

Vacuum Controller Hei-VAC Control



Instructions for use

Original instructions Keep for future use!

This manual is only to be used and distributed in its complete and original form. It is strictly the users' responsibility to check carefully the validity of this manual with respect to his product.

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Thank you for purchasing this product. You have chosen a modern and technically high quality product.

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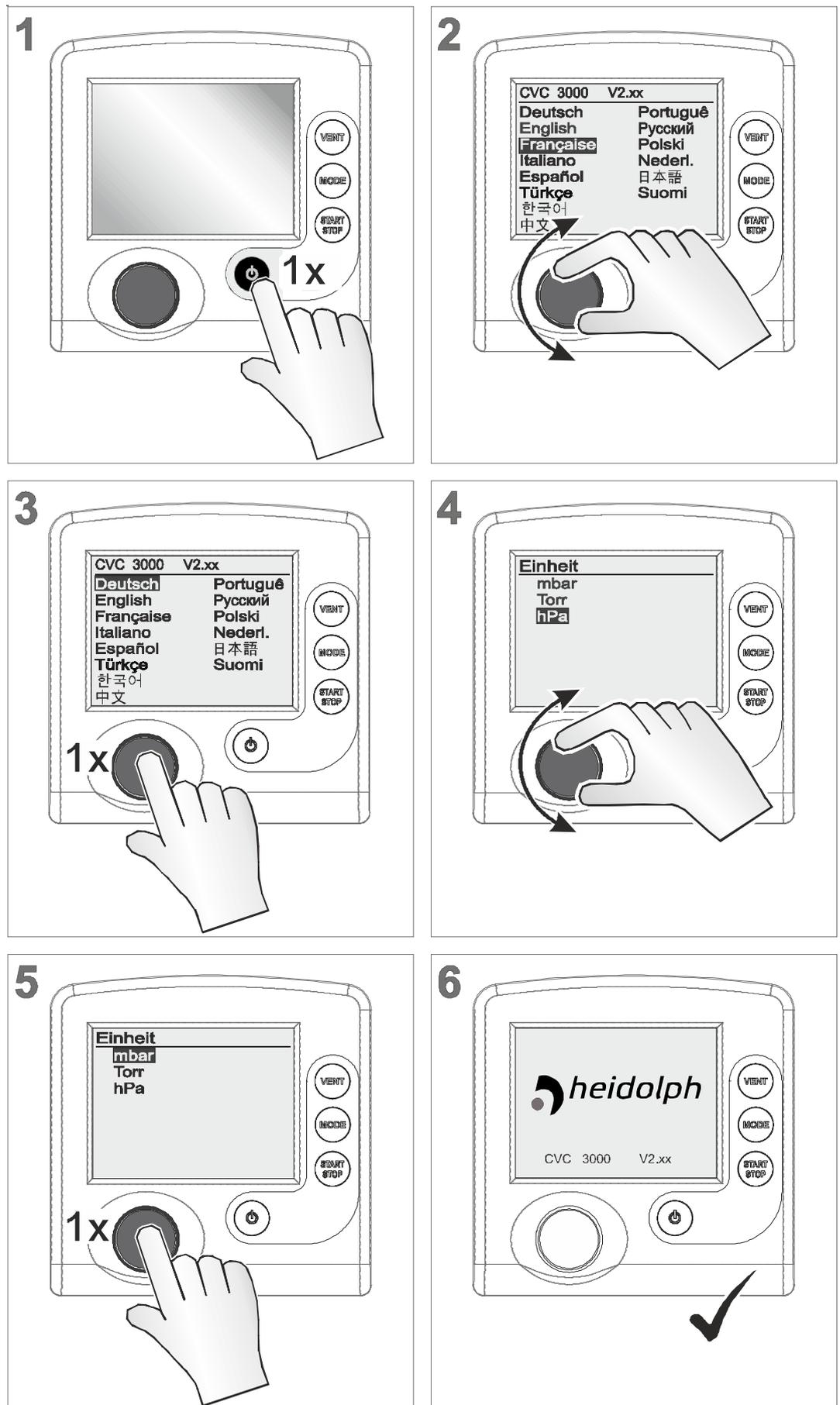
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Detailed descriptions about programming, function menu with address assignment, differential pressure measurement, and interface commands are included in the Online Instructions for use. You get the Online Instructions for use from the technical service of Heidolph Instruments.

First steps (delivery status)

First steps on delivery status
Select language and units



1 Introduction

This manual is part of your product. It provides important instructions for safe use of the product. Read this manual completely in order to understand proper use of your product.

1.1 User information

Safety

Instructions for use
and safety

- Read this manual thoroughly and completely before using the product.
- Keep this manual in an easily accessible location.
- Proper use of the product is essential for safe operation. Comply with all safety instructions provided!
- In addition to this manual, adhere to any relevant local accident prevention regulations and comply with industrial safety regulations.

General

General
information

- To make the text more readable in this manual, mostly the term **Controller** is used instead of **Hei-VAC Control**.
- When giving the product to a third party also hand out these instructions for use.
- The illustrations in this manual are provided as examples. They are intended to aid in your understanding of the proper use of the product.
- We reserve the right to modify or change the product design and/or technical specifications at any time without advanced notice.

Copyright

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Contact

- Contact us
- Contact us regarding any questions about this product, if you need further information, or to provide us with feedback.
 - When contacting our Customer Service Department, please be sure to have the correct type and serial number of your product → see *Rating plate*

1.2 About this document

1.2.1 Display conventions

Warning levels

Convention for warnings

	DANGER Indicates an imminent hazardous situation. Disregarding the situation will result in serious and even fatal injury or death. ⇒ Take appropriate action to avoid dangerous situation!
	WARNING Indicates a potentially hazardous situation. Disregarding the situation could result in serious, even fatal injury or massive damage to property. ⇒ Observe instruction to avoid dangerous situation!
	CAUTION Indicates a potentially hazardous situation. Disregarding the situation could result in slight or minor injury or damage to property. ⇒ Observe instruction to avoid dangerous situation!

Convention for additional notes

NOTICE
Notice for a potentially harmful situation. Disregarding the notice could lead to material damage.

Additional notes

IMPORTANT!

- ⇒ Information or specific use recommendation, which must be observed.
- ⇒ Important information for the proper operation.

- | | |
|---|---------------------------|
|  | ⇒ Helpful tips and tricks |
| | ⇒ Additional information |

1.2.2 Symbols and icons

This manual includes symbols and icons. Safety symbols indicate special danger in handling the product. Icons shall help to identify the danger directly and easier.

Safety symbols

Explanation of safety symbols



acute toxicity – hazards to human health



general warning symbol



danger: electricity



hot surface



explosive material



general prohibition symbol

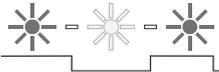


general mandatory sign



disconnect mains plug from outlet

Additional icons

References	 Positive example – Do! result – o. k.	 Negative example – Do not!
	 Refers to content of this manual.	 Refers to content of other documents.
Handling or action	 Press selection knob or key.	 Turn selection knob
	 Push and hold key	 Push and turn selection knob
Signals	 Flashing cycle – flashing icon indicating malfunction	
	 Sound – signal or warning sound	

 ⇒ For further detailed information about icons and signals in the display see chapter **5.2.2 Display icons on page 32.**

1.2.3 Handling instructions (action steps)

Action step (single step)

- Additional display conventions
- ⇒ Do the described step.
- Result of action.

Handling instructions(multiple steps)

1. first step
 2. next step
- Result of action.

Follow steps in the described order.

1.2.4 Abbreviations

Abbreviations

abs.	absolute
ATM	Standard Atmospheric Pressure
Hei-VAC Control	Vakuum controller, Controller
d_i (di)	Interior diameter
DN	Nominal diameter
EK	Emission condenser
EX*	Outlet
FKM	Fluorelastomer
Gr.	Size
hh:mm:ss	Time settings in hour/minute/second
hPa	Pressure unit, hectopascal (1 hPa = 1 mbar = 0.75 Torr)
IN*	Inlet
KF	Small flange
Max	Maximum value
mbar	Pressure unit, millibar (1 mbar = 1 hPa = 0.75 Torr)
Min	Minimum value
min	Minute
PA	Polyamide
PBT	Polybutylene terephthalate
PE	Polyethylene
respon.	responsible, supervising Specialist
RAN-N°	Return Merchandise Authorization number
SW	Wrench size (tool)
Torr	Pressure unit (1 Torr = 1.33 mbar = 1.33 hPa)
VAC	Vacuum
VMS	Vakuum Management System

* labeling on top of the vacuum pump

2 Safety instructions

All safety instructions must be observed by all individuals working with the product described here. The safety instructions are valid for the complete life cycle of the product.

2.1 Working conditions

Use the product only when it is in proper working condition.

2.1.1 Intended use

Intended use The **Hei-VAC Control** is a laboratory instrument, used to measure and/or control vacuum in therefore intended plants.
The controller may only be used in non-explosive areas and indoors.
Any other use is considered to be improper use. In that case, the safety and the protection of the system may be compromised.

Intended use also includes the following:



- observing safety information of document “**Safety Information for Vacuum Equipment**“.
- observing this manual.
- observing the manual of connected elements and to know their functioning.

2.1.2 Improper use

Using the product in contrary to its intended use could result in injury or damage to property.

Improper use includes:

- Improper use
- Using the product contrary to its intended use.
 - Operation with obvious malfunctions.

- Improper use
- Controlling explosive atmosphere. The device is not protected against explosion. There is no explosion or ATEX protection available.
 - Operation in impermissible operating and environmental conditions.
 - Unauthorized modifications and the use of accessories and spare parts that are not recommended by the manufacturer.
 - Use in mining.

2.1.3 Foreseeable misuse



Additionally to improper use there are types of use and dealing with the product, which are generally prohibited:

Foreseeable misuse

- Unauthorized modifications.
- The control of media which is liquid, hot, instable, or explosive.
- Installation and operation in explosive environments.
- To switch on/-off by foot or with unsuitable tool.
- To operate the controller with sharp stylus or objects.
- To put the controller completely into vacuum.
- To immerse the controller into liquid or to blast it with steam.

2.2 Target groups

IMPORTANT!

Ensure that the controller is only operated by authorized and skilled personnel.

Users need to have the corresponding skills and qualifications for doing the job listed in the table *User permissions*.

2.2.1 User permissions

This manual must be read, understood and complied with by the person performing one of the following tasks:

Responsibility
Assignment Matrix

Task (Job)	User	Specialist	Supervising Specialist
Installation and assembly		X	X
Commissioning		X	X
Operation	X	X	X
Readjust vacuum sensor		X	X
Error report	X	X	X
Troubleshooting		X	X
Update		X	X
Cleaning, simple	X	X	X
Clean vacuum sensor		X	X
Decontamination			X*
Repair order			X

* or order the decontamination by a qualified service provider.

2.2.2 Personal responsibility

Safe work

Personal safety has top priority. Processes which create a potentially hazardous situation are not allowed.

Always be conscious of safety, and work in a safe manner. Observe the owners' directives at work, the national accident prevention regulations and occupational safety provisions.

⇒ Use the controller only if you have understood its function and this manual.

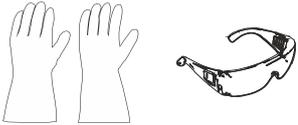
2.3 Safety precautions

Quality standards
and safety

Our products are subject to high quality tests with goals for safety and operation. Prior to delivery each product has been tested thoroughly.

2.3.1 Protective clothing

Protective clothing



No special protective clothing is required when working with the controller. Observe the owners regulation for workplaces.

Only for cleaning the controller we recommend to wear protective gloves, protective clothing and safety goggles.

IMPORTANT!

- ⇒ Be sure to observe the local requirements for decontamination.
- ⇒ Wear your personal protective equipment when handling chemical materials.

2.3.2 Eliminate sources of danger

	DANGER
	<p>Explosion hazard for critical processes. Depending on the process explosive mixtures can develop.</p> <p>⇒ Never operate critical processes unattended!</p>

Explosion danger for
critical processes

Depending on the running process, explosive mixtures can form in plants or other hazardous situations could result!

IMPORTANT!

Malfunctions which may affect safety must be eliminated immediately.

- ⇒ Do not work with damaged components.
- ⇒ Replace defective parts immediately, e. g., broken cable or faulty plug-connection.

Sources of error during connection

NOTICE

Measuring error due to an obstructed vacuum line.

⇒ Prevent overpressure > 1060 mbar (> 795 Torr) in the piping system.

Condensate Condensate can falsify the measurement. Position the vacuum hose in such a way that condensate cannot flow towards the controller and its vacuum sensor. No liquid should accumulate inside the vacuum hose.

⇒ Install vacuum hoses in such a way that condensate cannot flow into the controller.

Particles, liquids, dust Particles, liquids or dust may not enter the controller.

⇒ Install a separator or filter at the intake of the system. Appropriate filters are for example chemically resistant, and resistant to clogging.

Risks due to residual energy

Residual energy After switching off the controller and disconnecting it from mains, risk of residual energy could still prevail at the power supply adapter.

⇒ Repairs may only be performed by qualified personnel, e. g., service technician.



Installation and explosive environment

Installation and operation in areas where explosive atmospheres can occur is not allowed.

Avoid ignition
sources

The use of gas ballast or the operation of venting valves is only permitted if thereby explosive atmospheres normally do not occur in the interior of the equipment or, if they do occur, are likely to do so only infrequently and for a short period.

⇒ If necessary vent with inert gas.

2.4 Safety and service

Obligations for
service jobs

Safety regulations that apply to your work environment also apply to persons who perform service works, especially in the handling of hazardous materials.

2.4.1 Meaning Health and Safety Clearance

Products which are potentially hazardous may only be returned when all dangerous contaminations are removed.

IMPORTANT!

- ⇒ Observe the requirements for services.
- ⇒ Observe the *Notes on return to the factory* listed on the form Health and Safety Clearance.
- ⇒ Protect the service personnel from hazardous substances.
- ⇒ Confirm harmlessness with your signature.



⇒ You get the form *Health and Safety Clearance* from Heidolph Instruments.

2.4.2 Requirements for services

Fulfill the following conditions

1. Clean your product thoroughly and if necessary decontaminate it professionally.

IMPORTANT!

For all service works hazardous substances need to be excluded.

2. Fill in the form *Health and Safety Clearance* thoroughly and completely.
3. Contact your local supplier or our service department.
4. Request a **RAN-N°** for your **service order**.

5. **Before returning the product**, please **send the signed *Health and Safety Clearance*** form to your local supplier or our service department.

IMPORTANT!

For all service works the safety clearance needs to be proofed and confirmed.

⇒ Did your product get in touch with hazardous substances?
Please wait for the release of reshipment.

6. Send in your product including:

- RAN-N°,
- Service order (e. g., repair),
- Form *Health and Safety Clearance*,
- Short description (e. g., malfunction, working environment, media).

2.5 Environmental protection

NOTICE

Risk of environmental damage due to incorrect disposal of the controller.

- ⇒ Do not dispose your product in household waste!
Electronic components are subject to hazardous waste treatment and must only be disposed of by certified specialists.
- ⇒ Observe the national regulations for safe disposal and environmental protection.
- ⇒ Receive detailed information about respective regulations from your competent administrative authority.



3 Product description

Goods arrival

Check incoming goods

Check the shipment for transport damage and completeness.
⇒ Report any transit damage immediately to the supplier.

NOTICE

Condensate can damage the controller.

A large temperature difference between storage location and installation location can cause condensation.

⇒ Let the product acclimatize for 3–4 hours.

Included materials

Scope of supply

Component	Quantity	Order number
Controller Hei-VAC Control	1	11-008-003-75
Power supply unit 30W 24V; including interchangeable mains plugs	1	11-300-008-12
Vacuum valve preassembled	1	569-00080-00
Plastic foot CVC 3000	1	11-300-008-11
Operating manual german	1	01-005-005-87
Operating manual english	1	01-005-005-95
Warranty registration / confirmation of condition	1	01-006-002-78
EU Declaration of conformity	1	01-001-025-18

3.1 Vacuum controller Hei-VAC Control

The controller is designed for applications requiring controlled vacuum.

The controller has a two-point control mode to switch an in-line isolation valve.

The controller is freely programmable. Up to 10 programs can be stored in the controller memory. Each program also offers up to 10 program steps (time/pressure) plus control functions, such as: venting, pump down and ramp function.

The controller enables the measurement of relative pressure with regard to a reference sensor (VSK 3000).

Front side

Front panel

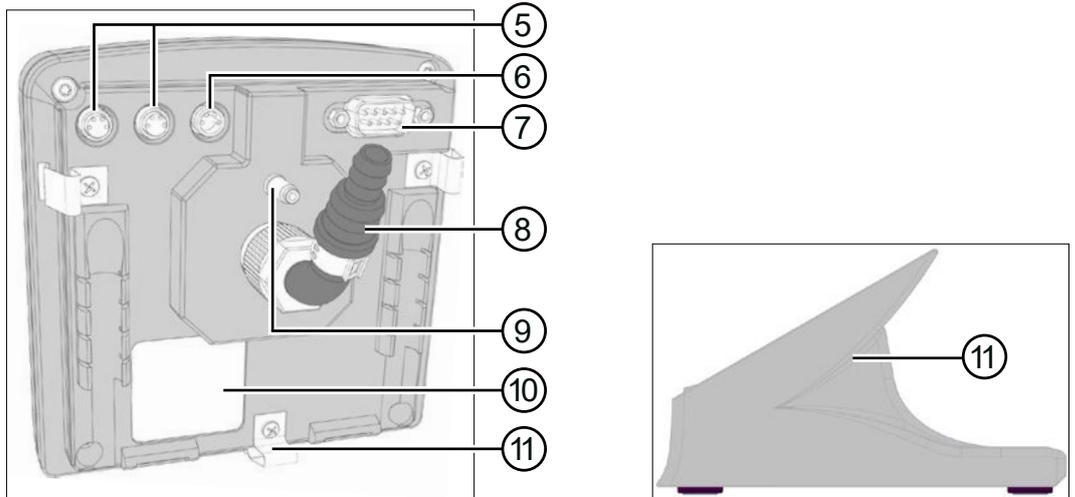


Meaning

1	Chemically resistant plastic housing
2	LC display
3	Control panel
4	Selection knob

Rear side

Rear side



Meaning

5	Ports for Heidolph vacuum valve
6	Mains connection ▶ power supply unit
7	Serial port RS 232 C (Sub-D)
8	Hose nozzle, vacuum connection
9	Venting tube, connection for external venting, e. g., inert gas
10	Rating plate
11	Spring clip as fixation for built-in version or plastic foot for table top version

3.2 Functionality

Functionality The controller manages vacuum processes by controlling vacuum pumps, in-line isolation- and/or air admittance valves. It controls process vacuum, cooling water and venting to demand.



Valves and/or vacuum pumps are necessary to operate the controller.

Without those components the controller can only be used as vacuum measurement device.

Specification

Specification and features

- Ceramic diaphragm vacuum sensor¹ and venting valve are already integrated into the controller.
- The ceramic vacuum sensor is chemically highly resistant, measures accurately and is gas-type independent.
- While booting the controller checks for current configuration of connected components.
- Operating elements are the selection knob, buttons on the control panel and full text menus on the display.

3.3 Operation modes

Up to 5 different operation modes are selectable at the controller. Specific modifications can be realized by individual mode menus.

Selectable operation modes

- **Pump down**
- **Vac control**
- **Program**

For more information about individual operation modes
→ see chapter **6.3.2 Mode menu on page 41**

¹ -> excluded for package fine vacuum control with VSP 3000.

4 Installation and connection

The controller is designed for installation directly at the workplace.



⇒ Observe all specifications for installation, connection and operation according to technical data,
→ see *chapter 10.1.1 Technical data*.

⇒ Also observe rating plate data.

Installation conditions

Consider installation conditions

- The controller has acclimatized.
- Ambient conditions are observed and are within the limitation of use.

Limitation of use		(US)
Ambient temperature	10–40 °C	50–104°F
Altitude, max.	3000 m above sea level	9840 ft above sea level
Relative humidity	30–85 %, non condensing	
Degree of protection (controller front)	IP 20 (IP 42)	
Avoid condensation or contamination by dust, liquids or corrosive gases.		

4.1 Installation

4.1.1 Table top version

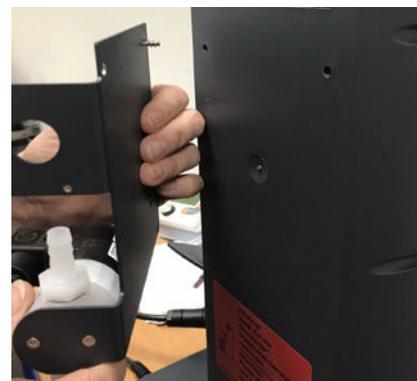


The table top or bench-top type controller can be installed and connected directly on top of the work bench or on laboratory table. The table top version is supplied with a hose nozzle. The hose nozzle should be positioned in a way that the connected vacuum hose cannot kink.

4.1.2 Attachment to Hei-VAP Rotary Evaporator

The Hei-VAC Control can be attached to Hei-VAP Rotary Evaporator directly.

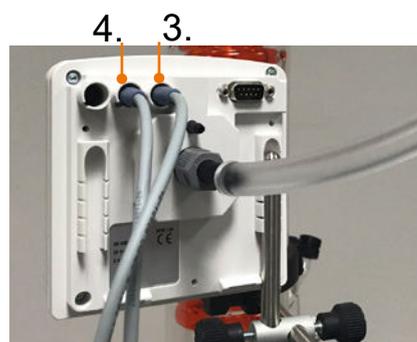
1. Screw the preassembled metal plate that carries the vacuum valve to the back of the evaporator with two screws.



2. Attach the support rod to the evaporator and attach the controller to the top end of the support rod, so that the support rod locks into the gap on the back of the controller.

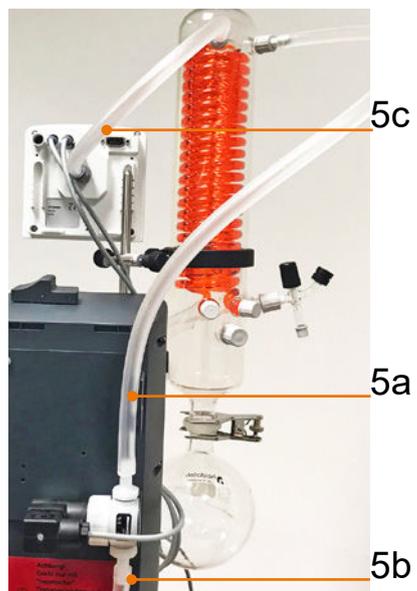
3. Connect the power supply to the controller. → see *chapter 4.2.1*.

4. Connect the cable of the vacuum valve to the controller.



5. Attach the hoses:

- ▶ From the upper connector of the vacuum valve to the top of the condensate cooler (5a).
- ▶ From the lower connector of the vacuum valve to the vacuum source (5b).
- ▶ From the connector for measuring and venting of the controller to the second connector at the top of the condensate cooler (5c).



4.2 Connection

4.2.1 Electrical connection

Wall power supply kit*



** short-circuit-proof multi-voltage power supply with integrated overload protection and changeable mains plugs.*

Prepare wall power supply plug

- Prepare connection
6. Take the wall power supply kit out of the packaging.
 7. Select the mains plug that fits to your mains socket.
 8. Connect the mains plug to the metal contacts of the wall power supply plug.
 9. Slide the mains plug until it locks.

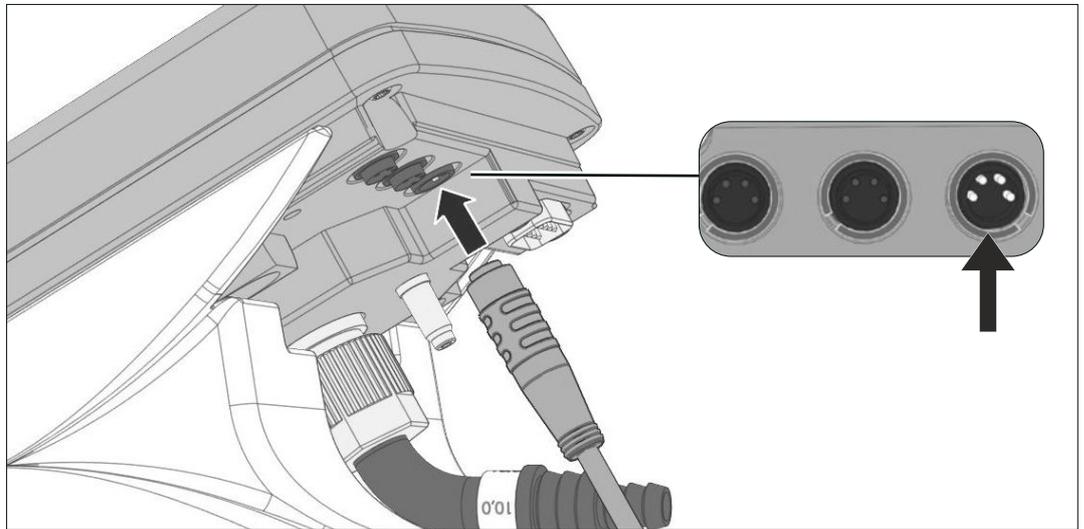
Remove mains plug

- Remove mains plug
1. Press the locking knob on top of the wall power supply plug.
 2. Remove the mains plug.
 - Another mains plug can be fixed.

Connect power supply to the controller

⇒ Plug female connection of the power supply cable into mains connection of the controller.

Mains connection on the rear side

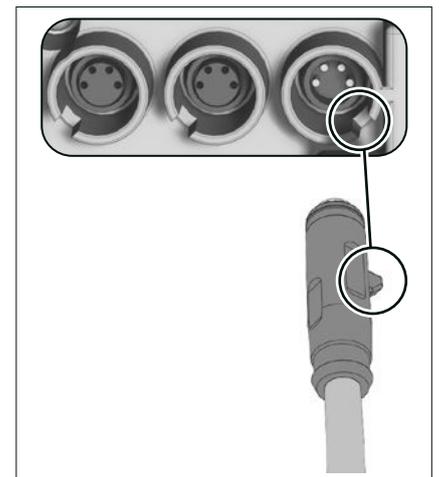


Ports with guide groove

Consider new connection design:

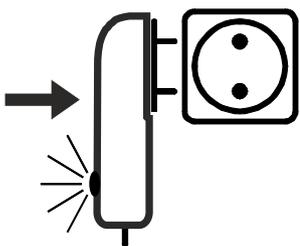
For easy connection, the controller of the newest series have a guide groove on the rear side for each port.

For connection insert the nose of the round plug into the guide groove.



IMPORTANT!

⇒ Please install the power supply line in such a way, that no damage be caused to the cable due to sharp edges, chemicals or hot surfaces.



Connect to mains

⇒ Plug the wall power supply into the mains socket.

- ☑ Green LED at wall power supply plug glows.

4.2.2 Vacuum connection

NOTICE

Flexible vacuum hoses can contract because of evacuation.

- ⇒ Fix vacuum hose at the connections.
- ⇒ Fix connected components.
- ⇒ Measure and trim the vacuum hose to a length that cares for the maximum shrinkage.

Possible damages to parts which are in contact with process media.

Residuals of aggressive or condensing media can cause damages to the controller or its inner parts.

- ⇒ Prevent that damaging process media can get into the controller.

Filters will compromise measurement and control.

Connect vacuum line

- ⇒ Connect the vacuum line gas-tight to the vacuum port of the controller;
 - see also *Connection examples on page 28*.

IMPORTANT!

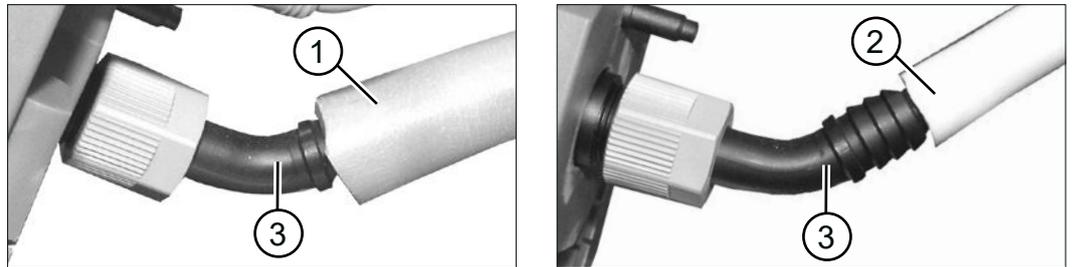
- ⇒ Only use a vacuum hose that is sufficient for the purpose and which provides enough stability.
- ⇒ Use hose tubes as short as possible.
- ⇒ Maximum admissible pressure at vacuum sensor: 1,5 bar/ 750 Torr (absolute).
- ⇒ Observe the maximum measuring limit of the controller, approximately 1060 mbar (795 Torr).

INSTALLATION AND CONNECTION

Connection examples

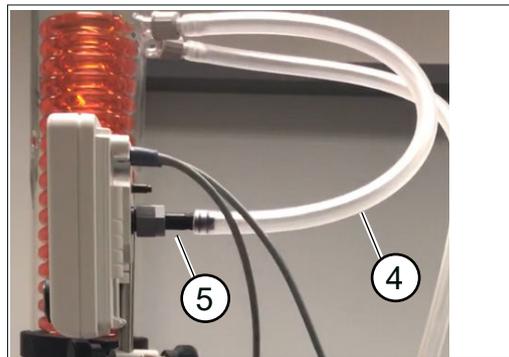
Depending on design and installation the controller provides several options for connection to the vacuum system.

Table top version



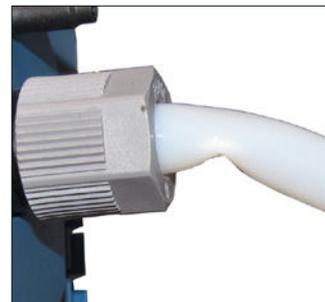
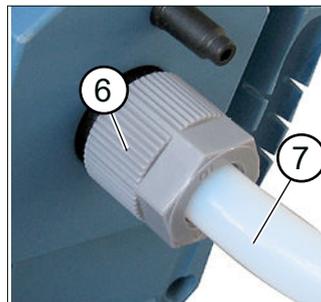
- Flexible caoutchouc hose (1) or (2), directly plugged on the **hose nozzle (3)**.

Attachment at the Hei-VAP Verdampfer



- Flexible caoutchouc hose (4), directly plugged on the **hose nozzle (5)**.

Built-in version
(front mounting)



- Vacuum hose made of PTFE (6) – plugged on **hose nipple**, fixed with union nut (7).

IMPORTANT!

With built-in controller the vacuum port is not visible. The vacuum hose may not be kinked.

- ⇒ Make sure there is sufficient space inside the housing, or
- ⇒ use a stable, curved hose nozzle for connection.

5 Operating and display elements

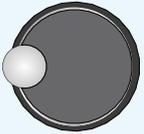
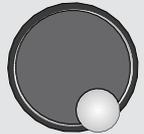
5.1 Operating elements

The operating elements are located on the controller front.
controller figure

→ see chapter 3.1 *Vacuum controller Hei-VAC Control on page 20*

5.1.1 Selection knob

The selection knob of the controller is a combination of rotary knob and push-button.

	Selection knob	Meaning
Press selection knob		<p>Press – Selection knob =</p> <ul style="list-style-type: none"> ▶ Call up menu or function. ▶ Exit menu or function. ▶ Confirm and store setting or selection. ▶ Step to next menu, function or content. ▶ Call up Configuration menu while booting.
Turn selection knob		<p>Turn – Selection knob =</p> <ul style="list-style-type: none"> ▶ Select menu, navigation function. ▶ Value setting – increase/decrease. ▶ Adapt set vacuum (in mode Vac control).

5.1.2 Control panel

	Key	Meaning
Control panel keys		<p>On/Off</p> <ul style="list-style-type: none"> ▶ Switch on/off controller.
		<p>Start/Stop</p> <ul style="list-style-type: none"> ▶ Start/stop vacuum control. ▶ Confirm completed program when clock icon blinks. ▶ Confirm error and status indications.
		<p>VENT – system venting;</p> <ul style="list-style-type: none"> ▶ Keystroke < 2 sec = momentarily venting, control continues. ▶ Keystroke > 2 sec = venting to atmospheric pressure (max. 1050 mbar/787 Torr), control stops. ▶ Keystroke while venting = venting stops.

Control panel keys

 **Mode** – Select operation mode

- ▶ With stopped operation: Mode menu for selecting the operation mode.

Mode – Change function/mode

- ▶ During running operation: To switch from *Pump down* to *Vac control* and further to *Auto mode*.
- ▶ During running operation: To switch between *Auto mode* and *Vac control*.

5.1.3 Key combinations

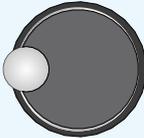
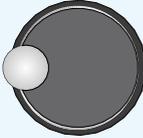
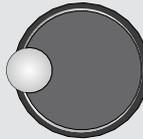
Menus and functions that are not intended for everyday use, can only be accessed through key combinations.

NOTICE

Wrong key combinations can lead to faulty settings.

⇒ First push and hold the key which must be hold and pressed, only then push the combination key shortly.

Key combinations
(key shortcuts)

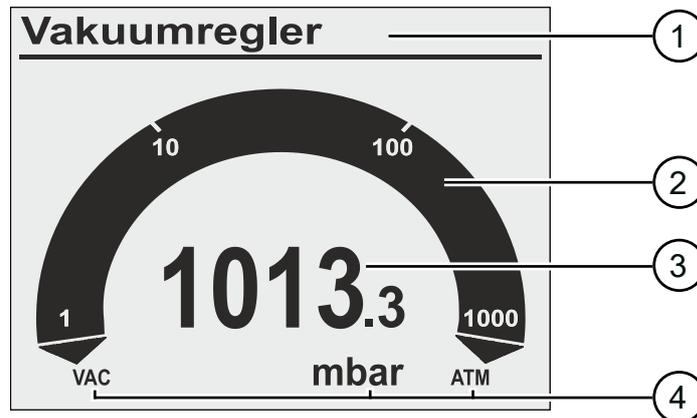
Combination	Meaning
 + 	Press and hold <i>Selection knob</i> + Press <i>On/Off</i> = Only when the controller is switched off
	<ul style="list-style-type: none"> ▶ Call up menu <i>Language selection</i> ▶ Call up menu <i>Pressure unit</i>
 + 	Press and hold <i>VENT</i> + Press <i>On/Off</i> =
	▶ Call up menu <i>Function</i>
 + 	Press and hold <i>Mode</i> + press <i>Selection knob</i> = Only in <i>Function</i> menu
	<ul style="list-style-type: none"> ▶ Enable Vacubus address assignment (frame marking). ▶ Confirm parameter transfer of selection <i>Vario init</i>.
	Press and hold <i>Selection knob</i> + turn it =
	▶ Quick adaption set vacuum. (in mode <i>Vac control</i>)
	Only in combination with VARIO®
	▶ Quick adaption motor speed high/low (in mode <i>Pump down</i>)

5.2 Display and user interface

After booting the pressure display appears, including *Bar graphic* and preset operation mode.

5.2.1 Pressure display

→ Example
Display after
switching on



Meaning

1 Title bar (or status bar)	
Operation mode - Mode	▶ Pump down ▶ Vac control ▶ Program
Process time	▶ hh:mm:ss (only displayed with running process)
2 Bar graphic	▶ Graphical display of actual pressure
3 Numerical value	▶ Actual pressure = digital pressure display
4 VAC	▶ Vacuum
mbar	▶ Pressure unit according to pre-setting (mbar, Torr, hPa)
ATM	▶ Atmospheric pressure

5.2.2 Display icons

When vacuum control has started additional icons appear on the display.

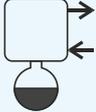
When starting operation

Display symbols during operation

Icon	Meaning
	Vacuum control is running (animation)
00:00:00	Process time; runtime vacuum control (hh:mm:ss)

Active component

Icons for active components

Icon	Meaning
	Pump is running; in combination with percentage sign = motor speed (only for VARIO systems)
	Venting* valve is active, i. e. open (VENT); Flashing cycle: continuous venting switched on.
	Coolant valve switched on, open
	In-line valve switched on, open
	Emission condenser (Peltronic) connected
	Level sensor activated (only when level sensor is connected)

* also named air admittance valve

The icon of a connected component is displayed as long as the component is running.

Status display while operation is running

Icons for control status

Icon	Meaning
	Pump down – continuous pumping
	Pump down: lower pressure limit reached VACUU·LAN: pump down to set pressure Vac control: for 2-point control – pump down to set pressure
	VACUU·LAN: pressure increase to switch on pressure Vac control: preset maximum exceeded
	VARIO control: pump down to set point. Auto mode: pump down and boiling point detection within the preset time interval regarding changing process conditions.
	VARIO control: reaches and tracks boiling point. The next program step starts when the programmed pressure has been reached or the preset time has elapsed.
	2-point control: pressure in hysteresis, pump switched on
	2-point control: pressure in hysteresis, pump switched off
	Turbo mode switched on (for VARIO® pump in combination with turbomolecular pump)

Additional information

Information icons

Icon	Meaning
	Clock - Program completed* - Mode VACUU·LAN: delay time elapses
	Lock – operation locked
HI	HI mode for Pump down = optimum speed for the respective pressure.
..%	Percentage value for Pump down motor speed.
100 	Set value for Vac control.

* The clock icon keeps flashing until the **Start/Stop** button has been pressed to acknowledge the end of program.

Fault indication (warning symbol)

	Icon	Meaning
Error display		Flashing: warning!

5.2.3 Signal sounds (warning beep)

Setting **Sound On** in menu **Configuration/Display** is required to hear the audio signals.

Meaning signal sound

Audio signal (beep)	Audio signal	Meaning
	1x  	Short beep for each keystroke.
	2x  	Audio warning for error indication. In short intervals a number of warning beeps are to be heard. This Audio warning is active until error clearance or reset.



Error messages are indicated by differing numbers of beeps (audio warning).

For the list of possible warning beeps

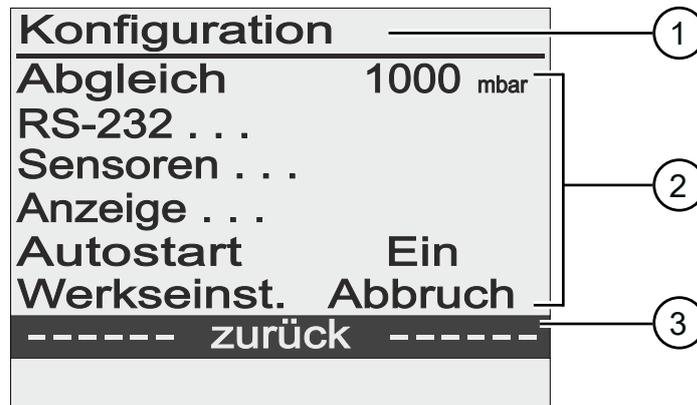
→ see chapter **8.1 Error display on page 60**.

5.2.4 Menu display in general

The controller includes several menus and submenus, e. g., *Configuration*, *Function*, *Display...*

Submenu

→ Example
Submenu
Configuration



Meaning

1 Titel bar	▶ Menu name
2 Menu interface	▶ Selectable functions or submenus (on the right side of the display) ▶ Adaptable value or ▶ selectable content
3 Back (return)	▶ Call-up previous menu or ▶ previous display



For detailed descriptions about individual menus,
→ see chapter **7.1 Operation menus**.

5.3 Handling

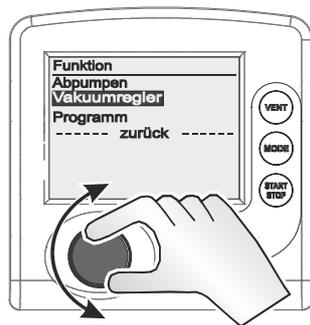
Handling and
Operation

The handling of the controller is menu-driven. Menus are accessed via push buttons on the control panel or via key combinations. Use the selection knob to select function or menu.

Operating steps and actions are displayed by an illustration, which is complemented by action symbols.

→ see chapter *1.2.2 Symbols and icons*.

Navigation



Turn selection knob to select a menu by shifting the bar marking.

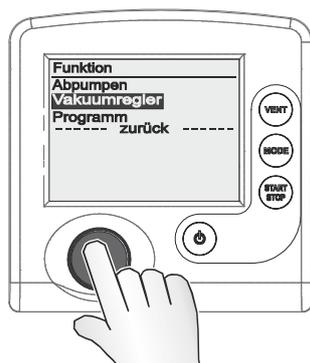
→ **bar marking** up/down.

Submenus



Submenus are highlighted with points.

Selection



Press selection knob to confirm selection.

Input (data entry)



Changeable values are positioned on the right side in the display.



Text on the right side accords to content selection like in a drop down list.

Exception: menu **Program**, in this menu data and value are editable.

Example: enable entry and edit

1. Select the required line and press selection knob.

- Marking jumps to the input field.
- Input/Content selection enabled.

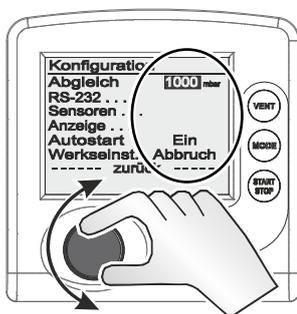
2. Turn the selection knob.

- Value/Content changes.

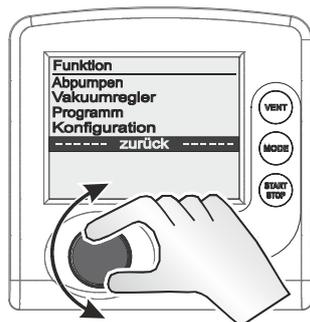
3. Adapt the numeric value within the specified min/max range or select the required function out of the available content.

4. Confirm input/selection by pressing the selection knob.

- Value is stored or
- selected function starts.



Back (return)



Place the bar marking on line **back** and press the selection knob to return to previous menu, display or to pressure display.

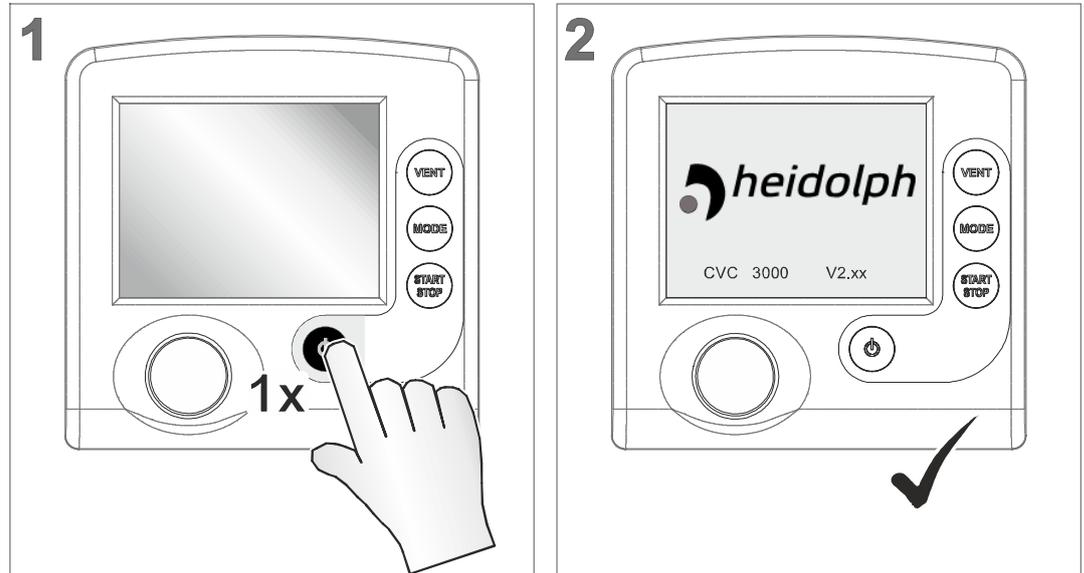


In submenu **Sensors** the display returns to previous menu only after the selection of a sensor.

6 Operation

6.1 Switch-on/-off controller

Switch-on



- Initial screen: company logo and firmware version, for approximately 2 seconds.
- Pressure graphic is displayed.

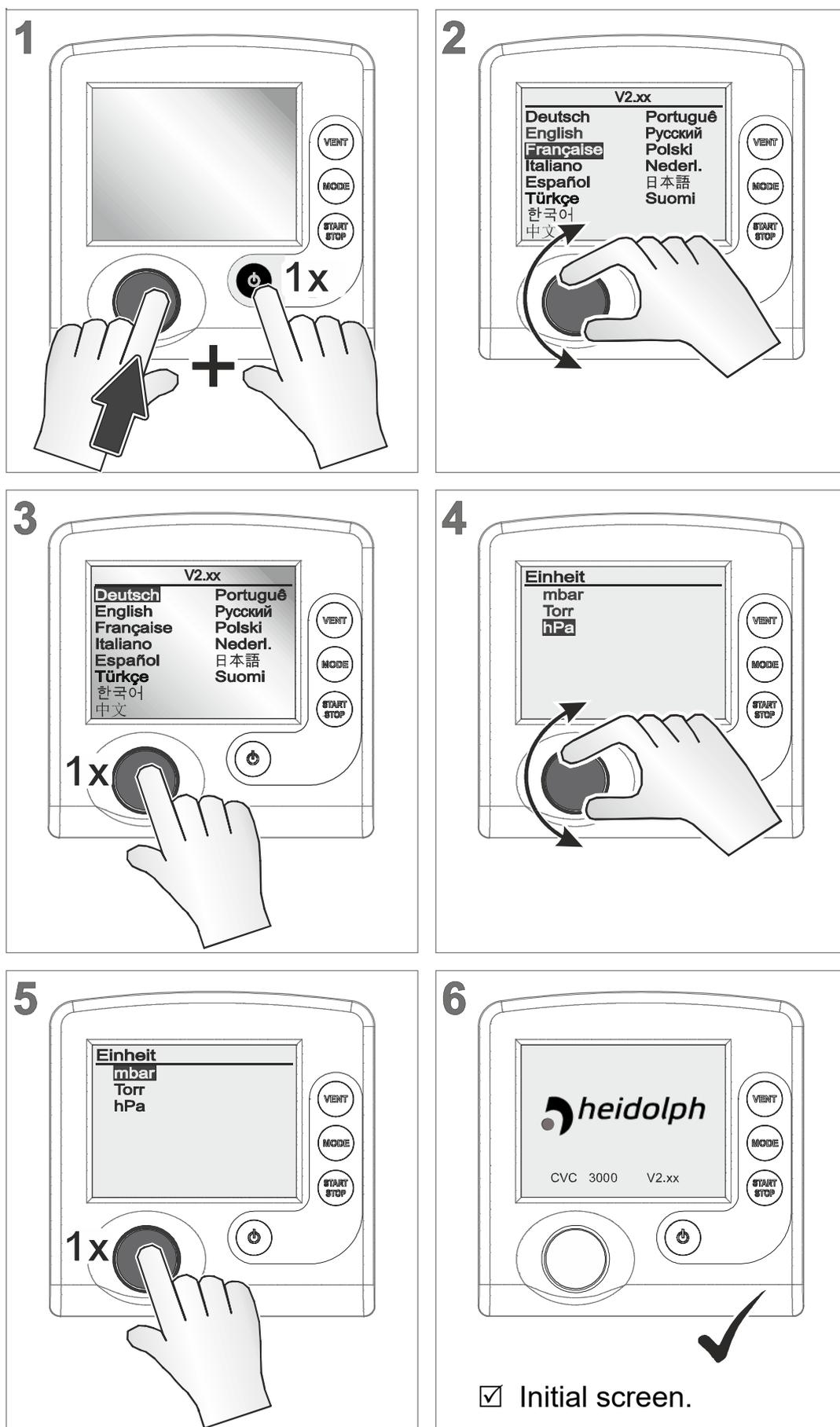
Switch-off

⇒ Press key *On/Off*

- Controller switched off (display off).

6.2 Select language and pressure unit

Select language and pressure unit



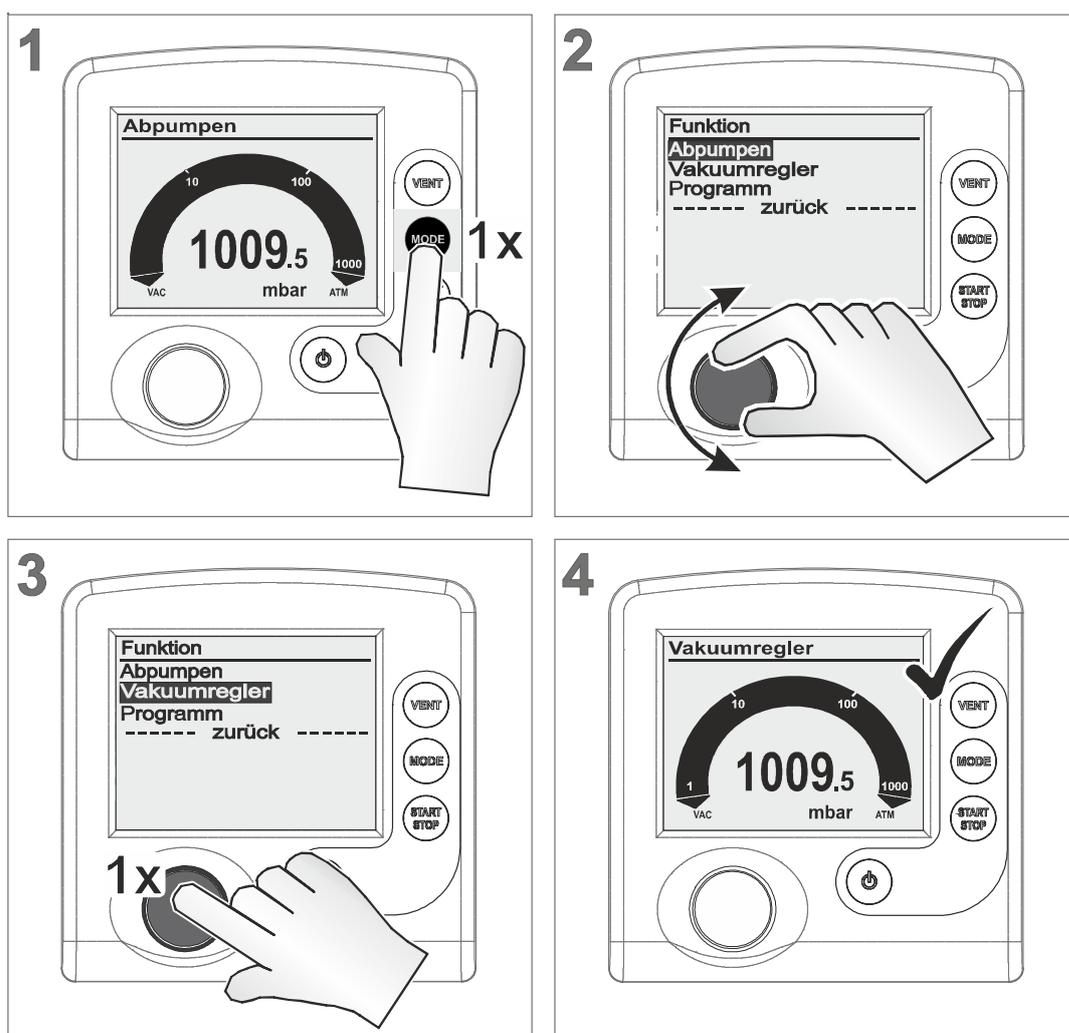
6.3 Mode – Operation mode



The controller is supplied with several operating modes. Only when the controlling process is stopped it is possible to select an operation mode.

6.3.1 Select operation mode

→ Example
Call-up Mode menu



Title bar shows the selected operation mode (*Mode*).



Select any other operation mode in the same way as described above for *Vac control*.

After 20 seconds without action, the display will return automatically to pressure display.

6.3.2 Mode menu

Mode menu display

→ Example
Menu description



Meaning and
operation modes

1 Title bar menu name

2 Selectable operation modes

Pump down

- ▶ Continuous pump down or
- ▶ Pump down with pressure and time presetting.
- ▶ **VARIO**[®]: pump down with adjustable motor speed (pumping speed) and continuous speed control.

Vac control

- ▶ Control to a preset vacuum value.

Program

- ▶ Load, edit and/or store program.
- ▶ Max. 10 programs with pressure and time presetting.

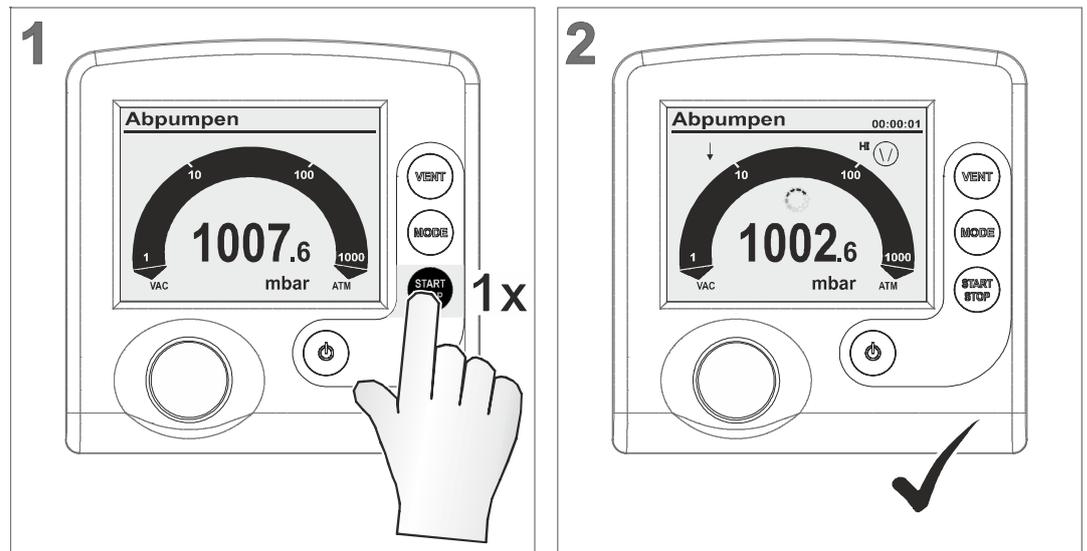
⇒ Select the mode suitable for vacuum apparatus and planned process.

6.4 Start controlling



Start vacuum controlling after selecting the required operation mode. The controller works in delivery status with the default settings of the factory setting.

Start controlling



- Controller starts.
- Icons are displayed.

6.5 Control during operation

6.5.1 Venting (VENT)

	DANGER
<p>Danger of explosion when venting with air by forming of explosive mixtures.</p> <p>Depending on the process venting can cause formation explosive mixtures.</p> <ul style="list-style-type: none"> ⇒ Never vent processes with air which can form explosive mixtures. ⇒ If necessary vent with inert gas (max. 1.2 bar absolute). 	

IMPORTANT!

Certain processes may cause overpressure.

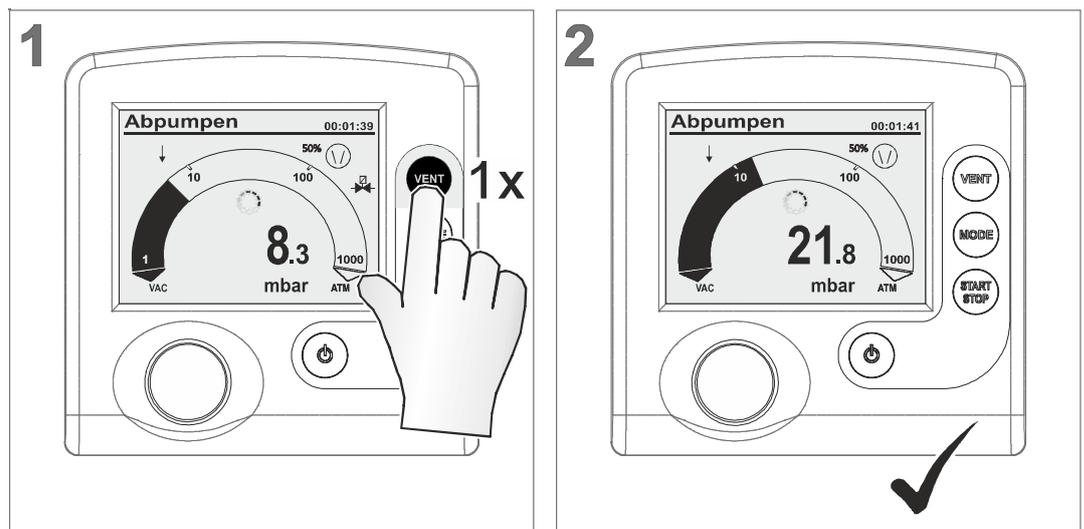

 VENT

Venting

The **VENT** button is used to vent the system. A short click on this button will momentarily vent the system as the process continues. Holding the **VENT** key for longer than 2 seconds will cause the system to be vented to atmospheric pressure and the pump will stop running; max. 1060 mbar (795 Torr). Continuous venting stops when pressing **VENT** key again.

Momentarily venting

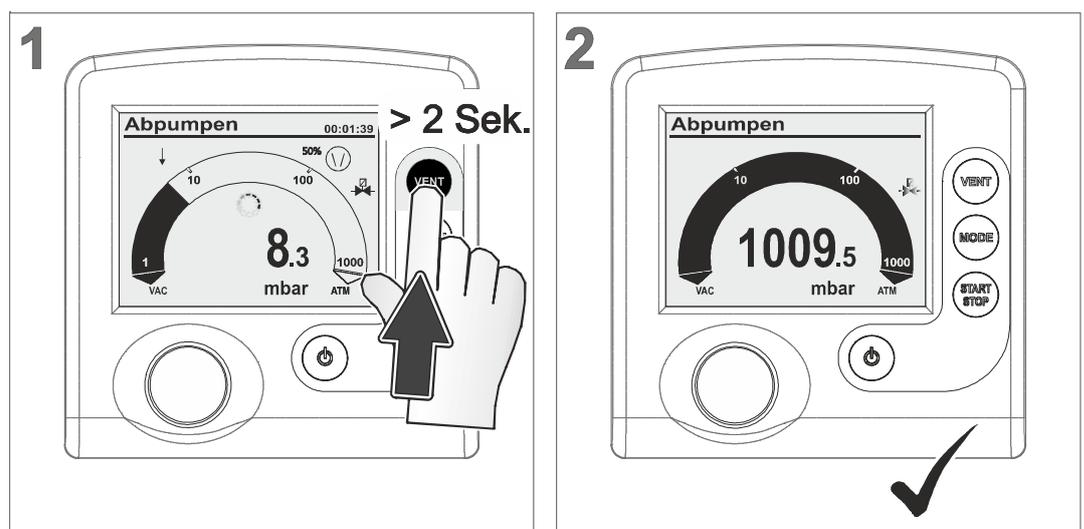
→ Example
Momentarily venting



- ☑ Venting impulse, venting valve respectively air admittance valve opens momentarily → short-term pressure increase.

Continuous venting

→ Example
Continuous venting



- ☑ Icon for venting valve is flashing,
- ☑ Venting valve opens → continuous pressure increase until atmospheric pressure → venting valve closes.
- ☑ Controller stops.

6.5.2 Change operation mode

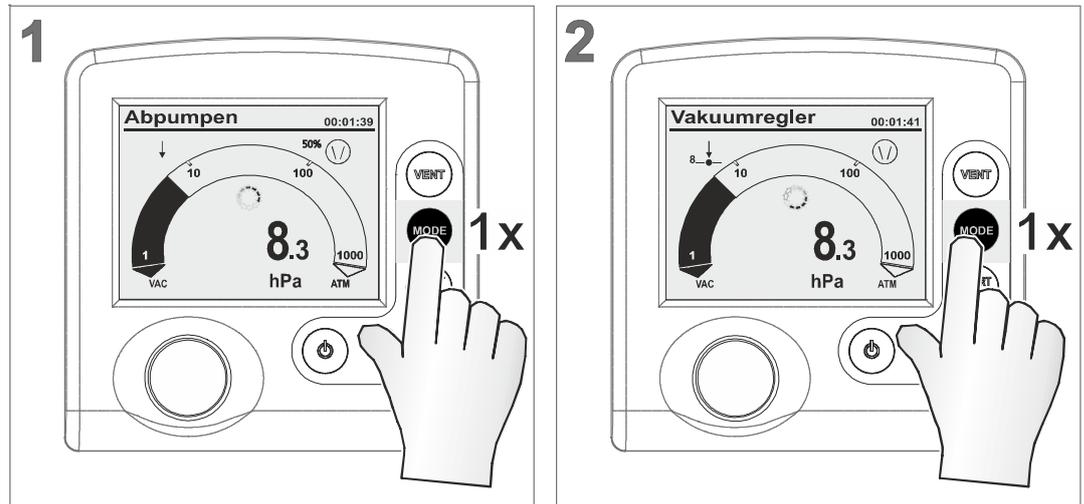


During running operation the operation mode can be switched between *Pump down* and *Vac control* by pressing *Mode* key.

Switch mode during running operation

→ Examples
Switch mode

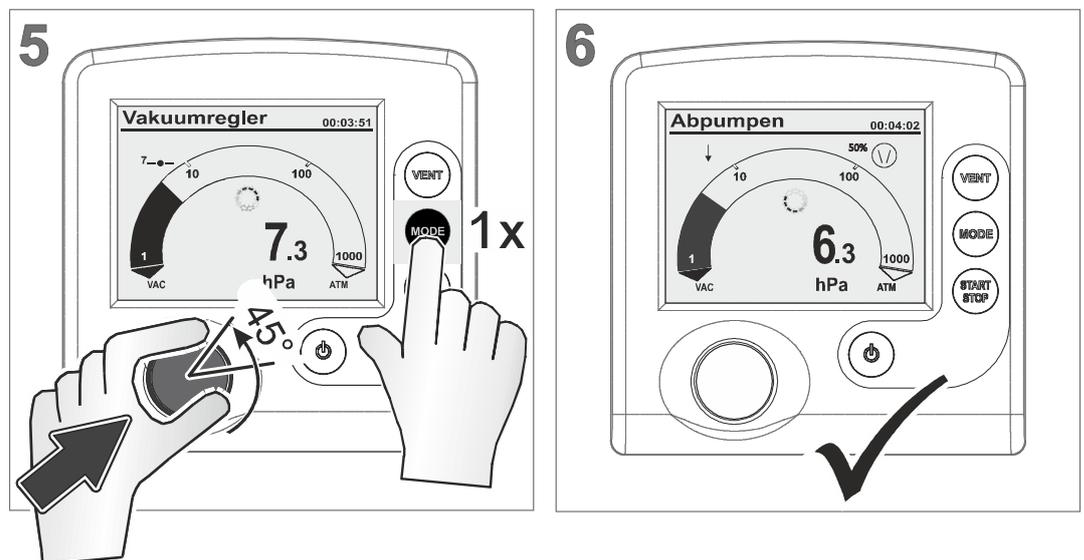
Pump down
↓
Vac control



☑ Operation mode switched to *Vac control*.

Switch back from *Vac control* to *Pump down*.

Switch back to
primary mode



☑ Title bar displays *Pump down*.

Typical applications

Pump down → Vac control:

Semiautomatic distillation. Recommended for applications for which the process vacuum is still to be determined. Firstly the vacuum pump is pumping down rapidly in mode ***Pump down***. As soon as the required process vacuum has been reached, e. g., boiling vacuum, this vacuum can be maintained by switching to ***Vac control***. The actual pressure is adopted as the required set vacuum.

Auto mode ⇔ Vac control:

With a connected **VARIO®** pump a controller working in ***Auto mode*** will detect and track the boiling point automatically. The vacuum will be adapted continuously to the process.

If a particular process vacuum is required, the mode can be switched back again to ***Vac control***.



Switching the mode during operation via ***Mode*** key works only temporarily. After stopping the controller switches back to its primary mode.

6.5.3 Display graphic (curve)

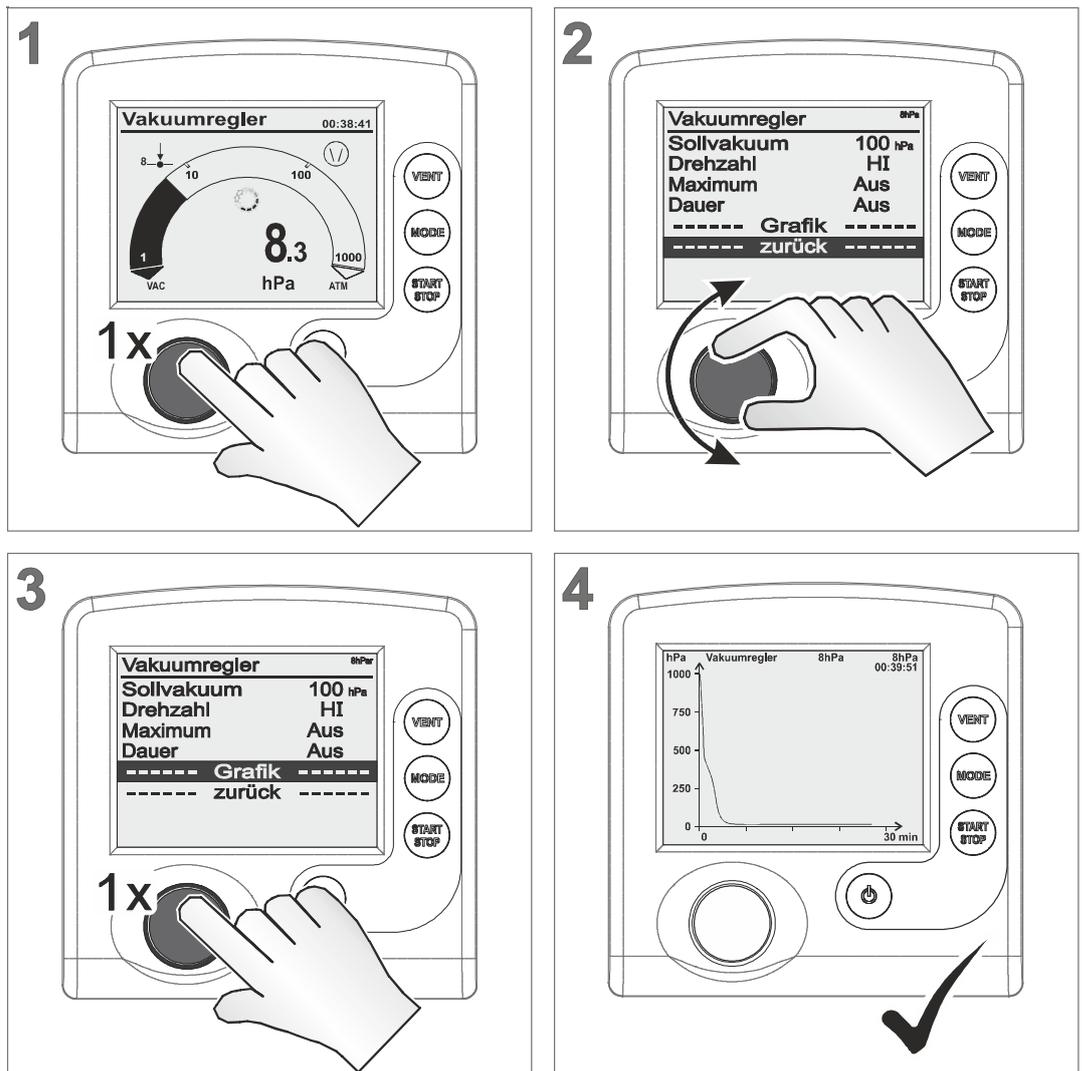
Pressure history

In addition to the bar graphic of the pressure display the display can be switched to a diagram named **Graphic** which shows a pressure vs. time curve.

That **Graphic** curve will only be displayed while operation is running. With each start the recording restarts.

Call up graphic

→ Example
Call up pressure
history display



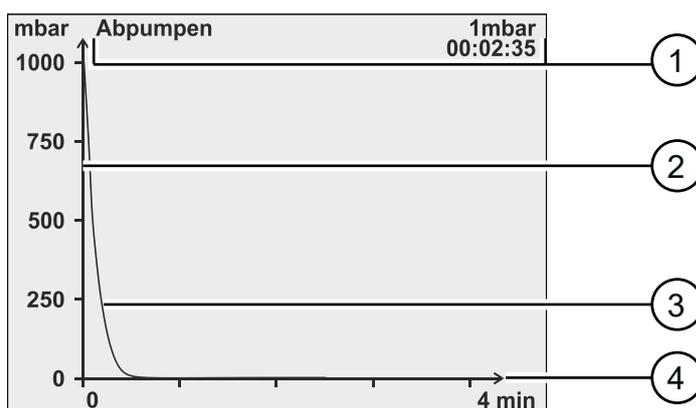
- Graphic** menu is displayed with the pressure curve of the actual process.



To call up **Graphic** with pressure history for other operation modes, do like described above.

Graphic menu

Description pressure history display



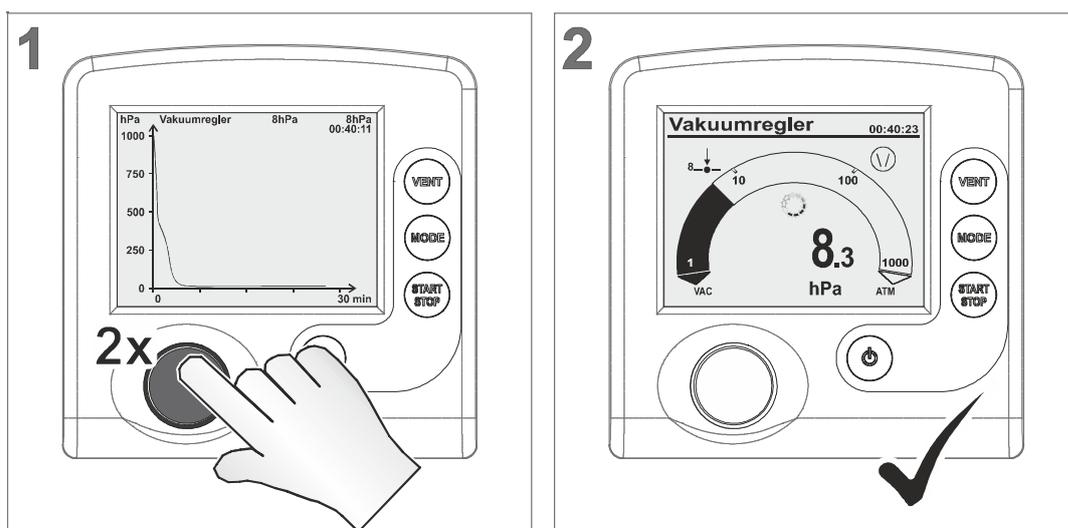
Meaning

- 1 Header**
 - ▶ Active operation mode.
 - ▶ Vacuum set point; for *Vac control* or *Auto mode*.
 - ▶ Actual vacuum value (actual pressure).
 - ▶ Elapsed process time.
- 2 Axis – pressure**
 - ▶ Unit according to pre-settings (mbar, Torr, hPa)
- 3 Pressure graph**
 - ▶ Pressure/time progress
- 4 Axis – time**
 - ▶ Continuous, automatically scaling time (minute, hour)

6.5.4 Quit display graphic

Return to basic display

→ Example
Switch back to
basic display



View basic display.

6.6 Quick adaption during operation

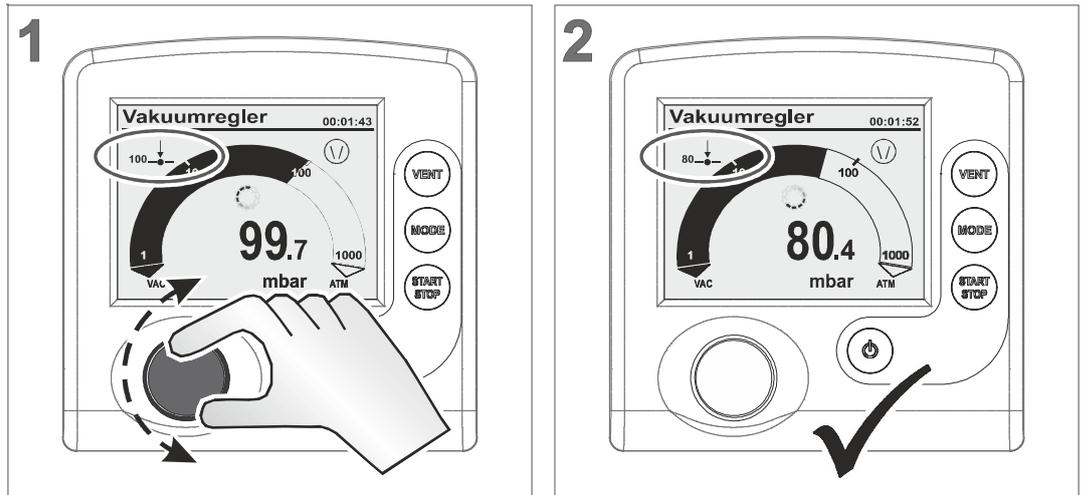
6.6.1 Set vacuum

In mode *Vac control* the set vacuum can be adapted directly during running operation.

Adapt set vacuum → fine tuning

1 detent = 1 pressure value (mbar, Torr, hPa)

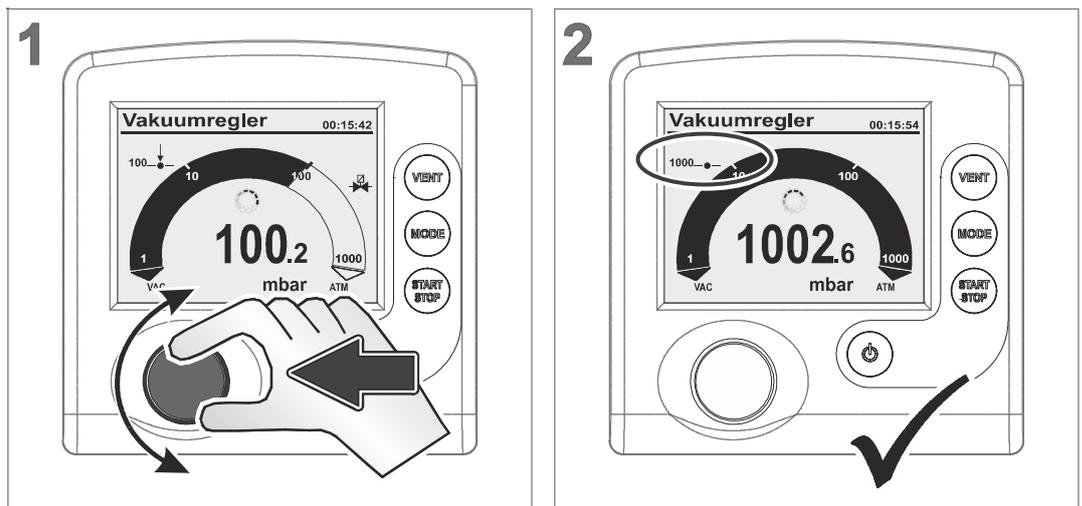
→ Example
Adapt set vacuum
fine tuning



Controller controls to new set vacuum.

Adapt set vacuum → quick tuning

→ Example
Adapt set vacuum
quick tuning



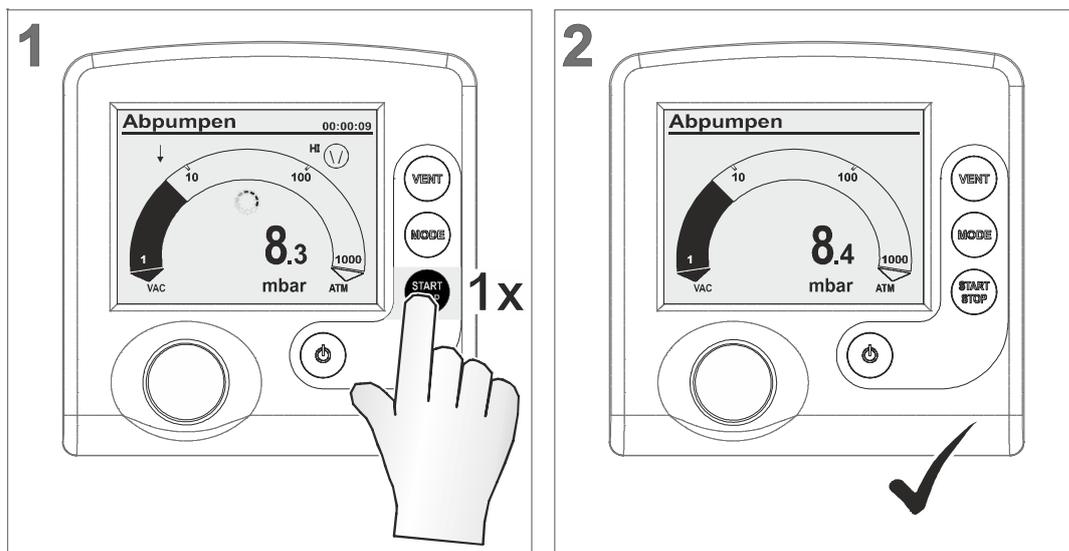
⇒ Press selection knob and turn it clockwise:
increase set vacuum (venting).

⇒ Press selection knob and turn it anticlockwise: decrease set vacuum (vacuum pump on).

Controller controls to the new set vacuum which is displayed while releasing the selection knob.

6.7 Stop control

Stop control



- Controller and vacuum control stops.
- Display icons switched off.

7 Advanced menus and operation

7.1 Operation menus

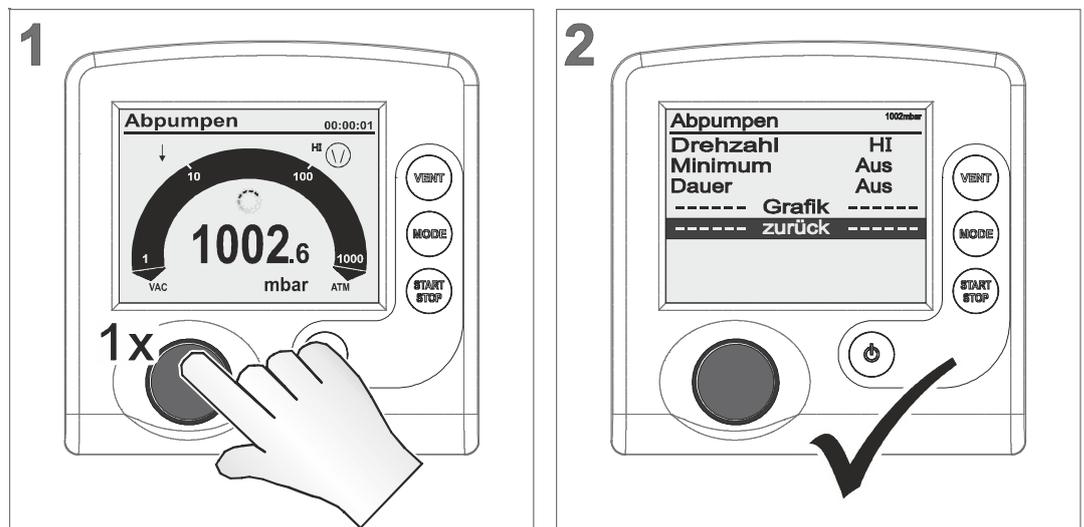
Optimizing operation mode

A selected operation mode can be adapted and optimized for the process through the corresponding operation menu. The settings in an operation menu include mainly: motor speed, set vacuum or time presets. Settings in operation menus are retained also after switching on/off.

Menu *Program* is for storing up to 10 individual programs, e. g., to store control settings for frequently repeated processes.

Call up submenu of an individual operation mode

→ Example
Call up operation menu



- Corresponding menu of the preset operation mode is displayed.

To call up an operation menu, press the selection knob. Adaptions are possible during a running process as well as when control is stopped.



Use operation menu to optimize vacuum control for application requirements.

7.1.1 Pump down

Meaning Continuous pump down with pressure and time presettings.

Menu – Pump down

→ Example
Operation menu
Pump down

Abpumpen		1013mbar
Drehzahl		HI
Minimum		Aus
Dauer		Aus
-----	Grafik	-----
-----	zurück	-----

Parameter
Pump down

Parameter	Meaning
Minimum* (mbar, Torr, hPa)	Vacuum set point; once reached, the controller switches off the vacuum pump or closes the in-line valve. Adjustment range: Off; 1–1060
Duration** (min)	Presetting process runtime from Start on. Adjustment range: Off; 1–1440

* If **Minimum** and **Duration** are set to **OFF**, pump down has to be stopped by pressing **START/STOP** key.

Application example – cabinet dryer

Application example
for Pump down

Set **Minimum** to a vacuum value below boiling pressure and the controller will switch the vacuum pump off, once the liquid has completely evaporated.

7.1.2 Vac control

Meaning Control to a set vacuum value.

Menu – Vac control

→ Example
Operation menu
Vac control

Vakuumregler		1002mbar
Sollvakuum	100	mbar
Drehzahl	HI	
Maximum	Aus	
Dauer	Aus	
-----	Grafik	-----
-----	zurück	-----

Parameter
Vac control

Parameter	Meaning
Set vacuum (mbar)	Setting for lower vacuum level for 2-point control or precisely for VARIO ® pump. Adjustment range: Turbo*; 1–1060
Hysteresis (mbar, Torr, hPa)	Only for VMS or in-line valve with vacuum pump: control range for 2-point control. Adjustment range: Auto; 1–300
Maximum (mbar, Torr, hPa)	Setting for upper vacuum level. Once reached, control switches off. Adjustment range: Off; 1–1060
Duration (min)	Presetting process runtime from Start on. Adjustment range: Off; 1–1440

* Turbo mode: auto-adapting vacuum control for best ultimate vacuum.
Best backing pressure for operation with a turbomolecular pump.

Application example – filtration

Application example
for Vac control

Set the set vacuum higher than the boiling pressure of the liquid and set **Maximum** value even a little bit higher. If the filter runs dry or if the filter is fractured, the pressure will increase and the control will be stopped automatically.

Hysteresis values Auto

Factory settings
Hysteresis

Set vacuum (mbar)	5	10	50	80	100	200	500	700	900	1000
Hysteresis (mbar)	2	2	5	8	9	17	40	55	71	78

7.1.3 Program

Meaning Up to 10 individual programs including vacuum and time presettings can be loaded, edited, and stored.

Menu – Program

→ Example
Operation menu
Program

Programm 0		1010mbar
Editieren		
Öffnen		0
Speichern		0
-----	Grafik	-----
-----	zurück	-----

Parameter Program

Parameter	Meaning
Edit	Edit program with presettings for a process cycle or edit an existing program.
Open	Load the selected program.
Store	Store the program under the selected number. (memory capacity for up to 10 programs)
Hysteresis (mbar, Torr, hPa)	Only for VMS or in-line valve with vacuum pump: control range for 2-point control. Adjustment range: Auto; 1–300

Hysteresis values Auto

Factory settings for
Hysteresis

Set vacuum (mbar)	5	10	50	80	100	200	500	700	900	1000
Hysteresis (mbar)	2	2	5	8	9	17	40	55	71	78

For further descriptions of program functions
→ see **Online Instructions for use**.

7.2 Program functions (see Online Instructions for use)

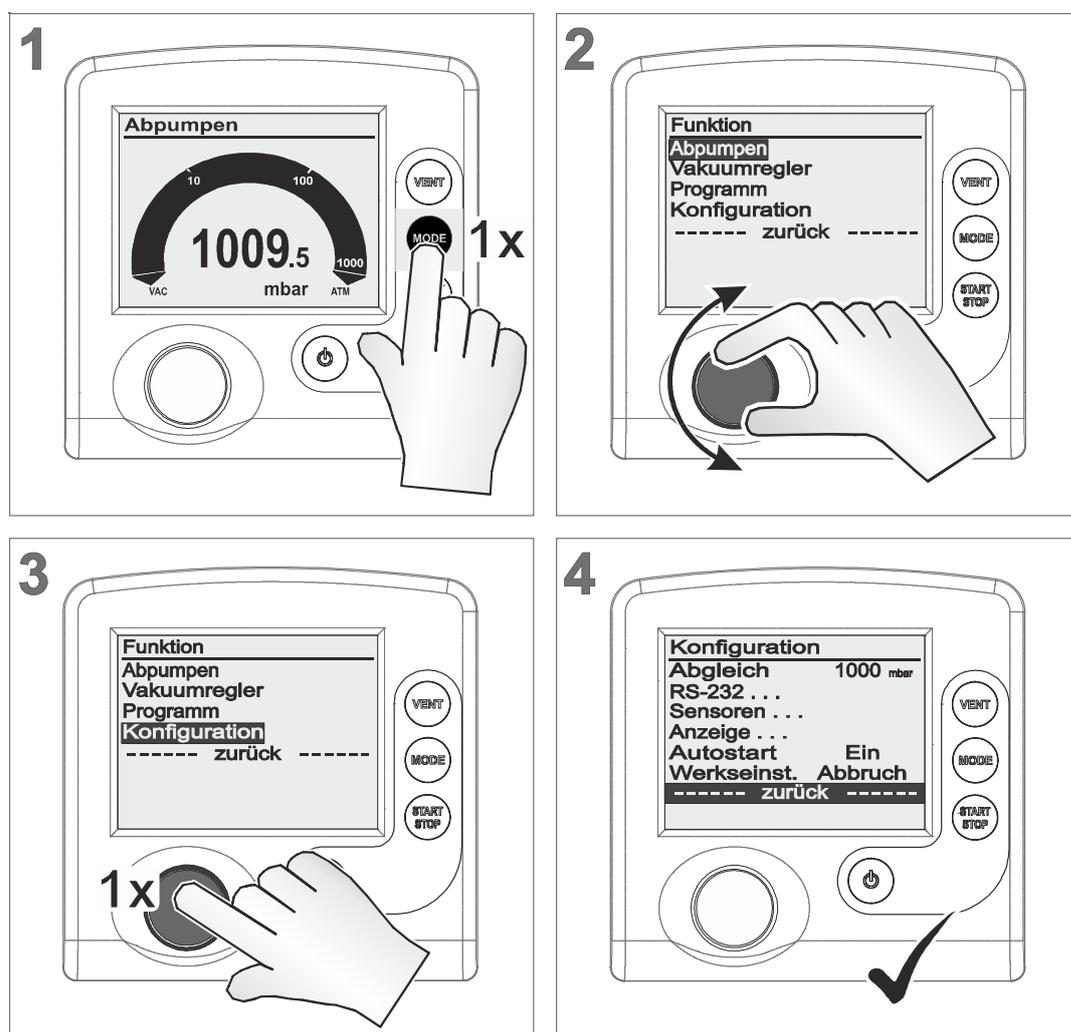
You get the Online Instructions for use from the technical service of Heidolph Instruments.

7.3 Configuration menu

Meaning In menu **Configuration** the controller parameters are set. This menu is also for adjusting the vacuum sensor and for loading **Defaults** settings.

Call up Configuration menu

→ Example
Call up
Configuration menu



Configuration menu displayed.



After 20 seconds without action, the display will return automatically to pressure display.

7.3.1 Content selection

Specified content The following menu items of **Configuration** can be selected, activated and used.

Defaults

Defaults (standard)

Selection	Meaning
Cancel	Leave menu item without default setting.
Load	Load default settings.

IMPORTANT!

If **Defaults Load** is activated all controller parameter will be reset to delivery status. Stored programs will be deleted.

Autostart

Auto start function

Selection	Meaning
Off	After switching on power supply or after power failure the controller remains in <i>Stop</i> . Press Start/Stop key to start the controller.
On	Once power is applied, the controller starts automatically with the settings before power failure. The controller starts control directly without pressing Start/Stop key, if it previously was in running operation. Recommended, if power supply is switched on from a central point or if power is switched on by an external switch.

IMPORTANT!

Ensure, if **Autostart** is activated, that no hazardous situations may occur due to the automatic start of the process.

⇒ Check whether the **Autostart** feature can be used safely with the intended application.

Adjustment

Sensor adjustment function

Selection	Meaning
1060–700 20–0	Adjustment range of a vacuum sensor, internal or external at atmospheric pressure (1060–700) or under vacuum (20– ~0).

For further descriptions about sensor adjustment
→ see chapter **9.2 Sensor readjustment on page 70**

7.3.2 Submenus

Submenu – Display

Submenu Display

Anzeige	
Helligkeit	100 %
Kontrast	40 %
Warnton	Ein
Einheit	mbar
Sprache	Deutsch
----- zurück -----	

Adjustable display parameter

Parameter	Selection	Meaning
Brightness	0–100 %	Adjust backlight brightness of the display.
Contrast	0–100 %	Adjust display contrast.
Sound	Off	Switch off keystroke sound and warning sound.
	On	Switch on keystroke sound and warning sound.
Units	mbar	Preset pressure unit for user interface.
	Torr	
	hPa	
Language	14 languages available	Preset pressure unit for user interface.

Submenu – Sensors

In submenu **Sensors** all connected sensors are listed. The internal sensor is generally displayed as **Sensor**. External sensors are listed with sensor type name and address.

Submenu Sensors

Sensoren	
Sensor	990.8 mbar
VSP 1	4.1E+2 mbar

Sensor selection

Display	Meaning
Inverse	Sensor = currently selected for pressure display.
Sensor type	Selection for displaying pressure on basic display (max. 8 sensors are listed).

For descriptions about sensor address assignment

→ see **Online Instructions for use**.



The display switches automatically to the previous menu when selecting a sensor with the selection knob.

Submenu – RS-232

Submenu **RS-232** is applied for interface configuration, parameter adjustments and commands.

→ see also *Online Instructions for use*.

Submenu RS232

RS-232	
Baud	19200
Parität	8-N-1
Handshake	Kein
Remote	Aus
----- zurück -----	

Adjustable RS232 parameter

Parameter	Selection	Meaning
Baud	19200	Default setting for transmission speed. The baud rate of data transfer of transmitter and receiver must correspond.
	9600	
	4800	
	2400	
Parity	8-N-1	Default setting for parity check, a method for error detection
	7-O-1	
	7-E-1	
Handshake	RTS-CTS	Preset for continuous data transmission without loss – flow control.
	Xon-Xoff	
	None	
Remote	Off	Control commands not enabled, only queries possible
	On	Connection for communication via RS 232 interface enabled.

IMPORTANT!

When selecting **Remote On** the controller itself is only operable via an external device. All keys of the control panel except key **On/Off** are locked.

VACUU-CONTROL® detects automatically, if **Remote** is activated or deactivated and retains that setting.

Icon on controller display

Icon	Meaning
	PC icon? Controller in remote operation!

7.4 Function menu (see Online Instructions for use)

You get the Online Instructions for use from the technical service of Heidolph Instruments.

7.5 Program functions (see Online Instructions for use)

Detailed descriptions about function menu with address assignment or about differential pressure measurement are included in the Online Instructions for use. You get the Online Instructions for use from the technical service of Heidolph Instruments.

8 Resolving problems

Technical support

Technical support ⇒ To identify errors and potential remedies, please refer to the troubleshooting table: ***Fault – Cause – Remedy on page 62***

In case you need additional assistance, please contact our service department.

8.1 Error display

The major symbol for fault indication is the warning triangle. Additionally displayed icons and sounds refer to the cause of fault.

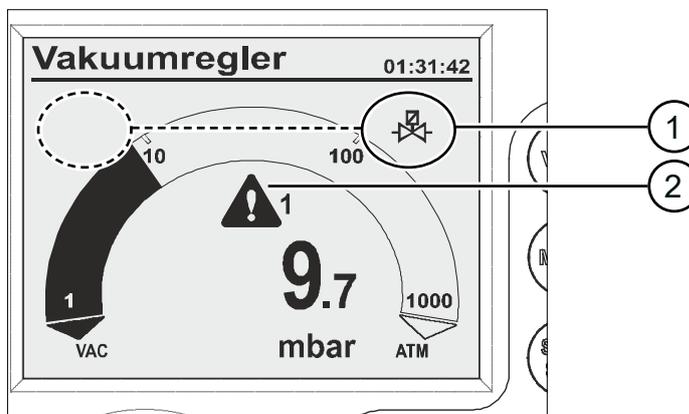
Safety alert symbol

Warning triangle

Icon	Meaning
	Flashing: Warning! Where applicable with: <ul style="list-style-type: none"> flashing component icon, warning sound (only when switched on) or flashing backlight.
	<ul style="list-style-type: none"> in combination with number = Vacuubus address of the component which is defective.

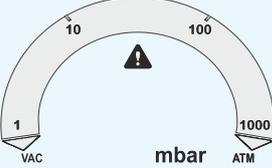
Example display in case of error

→ Example
Error In-line valve 1



1	Possible positions for flashing component/display icon; here: warning In-line valve
2	Flashing: Warning triangle

Combinations of flashing display icons

Icon flash rate 	Fault and Meaning	beep when Sound On
	▶ Limit pressure reached	1x 
1087.1	▶ Overpressure	1x 
	▶ Process time elapsed	1x 
 + 	▶ Venting valve	2x 
 + 	▶ In-line suction valve	3x 
 + 	▶ Coolant valve	4x 
	▶ External sensor removed ▶ or defective	5x 
	▶ internal sensor defective	7x 
 + 	▶ Vario pump	6x 
 + 	▶ VACUULAN process pressure not reached within 99 hours.	8x 
	Digital I/O module: ▶ Fault indicator triggered or ▶ fault special configurations	9x 
 + 	▶ Level sensor triggered; flask full	10x 
 + 	▶ Emission condenser Peltronic (too hot)	11x 
	▶ Analog I/O module	12x 



A defective I/O module, which is configured as a remote module, does not trigger a warning alert. The control is stopped. Alert display by the flashing warning triangle.

8.2 Fault – Cause – Remedy

Fault	Possible cause	Remedy	Personnel
Sensitive process not controllable	<ul style="list-style-type: none"> ▶ Motor speed too high. ▶ Pumping speed too high. 	<ul style="list-style-type: none"> ✓ Reduce motor speed. 	User, Specialist
Frequent error messages of connected components	<ul style="list-style-type: none"> ▶ Several controllers are connected. ▶ Several VACUU·BUS components of the same type are using the same address. 	<ul style="list-style-type: none"> ✓ Use only one controller for one VACUU·BUS system. ✓ Only in Function menu Assign a new address number to VACUU·BUS® component 	respon. Specialist
VENT key does not work	<ul style="list-style-type: none"> ▶ Venting function deactivated. 	<ul style="list-style-type: none"> ✓ Check why Venting is deactivated. 	Specialist, respon. Specialist
Internal air admittance valve cannot be triggered	<ul style="list-style-type: none"> ▶ Setting of <i>int.Air V</i> in menu Function is switched Off or Auto. ▶ External air admittance valve is connected, <i>and/or</i> ▶ External vacuum sensor is connected. 	<ul style="list-style-type: none"> ✓ Check if Venting by internal air admittance valve can be used without risk. ✓ Venting safe? Enable the function in menu Function/ int.Air V; adjustment: Auto or On. 	Specialist, respon. Specialist
Internal air admittance valve does not switch	<ul style="list-style-type: none"> ▶ Air admittance valve soiled. 	<ul style="list-style-type: none"> ✓ Clean venting valve (air admittance valve), see chapter 9.1 Cleaning on page 69 	Specialist
Function or menu item cannot be used	<ul style="list-style-type: none"> ▶ Function or menu item possibly only usable with short-cut (key combination). 	<ul style="list-style-type: none"> ✓ Press the correct key combination; for descriptions of keys and short-cuts see chapter: 5.1 Operating elements on page 29 	Specialist, respon. Specialist
Vario pump icon flashes	<ul style="list-style-type: none"> ▶ VARIO pump and VMS are both connected at the same time. ▶ VARIO pump defective. ▶ VMS defective or cable is not connected. ▶ Cable break. 	<ul style="list-style-type: none"> ✓ Remove VMS from VARIO-pump and restart controller. ✓ Check VARIO pump for defective parts. ✓ Check VMS for defective parts. ✓ Check cable connections. ✓ Replace defective parts. 	Specialist
Air admittance valve icon flashes	<ul style="list-style-type: none"> ▶ External air admittance valve removed. ▶ Plug disconnected. ▶ External air admittance valve defective. 	<ul style="list-style-type: none"> ✓ Check the connection. ✓ Check plug connection. ✓ Replace defective parts. ✓ Use internal air admittance valve. ✓ Reconfiguration without air admittance valve. 	Specialist

Fault	▶ Possible cause	✓ Remedy	Personnel
In-line suction valve icon flashes	<ul style="list-style-type: none"> ▶ In-line suction valve removed. ▶ Plug disconnected. ▶ In-line suction valve defective. 	<ul style="list-style-type: none"> ✓ Check the connection. ✓ Check plug connection. ✓ Replace defective parts. ✓ Reconfiguration without In-line suction valve. ✓ Switch-off the controller; On/Off key. ✓ Remove In-line suction valve and ✓ switch on controller again. 	User, Specialist
Coolant valve icon flashes	<ul style="list-style-type: none"> ▶ Coolant valve removed. ▶ Coolant valve defective. 	<ul style="list-style-type: none"> ✓ Check the connection. ✓ Replace defective parts. ✓ Reconfiguration without coolant valve. 	Specialist
Level sensor icon flashes	<ul style="list-style-type: none"> ▶ Level sensor triggered (flask full). ▶ Level sensor removed. ▶ Level sensor triggered with empty flask. ▶ Cable break. ▶ Level sensor defective. 	<ul style="list-style-type: none"> ✓ Empty flask/catch pot. ✓ Check position of level sensor. ✓ Adjust level sensor or delete the sensor from controller (by loading default). ✓ Check plug connection. ✓ Replace defective parts. 	Specialist
Peltronic icon flashes	<ul style="list-style-type: none"> ▶ Peltronic emission condenser too hot. ▶ Plug disconnected. 	<ul style="list-style-type: none"> ✓ Let the Peltronic emission condenser cool down. ✓ Check plug connection. 	User, Specialist
Title bar without text	<ul style="list-style-type: none"> ▶ No controllable device connected (In-line suction valve, VMS, VARIO pump). 	<ul style="list-style-type: none"> ✓ Check device connections and cable. ✓ Replace defective parts. ✓ Connect a controllable device to the controller. ✓ Use the controller as measuring gauge. 	Specialist
No key reaction – only On/Off, PC icon displayed	<ul style="list-style-type: none"> ▶ Remote switched On. ▶ Controller only controllable via connected external end device (via RS232). 	<ul style="list-style-type: none"> ✓ Switch-off Remote (switch off and on controller, press selection knob shortly while booting, select Configuration/RS232/Remote and adjust Off). ✓ Control controller via end device. 	Specialist
No reaction to key actuation	<ul style="list-style-type: none"> ▶ Controller defective 	<ul style="list-style-type: none"> ✓ Contact us and ✓ return device for repair. 	respon. Specialist

RESOLVING PROBLEMS

Fault	▶ Possible cause	✓ Remedy	Personnel
No display	<ul style="list-style-type: none"> ▶ Controller switched off. ▶ Power supply disconnected. ▶ Power supply not correctly connected. ▶ Mains voltage failure. ▶ Controller defective ▶ Cable break. 	<ul style="list-style-type: none"> ✓ Switch on the controller; On/Off key. ✓ Check plug connection and wall power supply for correct connection. ✓ Replace defective parts. ✓ Contact service and ✓ return device for repair. 	Specialist
Blank display	<ul style="list-style-type: none"> ▶ Too many devices connected, e. g., valves. 	<ul style="list-style-type: none"> ✓ Power input of all connected devices may not exceed the maximum power consumption of the controller: <ul style="list-style-type: none"> - controller with wall power supply max. 30 W, - Controller + VARIO max. 25 W. 	respon. Specialist
	<ul style="list-style-type: none"> ▶ Short circuit of a connected device. 	<ul style="list-style-type: none"> ✓ Replace defective parts. 	
	<ul style="list-style-type: none"> ▶ Short circuit at RS232 interface. ▶ Controller defective 	<ul style="list-style-type: none"> ✓ Check RS232 plug connection. ✓ Contact Service and ✓ return device for repair. 	
Incorrect pressure display	<ul style="list-style-type: none"> ▶ Humidity inside the vacuum sensor. ▶ Vacuum sensor soiled. ▶ Vacuum sensor not adjusted. ▶ Vacuum sensor not correctly adjusted. 	<ul style="list-style-type: none"> ✓ Identify and remove source of humidity. ✓ Dry the vacuum sensor, e. g., by pumping down. ✓ Clean the vacuum sensor, <i>see chapter .9.1 Cleaning on page 69.</i> ✓ Readjust vacuum sensor. 	User, Specialist
Digital pressure gauge flashes	<ul style="list-style-type: none"> ▶ Pressure display flashing with 0.0: <ul style="list-style-type: none"> - vacuum adjustment not correctly carried out. ▶ Pressure display flashing: <ul style="list-style-type: none"> - Overpressure! Pressure > 1060 mbar. 	<ul style="list-style-type: none"> ✓ Readjust internal or external vacuum sensor, <i>see chapter .9.2 Sensor readjustment on page 70.</i> <p>⚠ WARNING! Risk of bursting. ⇒ Discharge the system immediately by venting.</p>	Specialist
No digital pressure reading	<ul style="list-style-type: none"> ▶ External vacuum sensor defective. ▶ External vacuum sensor removed. ▶ Internal vacuum sensor defective. 	<ul style="list-style-type: none"> ✓ Replace defective parts. ✓ Reconnect external vacuum sensor. ✓ Contact Service and ✓ return device for repair. 	respon. Specialist

Fault	▶ Possible cause	✓ Remedy	Personnel
Sensors submenu is permanently displayed	▶ Submenu <i>Sensors...</i> does not automatically switch back to previous display.	✓ Select the required sensor by turning and pressing selection knob.	User, Specialist
After loading defaults <i>Language selection</i> appears	▶ Special factory settings have been loaded.	✓ Set language and pressure unit. IMPORTANT! Check if the loaded default settings are suitable for your vacuum apparatus.	respon. Specialist
Error I/O module	▶ Plug disconnected. ▶ An error occurred in the system, the I/O module passed the error alert to the controller.	✓ Check plug connection. ✓ Remedy external fault.	Specialist, respon. Specialist
VSP sensor displays wrong values	▶ VSP sensor configured as VSK.	✓ Use menu <i>Function/ Vacuubus</i> to reconfigure the sensor as VSP.	Specialist, respon. Specialist
Controller in operation, pressure display flashes	▶ VSK sensors are measuring negative difference pressure.	✓ Select an other vacuum sensor in menu <i>Sensors</i> .	

Action required	▶ Cause	✓ Remedy
Elapsed process time	▶ All program steps are completed. ▶ Program end reached.	✓ Acknowledge indication by pressing <i>Start/Stop</i> key.
Flashing clock icon	▶ Elapsed process time	✓ Acknowledge indication by pressing <i>Start/Stop</i> key.
Pump down stops, flashing arrow down icon	▶ Pressure below preset minimum value.	✓ Acknowledge indication by pressing <i>Start/Stop</i> key. ✓ If possible readjust presetting (Min.).
Vac control stops, flashing arrow up icon	▶ Preset maximum value exceeded.	✓ Acknowledge indication by pressing <i>Start/Stop</i> key. ✓ If possible readjust presetting (Max.).
Program -	▶ Program not yet stored.	✓ Store program under a free program number.

8.3 Controller Reset

Auto reset

Automatic reset The following error indications will be reset automatically with remedy:

- Overpressure
- Process time elapsed
- Limit pressure reached
- Error air admittance valve
- Error Peltronic

Active reset

Reset after action Several error indications need to be reset manually. Depending on the fault severity different actions are required.

⇒ Press **Start/Stop** key to reset the following error indications:

- In-line suction valve error
- Coolant valve error
- External vacuum sensor removed
- I/O module activated **Error indication**
- external error indicator has triggered via Digital I/O module; assigned as **Error**.
- Level sensor triggered

⇒ Load **Defaults** (standard factory setting) to reset the following error indications:

- Missing set value presetting or VACUU·BUS plug disconnected via Digital I/O module; assigned as **Remote**.
- Level sensor removed and/or VACUU·BUS plug disconnected.

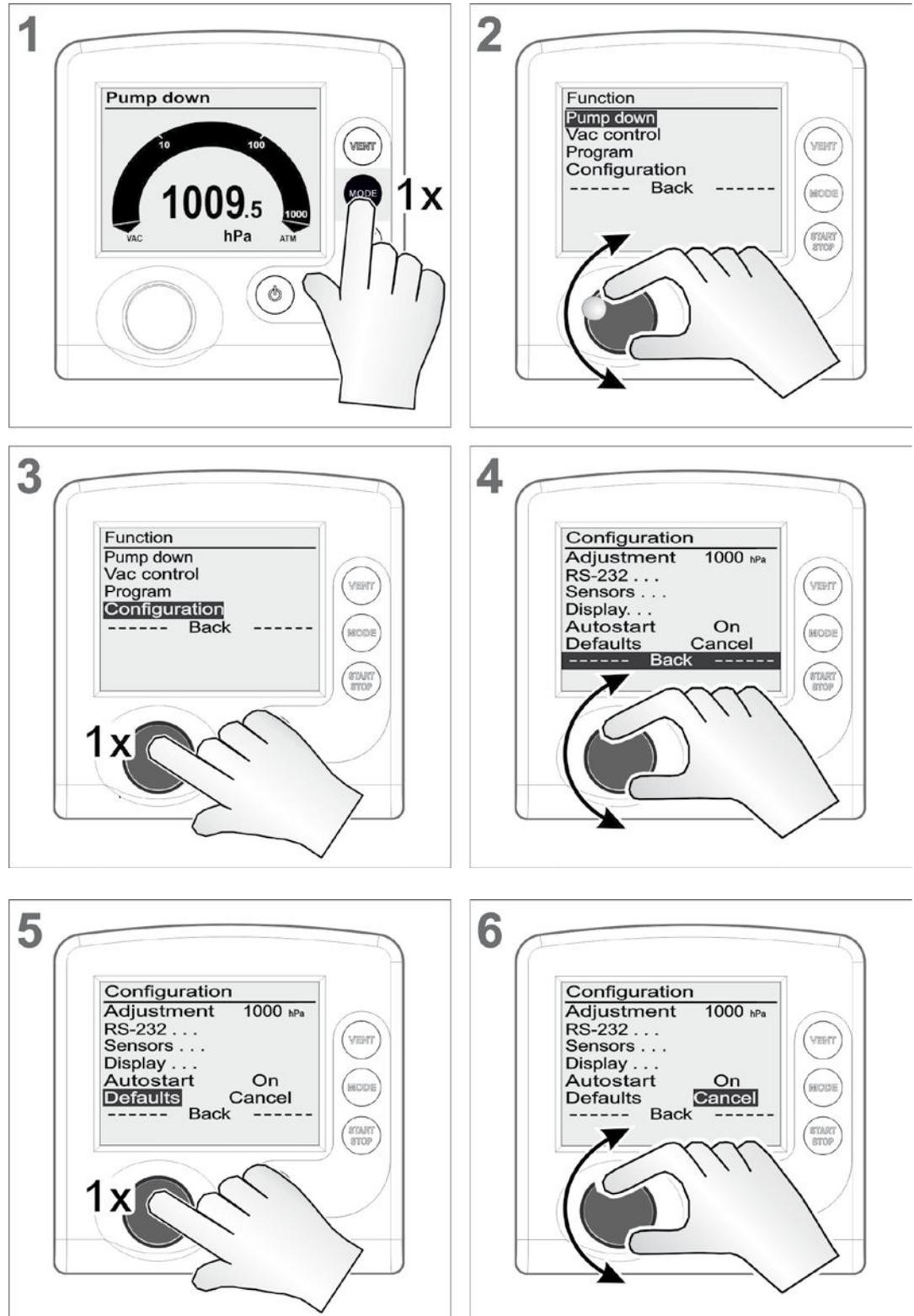
→ see also chapter: **7.3 Configuration menu on page 54** for loading **Defaults**.

IMPORTANT!

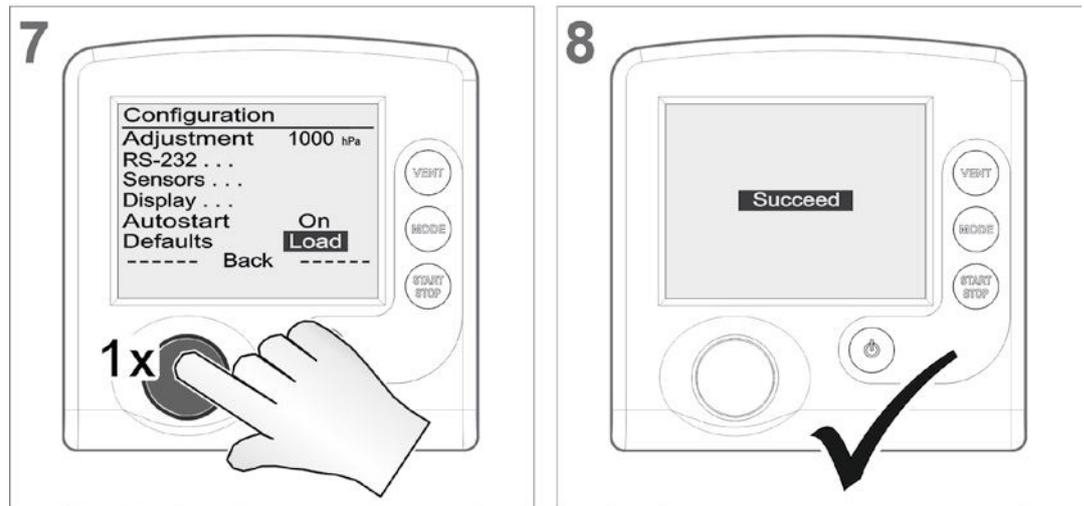
⇒ Note the settings of stored programs, before loading *Default*.

Load default settings

Load factory settings



Load factory settings



8.4 Error of external components

Error messages for defective external components such as In-line suction valve, vacuum sensor, etc. cannot be reset.

⇒ Replace defective accessories or

⇒ send defective accessories for repair to your local supplier or to our service.

9 Cleaning and maintenance

9.1 Cleaning

IMPORTANT!

This chapter does not contain descriptions for the decontamination of the controller. This chapter describes only simple cleaning and care measures.

9.1.1 Controller

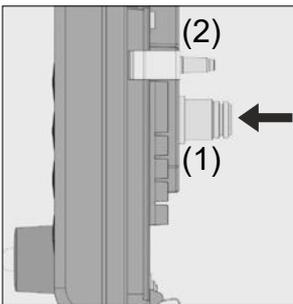
Clean surface



⇒ Clean soiled surface with a clean, slightly wetted cloth. To moisten the cloth we recommend water or mild soap.

9.1.2 Venting valve

Clean venting¹ valve



1. Apply slight overpressure of dry air or inert gas to the vacuum port (1).
2. Press the **VENT** key several times until gas escapes through the venting port (2).
3. Repeat this procedure until you hear the clicking of the valve and a gas stream is noticeable at the venting port (2).

9.1.3 Internal sensor

Clean internal sensor

1. Fill a small amount of solvent via the vacuum port (1) in the controller, e. g., cleaning solvent.
2. Let the solvent react for a few minutes.
3. Drain the solvent.
 - ☑ Dissolved substances or discolorations in the solvent are possible.
4. Repeat this procedure until no more pollutants are in the solvent.
5. Let the controller dry.
6. Readjust the internal (vacuum) sensor.

¹ -> air admittance valve

9.2 Sensor readjustment

NOTICE

For readjustment the reference pressures need to be known with certainty

In the pressure range 20 – 700 mbar (15 – 525 Torr) no adjustment is possible.

⇒ Check the accuracy of the pressure sensor in case of irregularities in the pressure display.

⇒ Readjust the sensor in two steps: at atmospheric pressure and under vacuum.

Do not adjust at atmospheric pressure, if the pressure at the location of the device is not exactly known (pay attention to height above sea level).

Any kind of pollution of the vacuum system, e. g., oil, substances, or humidity could falsify the adjustment.

⇒ Clean polluted sensors before readjustment.

Adjustment at atmospheric pressure

Adjustment at atmospheric pressure

An adjustment at atmospheric pressure is only possible if the pressure is higher than > 700 mbar (> 525 Torr).

1. Vent the measurement connection of the controller or in case the connected external vacuum sensor VSK 3000.
2. Make sure that the vacuum sensor (internal or external) is really at atmospheric pressure.
3. Determine the exact atmospheric pressure of your location, e. g, by barometer, inquiry at the meteorological office or the airport.
4. Call up menu **Configuration**.
5. Turn the **selection knob** and place the bar marking on **Adjustment**.
6. Press the **selection knob**.
 - Marking jumps to numeric value.
7. Adjust the exactly determined local atmospheric pressure by turning the **selection knob**.
8. Press the **selection knob**.
 - Sensor adjusted to atmospheric pressure.

Adjustment under vacuum

Adjustment under vacuum

An adjustment under vacuum is only possible if the pressure is lower than < 20 mbar (< 15 Torr) absolute.

1. Evacuate the measurement connection of the controller or in case the connected external vacuum sensor VSK 3000 to a pressure $< 0,1$ mbar.

IMPORTANT!

Adjustment under vacuum with an actual pressure higher than $0,1$ mbar (0.1 Torr) reduces the accuracy of the measurement. If the pressure is significantly higher than $> 0,1$ mbar (> 0.1 Torr) the adjustment to a reference pressure is recommended.

2. Call up menu *Configuration*.
3. Turn the *selection knob* and place the bar marking on *Adjustment*.
4. Press the *selection knob*.
 - Marking jumps to numeric value.
5. Adjust the pressure value to 0 by turning the *selection knob*.
6. Press the *selection knob*.
 - Sensor adjusted under vacuum.

NOTICE

The readjustment of a VSP 3000 can only be carried out in warmed-up state.

Adjustment is not possible during the warm-up time.

- ⇒ Use a high vacuum pump for the adjustment of a VSP sensor.
- ⇒ After connection to power supply and after the pressure has reached $< 10^{-3}$ mbar, wait 20 minutes before adjusting the VSP sensor.
- ⇒ Carry out the adjustment in the same order as described above for VSK.

Adjustment at a reference pressure

Adjustment at
reference pressure

Instead of adjustment under vacuum to a pressure $< 0,1$ mbar (< 0.1 Torr), adjustment to a precisely known reference pressure within the range of 0 – 20 mbar (0 – 15 Torr) is possible.

1. Evacuate the measurement connection of the controller or in case the connected external vacuum sensor VSK 3000 to a pressure in the range of 0 – 20 mbar (0 – 15 Torr).
2. Call up menu **Configuration**.
3. Turn the **selection knob** and place the bar marking on **Adjustment**.
4. Press the **selection knob**.
 - Marking jumps to numeric value.
5. Adjust the pressure value to the actual reference pressure by turning the **selection knob**.
6. Press the **selection knob**.
 - Sensor adjusted to reference pressure.

IMPORTANT!

The measurement uncertainty of the reference pressure will directly affect the measurement uncertainty of the controller.

If the nominal ultimate vacuum of a diaphragm pump is used as reference vacuum, the accuracy of the controller might be doubtful. The diaphragm pump may not achieve the specified vacuum (due to condensate, poor condition, failure of valves or diaphragm, leaks).

For further descriptions about **Adjustment**

→ see chapter: **7.3 Configuration menu on page 54**

10 Appendix

10.1 Technical information

Technical
information

Product	
Vacuum controller	Vacuum Controller Hei-VAC Control
Internal vacuum sensor	Ceramic diaphragm (alumina), capacitive, gas independent, absolute pressure

10.1.1 Technical data

Technical data

Ambient conditions		(US)
Working temperature	10–40 °C	50–104°F
Transport- and storage temperature	-10–60 °C	14–140°F
Altitude, max.	3000 m above sea level	9840 ft above sea level
Relative humidity	30–85 %, non condensing	
Avoid condensation or contamination by dust, liquids, or corrosive gases.		

Power supply unit		(US)
Input voltage	90–264 VAC	90–264 VAC
Frequency	47–63 Hz	47–63 Hz
Input current, max.	0,8 A	0.8 A
Output voltage, short-circuit-proof	24 VDC	24 VDC
Output current, max.	1,25 A	1.25 A
Cable length, approx.	2 m	79 in.
Dimension	108 mm x 58 mm x 34 mm 4.3 in. x 2.3 in. x 1.4 in.	
Weight	300 g	0.66 lb
Mains plug	AC, changeable: EU/UK/US/AUS	

Electrical data		(US)
Supply voltage, max.	24 VDC (±10 %)	24 VDC (±10 %)
Power, max.	3,4 W	3.4 W
Max. admissible current total for connected valves	4 A	4 A
Degree of protection (controller front)	IP 20 (IP 42)	
Port (interface)	RS 232 SUB-D 9 poles	

Technical data
basic device

Vacuum data		
Hei-VAC Control, internal vacuum sensor (US)		
Measuring range, absolute	1080–0,1 mbar	810–0.1 Torr
Max. control range	1060–0,1 mbar	795–0.1 Torr
Resolution	0,1 mbar	0.1 Torr
Max. admissible media temperature (gas):		
Temporarily	80 °C	176°F
Continuous operation	40 °C	104°F
Measurement uncertainty	< ±1 mbar	< ±0.75 Torr
Temperature coefficient	< ±0,07 mbar/K	< ±0.05 Torr/K
External vacuum sensor VSK 3000		
Max. admissible pressure, absolute	1,5 bar	1125 Torr
Venting		
Max. admissible pressure, absolute	1,2 bar	900 Torr
Gas connections		
Hei-VAC Control table top version	Fitting for PTFE tube 10/8 mm or hose nozzle for flexible tube DN 6/10	
Venting	Hose nozzle for flexible tube $d_i = 4\text{--}5$ mm	
Display		
Type	LC display (LCD)	
Brightness control	yes	
Pressure display	switchable: mbar, Torr, hPa	
Weight and dimensions*		
		(US)
Weight (built-in)	440 g	0.97 lb
Weight with foot (table top)	570 g	1.3 lb
Dimensions	123 mm x 124 mm x 83 mm 5 in. x 5 in. x 3.5 in.	
Dimensions with foot	144 mm x 124 mm x 115 mm 6 in. x 5 in. x 4.5 in.	
* without wall power supply		

10.1.2 Rating plate



- ⇒ In case of malfunction, please note type and serial number on the rating plate.
- ⇒ When contacting our service department, name us product type and serial number. With this information we can offer selective support and advice for your product.

Rating plate

Rating plate

Manufacturer

Product class & Type

Product number

Power supply &
Electrical power

Serial number

Address



10.1.3 Wetted parts

Wetted parts

Component	Wetted materials
Vacuum connection, hose nozzle	PP
Sensor	Aluminium oxide ceramic
Sensor housing	PPS/Glasfaser
Sensor seal	chemically resistand fluoroelastomer
Venting valve seal	FFKM

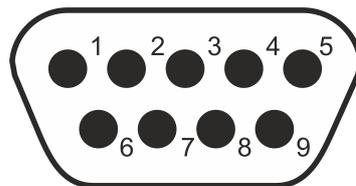
10.2 Interface commands (see Online Instructions for use)

You get the Online Instructions for use from the technical service of Heidolph Instruments.

10.2.1 Pin assignment (RS232)

Sub-D panel connector

SUB-D 9 poles



Sub-D 9 poles
(rear side of controller)

PIN	Name	Operation	PIN	Name	Operation
1	DCD	---	6	DSR	---
2	RxD	Received data	7	RTS	Transmission request
3	TxD	Transmission data	8	CTS	Ready to send
4	DTR	+10 V	9	RI	+5 V (<i>Bluetooth, remote control</i>)
5	GND	Mass	-	---	---

10.3 Certifications

10.3.1 EC Declaration of Conformity



EU-Konformitätserklärung EU Declaration of conformity

CE **Vakuum-Controller**
Vacuum-controller

Wir, die Heidolph Instruments GmbH & Co. KG,
We, Heidolph Instruments GmbH & Co. KG,

Heidolph Instruments GmbH & Co. KG
Walpersdorfer Straße 12
91126 Schwabach / Deutschland

erklären, dass nachstehend bezeichnete Geräte (ab der Seriennummer 200150525) in Konzeption und Bauart sowie in der von uns in Verkehr gebrachten Ausführung den grundlegenden Anforderungen der zutreffenden, aufgeführten EU-Richtlinien entspricht. Bei einer mit uns nicht abgestimmten Änderung an dem Gerät verliert diese Erklärung ihre Gültigkeit.

hereby declare, that the product (from serial number on 200150525) designated below is in compliance with the basic requirements of all applicable EU-directives stated below with regard to design, type of model sold and manufactured by us. This certificate will be invalid if the product is modified without the prior written consent and agreement of the manufacturer.

Hei-VAC Control 591-00360-00

Niederspannungsrichtlinie / low voltage Directive 2014/35/EU
EMV-Richtlinie / Electromagnetic Compatibility Directive 2014/30/EU
RoHS-Richtlinie / RoHS directive 2011/65/EU
Angewandte (harmonisierte) Normen / (Harmonized) Standards applied:
EN 12100:2010, EN 61326-1:2013, EN 61010-1:2010, EN IEC 63000:2018

Bevollmächtigter für die Zusammenstellung der technischen Unterlagen / Person
Authorized to compile the technical file: Marcell Sarré - Heidolph Instruments GmbH & Co. KG,
Walpersdorfer Straße 12, 91126 Schwabach / Germany

Schwabach, 23.09.2019

Wolfgang Jaenicke
Geschäftsführer
Managing Director

Marcell Sarré
Qualitätsmanager
Quality Manager

01-001-025-18-2

10.3.2 China RoHS Declaration of Conformity



China RoHS DECLARATION OF CONFORMITY

Heidolph Instruments GmbH & Co.KG has made reasonable efforts to ensure that hazardous materials and substances may not be used in its products.

In order to determine the concentration of hazardous substances in all homogeneous materials of the subassemblies, a "Product Conformity Assessment" (PCA) procedure was performed. As defined in GB/T 26572 the "Maximum Concentration Value" limits (MCV) apply to these restricted substances:

- Lead (Pb): 0.1%
- Mercury (Hg): 0.1%
- Cadmium (Cd): 0.01%
- Hexavalent chromium (Cr(VI)): 0.1%
- Polybrominated biphenyls (PBB): 0.1%
- Polybrominated diphenyl ether (PBDE): 0.1%

Environmental Friendly Use Period (EFUP)

EFUP defines the period in years during which the hazardous substances contained in electrical and electronic products will not leak or mutate under normal operating conditions. During normal use by the user such electrical and electronic products will not result in serious environmental pollution, cause serious bodily injury or damage to the user's assets.



The Environmental Friendly Use Period for Heidolph Instruments GmbH & Co.KG products is 25 years.

此表格是按照 SJ/T 11364-2014 中规定制定。

This table is created according to SJ/T 11364-2014

MATERIAL CONTENT DECLARATION FOR Heidolph Instruments GmbH & Co. KG PRODUCTS							
有毒有害物质或元素 Hazardous substances							
部件名称 Part name	铅 Pb	汞 Hg	铬 Cd	六价铬 Cr(VI)	多溴联 苯 PBB	多溴二 苯醚 PBDE	环保期限 标识 EFUP
包装 Packaging	○	○	○	○	○	○	
塑料外壳/组件 Plastic housing / parts	○	○	○	○	○	○	
电池 Battery	○	○	○	○	○	○	
玻璃 Glass	○	○	○	○	○	○	
电子电气组件 Electrical and electronic parts	X	X	X	○	○	○	
控制器/测量设备 Controller / measuring device	X	○	X	○	○	○	
金属外壳/组件 Metal housing / parts	X	○	○	○	○	○	
电机 Motor	X	○	○	○	○	○	
配件 Accessories	X	○	○	○	○	○	



注释: 此表格适用于所有产品。以上列出的原件或组件不一定都属于所附产品的组成。

Note: Table applies to all products. Some of the components or parts listed above may not be part of the enclosed product.

- O: 表示该有毒有害物质在该部件所有均质材料中的含量均在GB/T 26572规定的限量要求以下。
O: Indicates that the above mentioned hazardous substance contained in all homogeneous materials of the part is below the required limit as defined in GB/T 26572.
- X: 表示该有毒有害物质至少在该部件某一均质材料中的含量超出GB/T 26572规定的限量要求。
X: Indicates that the above mentioned hazardous substance contained in at least one of the homogeneous materials of this part is above the required limit as defined in GB/T 26572.

除上表所示信息外, 还需声明的是, 这些部件并非是有用铅(Pb)、汞(Hg)、镉(Cd)、六价铬(Cr(VI))、多溴联苯(PBB)或多溴二苯醚(PBDE)来制造的。

Apart from the disclosures in the above table, the subassemblies are not intentionally manufactured or formulated with lead (Pb), mercury (Hg), cadmium (Cd), hexavalent chromium (CrVI), polybrominated biphenyls (PBB), and polybrominated diphenyl ethers (PBDE).

Products manufactured by Heidolph Instruments GmbH & Co.KG may enter into further devices or can be used together with other appliances.

With these products and appliances in particular, Heidolph Instruments GmbH & Co.KG will not take responsibility for the EFUP of those products and appliances.

Place, date Schwabach, 19.09. 2019

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