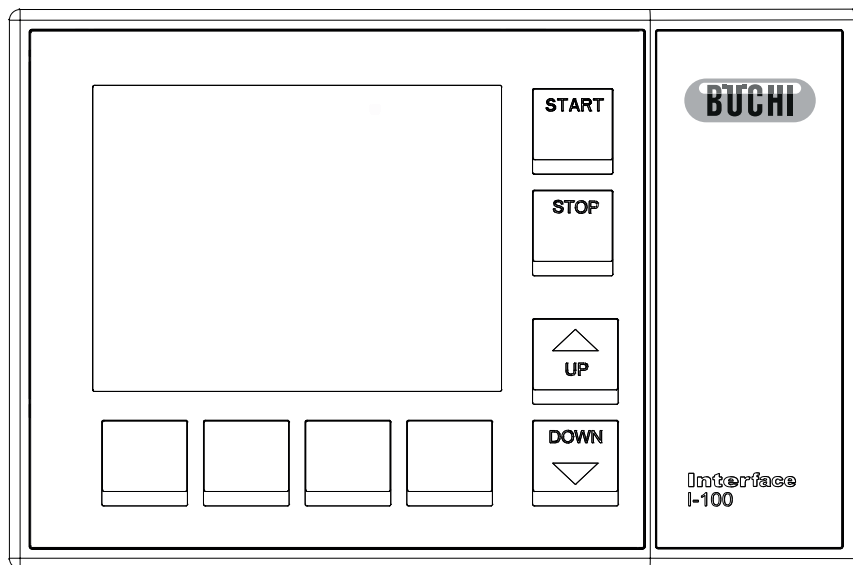




# Interface I-100 Operation Manual





# ***LAB Online Exhibition***



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# 1 About this document

These operating instructions describe the Interface I-100 at the time supplied. They are an integral part of the product and contain important information that is necessary for safe operation and maintenance.

These operating instructions apply to all variants of the Interface I-100 and are intended primarily for laboratory staff.

- ▶ To ensure safe and trouble-free operation, read these operating instructions before starting up the device and follow the guidance they contain.
- ▶ Keep the operating instructions somewhere near to the device.
- ▶ Pass on the operating instructions to any subsequent owner or user.

BÜCHI Labortechnik AG accepts no liability whatsoever for any faults or damage that result from the failure to follow these operating instructions.

- ▶ If you still have any questions after reading these operating instructions, please contact BÜCHI Labortechnik AG Customer Service. Contact details for your local agents can be found on the Internet at <http://www.buchi.com>.

## 1.1 Warning notices in this document









Warning notices warn you of dangers that can occur when handling the device. There are four danger levels, each identifiable by the signal word used.





Signal word	Meaning
DANGER	Indicates a danger with a high level of risk which could result in death or serious injury if not prevented.
WARNING	Indicates a danger with a medium level of risk which could result in death or serious injury if not prevented.
CAUTION	Indicates a danger with a low level of risk which could result in minor or medium-severity injury if not prevented.
IMPORTANT	Indicates a danger that could result in damage to property.

## 1.2 Symbols





The following symbols may be displayed in this instruction manual or on the device:

### 1.2.1 Warning symbols

Symbol	Meaning	Symbol	Meaning
	General warning		Corrosive substance
	Dangerous electrical voltage		Flammable substance
	Biological hazard		Potentially explosive atmosphere
	Breakable items		Dangerous gases

Symbol	Meaning	Symbol	Meaning
	Hot surface		Health-harming or irritant substances
	Risk of hand injury		Strong magnetism

### 1.2.2 Mandatory directive symbols

Symbol	Meaning	Symbol	Meaning
	Wear safety goggles		Wear protective clothing
	Wear protective gloves		Heavy load, do not lift without assistance

### 1.2.3 Other symbols



#### NOTE

This symbol draws attention to useful and important information.

- This character draws attention to a requirement that must be met before the instructions below are carried out.
- This character indicates an instruction that must be carried out by the user.
- This character indicates the result of a correctly carried out instruction.

## 1.3 Available languages

These operating instructions were originally produced in German and have been translated into several other languages. The translations are available on the enclosed CD or can be obtained as a PDF file via <http://www.buchi.com>.

## 1.4 Trademarks

Product names and registered or unregistered trademarks that are used in this instruction manual are used only for identification and remain the property of the owner in each case.

For example, Rotavapor® is a registered trademark of BÜCHI Labortechnik AG.

## 2 Safety

### 2.1 Intended use

The Interface I-100 is intended for regulating and indicating vacuum within an operating range of 0 mbar to atmospheric pressure. It has been designed and built as an item of laboratory equipment and can be used in conjunction with the following devices:

- Distillation apparatus, especially rotary evaporators
- Vacuum-drying cabinets

### 2.2 Use other than that intended

Use of any kind other than that described in the section Chapter 2.1 "Intended use", page 7 and any application that does not comply with the technical specifications (see Chapter 3.4 "Technical data", page 14) constitutes use other than that intended.

In particular, the following applications are not permissible:

- Use of the device in areas which require explosion-safe apparatus
- Use as a calibration device for other equipment
- Operation at pressures above atmospheric

Damage or hazards attributable to use of the product other than as intended are entirely at the risk of the user alone.

### 2.3 Staff qualification

Unqualified persons are unable to identify risks and are therefore exposed to greater dangers.

The device may only be operated by suitably qualified laboratory staff.

These operating instructions are aimed at the following target groups:

#### Users

Users are persons that meet the following criteria:

- They have been instructed in the use of the device.
- They are familiar with the contents of these operating instructions and the applicable safety regulations and apply them.
- They are able on the basis of their training or professional experience to assess the risks associated with the use of the device.

#### Operator

The operator (generally the laboratory manager) is responsible for the following aspects:

- The device must be correctly installed, commissioned, operated and serviced.
- Only suitably qualified staff may be assigned the task of performing the operations described in these operating instructions.
- The staff must comply with the locally applicable requirements and regulations for safe and hazard-conscious working practices.
- Safety-related incidents that occur while using the device should be reported to the manufacturer (quality@buchi.com).

**BUCHI service technicians**

Service technicians authorized by BUCHI have attended special training courses and are authorized by BÜCHI Labortechnik AG to carry out special servicing and repair measures.

**2.4 Residual risks**

The device has been developed and manufactured using the latest technological advances. Nevertheless, risks to persons, property or the environment can arise if the device is used incorrectly.

Appropriate warnings in this manual serve to alert the user to these residual dangers.

**2.4.1 Faults during operation**

If a device is damaged, sharp edges or exposed electrical wires can cause injuries.

- ▶ Regularly check device for visible damage.
- ▶ If faults occur, switch off the device immediately, unplug the power cord and inform the operator.
- ▶ Do not continue to use devices that are damaged.

**2.5 Modifications**

Unauthorized modifications may impair safety and lead to accidents.

- ▶ Use only genuine BUCHI accessories, spare parts and consumables.
- ▶ Technical modifications to the device or accessories should only be carried out with the prior written approval of BÜCHI Labortechnik AG and only by authorized BUCHI technicians.

BUCHI accepts no liability whatsoever for damage arising as a result of unauthorized modifications.

## 3 Product description

### 3.1 Description of function

The Interface I-100 is designed for indicating, adjusting and controlling vacuum. It can regulate the Vacuum Pump V-100 and the Recirculating Chiller F-105 and thus constantly maintain a set pressure.

The pressure is measured capacitively and indicated as an absolute value. Measurement is independent of the solvent used.

### 3.2 Configuration

#### 3.2.1 Front view

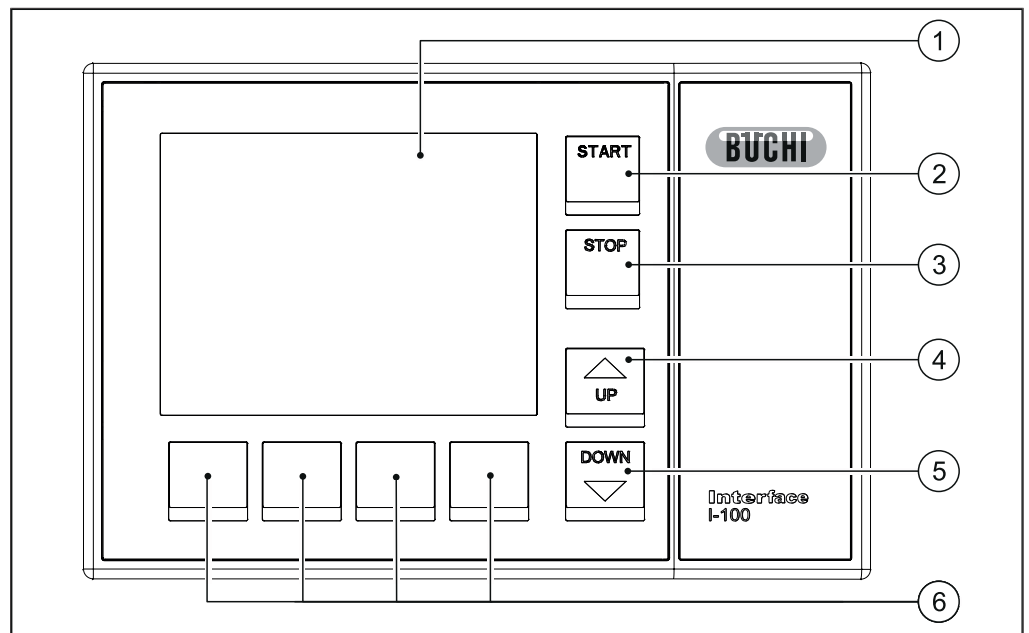


Fig. 1: Front view of Interface I-100

- |                |                    |
|----------------|--------------------|
| 1 Display      | 4 UP button        |
| 2 Start button | 5 DOWN button      |
| 3 Stop button  | 6 Function buttons |

### 3.2.2 Rear view

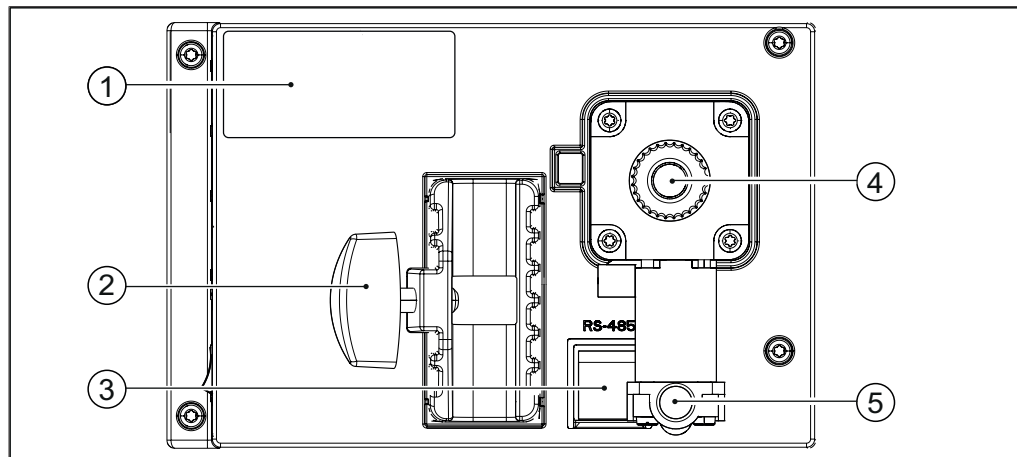


Fig. 2: Rear view of Interface I-100

- |  |   |
|--|---|
| 1 Type plate                                   | 4 Vacuum connection                       |
| 2 Mount  | 5 Venting valve with inert gas connection |
| 3 RS485 connection (for recirculating chiller) |   |

### 3.2.3 Side view from right (connections)

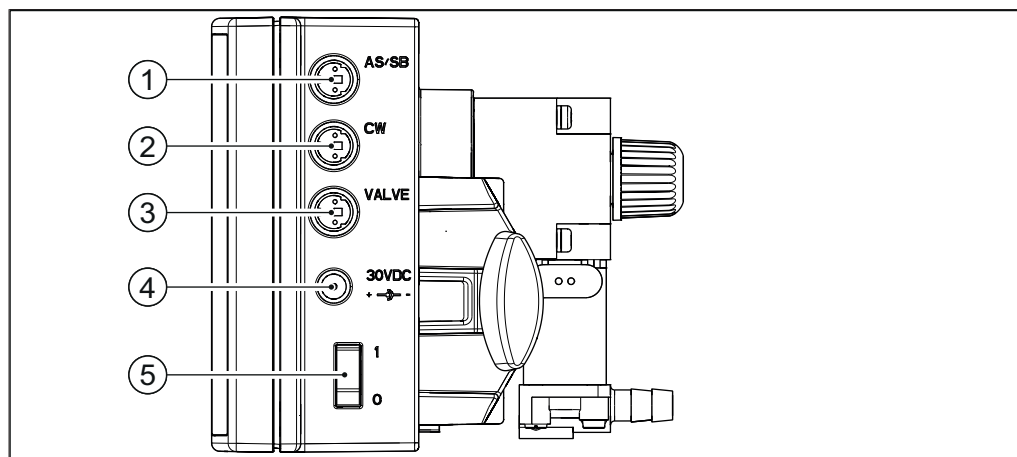


Fig. 3: Connections on Interface I-100

- |   |
|---|
| 1 Vacuum pump connection                          |
| 2 Water coolant valve connection                  |
| 3 Connection for valve unit or straight-way valve |
| 4 Power supply connection                         |
| 5 Master switch                                   |

## 3.2.4 Screen

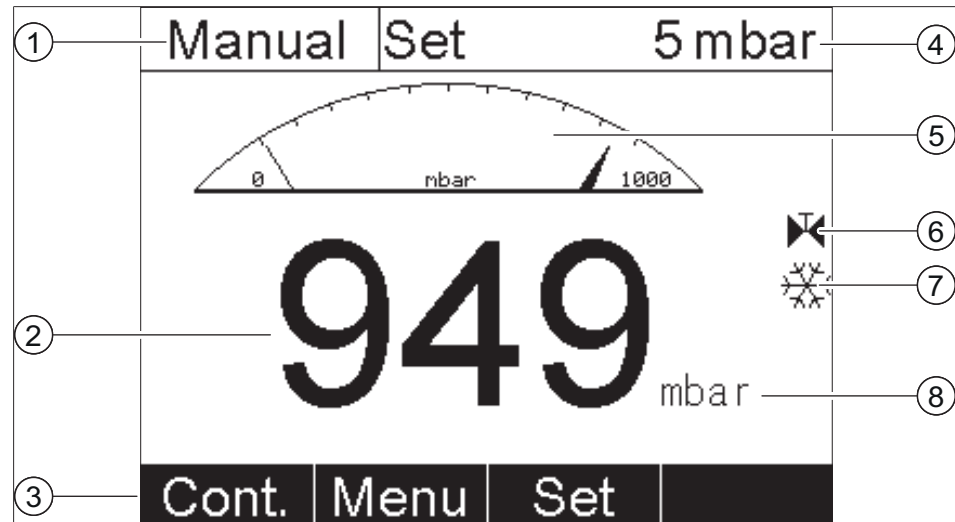


Fig. 4: Screen layout


- |                                  |                                   |
|----------------------------------|-----------------------------------|
| 1 Operating mode                 | 4 Specified pressure in system    |
| 2 Actual pressure in system      | 5 Analogue pressure indication    |
| 3 Functions of the buttons below | 6 Vacuum valve connected          |
|                                  | 7 Recirculating chiller connected |
|                                  | 8 Unit of pressure                |

**NOTE**

Depending on application, the standard display may show different symbols.

When a component is active, the symbol concerned is shown in inverse type (white symbol on black background).

Other symbols:

Symbol	Meaning
	Water coolant valve is connected

### 3.2.5 Typical application

The Interface I-100 is designed to be used in the following combination of devices:

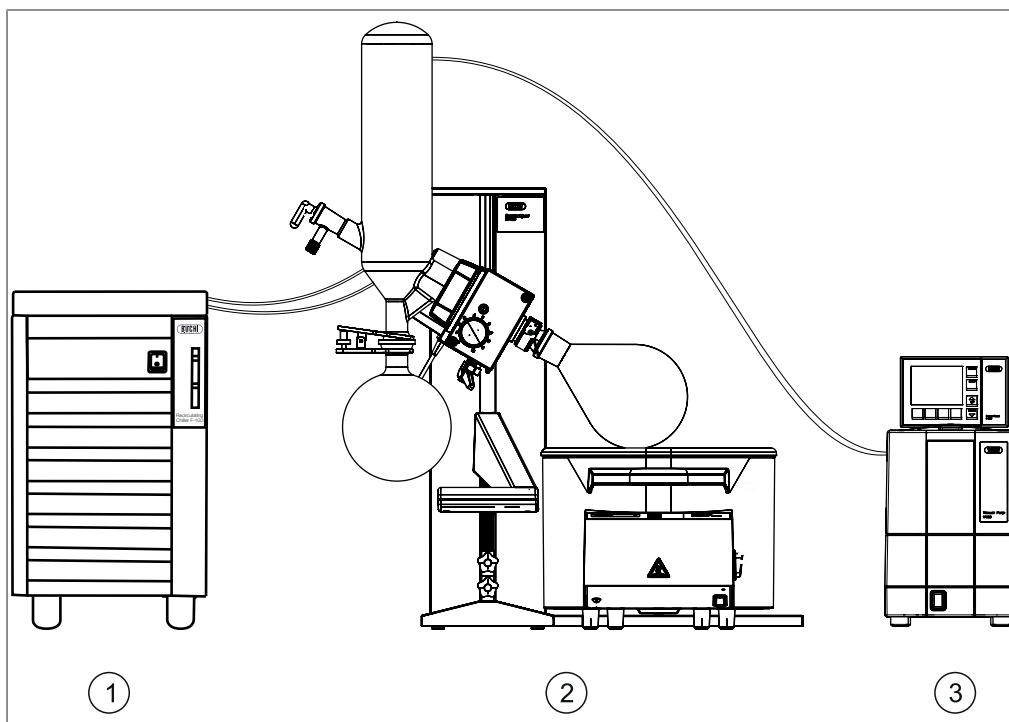


Fig. 5: Configuration of a complete system

- 1 Recirculating Chiller F-100/F-105
- 2 Rotavapor R-100
- 3 Vacuum Pump V-100 with Interface I-100

The F-100 and F-105 are sealed-system recirculating chillers. They are available in various capacity ratings. The F-105 can be electronically controlled.

The Rotavapor R-100 is a rotary evaporator with the aid of which single-stage distillation can be carried out quickly under vacuum conditions without unduly stressing the product.

The Vacuum Pump V-100 is designed for evacuating laboratory apparatus. It can be operated either as a standalone device or combined with optional accessories such as an interface unit and a secondary condenser to form a complete vacuum system.

### 3.2.6 Type plate

The type plate is on the rear of the Interface I-100.

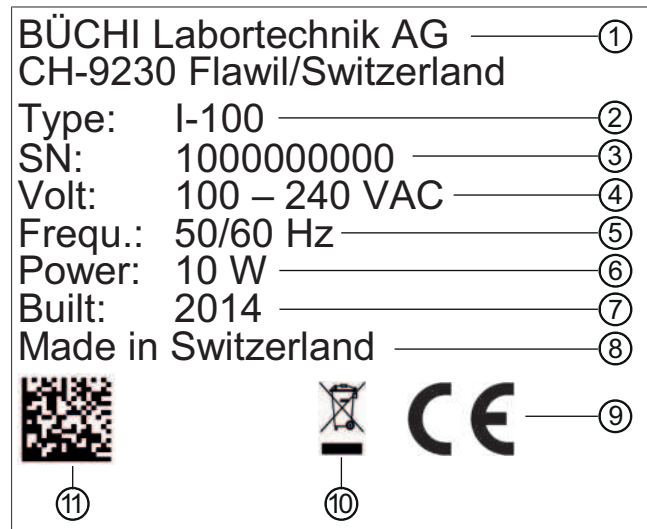


Fig. 6: Type plate (example)

- |                            |  |
|----------------------------|--|
| 1 Company name and address | 7 Year of manufacture                                |
| 2 Device name              | 8 Country of manufacture                             |
| 3 Serial number            | 9 Approvals  |
| 4 Input voltage            | 10 Symbol for "Do not dispose of as household waste" |
| 5 Frequency                | 11 Product code                                      |
| 6 Maximum power rating     |  |

### 3.3 Specifications supplied

	Standalone	For V-100	For lab vacuum supply
Interface I-100	1	1	1
Power adapter	1	1	1
Holder for mounting on V-100	–	1	–
Connecting tubing	–	1	1
Mini-DIN communication cable	–	1	–
Valve unit	–	–	1

### 3.4 Technical data

#### 3.4.1 Interface I-100

Dimensions (W x H x D)	160 x 105 x 120 mm
Weight	700 g
Voltage	30 V DC
Power consumption	10 W
Solenoid valve power supply	24 V
Measurement range	1400 – 0 mbar
Regulating range	1100 – 0 mbar
Measurement accuracy	± 2 mbar (after calibration at constant temperature)
Temperature compensation	0.07 mbar/K
Hysteresis	Automatic or 1 – 500 mbar
Vacuum connection	GL14
Enclosure rating	IP21
Approval	CE

#### 3.4.2 Power adapter

Input voltage	100 – 240 V
Output voltage	30 VDC
Power consumption	30 W
Frequency	50/60 Hz
Enclosure rating	IP20
Approval	CE/UL/CSA

#### 3.4.3 Ambient conditions

Max. altitude above sea level	2000 m
Ambient temperature	5 – 35 °C
Maximum relative humidity	80 % for temperatures up to 31 °C decreasing linearly to 50 % at 40 °C

The Interface I-100 may only be used in indoor areas.

#### 3.4.4 Materials

Component	Material
Pressure foil	Polyester
Casing	PBT
Vent tube connection	PPS
Pressure sensor	Al <sub>2</sub> O <sub>3</sub> 96%

## 4 Transport and storage

### 4.1 Transport

#### IMPORTANT

##### Risk of breakage due to incorrect transportation

- ▶ Make sure that all parts of the device are safely packed in such a way as to prevent breakage, ideally in the original box.
- ▶ Avoid sharp movements during transit.

- 
- ▶ After transportation, check the device for damage.
  - ▶ Damage that has occurred in transit should be reported to the carrier.
  - ▶ Keep packing for future transportation.

### 4.2 Storage

- ▶ Make sure that the ambient conditions are complied with (see Chapter 3.4 "Technical data", page 14).
- ▶ Wherever possible, store the device in its original packaging.
- ▶ After storage, check the device, all glass components, seals and tubing for damage and replace if necessary.

## 5 Installation

### 5.1 Assembly

The Interface I-100 can be mounted either on the Vacuum Pump V-100 or a laboratory stand.

#### 5.1.1 Fitting an interface unit to the Vacuum Pump V-100

##### Fitting the holder

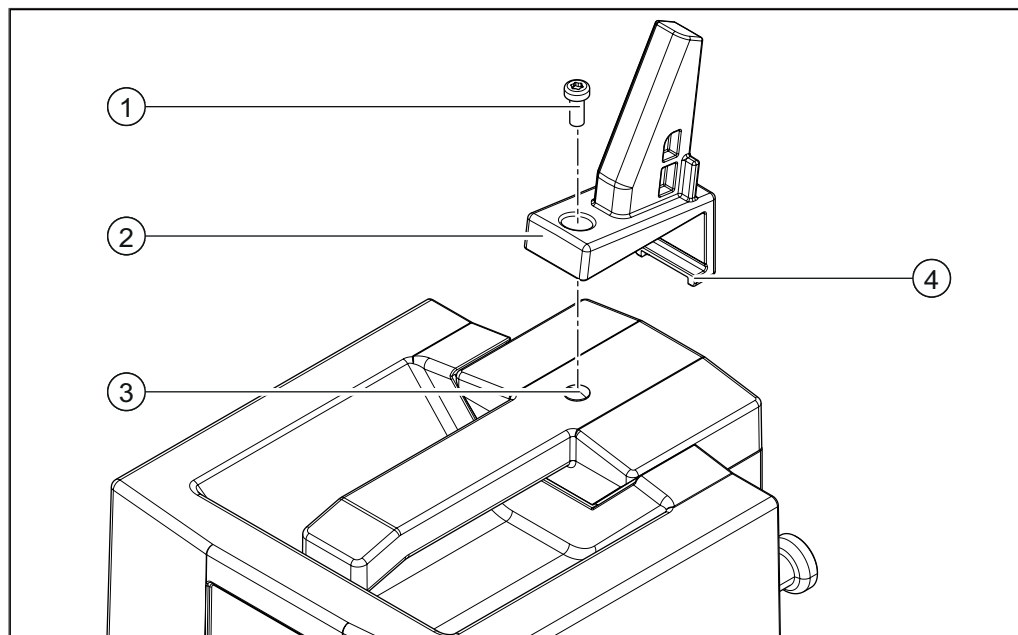


Fig. 7: Fitting the holder for the Interface I-100

- |                              |                                     |
|------------------------------|-------------------------------------|
| 1 Screw                      | 3 Rubber plug (in thread for screw) |
| 2 Holder for Interface I-100 | 4 Lower hinge of holder             |

The Torx key required for fitting the holder is included in the specifications supplied.

- ▶ Remove rubber plug (3).
- ▶ Fit the holder (2) onto the pump top cover from behind and secure it with the screw (1).
- ▶ Make sure that the hinge (4) of the holder is engaged in the slot on the rear of the V-100.

### Fitting the interface unit

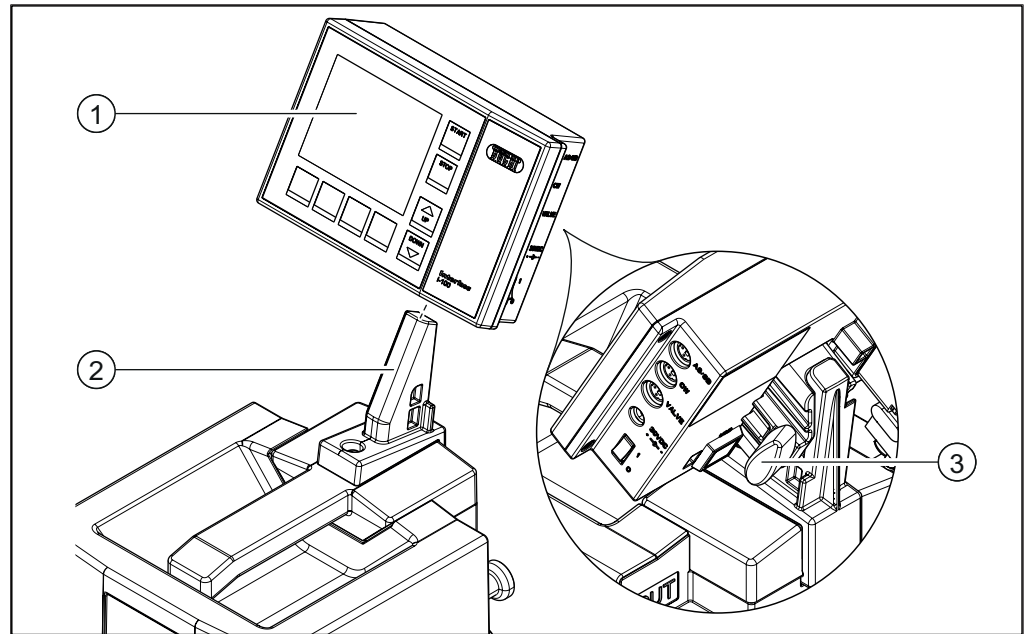


Fig. 8: Fitting the Interface I-100

1 Interface I-100  
2 Holder

3 T-screw

- ▶ Fit the interface unit (1) onto the holder (2).
- ▶ Tighten the T-screw (3) on the back of the interface unit by turning it clockwise.

#### 5.1.2 Mounting interface unit on laboratory stand

- ▶ Slide the interface unit onto the laboratory stand and fix it in place by tightening the knob on the back.

## 5.2 Connections

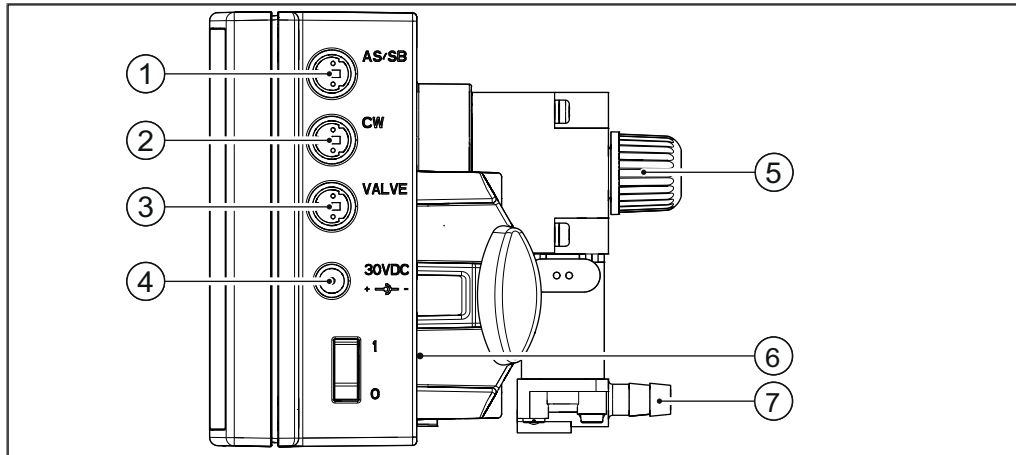
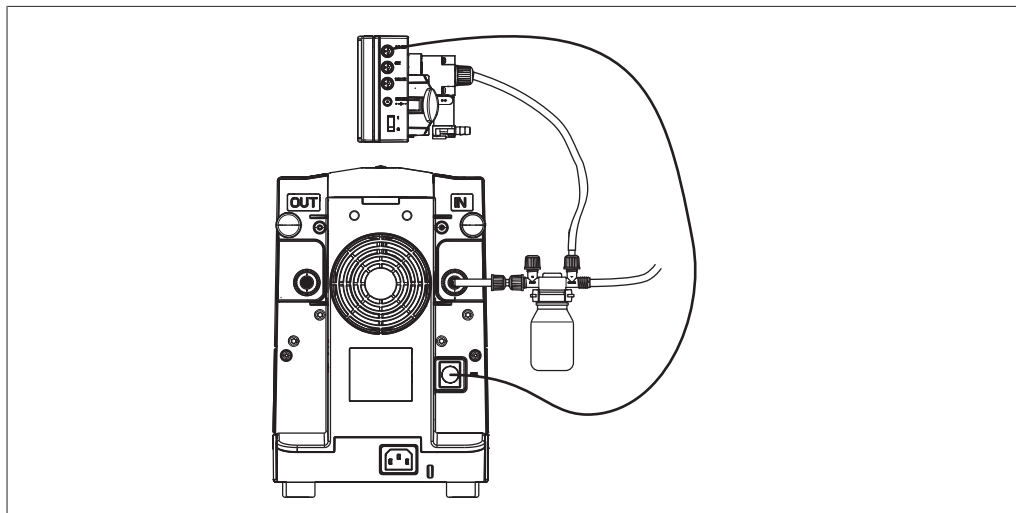


Fig. 9: Connections on I-100

- ▶ Connect the communication cable from the vacuum pump to the connection marked **AS/SB** (1).
- ▶ Connect the lead from the coolant water valve to the RS-485 socket (6) on the rear panel, if used.
- ▶ Connect the communication cable from the valve unit to the connection marked **VALVE** (3), if used.
- ▶ Connect the lead from the power adapter to the **30VDC** socket (4).
- ▶ Connect the vacuum tubing for pressure measurement to the vacuum connection (5) with GL14 cap nut.
- ▶ If inert gas is required, connect it to hose barb (7).

## 5.3 Connection to vacuum pump

For connecting the Interface I-100 to the Vacuum Pump V-100 we recommend using a Woulff bottle.



## 5.4 Basic settings

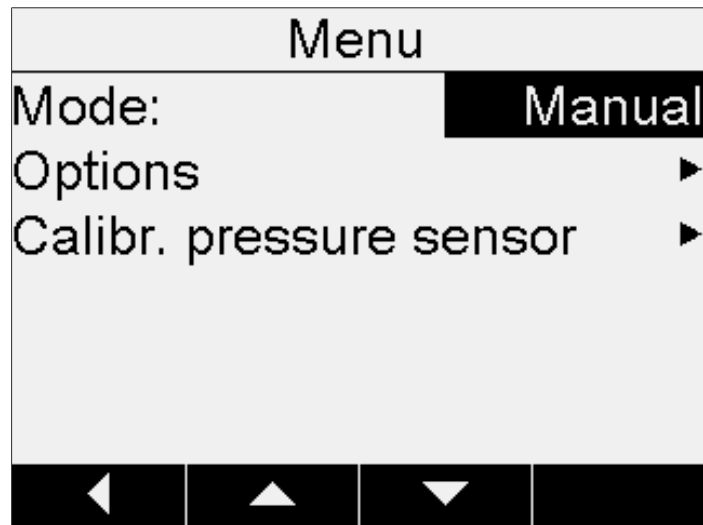


Fig. 10: Menu

- ▶ To change the basic settings, press the following buttons: **Menu** > Down arrow until **Settings** is selected > Right arrow.
- ▶ Use the arrow buttons to select whether the interface (controller) or system settings are to be changed.

### 5.4.1 Controller settings

The following settings can be adjusted:

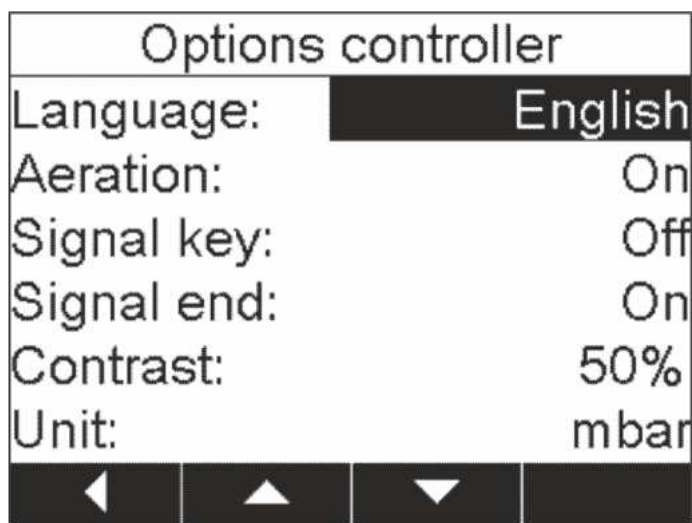


Fig. 11: Menu > Settings > Controller settings

<b>Language</b>	The following languages can be selected: English, German, French, Italian, Spanish, Portuguese, Japanese, Chinese, Russian
<b>Aeration</b>	<b>On:</b> the system is automatically vented when the <b>STOP</b> button is pressed or when distillation automatically stops. <b>Off:</b> when the <b>STOP</b> button is pressed the current pressure is maintained. The system is not vented until the <b>STOP</b> button is pressed for a second time.
<b>Signal Key:</b>	<b>On:</b> there is an audible confirmation beep whenever a button is pressed. <b>Off:</b> no confirmation beep when a button is pressed.
<b>Signal End:</b>	<b>On:</b> an audible signal sounds when the timer has run down. <b>Off:</b> no audible signal when the timer has run down.
<b>Contrast</b>	The screen contrast can be set to between 0 and 100 %.
<b>Unit</b>	The following units can be selected: mbar, torr, hPa

### 5.4.2 System configuration

The following settings can be adjusted:

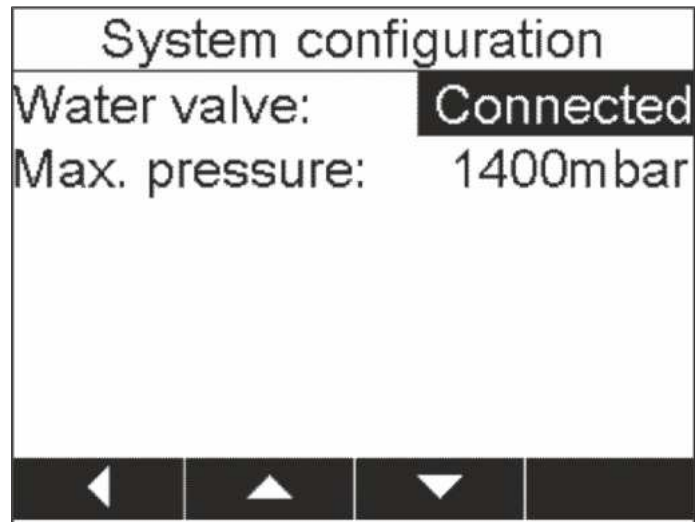


Fig. 12: Menu > Settings > System configuration

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**Coolant valve** Here you can specify whether a coolant water valve is connected.

**Max Pressure** Here you can set the maximum pressure for the system, i.e. the pressure that is not to be exceeded in the system. If this pressure is reached, the venting valve opens.

---

## 6 Operation

### 6.1 Function buttons

The function of the four buttons underneath the screen varies according to application. Their functions are indicated at the bottom of the screen in each case:

Button	Description
<b>Cont.</b>	Switch on continuous pump mode
<b>Menu</b>	Open main menu
<b>Set</b>	Set required pressure
<b>Man.</b>	Activate manual pump mode
<b>Prog.</b>	Set time and pressure for Timer mode
<b>OK</b>	Confirm and save setting
<b>ESC</b>	Exit setting mode without saving changes
<b>◀</b>	Go back one level in the menu system
<b>▶</b>	Go forward one level in the menu system
<b>▲</b>	Scroll upwards in a list
<b>▼</b>	Scroll downwards in a list
<b>P ↑</b>	Pause an evacuation sequence (Hold mode) and slightly increase the system pressure
<b>P ↓</b>	Reduce system pressure during calibration
<b>H Off</b>	Cancel Hold mode
<b>Yes</b>	Acknowledge a screen message
<b>No</b>	Reject a screen message
<b>Next</b>	Move to the next screen
<b>Back</b>	Go back to the previous screen

## 6.2 Performing distillation

- ▶ Switch on the I-100 at the master switch on the right.

Depending on the requirements, the Interface I-100 may be operated in any of the following modes:

- Continuous mode (see Chapter 6.2.2 "Continuous mode", page 24)
- Manual mode (see Chapter 6.2.1 "Manual mode", page 23)
- Timer mode (see Chapter 6.2.3 "Timer mode", page 25)

### 6.2.1 Manual mode

- ▶ Press the **Set** button.

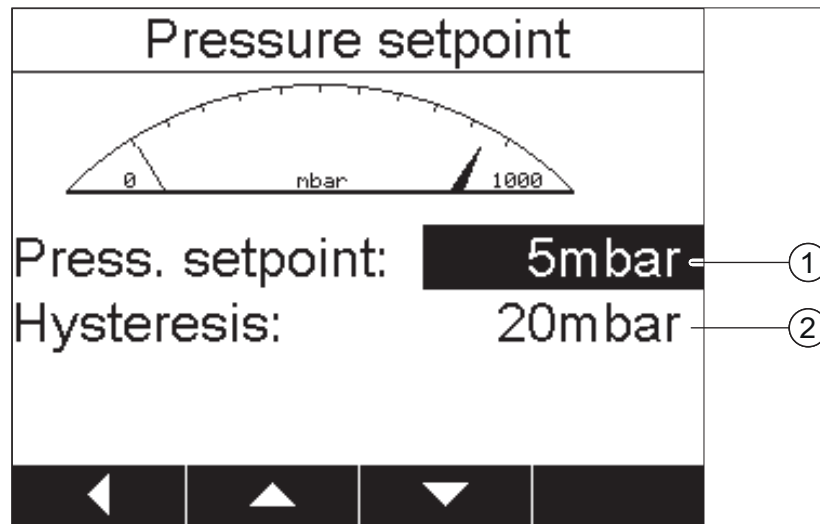


Fig. 13: Setting the required pressure

- ▶ Using the arrow buttons, set the specified pressure (1) and the hysteresis (2) and press **OK** to confirm in each case.



#### NOTE

The hysteresis is the tolerance by which the pressure may fluctuate before it is corrected by the pump.

- ▶ Press the **START** button.  
The vacuum pump switches on and runs until the set pressure is reached. Thereafter the pump will intermittently start up automatically to maintain the pressure.

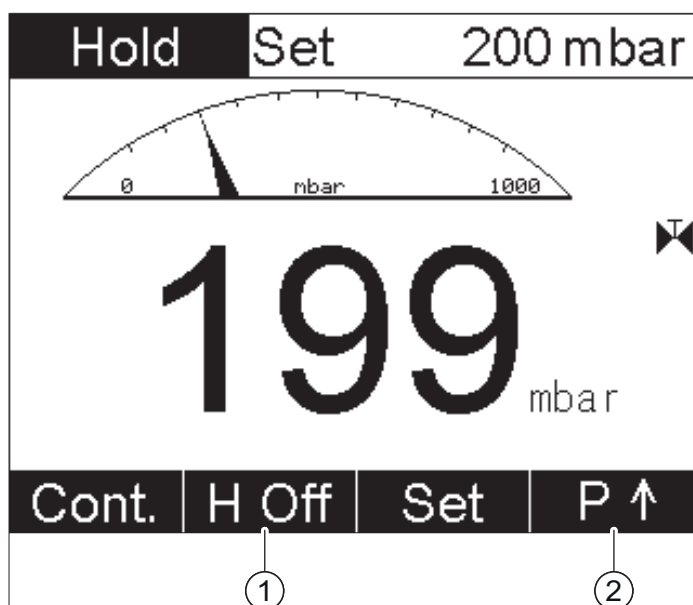


Fig. 14: Display during evacuation sequence

- ▶ To increase the specified pressure while evacuation is in progress, press the **P↑** button (2).  
The system pressure is increased by a small amount and the pump switches to Hold mode. The current pressure is maintained even if the specified setting has not yet been reached.
- ▶ To cancel Hold mode, press the **H Off** button (1).  
The specified pressure previously set is reinstated.
- ▶ To stop the distillation process, press the **STOP** button.
- ▶ If necessary, depending on the venting setting (see Chapter 5.4.1 "Controller settings", page 20), press the **STOP** button again to vent the system.

### 6.2.2 Continuous mode

- ▶ Press the **Cont.** button.  
The vacuum pump is switched on and keeps running until the **STOP** or **Man.** button is pressed. After an hour, the vacuum pump switches to Eco mode (see vacuum pump operating instructions).

### 6.2.3 Timer mode

In Timer mode the set pressure is maintained for the set time. Depending on the venting setting (see Chapter 5.4.1 "Controller settings", page 20), the system is then either immediately vented or a message simply displayed indicating that distillation has finished.

- ▶ Press the **Menu** button and for **Mode** select **Timer**.

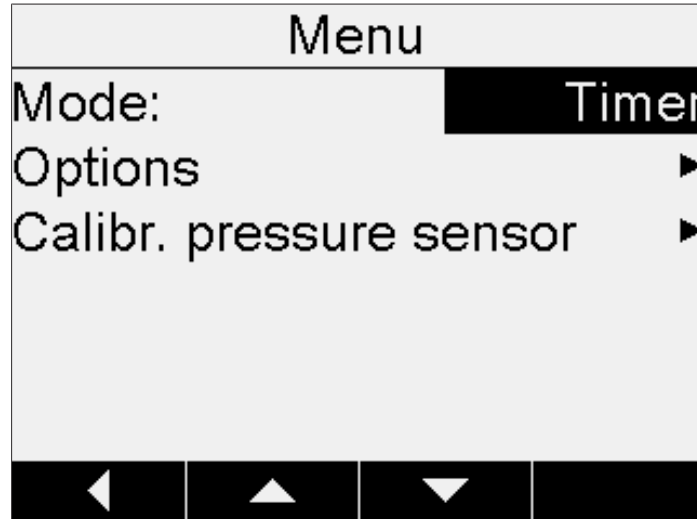


Fig. 15: Main menu

- ▶ Press the **Prog.** button.
- ▶ Using the arrow buttons, set the pressure and the time and press **OK** to confirm in each case.
- ▶ Press the **START** button.  
The vacuum pump switches on and runs until the set pressure is reached. Thereafter the pump will intermittently start up automatically to maintain the pressure.
- ▶ If necessary, depending on the venting setting (see Chapter 5.4.1 "Controller settings", page 20), press the **STOP** button to vent the system.

### 6.3 Calibrating the pressure sensor

The pressure sensor is calibrated at the factory by BUCHI prior to delivery. However, it can be recalibrated with the aid of an external reference pressure gauge at any time.

- ▶ Press the **Menu** button and select **Pressure sensor calibration**.

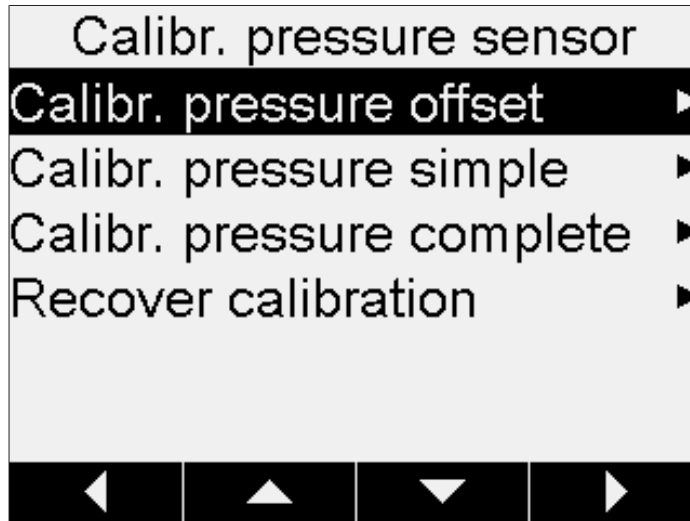


Fig. 16: Menu > Pressure sensor calibration

#### 6.3.1 Offset calibration

An offset has to be specified if the pressure indicated on the interface unit differs from the pressure indicated by an external reference pressure gauge. The difference between the two figures is referred to as the offset. The offset applies to the entire pressure range.

- ▶ On the calibration menu, select the option **Calibration pressure offset**.

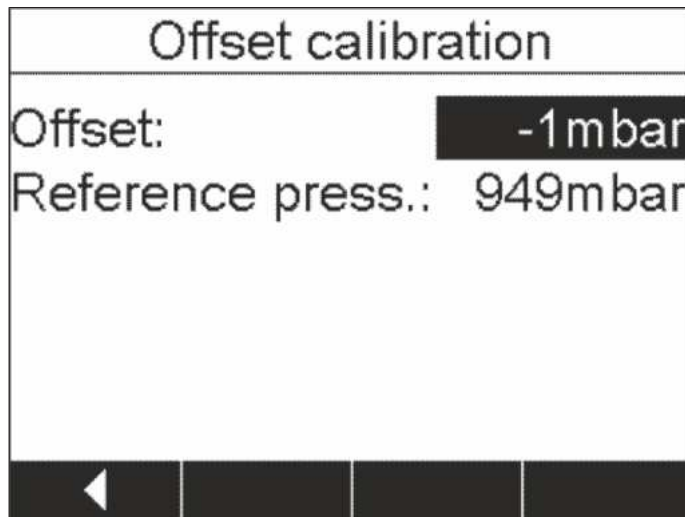


Fig. 17: Menu > Pressure sensor calibration > Calibration pressure offset

- ▶ Using the arrow buttons, set the offset and press **OK** to confirm. The measured readings will then automatically be adjusted by the specified offset.
- ▶ Make sure that the reference pressure indicated on the interface unit matches the figure shown on the external reference pressure gauge.

### 6.3.2 Simple calibration (without temperature compensation)

This calibration method is used to adjust the linearity of the pressure sensor at specific predefined pressure levels. During the calibration sequence the pressure sensor is calibrated at room temperature in six stages at normal atmospheric pressure and at 800, 600, 400, 200 and 10 mbar.



#### NOTE

This calibration process may only be carried out by authorized service technicians.

During the calibration sequence, the system carries out a plausibility check on the measured readings and indicates a fault if the confirmed readings are implausible.

- ▶ Connect the reference pressure gauge to the same vacuum system that the pump and interface unit are connected to.
- ▶ On the calibration menu, select the option **Simple pressure calibration**.

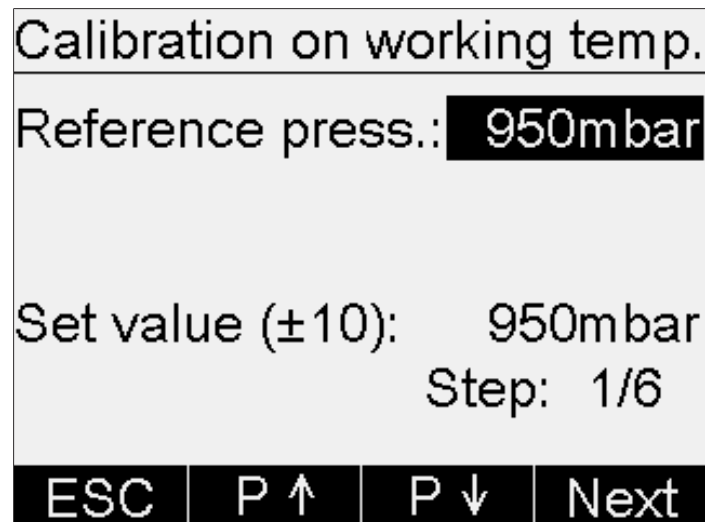


Fig. 18: Menu > Pressure sensor calibration > Simple pressure calibration

- ▶ Using the arrow buttons, adjust the specified reference pressure to the figure shown on the reference pressure gauge and press **OK** to confirm.
- ▶ Press the **Next** button.
- ▶ Using the **P↑** and **P↓** buttons, increase/decrease the vacuum in the system until the pressure shown on the reference gauge is within  $\pm 10$  mbar of the specified setting.
- ▶ Repeat the last three steps for each of the pressure levels listed above.
- ▶ On completion of the last step, press **OK** to confirm the calibration. The calibration settings are saved and the display reverts to the default screen.

### 6.3.3 Complete calibration (with temperature compensation)

This calibration method is used to adjust the linearity of the pressure sensor at specific predefined pressure levels and temperatures. During the calibration sequence the pressure sensor is calibrated at room temperature and at a temperature of approx. 55 °C in six stages at normal atmospheric pressure and at 800, 600, 400, 200 and 10 mbar.



#### NOTE

This calibration process may only be carried out by authorized service technicians.

During the calibration sequence, the system carries out a plausibility check on the measured readings and indicates a fault if the confirmed readings are implausible.

- ▶ Connect the reference pressure gauge to the same vacuum system that the pump and interface unit are connected to.
- ▶ On the calibration menu, select the option **Complete pressure calibration**.

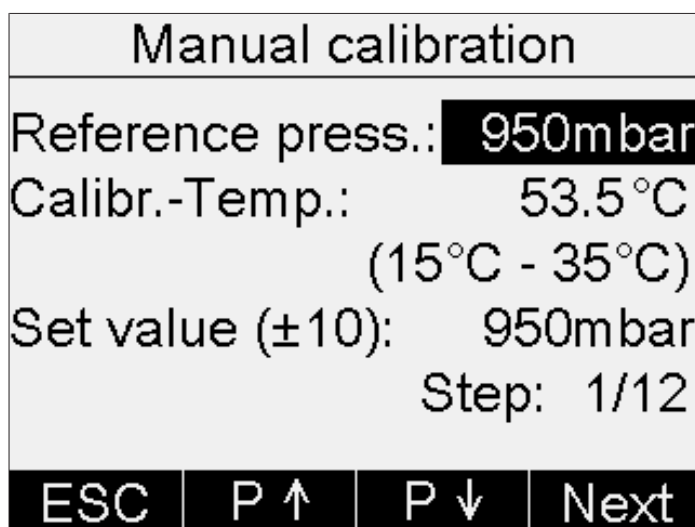


Fig. 19: Menu > Pressure sensor calibration > Complete pressure calibration.

- ▶ Using the arrow buttons, adjust the specified reference pressure to the figure shown on the reference pressure gauge and press **OK** to confirm.
- ▶ Press the **Next** button.
- ▶ Using the **P↑** and **P↓** buttons, increase/decrease the vacuum in the system until the pressure shown on the reference gauge is within  $\pm 10$  mbar of the specified setting.
- ▶ Repeat the last three steps for each of the pressure levels listed above.
- ▶ When the six pressure levels have been calibrated at room temperature, place the interface unit in a laboratory kiln and heat it up to 55 °C (approx. 1.5 hours).
- ▶ **CAUTION! Risk of skin burns. Wear protective gloves.** Leave the interface unit in the kiln and repeat the steps set out above.
- ▶ On completion of the last step, press **OK** to confirm the calibration. The calibration settings are saved and the display reverts to the default screen.

### 6.3.4 Loading the factory calibration

This function enables you to reset the calibration to the factory settings as supplied. Any previously saved calibration settings will be deleted.

- ▶ To reset the calibration to the factory settings as supplied, open the calibration menu and select the option **Load factory calibration**.  
The device asks you to confirm that the factory calibration should be reloaded.
- ▶ Press the **Yes** button to confirm or the **No** button to retain the existing calibration settings.

## 7 Cleaning and servicing



### NOTE

Users may only carry out the servicing and cleaning operations described in this section.

Any servicing and repair work which involves opening up the casing may only be carried out by BUCHI service technicians.

- ▶ Use only genuine BUCHI consumables and spare parts in order to ensure correct operation of the device and preserve the warranty.

### 7.1 Cleaning the housing

#### IMPORTANT

#### Risk of acid damage

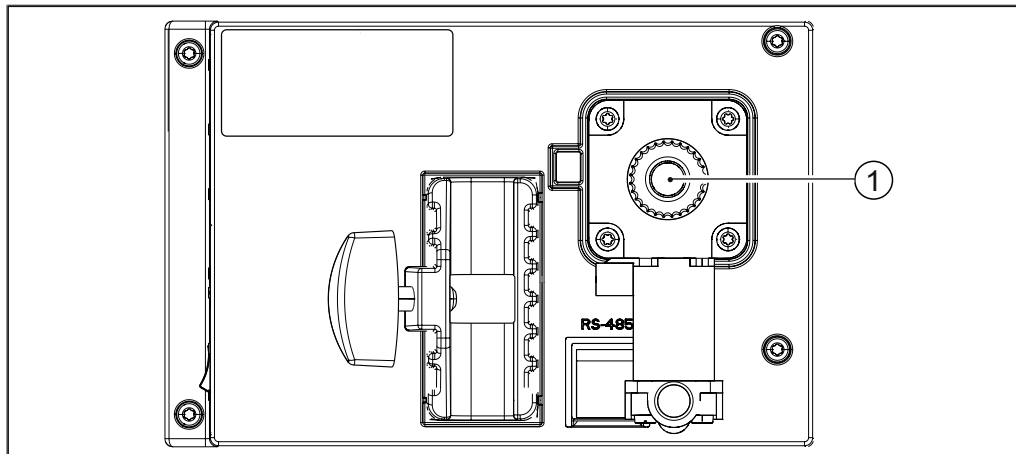
The housing of the unit is made of plastic. Escaping acid may damage the material.

- ▶ Immediately remove any drops of acid with a damp cloth.

- ▶ Use a damp cloth to clean the device.
- ▶ To clean the housing, only use ethanol or soapy water.

### 7.2 Checking seals

Seals are wear parts. They have to be regularly inspected, cleaned and, if necessary, replaced. The life of a seal depends on how much it is used and how well it is looked after.



- ▶ Remove seal from vacuum connection (1) and examine for damage and cracks.
- ▶ Rinse intact seals in water or ethanol and dry with a soft cloth.
- ▶ Replace damaged seals.

## 8 Help with faults

### 8.1 Faults, possible causes and remedies

Fault	Possible cause	Remedy
Device does not work	Device is not connected to power supply	▶ Check power supply (see Chapter 5.2 "Connections", page 18).
Valve or pump frequently switches over	System leaking	▶ Check system for leaks (see Rotavapor operating instructions). ▶ If necessary, replace tubing and/or seals.
	Hysteresis setting too small	▶ Select a larger hysteresis (for terminal vacuums greater than 700 mbar, set to automatic hysteresis; see Chapter 6.2.1 "Manual mode", page 23).
Valve does not switch over	Valve coil dirty	▶ Contact BUCHI Customer Service.
	Valve lead not plugged in	▶ Plug in valve lead.
	Valve not adjusted	▶ Contact BUCHI Customer Service.
Vacuum is not achieved	Back-evaporation from the receiving flask	▶ Empty receiving flask (see Rotavapor operating instructions).
	System leaking	▶ Check system for leaks (see Rotavapor operating instructions). ▶ If necessary, replace tubing and/or seals.
	Water pressure of glass filter pump too low	▶ Increase water flow (see pump operating instructions).
	Vacuum pump too weak	▶ Use suitably dimensioned vacuum pump.

## 8.2 Error messages

Error message	Remedy
Pressure sensor is defective.	▶ Contact BUCHI Customer Service.
Pressure sensor not calibrated.	▶ Calibrate pressure sensor (see Chapter 6.3 "Calibrating the pressure sensor", page 26).
Data transmission error on RS-485.	▶ Check RS-485 lead and make sure that it is only connecting an interface unit to a recirculating chiller.
Excess pressure in system.	▶ Set pump to continuous mode until the system pressure is reduced.
Error reading from or writing to memory (EEPROM).	▶ Contact BUCHI Customer Service.

## 8.3 Customer service

Repairs to the device may only be carried out by authorized service technicians. The service technicians have been comprehensively technically trained and are aware of the potential hazards that can arise from the device.

The addresses of the official BUCHI Customer Service offices can be found on the BUCHI website at: [www.buchi.com](http://www.buchi.com). If you have any questions regarding technical issues or faults, please contact those offices.

Customer Services can offer you:

- supply of spare parts
- repairs
- technical advice

## **9 Taking out of service and disposal**

### **9.1 Taking out of service**

- ▶ Switch off the Interface I-100 and disconnect it from the mains power supply.
- ▶ Remove all tubing and communication cables from the device.

### **9.2 Disposal**

The operator is responsible for proper disposal of the Interface.

- ▶ When disposing of equipment observe the local regulations and statutory requirements regarding waste disposal.

## 10 Appendix

### 10.1 Solvent table

Solvent	Formula	Molar mass in g/mol	Evaporation energy in J/g	Boiling point in °C at 1013 mbar	Density in g/cm <sup>3</sup>	Vacuum in mbar for 40 °C boiling point
Acetone	CH <sub>3</sub> H <sub>6</sub> O	58.1	553	56	0.790	556
<i>n</i> -Amyl alcohol, <i>n</i> -pentanol	C <sub>5</sub> H <sub>12</sub> O	88.1	595	37	0.814	11
Benzene	C <sub>6</sub> H <sub>6</sub>	78.1	548	80	0.877	236
<i>n</i> -butanol	C <sub>4</sub> H <sub>10</sub> O	74.1	620	118	0.810	25
Tert butyl alcohol (2-methyl-2-propanol)	C <sub>4</sub> H <sub>10</sub> O	74.1	590	82	0.789	130
Chlorobenzene	C <sub>6</sub> H <sub>5</sub> Cl	112.6	377	132	1.106	36
Chloroform	CHCl <sub>3</sub>	119.4	264	62	1.483	474
Cyclohexane	C <sub>6</sub> H <sub>12</sub>	84.0	389	81	0.779	235
Diethyl ether	C <sub>4</sub> H <sub>10</sub> O	74.0	389	35	0.714	850
1,2-dichloroethane	C <sub>2</sub> H <sub>4</sub> Cl <sub>2</sub>	99.0	335	84	1.235	210
<i>cis</i> -1,2-dichloroethylene	C <sub>2</sub> H <sub>2</sub> Cl <sub>2</sub>	97.0	322	60	1.284	479
<i>trans</i> -1,2-dichloroethylene	C <sub>2</sub> H <sub>2</sub> Cl <sub>2</sub>	97.0	314	48	1.257	751
Di-isopropyl ether	C <sub>6</sub> H <sub>14</sub> O	102.0	318	68	0.724	375
Dioxane	C <sub>4</sub> H <sub>8</sub> O <sub>2</sub>	88.1	406	101	1.034	107
DMF (dimethylformamide)	C <sub>3</sub> H <sub>7</sub> NO	73.1	–	153	0.949	11
Acetic acid	C <sub>2</sub> H <sub>4</sub> O <sub>2</sub>	60.0	695	118	1.049	44
Ethanol	C <sub>2</sub> H <sub>6</sub> O	46.0	879	79	0.789	175
Ethylacetate	C <sub>4</sub> H <sub>8</sub> O <sub>2</sub>	88.1	394	77	0.900	240
Heptane	C <sub>7</sub> H <sub>16</sub>	100.2	373	98	0.684	120
Hexane	C <sub>6</sub> H <sub>14</sub>	86.2	368	69	0.660	360
Isopropylalcohol	C <sub>3</sub> H <sub>8</sub> O	60.1	699	82	0.786	137
Isoamylalcohol (3-methyl-1-butanol)	C <sub>5</sub> H <sub>12</sub> O	88.1	595	129	0.809	14
Methylethylketone	C <sub>4</sub> H <sub>8</sub> O	72.1	473	80	0.805	243
Methanol	CH <sub>4</sub> O	32.0	1227	65	0.791	337
Methylene chloride, dichloromethane	CH <sub>2</sub> Cl <sub>2</sub>	84.9	373	40	1.327	850
Pentane	C <sub>5</sub> H <sub>12</sub>	72.1	381	36	0.626	850
<i>n</i> -propylalcohol	C <sub>3</sub> H <sub>8</sub> O	60.1	787	97	0.804	67
Pentachloroethane	C <sub>2</sub> HCl <sub>5</sub>	202.3	201	162	1.680	13

Solvent	Formula	Molar mass in g/mol	Evaporation energy in J/g	Boiling point in °C at 1013 mbar	Density in g/cm <sup>3</sup>	Vacuum in mbar for 40 °C boiling point
1,1,2,2-tetrachloroethane	C <sub>2</sub> H <sub>2</sub> Cl <sub>4</sub>	167.9	247	146	1.595	20
Carbon tetrachloride	CCl <sub>4</sub>	153.8	226	77	1.594	271
1,1,1-trichloroethane	C <sub>2</sub> H <sub>3</sub> Cl <sub>3</sub>	133.4	251	74	1.339	300
Tetrachloroethylene	C <sub>2</sub> Cl <sub>4</sub>	165.8	234	121	1.623	53
THF (tetrahydrofuran)	C <sub>4</sub> H <sub>8</sub> O	72.1	–	67	0.889	374
Toluene	C <sub>7</sub> H <sub>8</sub>	92.2	427	111	0.867	77
Trichloroethylene	C <sub>2</sub> HCl <sub>3</sub>	131.3	264	87	1.464	183
Water	H <sub>2</sub> O	18.0	2261	100	1.000	72
Xylene (mixture)	C <sub>8</sub> H <sub>10</sub>	106.2	389	–	–	25
<i>o</i> -xylene	C <sub>8</sub> H <sub>10</sub>	106.2	–	144	0.880	–
<i>m</i> -xylene	C <sub>8</sub> H <sub>10</sub>	106.2	–	139	0.864	–
<i>p</i> -xylene	C <sub>8</sub> H <sub>10</sub>	106.2	–	138	0.861	–

## 10.2 Spare parts and accessories

- Use only genuine BUCHI consumables and spare parts in order to ensure correct, safe and reliable operation of the system.



### NOTE

Any modifications of spare parts or assemblies are only allowed with the prior written permission of BUCHI.

### 10.2.1 Accessories

#### Communication cables

<b>Mini-DIN, 0.6m</b> Connection between interface and vacuum pump	11060882
<b>RJ45, 2m</b> Connection between vacuum controller/interface unit and recirculating chiller or vacuum controller/interface unit and vacuum pump	044989
<b>RJ45, 5m</b> Connection between vacuum controller/interface unit and recirculating chiller or vacuum controller/interface unit and vacuum pump	11056240

#### Tubing

<b>Natural rubber, Ø6/16mm, red, per m</b> Utilization: Vacuum	017622
<b>Nyflex, PVC-P, Ø8/14mm, transparent, per m</b> Utilization: Vacuum, cooling media, feeding (industrial Rotavapor)	004113

#### Further accessories

<b>Cooling water valve. 24VAC</b> Valve opens cooling water feed during distillation, only used in combination with a vacuum controller/interface	031356
<b>Power adapter. 30V, 30W, frequency 50/60Hz</b> To power Interface I-100	11060669
<b>Support interface. Incl. connection tube, holder</b> To mount vacuum controller/interface on vacuum pump. Contents: Holder, hose barbs, connection piece	11061448
<b>Vacuum valve. 2.4mm, 24VDC</b> For use with a centralized vacuum source or an unregulated vacuum pump, does not include condensate trap, only used in combination with a vacuum controller/interface	031353
<b>Valve unit. Incl. Woulff bottle, 125mL, P+G, holder</b> The valve is only to use in combination with a vacuum controller/interface	047160
<b>Water jet pump, B-764. Magnetic valve, FFKM, 24V</b> Simple principle of vacuum generation, without cooling water valve, only used in combination with a vacuum controller/interface	031358
<b>Woulff bottle. 125mL, P+G, incl. holder</b> For trapping particles and droplets and for pressure equalization	047170

	<b>Woulff bottle. 3-neck, 800mL, P+G</b> For trapping particles and droplets and for pressure equalization	025519
<b>10.2.2</b>	<b>Wear parts</b>	
	<b>Seals</b>	
	<b>For cap nut, GL14, FEP</b>	038225
	<b>Hose barbs</b>	
	<b>Set. 2pcs, bent (1), straight (1), GL14, silicone seal</b> Content: Hose barbs, cap nuts, seals	041939
	<b>Set. 4pcs, bent, GL14, silicone seal, incl. cap nut</b> Content: Hose barbs, cap nuts, seals	037287
	<b>Set. 4pcs, straight, GL14, silicone seal</b> Content: Hose barbs, cap nuts, seals	037642
	<b>Further wear parts</b>	
	<b>Cap nuts, set. 10pcs, screw cap with hole, GL14, incl. FEP seal</b> Content: Hose barbs, cap nuts, seals	041999
<b>10.2.3</b>	<b>Spare parts</b>	
	<b>Connection piece. PTFE, Ø6/8mm, 162mm</b> Tubing between vacuum controller/interface and Woulff bottle	047154

### 10.3 List of abbreviations

Abbreviation	Meaning
ADR	Accord européen relatif au transport international des marchandises dangereuses par route (European Agreement concerning the International Carriage of Dangerous Goods by Road)
DKD	Deutscher Kalibrierdienst (German Calibration Service)
FCC	Federal Communications Commission
FEP	Fluorinated ethylene propylene
FFKM	Perfluoro-elastomer
GGVE	Gefahrgutverordnung Eisenbahn (German Hazardous Goods Regulations for Railways)
GGVS	Gefahrgutverordnung Strasse (German Hazardous Goods Regulations for Road Transport)
PBT	Polybutylene terephthalate
PEEK	Polyetheretherketone
PPS	Polyphenylene sulfide
PTFE	Polytetrafluoroethylene
PVC	Polyvinyl chloride
RID	Règlement concernant le transport international ferroviaire de marchandises dangereuses (Regulations concerning the International Carriage of Dangerous Goods by Rail)

### 10.4 Health and safety approval

To guarantee the health and safety of our staff and to comply with the law and the regulations for handling hazardous materials, for the purposes of health and safety at work and safe disposal of waste, no products may be sent back to BÜCHI Labortechnik AG or repaired unless we have received the declaration below, completed and signed.

Products sent to us will not be accepted for repair or DKD calibration until we have received this declaration.

- ▶ Copy the form overleaf and complete it.
- ▶ Make sure that you know the full details of the substances with which the device has been in contact and the all questions have been answered fully and correctly.
- ▶ Send the completed form to us in advance by post or fax. The declaration must reach us before the device.
- ▶ Enclose a copy of the declaration with the device.
- ▶ If the product is contaminated, inform the carrier (in accordance with GGVE/ GGVS/RID/ADR).

If the declaration is missing or the procedure described is not followed, the repairs will be delayed. We ask for your understanding and cooperation with regard to these measures.

## 10.5 Health and safety

### Declaration regarding the safety, hazards and safe disposal of waste

To guarantee the health and safety of our staff and to comply with the law and the regulations for handling hazardous materials, regarding health and safety at work, and to comply with safety regulations, health and safety requirements and requirements for safe disposal of waste such as chemical waste, chemical residues or solvents, the form below must be fully completed and signed whenever devices or faulty components are to be sent back to our factory.

**Products or components will not be accepted if this declaration has not been provided.**

<b>Device</b>	Model:	Part/Device no.:
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**Declaration for non-hazardous materials**

We hereby assure that the products returned

- have not been used in the laboratory and are new.
- have not been in contact with toxic, corrosive, biologically active, explosive, radioactive or other hazardous materials.
- are not contaminated. The solvents or residues of the substances pumped have been removed.

**Declaration for hazardous materials**

In respect of the products returned, we hereby assure that

- all substances (toxic, corrosive, biologically active, explosive, radioactive or otherwise hazardous) that have been pumped by the products or have otherwise been in contact with the products are listed below.
- the products have been cleaned, decontaminated, sterilised inside and outside and all inlets and outlets are sealed.

List of hazardous materials that have been in contact with the products:

Chemical, material	Hazard category

**Final declaration**

We hereby declare that

- we are fully conversant with the substances that have been in contact with the products and have answered all questions correctly.
- we have taken all measures necessary to prevent potential hazards in respect of the products returned.

Company name or stamp:

Place, date:

Name (block letters), position (block letters):

Signature:

## 10.6 FCC requirements (for USA and Canada)

### English:

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to both Part 15 of the FCC Rules and the radio interference regulations of the Canadian Department of Communications. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment.

This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

### Français:

Cet appareil a été testé et s'est avéré conforme aux limites prévues pour les appareils numériques de classe A et à la partie 15 des réglementations FCC ainsi qu'à la réglementation des interférences radio du Canadian Department of Communications. Ces limites sont destinées à fournir une protection adéquate contre les interférences néfastes lorsque l'appareil est utilisé dans un environnement commercial.

Cet appareil génère, utilise et peut irradier une énergie à fréquence radioélectrique, il est en outre susceptible d'engendrer des interférences avec les communications radio, s'il n'est pas installé et utilisé conformément aux instructions du mode d'emploi. L'utilisation de cet appareil dans les zones résidentielles peut causer des interférences néfastes, auquel cas l'exploitant sera amené à prendre les dispositions utiles pour palier aux interférences à ses propres frais.



