifier Filters can be seen at all times on the start screen. The Icon for the filter differs for each mode. As show in figure 2.

Figure 2: Status of Purifiers



9.3. Prerequisites

- All preceding chapters have been observed
- All connections are properly made.
- All antechamber doors are closed.
- The Glove Box system has been purged.
- The system is activated.
- No regeneration of the purifier column.

9.4. Circulation Mode

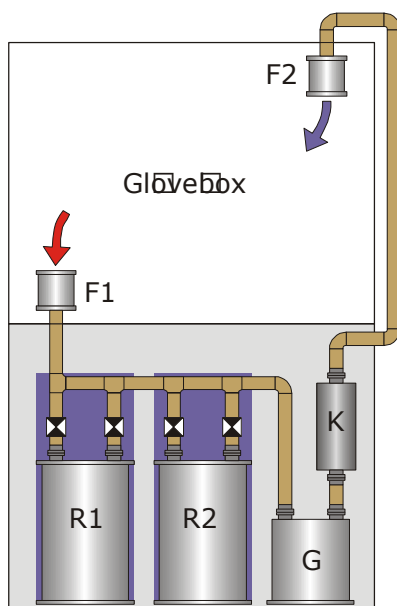
Note:

The principle for circulation is the same for both 1 and 2 filter systems.

The two purifier system allows greater flexibility in operation of the box by allowing one filter to be regenerated while the other is in circulation (purifying) Mode.

The position of buttons with the Touch Panel (TP170B) is the same for both systems. However only those relevant to the system supplied are displayed.

Figure 3: Circulation in Box



The diagram shows the gas flow in the circulation mode:
(2 Purifier Column System)

- Glovebox
- Dust filter (F1)
- Purifier column
either:
H₂O/O₂-Purifier column 1 (R1) in circulation mode
H₂O/O₂-Purifier column 2 (R2) can be regenerated
or:
H₂O/O₂-Purifier column 2 (R2) in circulation mode
H₂O/O₂-Purifier column 1 (R1) can be regenerated
- Blower unit (G)
- Heat exchanger (K)
- Dust filter (F2)

Note:

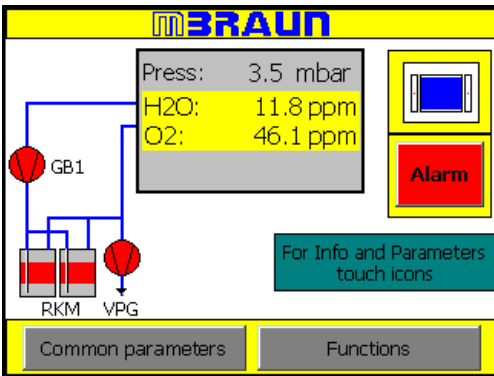
Circulation cannot run simultaneously through both columns.

Note:

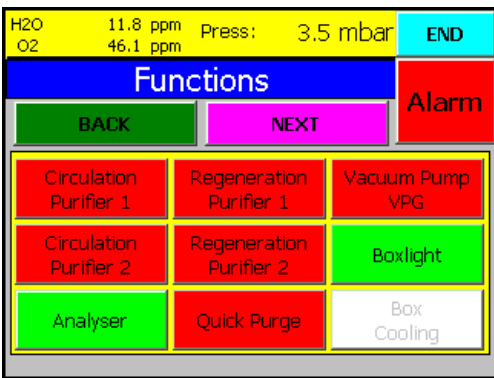
When commissioning the system for the first time, the circulation mode can be run via Purifier column 1 that was regenerated by the manufacturer prior to delivery.

Purifier column 2 should be regenerated before being used in circulation mode.

9.4.1. Activating and Deactivating the Circulation Mode



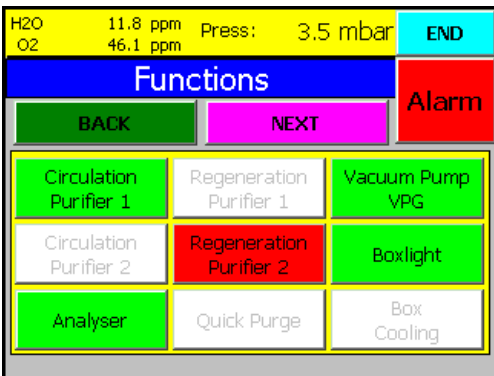
Select the Functions button on the Start screen



Select the Circulation Purifier button (red) to start the Circulation Mode.

Note:
Circulation can only be made via one purifier at any time.

Note:
If a filter is in Regeneration Mode, the regeneration must finished before switching the filter into Circulation Mode.

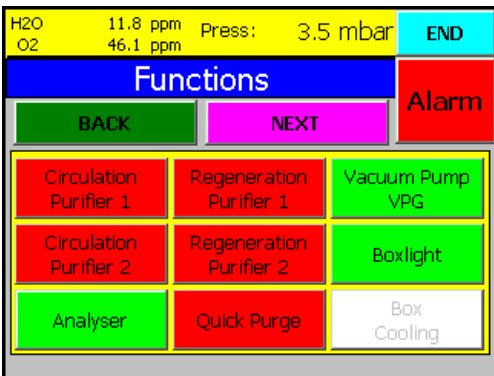


To acknowledge that the purifier is in Circulation Mode the button will change to green.

Note:
The Vacuum Pump activates automatically, if not previously activated.

The regeneration function for the selected filter will become blocked (button will display grey) until circulation over the filter is cancelled.

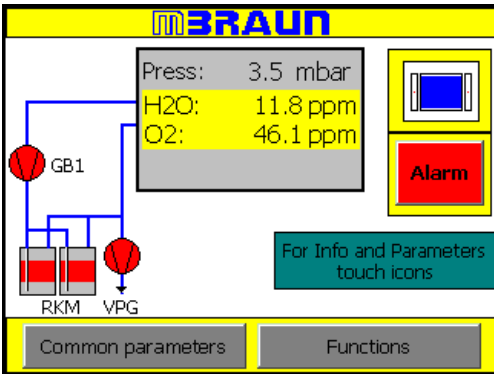
Note:
If the system has a second filter option this will have its circulation function blocked. Regeneration of second filter is still available.



Selecting the Circulation Filter button a further time will switch off the circulation over the first purifier column.

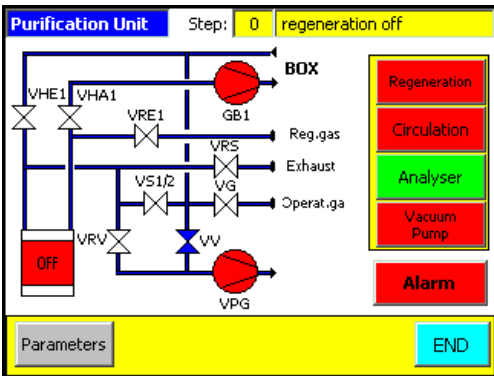
9.4.2. Automatic Start of Circulation Mode

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

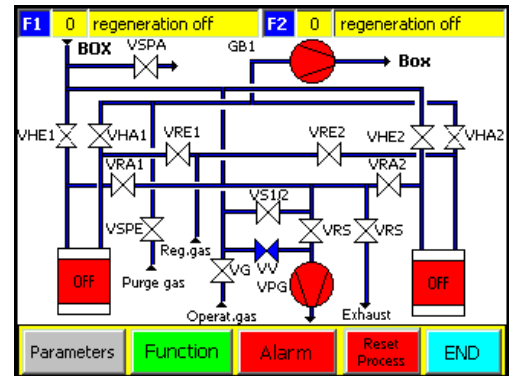


Select the Purification Filter icon on the start screen.

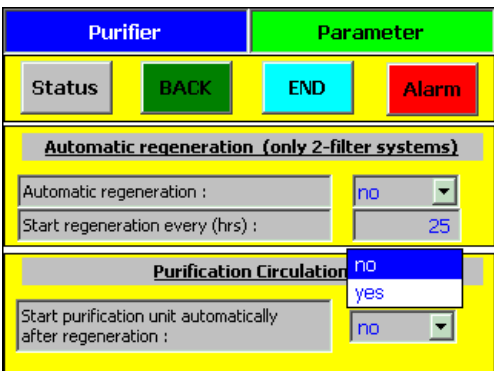
1 filter screen layout



2 filter screen layout



Select the Parameters button to go to the Purifier Parameter Screen



Select the input field for Purification Circulation by touching the arrow to the right of the input field.

A pull down options menu will appear. Select the option required – Yes or No.

The contents of the input field will automatically update.

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10.1. General Information

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.




Recommendation:

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, record the operating hours run. The operating hours reading minus 10 hours can be used as a reference value for the intervals between the respective regeneration procedures.

10.2. Status of Purifier Filters

The Status of the Purifier Filters can be seen at all times on the start screen. The Icon for the filter differs for each mode. As show in figure 2.

Figure 1: Status of Purifiers

 RKM	 RKM	 RKM
Purifier inactive	Purifier in Circulation (Active)	Purifier in Regeneration

10.3. Prerequisites

- All preceding chapters observed.
- All connections properly made.
- Sufficient regeneration gas is available.
- The system is activated.
- Circulation mode has to be deactivated.
- The purifier column to be regenerated is not in the circulation mode.

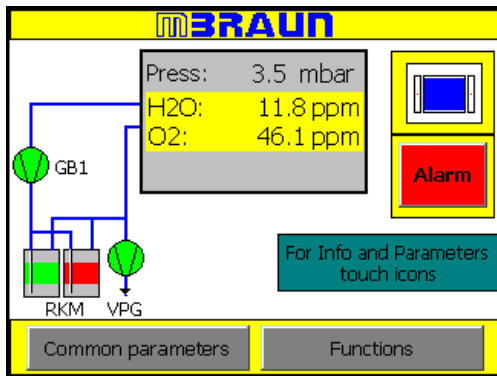
10.4. Regeneration Program

10.4.1. Activating the Regeneration Program

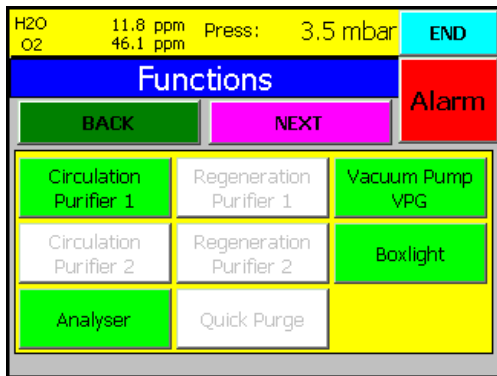
Note:

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.

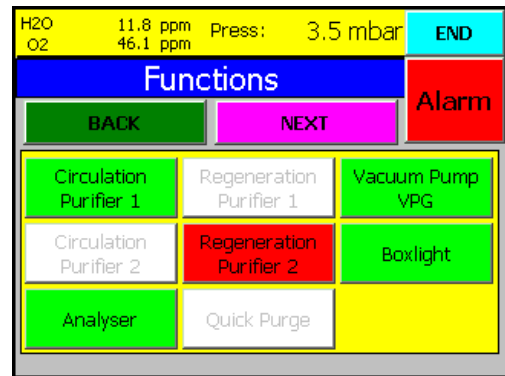
Prove flow of the regeneration gas!
If OK --> Confirm this button



Select the Functions button on the Start Screen.



Functions screen for single filter system

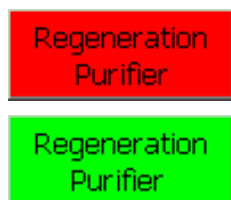


Function Screen for two filter system

Select the Regeneration button (red) to start the regeneration mode.

Note:

Regeneration can only be made via one purifier at any time. For system with one filter, the Circulation mode will need to be stopped before the "Regeneration" Button is released.



To acknowledge that the purifier is in Regeneration Mode the button will change to green. The circulation function for the selected filter will become blocked (button will display grey) until Regeneration of the filter is finished.

Note:

If the system has a second filter option this will have its regeneration function blocked. Circulation via the second filter is usually active.

10.4.2. 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.

Figure 2: Regeneration Program Table

Step	Time	Action
0	Start 0 min.	Regeneration deactivated
1		Regeneration gas test ON
2		Regeneration gas test OFF
3		Purge valve (VRS) open and heating (EH) on
4	after 180 min.	Regeneration gas inlet valve (VRE) open
5	after 345 min.	Heating (EH) off
6	after 360 min.	Regeneration gas inlet valve (VRE) closed
7	after 361 min.	Regeneration gas outlet valve (VRS) closed
8	after 480 min.	Regeneration vacuum/gas ballast valves (VRV/VGB) open
9 - 16	after 540 min.	Activation of the regenerated filter with proprietary intermediate steps
17	after 960 min.	Program completed

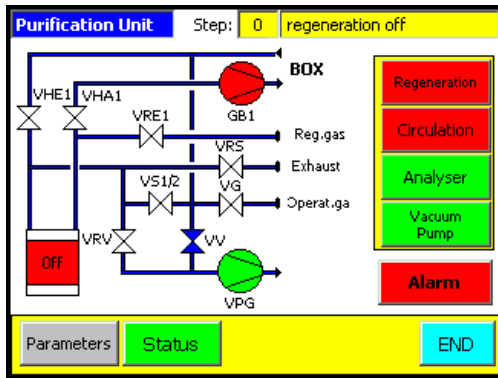
Caution:

By no means should the regeneration program be interrupted. Before activating the regeneration program, make sure that sufficient gas supply is available. Refer to the “Preparing the connections” as well as the “Installation” chapters.

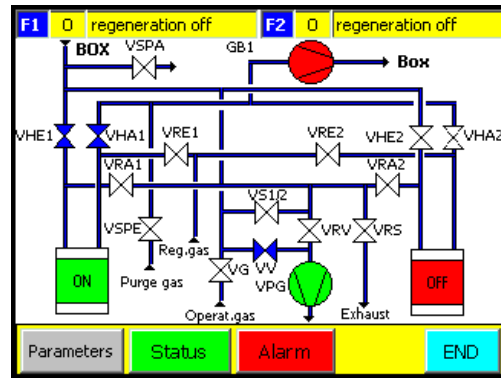
Note:

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.

10.4.3. Regeneration Program Completed

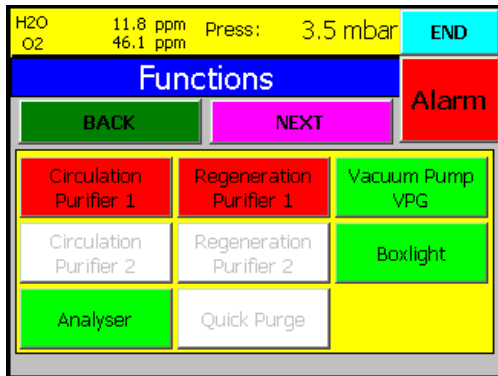


1 filter system

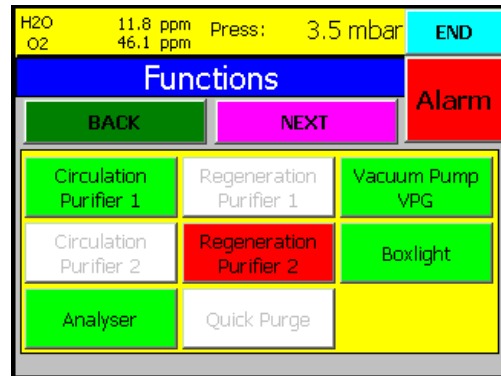


2 filter system

After being successfully executed, the regeneration program is completed automatically. With the regeneration program completed, the status indicator of the Purification Filter changes to red and the Status field at the top of the screen will read "regeneration off"



Functions screen for single filter system



Function Screen for two filter system

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

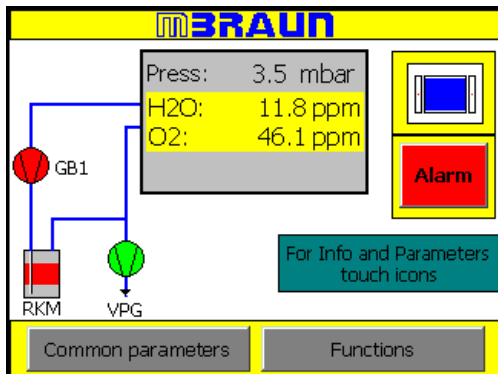
The Functions Screens above (accessed from the Start Screen) show that the regeneration mode (and Circulation mode for 1 purifier systems) have been released.

This would be repeated by the Icon Status (see status sub-section above) on the Start Screen.

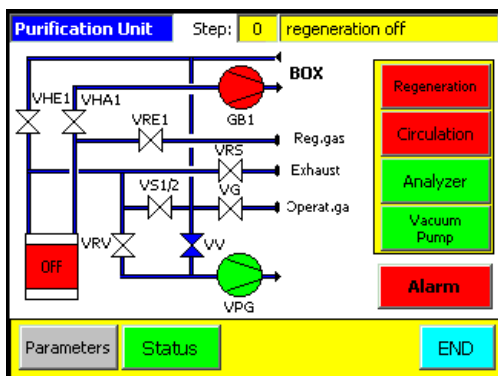
10.5. Auto-Start after Regeneration (1 Filter Systems)

Recommendation:

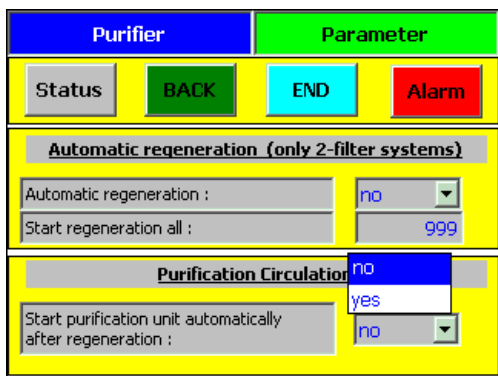
MBRAUN recommends auto-start of the circulation after regeneration is selected for single column systems.



To select the "Auto Start" function from the "Start Screen" select the Purification Filter Icon.



Select the Parameters Screen button.



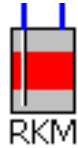
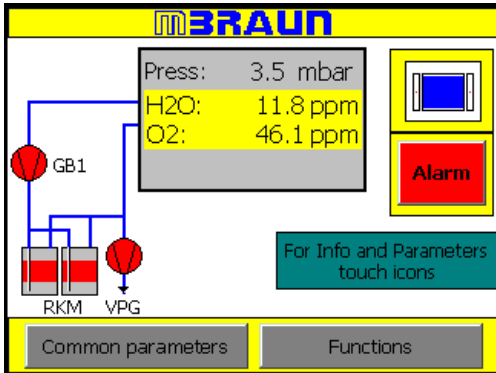
Select the input field for Purification Circulation by touching the arrow to the right of the input field.

A pull down options menu will appear. Select the option required – Yes or No.

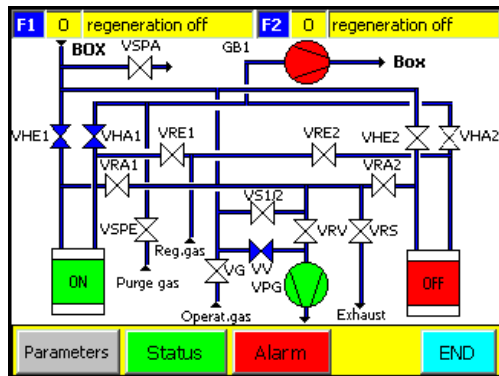
The contents of the input field will automatically update.

10.6. Automatic Regeneration Mode

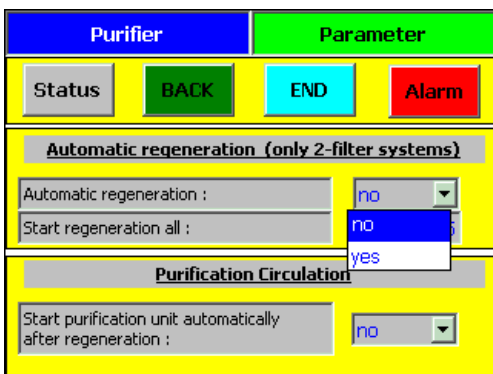
Note:
Only available for systems equipped with two purifiers.



Select the Purification Filter icon on the start screen.



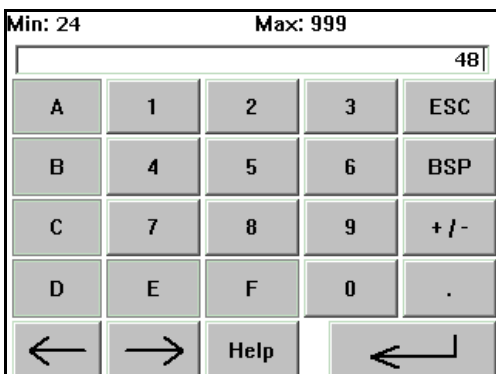
Select the Parameters button to go to the Purifier Parameter Screen



Select the input field for Automatic Regeneration by touching the arrow to the right of the input field.

A pull down options menu will appear. Select the option required – Yes or No.

The contents of the input field will automatically update.



To set the intervals between each automatic regeneration cycle select the "Start regeneration" field.

The alphanumeric pad opposite will appear.

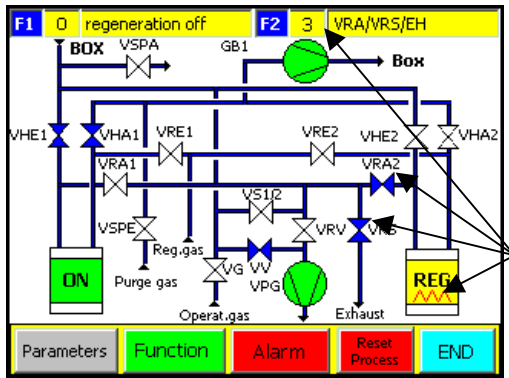


Enter the desired value and select the enter button to input the data.

10.7. Status of Regeneration

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

10.7.1. Step Status



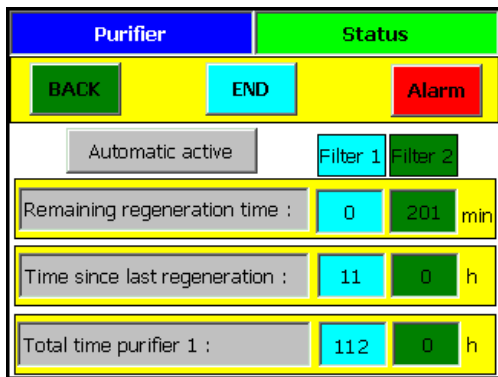
Selecting the Icon will open the screen left.

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

In the diagram, on the right-hand side, you can see that the regeneration process is in its third step.

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

10.7.2. Time Status



Selecting the Status button in the Purifier Parameters Screen will open the screen shown left.

This screen displays the total times for the Purification Filters (in systems with only one filter then only one set of detail are displayed.)

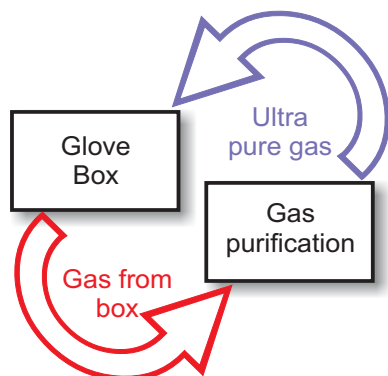
The Automatic Active button is Password protected – for use by MBRAUN service personnel.

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11.1. General Information

Figure 1: Principle of Circulation



The Solvent Trap is available as an option.

It is designed to remove solvent vapor from the Glovebox Atmosphere.

The Solvent Trap works in the same manner and in series with the H₂O/O₂ gas purification system (see also chapters Circulation and Regeneration.)

The working gas permanently circulates between the glovebox, the H₂O/O₂ gas purification system and the solvent removal system. This process guarantees absolutely stable values of gas purity and cost-efficient processing.

Caution:

The solvent trap filter can only remove the solvent vapor when both the solvent trap (LMF) and the H₂O/O₂ gas purification (RKM) are both in circulation mode.

There are two main types of solvent removal systems:

- Manually operated Solvent Trap.
- PLC controlled Solvent Trap.

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

The retention capability and capacity of the solvent trap depends on the type of solvent vapor to be removed from the box atmosphere.

The retention characteristics also depend upon the type of catalyst used to within the solvent trap.

Single column solvent traps and two column solvent traps without the regeneration option are filled with activated charcoal.

Regenerable solvent traps are filled with a certain type of molecular sieve.

M.Braun solvent traps are optimized for the removal of certain aromatic organic solvents, as well as a variety of aliphatic organic solvents.

11.2. Manually Operated Solvent Trap

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

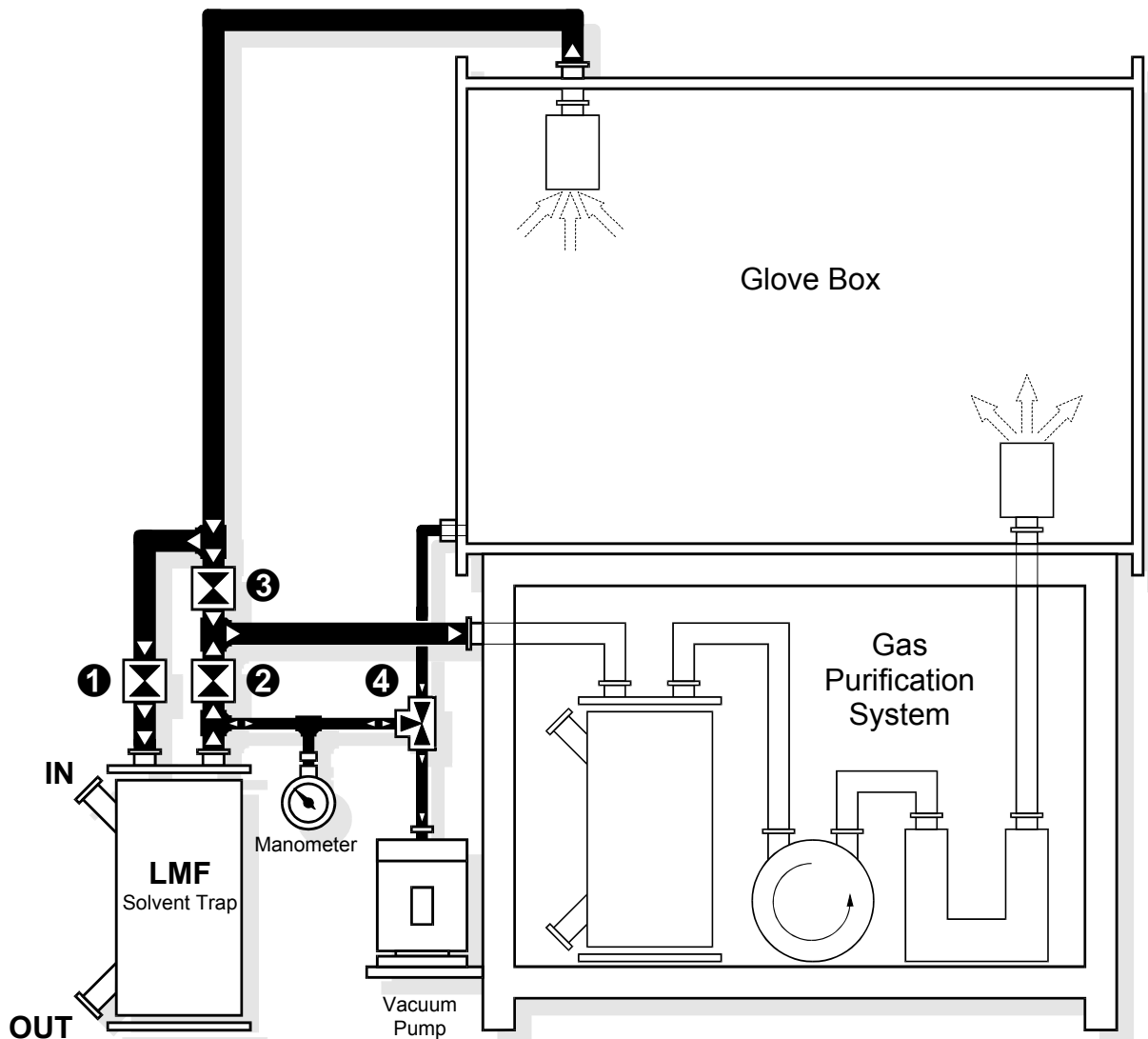


Figure 2: Operation of Solvent Trap

MB LMF-II: OPERATION MODE

Operation: Gas purification system (GPS)
and solvent absorber (LMF)

Open valve ①

Open valve ②

Close valve ③

Valve ④ position "CLOSED"

MB LMF-II: BYPASS MODE

Operation: Gas purification system (GPS)
without solvent absorber (LMF)

Open valve ③

Close valve ①

Close valve ②

Valve ④ position "CLOSED"

11.2.1. Changing the Filter Medium

Recommendation:

M.Braun recommends that the solvent trap medium is changed at least annually. However, in cases of high solvent use this may need to be done more frequently.
If a quantitative measure for the solvent retention is required a suitable analyzer is also an option.

Caution:

Wear protective mask, glasses and gloves while changing the activated charcoal.



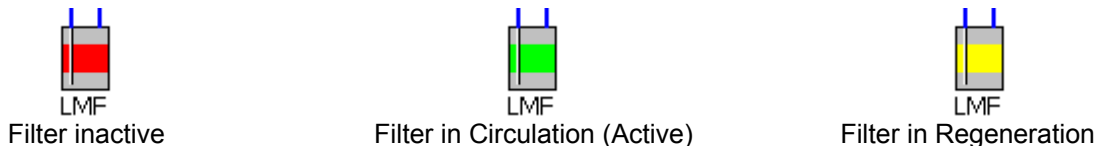
1. Switch the gas purification system into the bypass mode by setting the valves in the following positions:
 - Open valve ③
 - Close valve ①
 - Close valve ②
 - Valve ④ - position "CLOSED"
2. Open outlet flange (OUT) at the solvent absorber (LMF) and empty the exhausted charcoal in a tub. Please dispose the exhausted activated charcoal correctly – observing all applicable environmental, safety and health guidelines.
3. After the emptying the trap close the outlet flange (OUT) and open the inlet flange (IN) at the solvent absorber (LMF).
4. Fill in new activated charcoal; filling amount 5 kg. Afterwards close the inlet flange (IN) again.
5. Set hand valve ④ on "EVACUATE" position.
The minimum duration of the evacuation is 6 hours.
6. After the evacuation set the hand valve ④ on "REFILL" position.
Wait until the pressure indication at the manometer (MM) has reached the value "0".
7. After the refilling set the hand valve ④ on "CLOSED" position.
The solvent absorber (LMF) is again ready for operation.

11.3. PLC Controlled Solvent trap

11.3.1. Status of Solvent Trap (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. As show in figure 3.

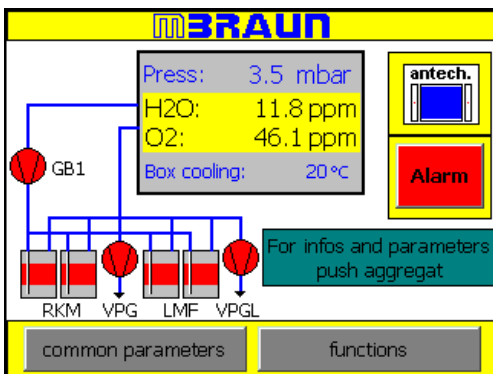
Figure 3: Status of Purifiers



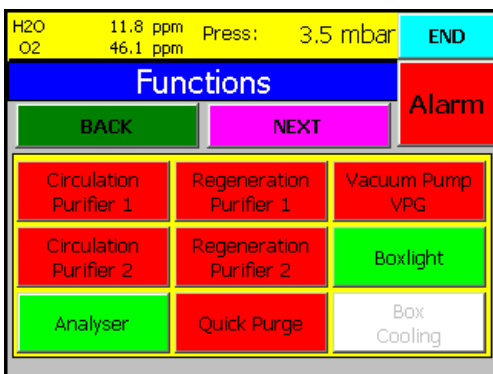
Note:

The principle for circulation is the same for both 1 and 2 filter systems. The two filter system allows greater flexibility in operation of the box by allowing one filter to be regenerated whilst the other is in circulation (purifying) Mode. The position of buttons is shown for the Touch Panel (TP170B). However the principle for operation is the same for the TOUCH Panel series. Only those buttons relevant to the system supplied are displayed.

11.3.2. Activating and Deactivating the Solvent Trap Mode

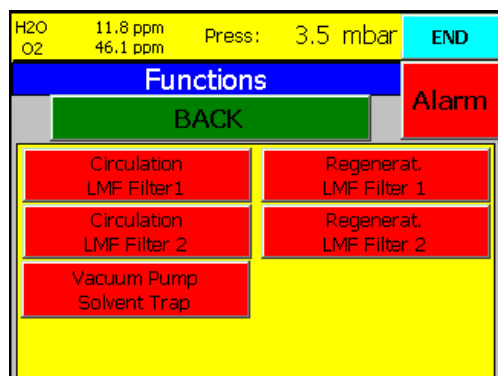


Select the Functions button on the Start screen.

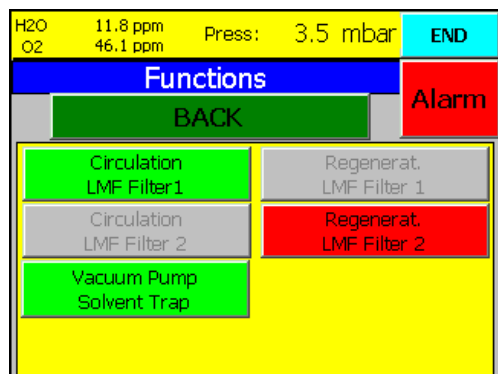


Select the Circulation Purifier button (red) to start the circulation over one of the purifier filters (RKM)

(see circulation Mode for further information.)



Select the Next button until the Function screen for the Solvent Trap (LMF) appears.



To acknowledge that the purifier is in Circulation Mode the button will change to green.

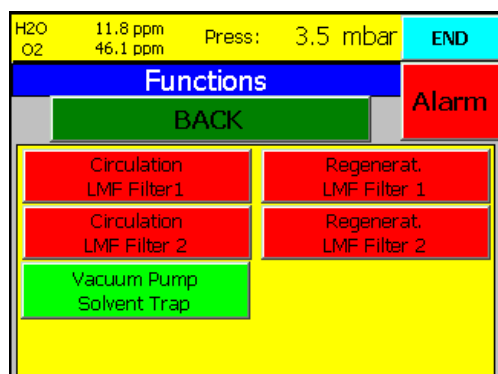
Note:

The Vacuum Pump activates automatically, if not previously activated.

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

Note:

If the system has a second filter option this will have its circulation function blocked. Regeneration of second filter is still available.



Selecting the Circulation Filter button a further time will switch off the circulation over the first purifier column.

Note:

The Vacuum Pump remains activated until it is deactivated by selecting its function button.

11.3.3. Regeneration of the Solvent Trap

The principle for regeneration of the solvent trap is the same as for the H₂O/O₂ gas purification system (see also chapter Regeneration.)

Note:

Systems that are equipped with one solvent trap are fitted with a by-pass valve to allow the filter to be regenerated whilst the system operates over the H₂O/O₂ gas purification system.

11.4. Solvent Vapor Analyzer

The solvent vapor analyzer is available as an option.

Access to the solvent trap analyzer screen is made by selecting the "Icon" button for the LMF on the "Start Screen and then further selecting the "Parameters" button.

Solvent Trap		Analyzer	
Status	BACK	END	Alarm
Solvent Trap Analyzer			
Actual value analyzer :	1.4	V	
Alarm setpoint analyzer :	5.0	V	

The solvent vapor analyzer reading is proportional to the concentration of the solvent vapor after passage over the solvent trap.

The sensitivity of the solvent vapor analyzer 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 M.Braun solvent vapor analyzer can be calibrated for a specific solvent upon request.

Note:

The alarm setpoint analyzer setting will differ for various solvents.

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intentionally blank***

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12. Glovebox Parameter Settings

General Information

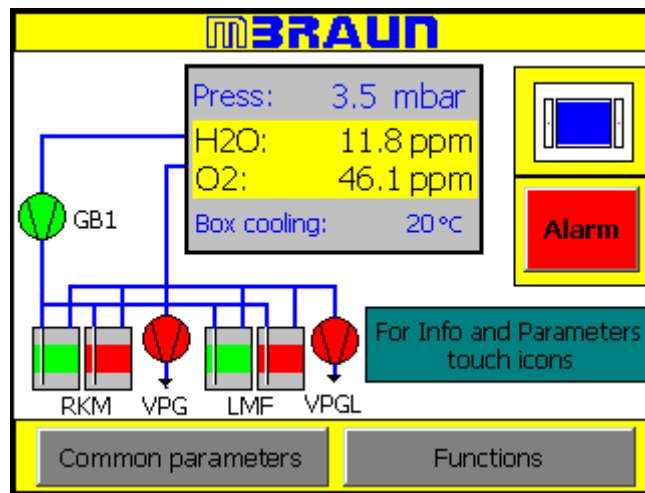
On the TP170B Operation Panel (TOUCH Screen) all messages, values and parameters of the system can be displayed.

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

Status Overview

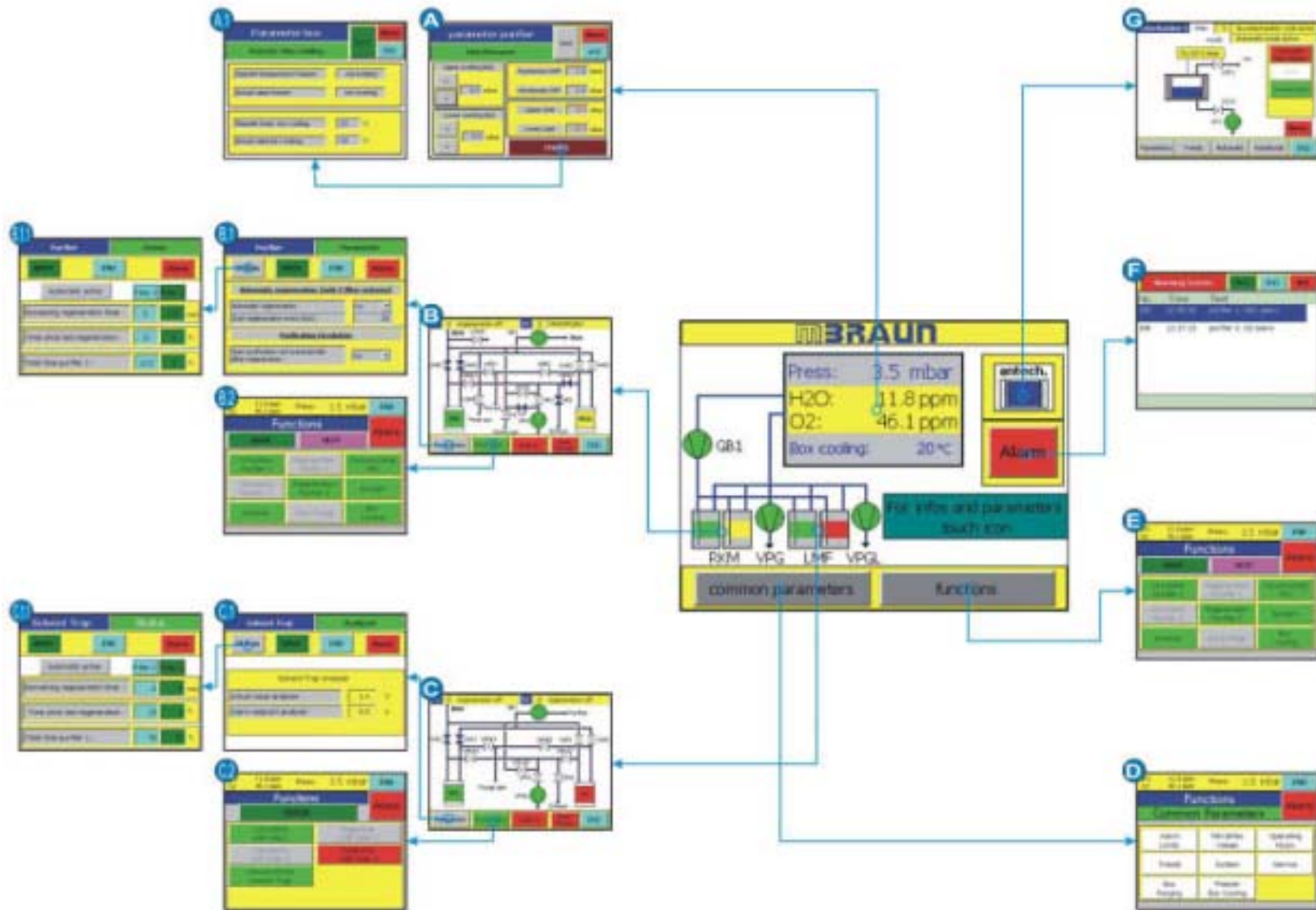
When the system is activated, the TP170B Touch Screen will display the “Start Screen”. This screen displays an overview of the system and reports readings for various sensors. (See diagram below).

Figure 1: Start Screen

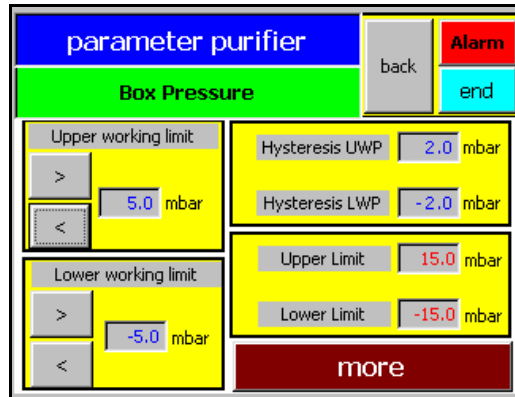


In the upper display area of the message level current operating values are permanently displayed, such as the box pulse.

The diagram below shows how each screen may be accessed. Each screen is numbered and are described further in the following sections:



12.A. Setting the Box Pressure



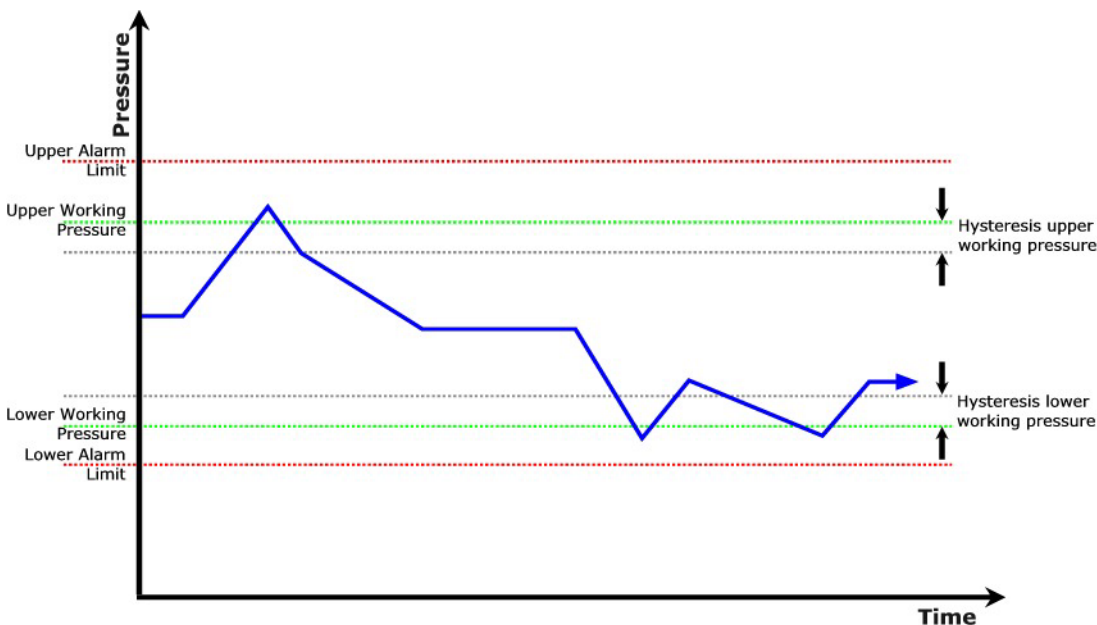
When this display selected, the box pressure control is deactivated.

You can enter the upper and lower working limit directly via the arrow-buttons “>” and “<” or by selecting the numeric box and then entering the value with the alphanumeric keypad.

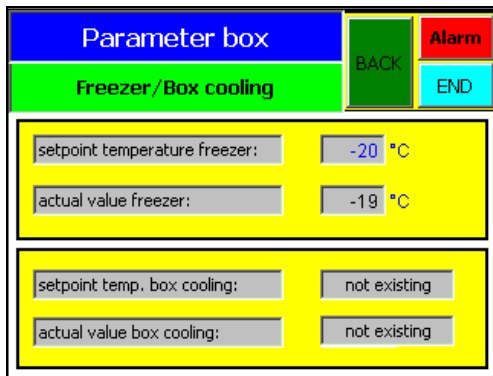
The upper working limit cannot be set higher than the upper limit, and likewise the lower working limit cannot be set lower than the lower limit.

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.



12.A.1. Freezer / Box Cooling Parameters



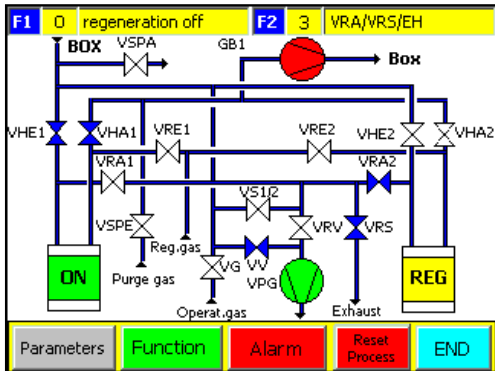
The Freezer and Box Cooling functions are offered as an option.

The use and settings for the Freezer and Box Cooling are described in their individual chapters.

12.B. Gas Purification System (RKM)

Note:
See also “Circulation” and “Regeneration” Chapters.

The screens below show how the gas purification system screens may be navigated and a brief description of the data that is displayed on each screen. For further information on the principles of the gas purification system see also the Circulation and Regeneration chapters.



The screen on the left shows the function status of the gas purification system (RKM).

The top line gives the “regeneration step” and valve status for the regeneration process for each RKM filter.

The main screen displays the gas purification system as a schematic diagram.

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

12.B.1. Parameters for Gas Purification System

Purifier	Parameter
Status	BACK END Alarm
Automatic regeneration (only 2-filter systems)	
Automatic regeneration :	no
Start regeneration every (hrs) :	25
Purification Circulation	
Start purification unit automatically after regeneration :	no

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

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

12.B.1.1. Status of Gas Purification System

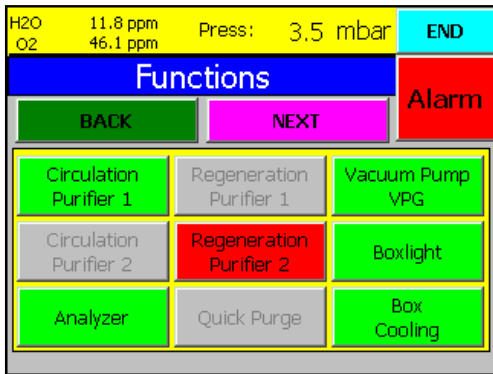
Purifier	Status
BACK	END Alarm
Automatic active	Filter 1 Filter 2
Remaining regeneration time :	0 201 min
Time since last regeneration :	11 0 h
Total time purifier 1 :	112 0 h

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 M.Braun service technicians replacing the filter medium.

12.B.2. Functions for Gas Purification System



Function buttons for the gas purification system and glove box.

Note:

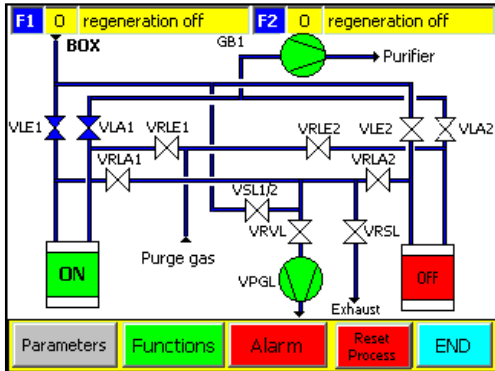
Systems fitted with dual filter solvent filters (LMF Auto) require circulation over one of the solvent filters (LMF) whenever the gas purification (LMF) circulation is used.

12.C. Solvent Vapor Filter Purification System (LMF)

Note:

See also “Circulation” and “Regeneration” Chapters.

The screens below show how the solvent filter screens may be navigated and a brief description of the data that is displayed on each screen. For further information on the principles of the solvent filter see also the Circulation, Regeneration and Solvent Filter chapters.



The screen at the 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.

12.C.1. Parameters for Solvent Vapor Filter

The screen displays the alarm parameters for the solvent filter (LMF).

For further details see Solvent Filter chapter.

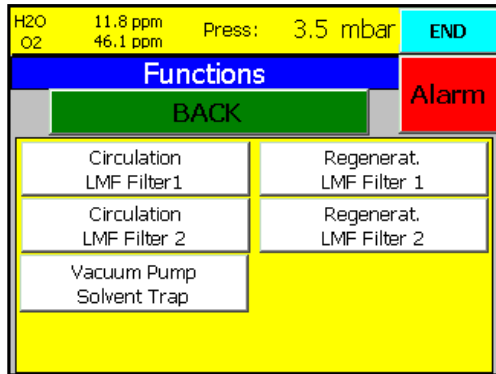
12.C.1.1. Status of Solvent Vapor Filter

This screen displays the time status for the solvent filters (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 M.Braun service technicians replacing the filter medium.

12.C.2. Functions for Solvent Vapor Filter



Function buttons for the solvent filter system.

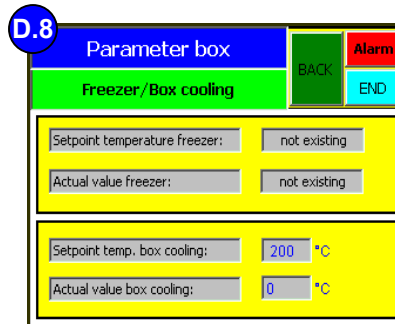
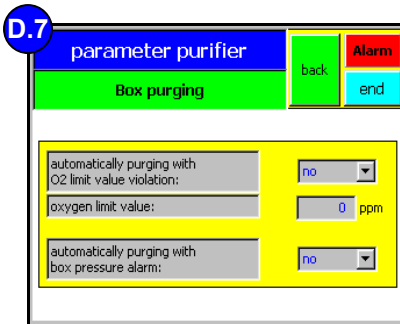
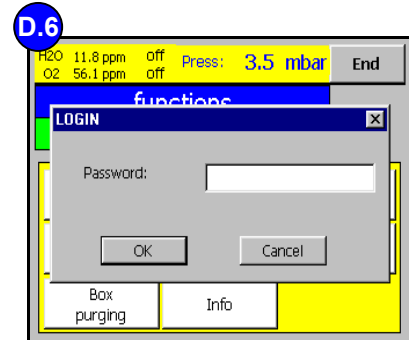
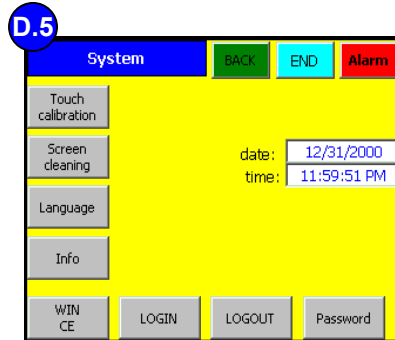
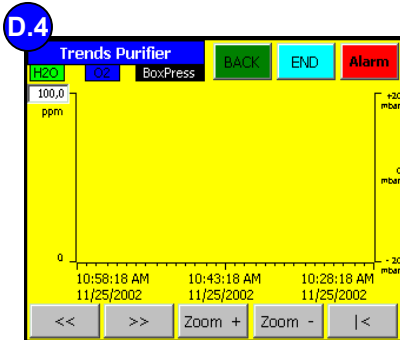
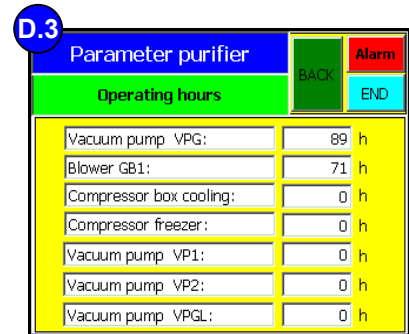
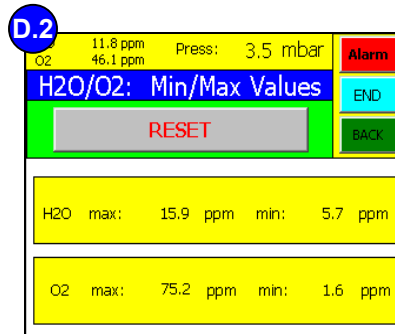
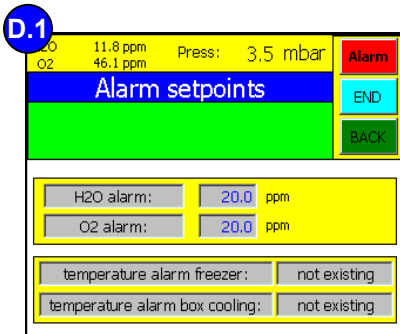
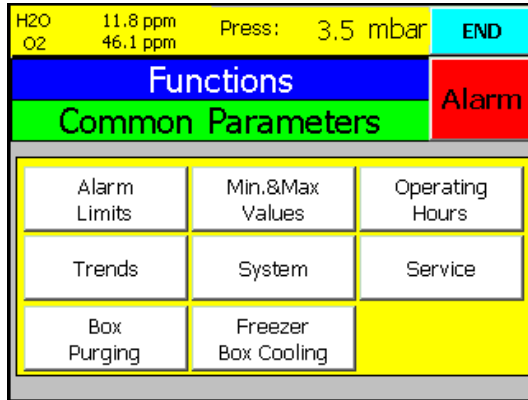
Note:

Systems fitted with dual filter solvent filters (LMF Auto) require circulation over one of the solvent filters (LMF) whenever the gas purification (LMF) circulation is used.

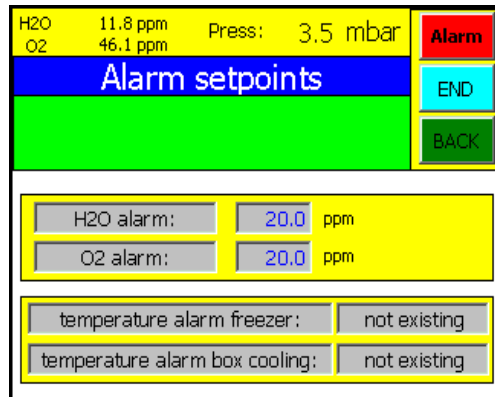
12.D. Common Parameters

Layout of Parameter Screens

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

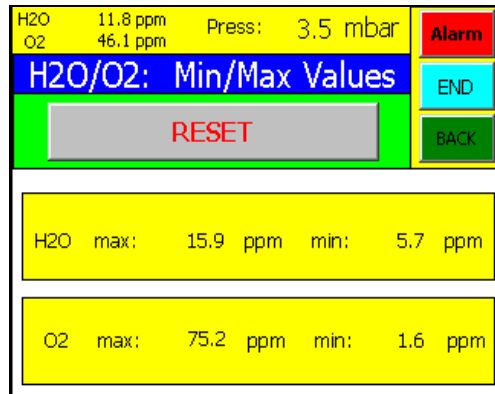


12.D.1. Alarm Setpoints



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

12.D.2. H2O / O2 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 changed to a new high or low and then that reading will be stored.

12.D.3. Purifier Operating Hours

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

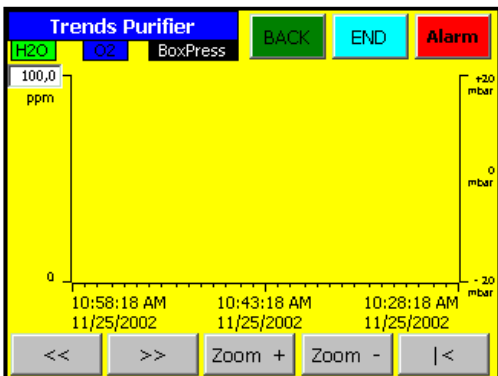
Note:
See also section “Status of Purifier Filters” in “Circulation” Chapter.
See also section “Status of Regeneration” in “Regeneration” Chapter.

Parameter purifier		BACK	Alarm
Operating hours		BACK	END
Vacuum pump VPG:	89 h		
Blower GB1:	71 h		
Compressor box cooling:	0 h		
Compressor freezer:	0 h		
Vacuum pump VP1:	0 h		
Vacuum pump VP2:	0 h		
Vacuum pump VPGL:	0 h		

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

Note:
The times can only be reset by MBRAUN Service personnel e.g. upon replacement of a spare part by MBRAUN Service Technicians.

12.D.4. Purifier Trends



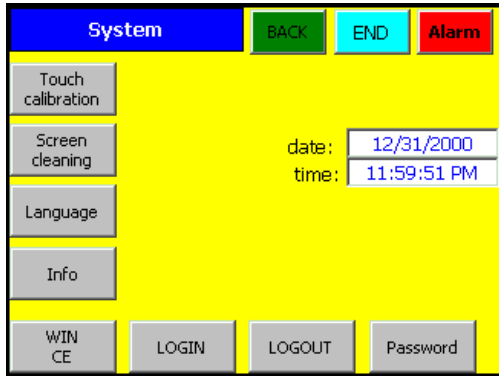
The trends screen is in the form of a time graph.

There are 5 buttons on all graph displays. With the **back<<**, **forward>>** you can move along the time axis. With the **Zoom+** and **Zoom-** you can select a narrower or broader time frame. The **|<** button returns you to the current time.

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.

12.D.5. System Settings



To access the “System Settings” screen select the “Common Parameters” from the “Start Screen”, and then select “System”.

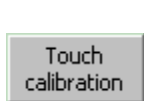
12.D.5.1. Date and Time



The user may change the Date and Time to local settings.

To change the time, follow the directions in section “Input Fields and Buttons” in Chapter “Operation Panel TOUCH Panel (TP170b).”

12.D.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:

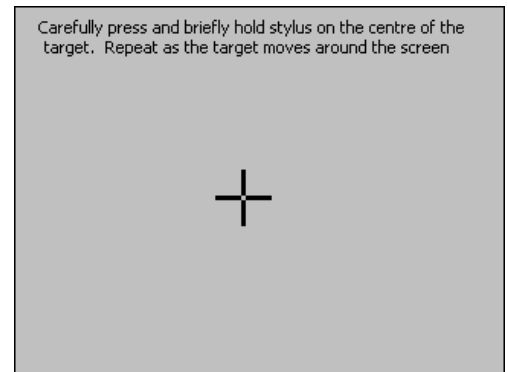
Start the calibrating procedure via the Touch Calibrating pushbutton. Five calibration crosses are displayed in succession at random points on the screen. Follow the instructions displayed on the screen and touch each calibration cross as it is displayed.

Performing calibration

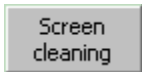
With the calibration procedure completed, touch the screen at any point for accepting the latest calibration data.

Rejecting calibration

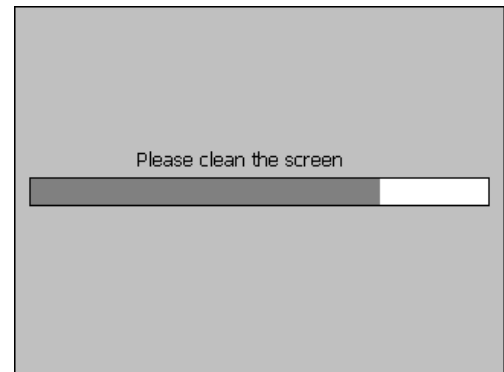
Wait 30 seconds until the overlaid timer bar has reached zero, for rejecting the latest calibration data. In case calibration has been carried out incorrectly the latest values are not accepted.



12.D.5.3. Screen Cleaning



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

A protective foil for the Touch Screen 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.

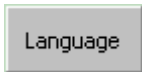
In addition, the matte surface of the foil reduces any kind of reflection.

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.

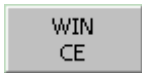
12.D.5.4. Language



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

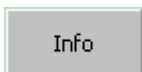
MBRAUN systems are currently loaded with German and English. To change between languages stored on the TP170 simply press the "Language" button.

12.D.5.5. WIN CE



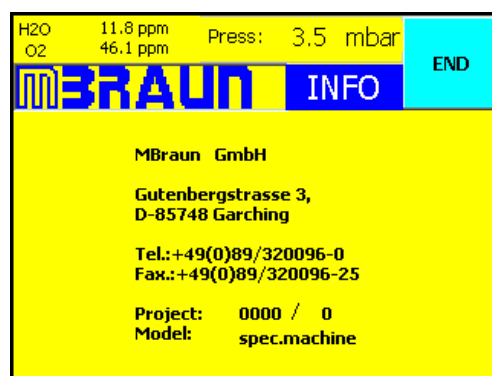
With the Win CE button activated, the Runtime program is completed and the panel is run down to the operating system level. If important filing procedures are running in the background, this is the safest way of completing the filing procedures before the device is deactivated.

12.D.5.6. Info



This area displays the following information:

- Type of device, project number, manufacturer's address.



12.D.5.7. LOGIN / LOGOUT



These Buttons are reserved for service use only.

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

12.D.6. Service Functions

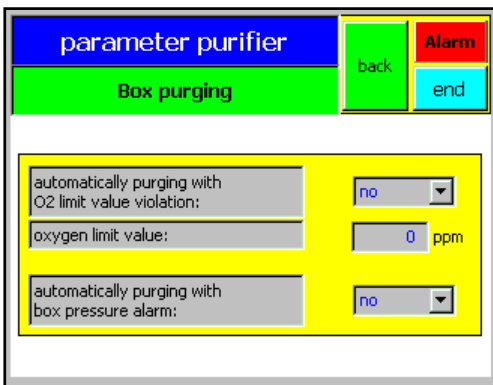


The "Service" button

Note:
The Service Function is password protected. It is reserved for MBRAUN service personnel only.

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

12.D.7. Box Purging Parameters



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.

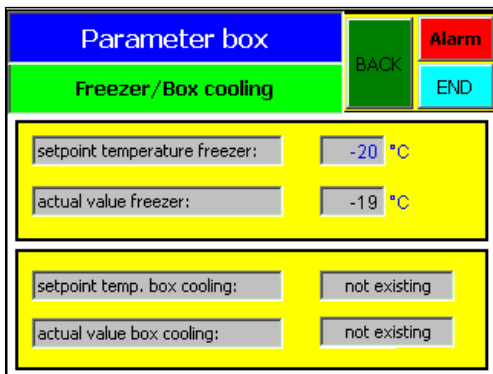
Automatically purging with O2 limit value violation – will purge the glovebox atmosphere as soon as the **Oxygen limit value** is over stepped
e.g. if the oxygen limit value is 50 ppm and the sensor reading is 51 ppm then the Automatic purging will bring the oxygen content of the glove box atmosphere to below 50 ppm.

Automatically purging with box pressure alarm – will either refill or evacuate the glovebox 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 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.

Likewise, if the under pressure setpoint is over stepped then the glovebox will be filled by 5 mbar.

12.D.8. Freezer / Box Cooling Parameters



The Freezer and Box Cooling functions are offered as an option.

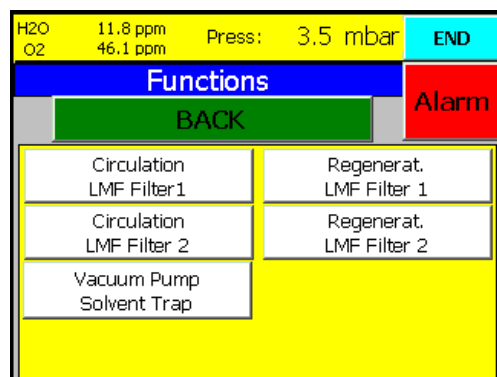
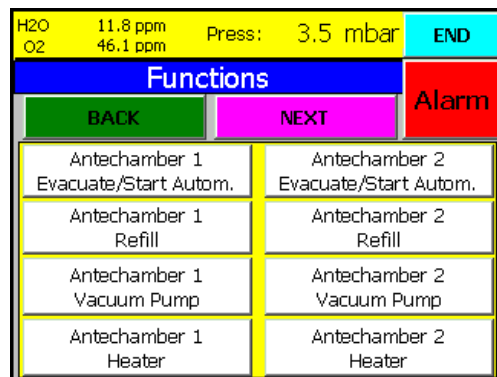
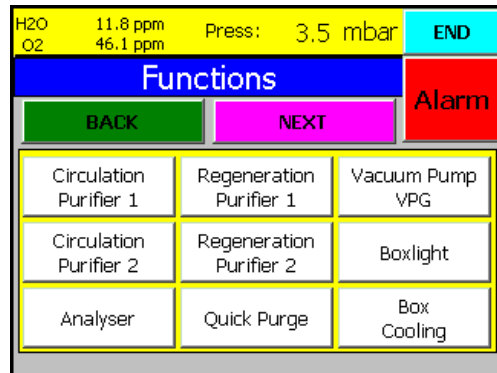
The use and setting for the Freezer and Box Cooling are described in their individual chapters.

12.E. Functions

Note:

All existing functions can be selected and the status can be controlled via the Functions buttons in the Start Display. 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.



12.F. Warnings and Error Messages



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.

Figure 2: Warning Screen

Warning Screen			BACK	END	ACK
No.	Time	Text			
106	12:48:16	purifier 1: H2O alarm			
108	12:17:13	purifier 1: O2 alarm			

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

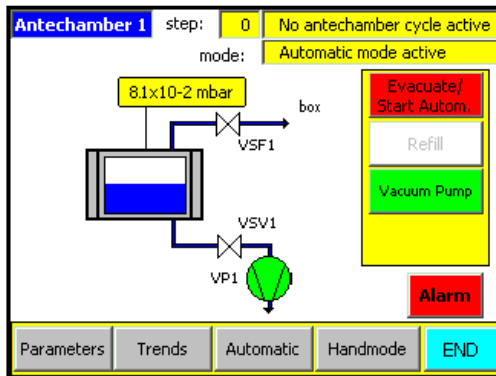


To acknowledge that a message has been read, select the message by touching the screen. The message will become highlighted on the screen. Select the Acknowledge button.

Messages that are no longer valid (e.g. The moisture sensor reading is again within the alarm limit range) will be removed from the screen upon being acknowledged.

Selecting the "Back" button will return to the previous screen.

12.G. Antechamber Functions



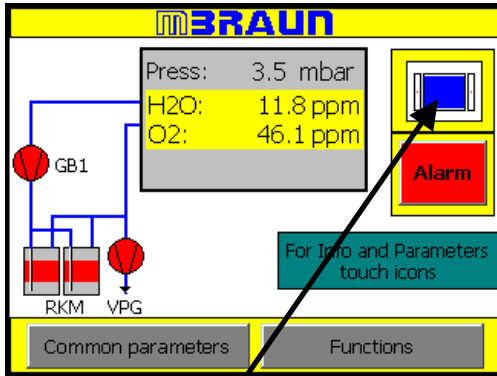
The purpose and functions of the antechamber are described in the chapter – Antechamber Operation.

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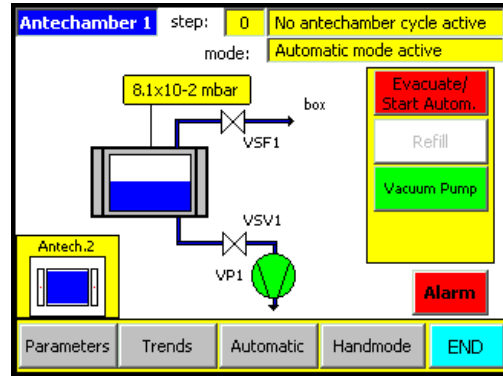
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13.1. General Information

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



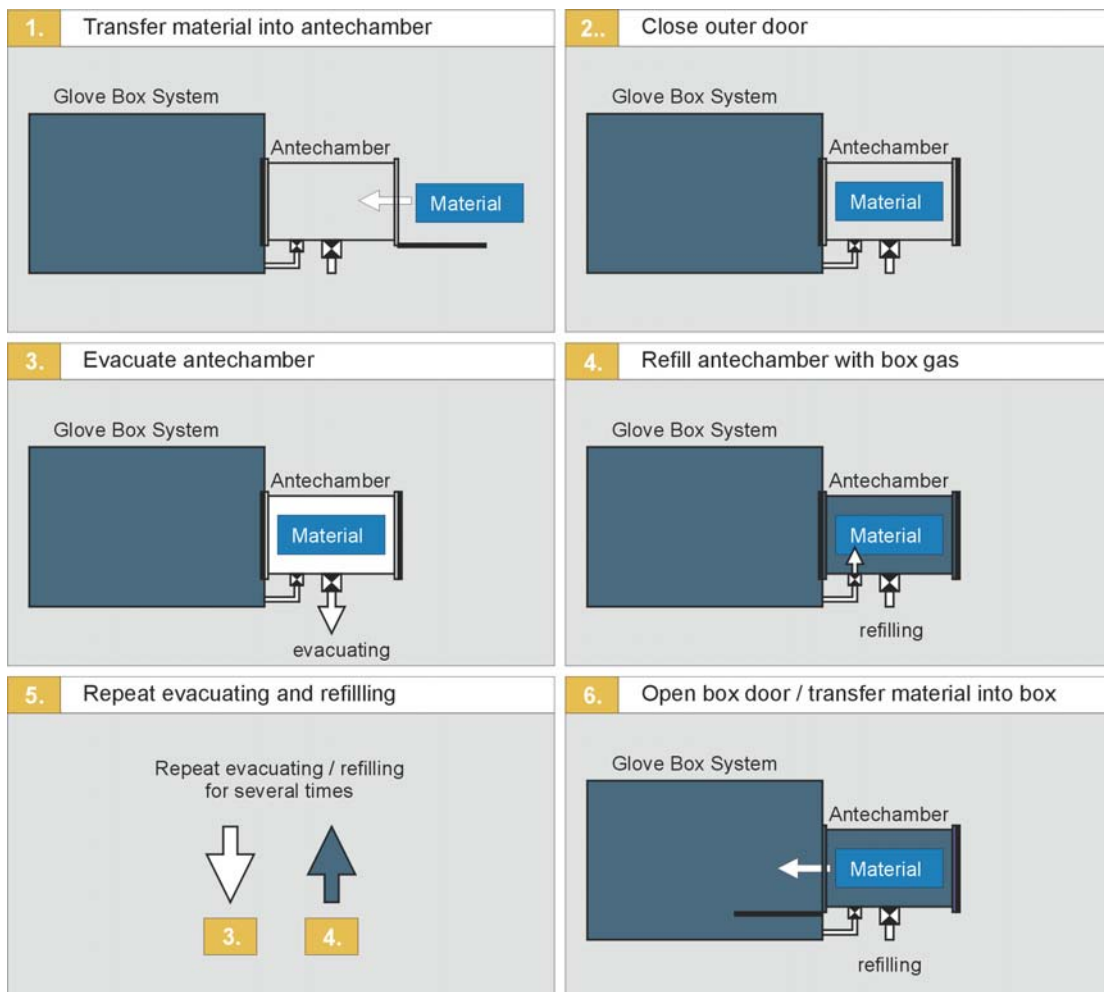
Antechamber Icon shown on Start Screen



Antechamber Screen
(Button for 2nd antechamber is also shown)

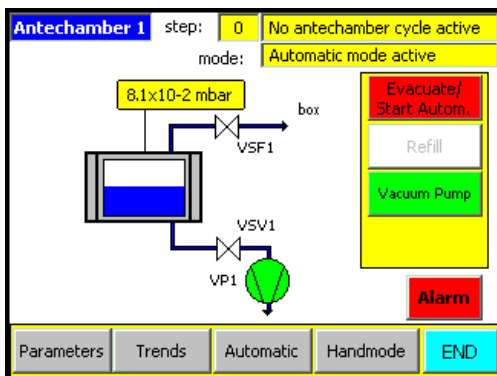
13.2. Principle

Figure 1: Principle of Antechamber Operation

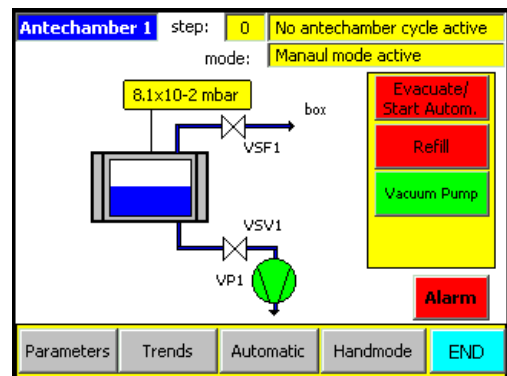


13.3. Overview

Figure 2: Antechamber Control Screens



Antechamber in Automatic Mode



Antechamber in Manual Mode

13.3.1. Standard Antechamber Operation

Standard operation means that the functions of “Antechamber Evacuation” and “Antechamber Refilling” should be started and completed manually.

13.3.2. Automatic Antechamber Control

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

13.4. Important Notes

Caution:

Never open the inner and outer antechamber doors simultaneously.

An evacuated antechamber cannot be opened. Attempting to open an evacuated antechamber may damage the door locking mechanism. Never open the inner door of an antechamber filled with ambient atmosphere. This would result in pollution of the box atmosphere and could possibly damage measuring instruments and material within the box.

Mechanical parts and seals should be checked regularly and protected against any contamination.

When handling gases always keep to the national and international guidelines.

Recommendation:

If the system is equipped with a separate pump, MBRAUN recommends that the pump is switched off (using the control panel) when not required. The pump will be restarted automatically on the next evacuation / refill cycle.

13.5. Transferring Material into the Box

Note:

Applies to systems without optional automatic antechamber control.

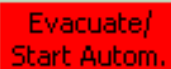
13.5.1. Preparation

- Observe item “Important Notes” in this chapter.
- The antechamber door located inside the box is closed.
- The outer antechamber door 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.
- Then close outer antechamber door.

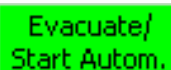
Caution:

If you transfer material with enclosed gaseous volume into the box 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.

13.5.2. Evacuation in Manual Mode




Press the Evacuate / Start Autom. button to start evacuation.



The antechamber is being evacuated. Status indicator of the “Evacuate/Start Autom.” button is green, an appropriate status message appears at the top of the Antechamber screen and the “Blue Bar” in the antechamber icon will decrease to show current status.

Recommendation:

MBRAUN recommends an evacuation of the antechamber up to a value of <math><0.5\text{ mbar}</math>.



Pressing the “Evacuate/Start Autom.” button again will stop the process.

13.5.3. Refilling in Manual Mode

A red rectangular button with the word "Refill" in white text.

Press the "Refill" button to start refilling the antechamber.

A green rectangular button with the word "Refill" in black text.

The antechamber is being refilled with gas from the box atmosphere. Status indicator of the "Refill" button is green, an appropriate status message appears at the top of the Antechamber screen and the "Blue Bar" in the antechamber icon will increase to show current status.

Note:

Refill antechamber until pressure compensation between glovebox and antechamber is attained.

A red rectangular button with the word "Refill" in white text.

Pressing the "Refill" button again will close the valve between the antechamber and the box.

Caution:

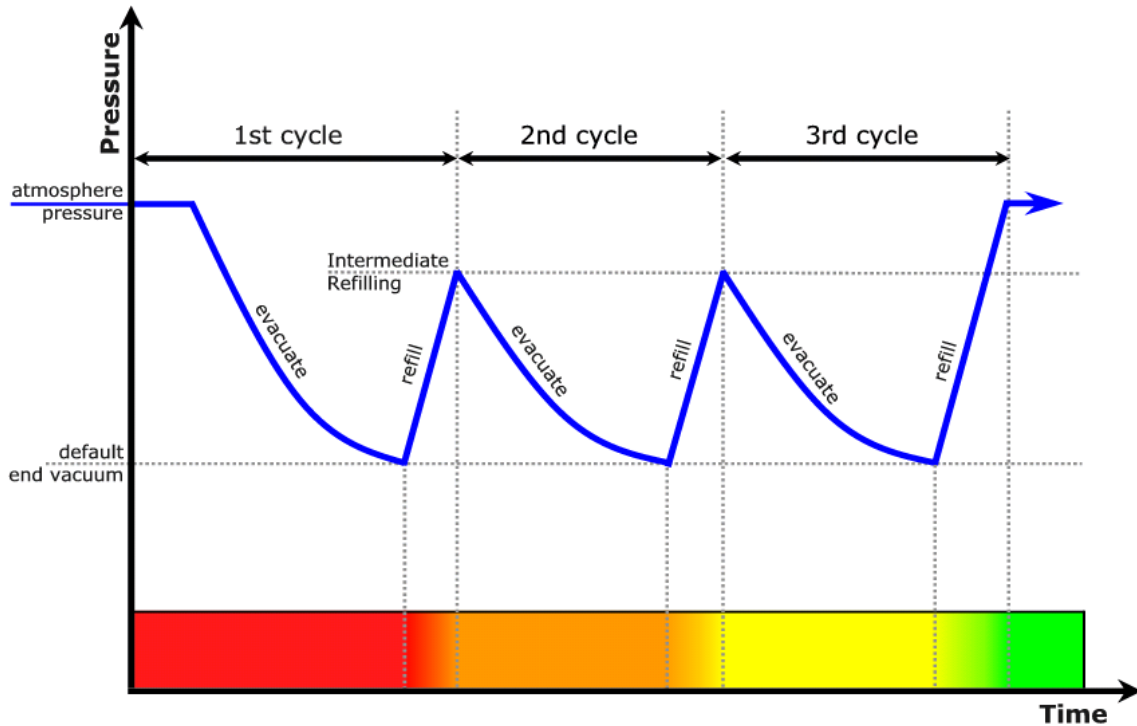
For obtaining a high degree of purity, the antechamber should undergo repeated evacuation and refilling procedures.

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.

13.6. Information About the Automatic Antechamber Control

Note:
Applies only to systems equipped with an optional automatic antechamber control.

Figure 3: Principle of Automation Antechamber Cycles



The diagram above shows how the intermediate refilling affects the atmosphere within the antechamber.

The parameters of the automatic antechamber control have optimally been matched with the antechamber by the manufacturer. If required, they can be changed by the user. For information about changing the parameters or deactivating the automatic function, refer to chapter “Settings and Display Patterns”.

Evacuate/
Start Autom.

Press the Evacuate/Start Autom. button to start Automatic evacuation.

Evacuate/
Start Autom.

The antechamber is being evacuated.

Evacuate/
Start Autom.

The “Evacuate/Start Autom.” button will release when the process has finished.

13.7. Transferring Material Out of the Box

13.7.1. 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.
- Then close inner antechamber door.

13.7.2. Removal of Material from 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.

Caution:

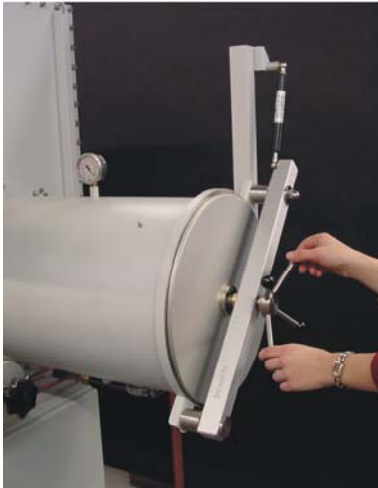
Annoyance by bad smell is expected as soon as any waste purge gas escapes into the surroundings. Environmental pollution and effects detrimental to health, however, are not known, but cannot be excluded. The manufacturer does not assume any liability. When using toxic or radioactive material manual, by no means the gas should escape to the environment. Information about pertinent alternative methods: info@mbraunusa.com

Recommendation:

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.

13.8. Circular Antechambers

13.8.1. Opening and Closing the Antechamber Door Outside the Box



Observe all items of this chapter.
Turn the locking mechanism until the antechamber door is free.

Caution:

Antechamber under vacuum cannot be opened. If you try to open the antechamber under vacuum the opening mechanism can be damaged.



Carefully open the antechamber door in upward direction.



The antechamber door is held by the spring mechanism. It stays in the position (see picture).



Carefully pull out sliding tray.

Follow the steps above in reverse for closing the outer door.

13.8.2. Opening and Closing the Antechamber Door Inside the Box



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.

Caution:

Never open the inner door of an antechamber filled with air. This will result in polluting the inert box atmosphere and could possibly damage measuring instruments and any material in the box. Antechambers under vacuum cannot be opened. Attempting to open the antechamber under vacuum may damage the opening mechanism.

13.9. Mini Antechamber

13.9.1. Opening and Closing the Outer Door



Observe all items of this chapter.
Turn the locking mechanism until the cover is free.

Caution

Antechambers under vacuum cannot be opened. Attempting to open the antechamber under vacuum can damage the opening mechanism.



Remove the cover.



Insert material into the antechamber.



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



Execution of the evacuation /refill cycles:

- A. Turn the hand valve to the position "Evacuate". The antechamber will be evacuated.



- B. Evacuate until the manometer shows a pressure of -0.9 up to -1.0 bar.



- C. Turn the hand valve to the position "refill". Please pay attention to the description on the antechamber. The antechamber is purged with box gas. Purge until there is a pressure balance between the box and the antechamber. The reading on the manometer will change to zero.



Please process the described work cycle (Points A-C) at least twice, then the hand valve can be turned to the position "close".

Caution:

Never open the inner door of an antechamber filled with air. This will result in polluting the inert box atmosphere and could possibly in damage measuring instruments and any material.



Turn the locking mechanism until the cover is free.



Remove the cover and take the material out of the antechamber.

13.9.2. Transferring Material Out of the Box



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

Caution:

Annoyance by bad smell is expected as soon as any waste purge gas escapes 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, by no means the gas should escape to the environment.

Information about pertinent alternative methods:
info@mbraunusa.com



Remove the outer cover and the material.

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14.1. General Information

M.Braun gloveboxes can be equipped with an oven. The oven can be installed at the place usually occupied by the antechamber, or as an additional antechamber on the opposite side, the rear or on top of the glovebox.

The oven allows a process at an elevated temperature to be performed under vacuum and/or under an inert gas atmosphere. Typical applications are for the removal of water or solvents from either surfaces or substances prior to the material being transferred into the glovebox.

If the oven is placed at the side of the glovebox then it typically functions as an antechamber, i.e. it allows the transfer of materials into and out of the inert Glovebox System without polluting the box internal atmosphere during the respective procedures.

Note:

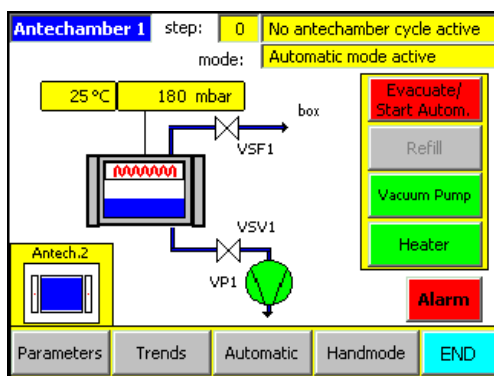
See also Antechamber chapter.

The Oven antechamber has a slightly larger diameter and longer length than the standard antechamber to allow for the heating and cooling apparatus while maintaining a similar internal dimension as a standard antechamber.

M.Braun also offers a range of ovens for specific operations.

14.2. Operation of the Oven

See also “Antechamber Operation” Chapter.



The picture shows the schematic structure of the oven antechamber. The yellow status fields display the various actual values or process steps.

The section on the right of the screen displays the oven functions.

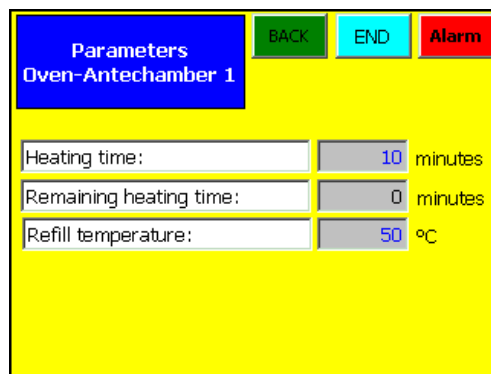
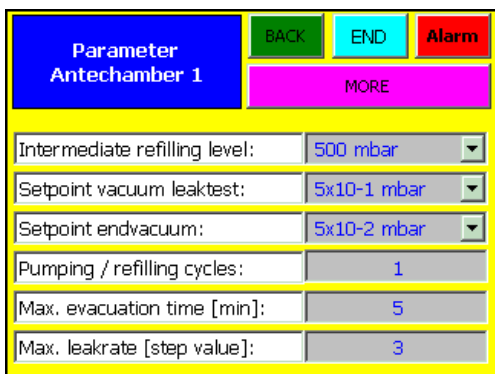
At the bottom of the screen are buttons for operation mode and status. Selecting the appropriate button will open the “Oven Parameters” or the “Trends” Screen.

Note:

Operation of the antechamber is possible with or without the heating cycle. Selecting the “Heating” button switches the heating function on or off.

14.3. Parameters for Oven Antechamber

Selecting the Parameters button from the “Antechamber” screen will open the parameters screen. The parameters that are specific for the oven operation are accessed by pressing the “more” button.



14.3.1. Parameter Definitions

Intermediate refilling Level: Up to this value the oven is flooded with inert gas.

Setpoint vacuum leaktest: At this pressure the vacuum leaktest will be started.

Setpoint endvacuum: Up to this pressure the antechamber will be evacuated.

Pumping / refilling cycles: Number of evacuation and refilling cycles.

Max. evacuating time [min]: If the set value “setpoint vacuum leaktest” is not reached in this time the automatic antechamber cycle will be stopped and the warning: "pumping time exceeded" will be displayed.

Max. leakrate [step value]: Parameter of the maximum pressure increase during the 2 steps of the vacuum leaktest within the measuring time frame. Example: 2×10^{-1} mbar to 4×10^{-1} mbar. If the parameter value is exceeded the antechamber process will be stopped and the warning: “antechamber leaking” will be displayed.

Heating time: The maximum time that is allowed for the oven to reach the desired temperature.

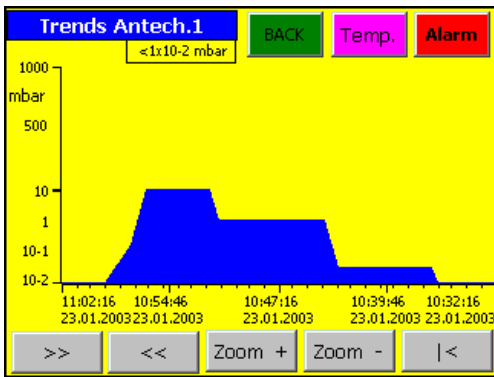
Refill temperature: The oven must cool to this level after the heating process, following this it may be flooded with inert gas to the atmospheric pressure.

Note:
Heating time and Refill temperature parameters when the system is equipped with the automatic cycle function

14.4. Trends for Oven Antechamber

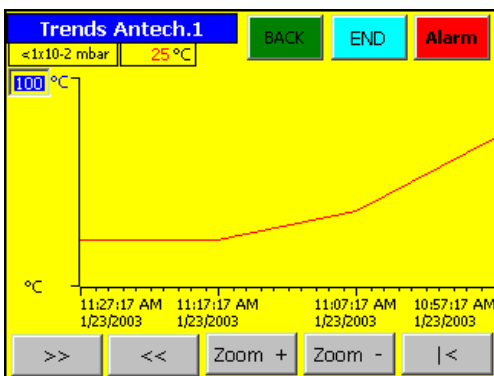
All graphs are similarly designed. The measurements are displayed on a timeline.

The trend graphs for the oven antechamber are displayed over two screens and are accessed by selecting the “Trends” button in the “Antechamber” screen.



The first trends screen displays the atmosphere pressure within the antechamber.

The current atmosphere pressure is displayed at the top left-hand corner of the screen.



The second “Trends” screen displays the temperature within the antechamber.

On the left-hand side of the screen is an input field that allows the Y-axis scale to be altered between the range of 1°C and 800°C.

The current atmosphere pressure and temperature are displayed at the top left-hand corner of the screen.

There are 5 buttons on all graph displays. With the (back) and (forward) buttons you can move along the time axis. With the and (zoom) buttons you can select a narrower or broader time frame. The (re-set) button returns you to the current time.

- X - Axis = Timescale – details in hours and minutes
- Y - Axis = Measurement in mbar (pressure) or °C (temperature)

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15.1. General Information

Note
 Applies to systems with optional H₂O and/or O₂ analyzer. Systems with analyzer option are equipped with an “Analyzer” function button. The measured H₂O and/or O₂ values are shown on the operation panel display.

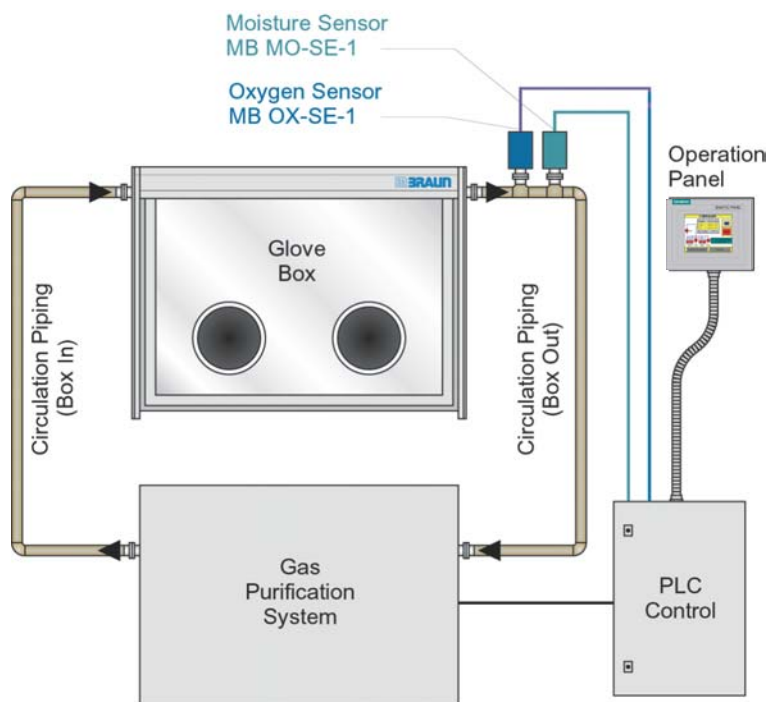
Figure 1: Types of Sensor



15.1.1. Connection of Analyzers

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

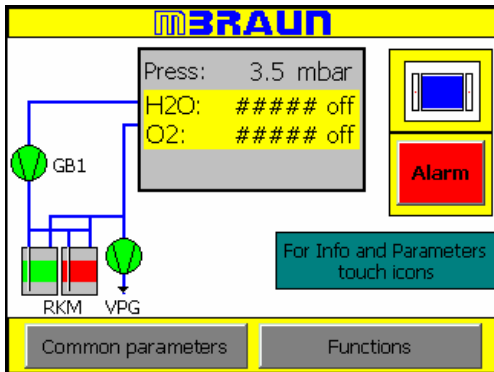
Figure 2: Connection Diagram



15.1.2. A e Analyzer(s)

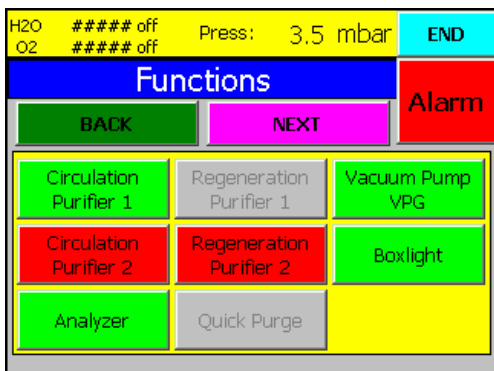
Note

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.

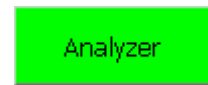


Start display with the analyzers switched off.

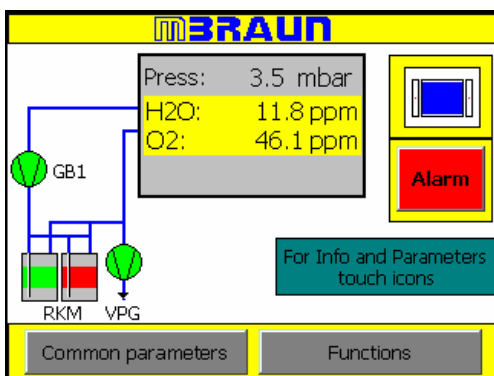
To activate the analyzers, open the Functions screen by selecting the "Function" button.



Selecting the "Analyzer" button will activate the connected analyzers.



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



The reading from the analyzers can now be seen on the start screen. The readings are also repeated on various other screens.

The analyzer readings are in the following format:

Press: xxx mbar
H2O*: xxx ppm
O2:** xxx ppm
Box Cooling*:** xxx °C
Oven*:** xxx °C

* Is displayed only when the system is provided with a moisture analyser.
 ** is displayed only when the system is provided with an oxygen analyser.
 *** is displayed only when the system is provided with cooling or oven

15.1.3. Deactivating the Analyzer(s)

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



The Analyzer button will display the status change by turning from green (active) to red (not active).

15.2. Calibration of Sensors

All MBRAUN sensors have a certified calibration before shipping.

Recommendation

MBRAUN recommends that sensors are calibrated annually by MBRAUN technicians. Quotations are available upon request from the MBRAUN Service Department.

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.).

15.3. Oxygen Analyzer (MB OX-SE-1)

15.3.1. General

The MB-OX-SE-1 sensor has been designed to control the atmosphere of MBRAUN Systems for residual Oxygen content. The measuring range 0 - 1000 ppm is linear in the range of 0 - 100 ppm and over 100 ppm is only used to estimate the oxygen content of the inert gas.

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.

Caution

Operating the sensor at oxygen levels of >1000 ppm (e.g. in air) does not irreversibly damage the sensor element, 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.

15.3.2. 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 vacuum tight feedthroughs. The electronics are contained in an airtight box mounted directly to the back of the NW40 flange.

The measuring electronics is operated by 24 VDC. It supplies a 0 to 10 VDC output proportional to the oxygen concentration. An additional input switches the heating element of the sensor on and off to control the temperature of the sensor. If this input is not used, an internal jumper has to be set to operate the probe.

Electronics and Sensor Element have been factory calibrated with certified calibration gases; there are no user accessible adjustment points. (Note: On special request we 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.)

15.3.3. Connector

8-pole socket (RJ45):

Pin-Nr.	Connection
1	Supply Ground
2	Switching ON/OFF 24 V
3	Signal Ground
4	Livebit (O ₂)
5	Not Connected
6	Signal 0 - +10 V
7	Supply +24 V
8	Supply Ground

15.3.4. 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 + 35 °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 %): approx. 10 sec. (0 - 90 %)
 Warm-up time: 10 minutes (for < 10 ppm approx. 6 hours)
 Accuracy¹⁾: 2 % of displayed value ± 1 ppm up to 100 ppm
 Drift at 10 ppm: 10 % / year
 Sensor life²⁾: at least 5 years

1) in clean argon-atmosphere, without interfering gases like H₂O or CO₂

2) in absence of reactive gases e.g. PH₃ or SO₂ that reduce the catalytic surface of the platinum coating of the sensor

15.3.5. Installation**Caution**

Before applying electrical power the sensor should be exposed to clean inert atmosphere for at least 1 minute.

The oxygen probe is mounted vacuum tight on an appropriate NW40 flange by means of a centring ring and a clamp. The usual way is to use a NW40 t-piece in the gas flow piping. This will guarantee that the sensor is exposed to direct gas-flow and is not located in a dead space. The sensor only requires a low flow rate and is not flow sensitive up to flow rates of 2 m/s.

The plug connection to the control unit must 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 performed by the control unit.

15.3.6. Trouble-shooting

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

Description of malfunction	What to do
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.

15.4. Moisture Analyzer (MB MO-SE-1)

15.4.1. 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, where the lower range up to 50 ppm is linear and over 50 ppm is only used to estimate the moisture content of the inert gas atmosphere.

The sensor element is a “double helix” made of platinum wire fixed on a special insulation material. 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 H_2 and O_2 produces an electric current. So, 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.

15.4.2. Connector

8-pole socket (RJ45):

Pin-Nr.	Connection
1	Supply Ground
2	Switching ON/OFF 24 V
3	Signal Ground
4	Not Connected
5	Live bit (H ₂ O)
6	Signal 0 - +10 V
7	Supply +24 V
8	Supply Ground

15.4.3. 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 + 35 °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 %):approx. 120 sec. (0 - 90 %)
 Warm-up time:10 minutes (for < 10 ppm approx. 6 hours)
 Accuracy¹⁾:
 High precision range (0 - 10 ppm):better than 5 % of value
 Wide range (10 - 100 ppm):better than 20 % of value
 Drift at 10 ppm:10 % / year
 Sensor life²⁾:at least 5 years

1) without interfering gases like NH₃

2) with regular maintenance

15.4.4. Maintenance: Sensor Cleaning**Recommendation**

MBRAUN recommends a maintenance cleaning procedure every 3 months.

Caution

When cleaning the sensors it is important that contamination from the ambient atmosphere is prevented. Therefore MBRAUN recommends that the box parameters are set to a pressure of between +1.0 and +5.0 mbar (see parameters chapter) and that the circulation mode is switched OFF.

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

This routine maintenance consists of cleaning the platinum winding of the MB MO-SE-1 and moistening it with phosphorous acid H₃PO₄. The following aids are required for disassembling and maintaining the MB MO-SE-1.

Tool for disassembly (screwdriver)
 Soft, absorbent, lint free cloth (cotton)
 Small quantity of phosphorous acid (H₃PO₄).
 Protective clothing, including gloves and goggles
 One dummy plug for the open circulation piping (DN40)

Caution

Be cautious when handling phosphorous acid. Wear protective gloves and goggles. Any phosphorous acid getting in contact with your skin should immediately be rinsed off using running water. When getting in contact with your eyes, the acid should immediately be rinsed also using running water; afterwards you should immediately consult a doctor.

Caution

Prior to any maintenance work the moisture measurement should be deactivated, i.e. the analyzer is switched off; refer to subchapter "Deactivating the analyzer(s)".

Figure 3: Procedure for Cleaning Moisture Sensor

1



Disconnect plug connector.

2



Loosen clamp.

3



Insert dummy plug.

4



Tighten flange clamp.

5



Unscrew protective cover.

6



Moisten sensor with distilled water.

7



Carefully clean and dry using a winding motion.

8



Moisten by winding with phosphorous acid.

9



Remount protective cover.

10



Remove clamp and dummy plug.

11



Insert measuring probe and re-clamp.

12



Tighten clamp.

13



Insert plug connector.

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16.1. 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.

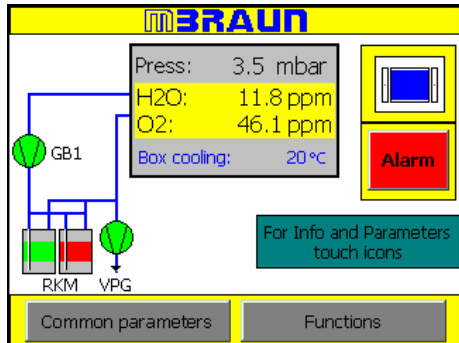
The cooling unit directs a cooling airflow to a specific area, therefore allowing the maximum cooling effect on items that are placed in the current. The normal Glovebox circulation will cause an overall cooling effect within the system.

Caution:
When the cooling unit is not in operation, there is a reduced airflow within the unit. Therefore, during manual purging, extra care is required for the area around the cooling unit to ensure that the area is completely purged.

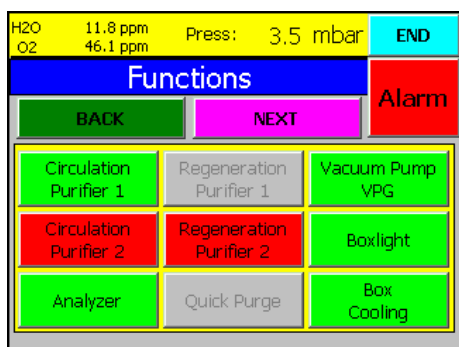
The range of the Box Cooling Temperature is +10°C to +40°C

16.2. Operation of the Box Cooling Unit

The cooling unit is controlled by the Touch Panel.



To activate the Box Cooling function select the Functions Button on the Start Screen.

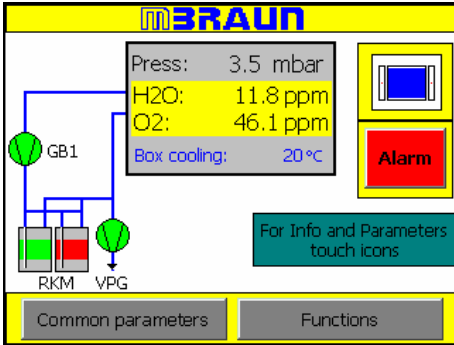


Select the "Box Cooling" button.

The button will turn to green when the Box Cooling is active.

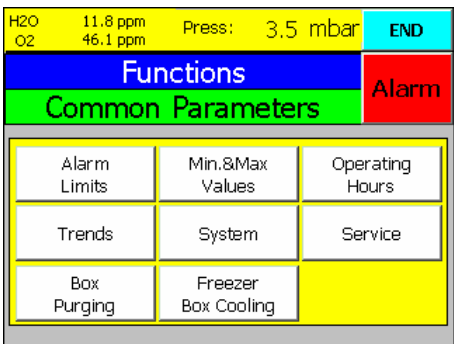
To deactivate the "Box Cooling" select the button again – the button will return to the color red.

16.3. Setting the Box Cooling Parameters

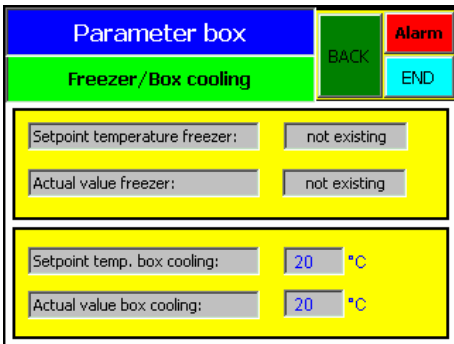


Select the “Common Parameters” button on the start screen.

Note:
If the Glovebox is equipped with a Box Cooling unit the current temperature will be displayed on the “Start Screen”.



Select the “Freezer Box Cooling” Button from the common Parameters screen to access the Parameter Screen for the Box Cooling Unit.



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.

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17.1. 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

Figure 1: Freezer - Door Closed

17.2. Purging the Freezer

Caution:

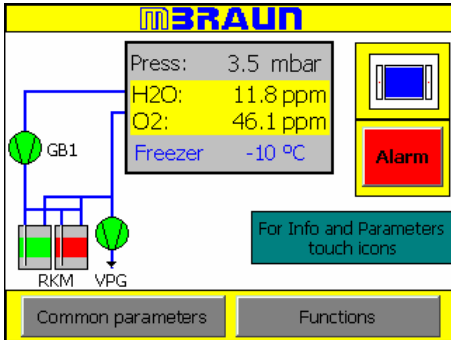
It is important that the interior of the freezer is fully purged of ambient atmosphere before the glovebox is used. Failure to purge this area could cause the box atmosphere to become polluted upon opening of the freezer door, thus causing damage to the box equipment, and/or material within the Glovebox.



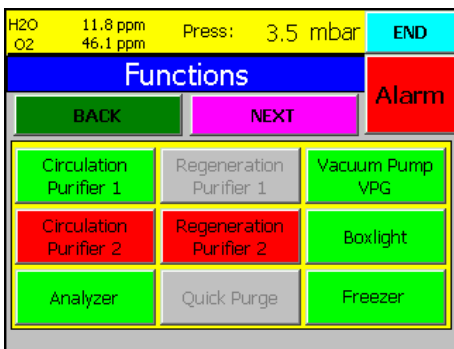
Before the glovebox is used the system must be purged (see Chapter – Purging the System). During the glovebox purging process it is important that all areas are fully purged of ambient atmosphere. With the freezer in the glovebox it is important that not only the area around the freezer unit is purged but also the area within the freezer.

Figure 2: Freezer – Door Open

17.3. Operation of the Freezer



To Activate the Freezer function select the Functions Button on the Start Screen.



Select the "Freezer" button.

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

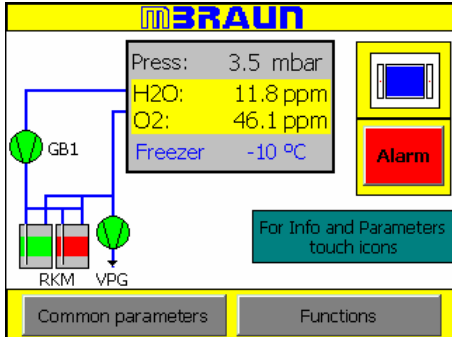
To deactivate the "Freezer" select the button again – the button will return to the color red.

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 to the door. For additional security the door may be locked with a key.

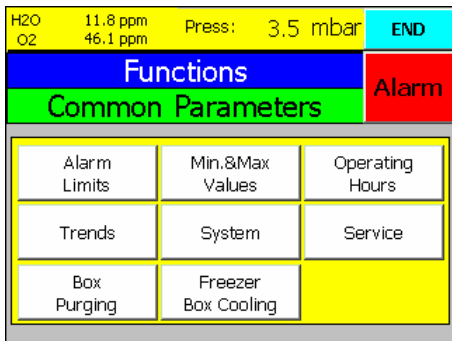
Within the freezer compartment there are shelf supports to give a range of settings for additional shelving.

17.4. Setting the Freezer Parameters

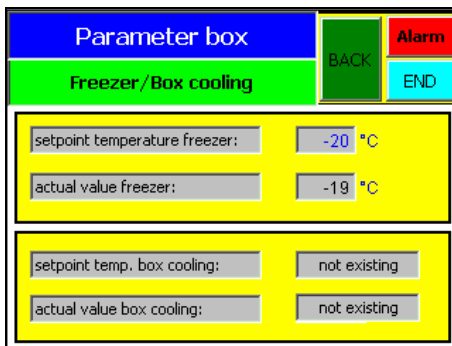


Select the “Common Parameters” button on the start screen.

Note:
If the glovebox is fitted with a freezer unit the current temperature will be displayed on the “Start Screen”.



Select the “Freezer/Box Cooling” Button from the common Parameters screen to access the Parameter Screen for the Freezer Unit.



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.

Note:
The “actual value freezer” field returns the current temperature within the freezer – the value is generated by the system.

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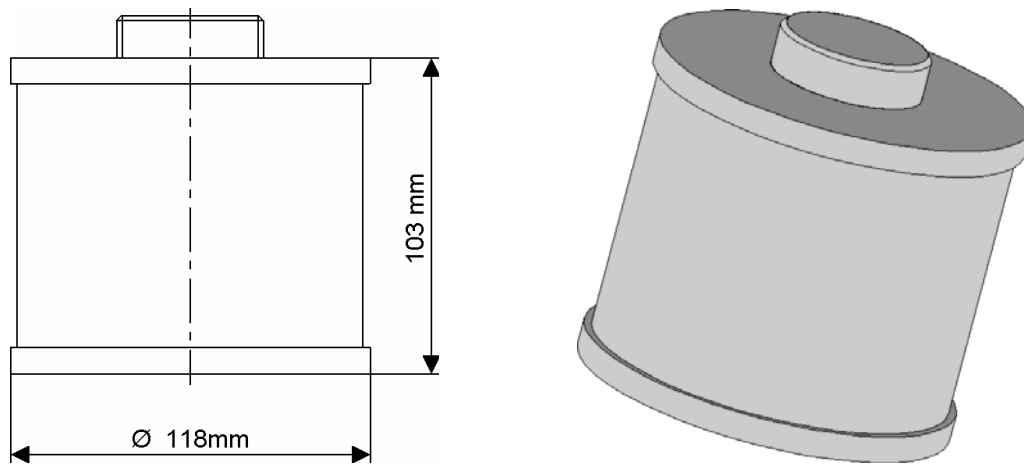
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18.1. General Information

MBRAUN gloveboxes 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 glovebox. The latter filter ensure optimal particle free incoming gas.

18.2. Technical Data

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



The standard filter is of a HEPA format (class H14) - i.e. filtering 99.995% of particles – typically down to 0.2 microns.

Note:

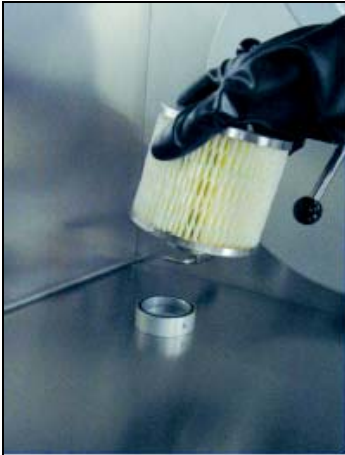
M.Braun can also supply finer filters (e.g. Class U15 – Filtering 99.9995% of particles) upon request.

18.3. Exchanging Dust Filters

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

18.3.1. Method for Exchanging the Filter:

Figure 1: Removing Filter



Unscrew used dust filter.

Figure 2: Replacing Filter



Screw new dust filter in place.

Note:

Depending upon the substances used inside the glove box, the replaced filter may need to be treated with care outside of the glovebox atmosphere. Please refer to all local Environmental, Safety and Health guidelines that may apply for the type of substances used within the glovebox.

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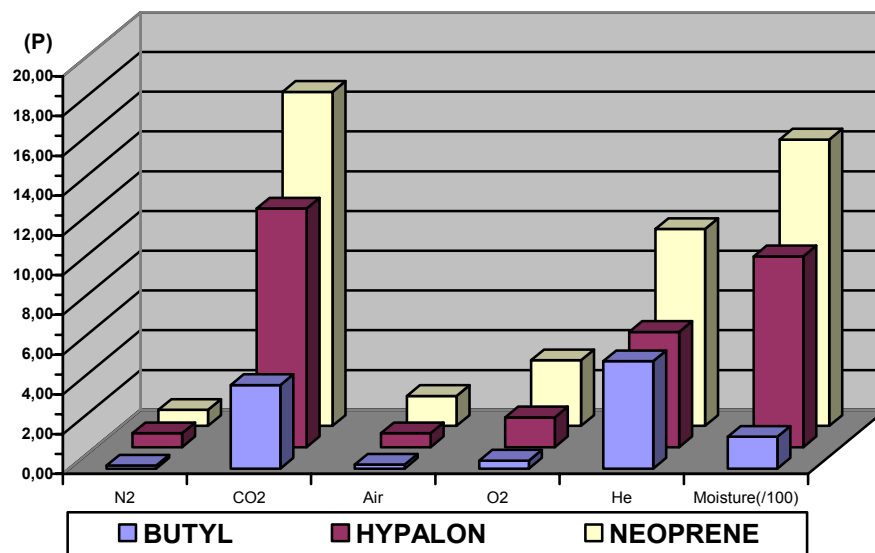
19.5. Standard Spare Parts and Accessories for M.Braun Gloves 4

19.1. General Information

M.Braun 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 °C to +90 °C). The following graphic chart shows, that butyl compared to hypalon and neoprene evidently has the most favorable values regarding the permeability for different gases and for water vapor.

Note:
For working with higher temperatures M.Braun also offers gloves made of butyl with a hypalon layer.

Gas Permeably Constant Comparison Chart



Note:
Permeability Constant (P) = gas flow through a material of 1cm thickness at a standard pressure and temperature. It is measured at a rate of 10⁻⁹ cm³ gas/s.

19.2. Technical Data

Product:MB Gloves.

Type:.....Special gloves made of brom-butyl for Glovebox Systems.

Design:.....Various diameters, sizes and shapes.

19.3. Replacing Gloves

Recommendation:

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

Caution:

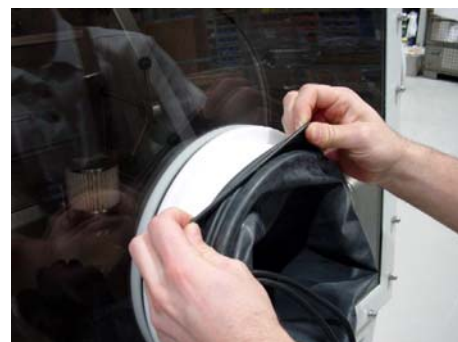
Before changing gloves ensure that the glovebox atmosphere is safe to breathe. If necessary purge and fill the glovebox with ambient air before attempting to change gloves.



The Gloves are secured by two O-rings.



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).

Caution:

Ensure that the correct type of glove is chosen e.g. left or right hand, or ambidextrous and of the correct size



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

Note:

After the changing of gloves the glovebox atmosphere will require purging to remove any undesired oxygen and/or moisture. (see chapter on Purging the System)

19.4. Gloveport Covers

MBRAUN gloveport covers are available as an option. The gloveport covers are for standard round gloveports and are available for either interior or exterior fitting.

The gloveport covers allow for the changing of gloves while preventing the influx of the outer-atmosphere into the glovebox.

Glove portcovers can be ordered by contacting the M.Braun Service Department.

19.5. Standard Spare Parts and Accessories for M.Braun Gloves

M.Braun Order No.	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
3000050	Brom-butyl anatomical Glove	160 mm	0.4 mm	Large
3000051	Brom-butyl ambidextrous Glove	160 mm	0.4 mm	Large
3005008	Brom-butyl ambidextrous Glove	Oval	0.4 mm	Large
2600239	O-Ring for Gloves	220 mm		
2600240	O-Ring for Gloves	160 mm		
9002371	Internal Glove Port Cover	220 mm		
7019882	External Glove Port Cover	220 mm		
7024831	Internal Glove Port Cover	160 mm		
7024791	External Glove Port Cover	160 mm		
9004663	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		
9004667	Glove Port Feed-Through	160 mm		

Other gloves, as well as O-Rings, are available by request from the M.Braun Service Department.

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20.1. Components of Third Party Manufacturers

MBRAUN Glovebox systems are partly equipped with third party manufacturers' components such as:

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

The original third party manufacturers' documents, in which the maintenance and service of the components are described, are included in the systems delivery.

Caution:

The third party manufacturers' maintenance and service instructions should be followed.

20.2. Regular Maintenance and Service

Main glovebox and window

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.

Note:

If the Box is equipped with an **MBRAUN Clean-Jet** unit then the interior of the box and window may also be vacuumed with a brush attachment.

Gloves

Check the gloves for damage; in addition, use linen gloves to avoid humidity in the box gloves.

Caution:

Do not use powder within the box or within a clean room environment. Replace gloves when damaged - NEVER attempt to repair gloves.

Antechambers

Check antechamber seals for damage. If the antechamber doors are difficult to open or to close, grease or lubricate threads lightly.

Caution:

Some areas of the system must be left without grease or lubrication. In this case, grease or lubricants should not be used.

Connections

Check connections for firm seat and are leak free.

Components

Observe the maintenance instructions of the optional equipment components, such as analyzer and refrigerator.

Observe the third party manufacturers' maintenance instructions.

20.3. Quarterly and Annual Maintenance and Service

Type of System	Quarterly	Annually
Glovebox	<ul style="list-style-type: none"> • Check the Omega sealing for the windows • Check the gloves and gloveports • Check the magnetic valves • Complete leakage test • Function test 	<ul style="list-style-type: none"> • Check and if necessary replace the sealing for the windows • Check the Omega sealing of the windows • Check the gloves and gloveports • Check the illuminating equipment • Check and, if necessary, replace the dust filters • Check and, if necessary, replace the magnetic valves • Complete leakage test • Function test
Gas Purification System	<ul style="list-style-type: none"> • Check the magnetic valves • Check the blower • Check the vacuum pump • Complete leakage test • Function Test 	<ul style="list-style-type: none"> • Check the vacuum pump • Check and, if necessary, replace the circulation blower • Check and, if necessary, replace the filter medium • Dismantle pipe work and clean it. Replace all Viton seals. • Check and, if necessary, replace the valve seals • Check the cooling system • Check the cooling fluid • Complete leakage test • Function test
Analyzers	<ul style="list-style-type: none"> • Check the sensors • Check the flow rate meter • Complete leakage test 	<ul style="list-style-type: none"> • Check, and if necessary, replace sensors • Check the vacuum pump • Leak test piping • Complete leakage test • Check calibration