

The miVac Pressure Controller



User Manual

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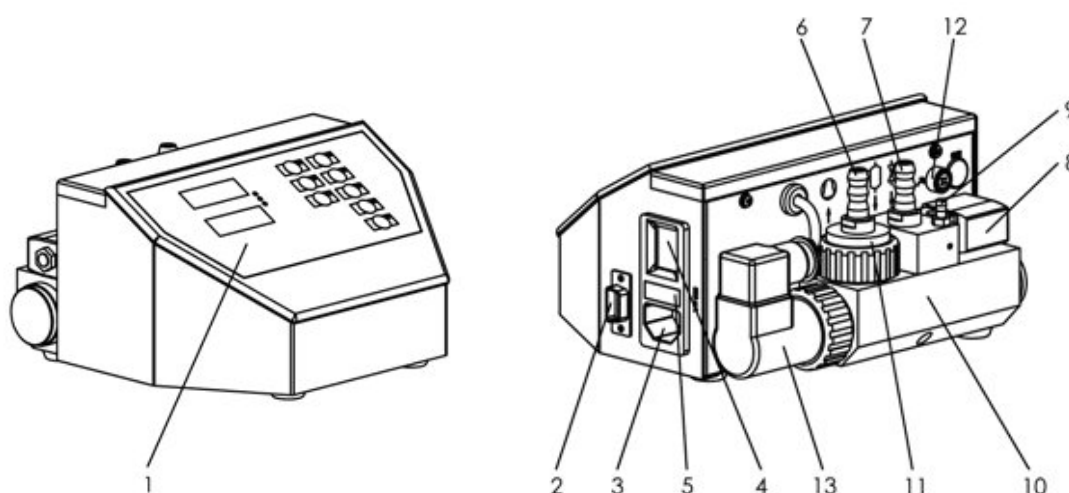
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Introduction

The **miVac Pressure Controller** is designed to improve concentration performance and solvent recovery of the **miVac Modular Concentrator series**.

This manual is a guide to the installation, set up and operation of the pressure controller. It facilitates the most efficient procedure to protect sample integrity and ensure optimum performance at all times.

Use the **miVac Pressure Controller User Manual** in conjunction with the **miVac Modular Concentrator Series User Manual**. It is advisable to keep these manuals near the place of use so they are available to personnel when required.



Item no.	Description	Item no.	Description
1	Controller complete	8	Ventilation valve
2	RS 232 – NOT USED	9	Inert gas connection
3	Power supply plug	10	Sensor integrated
4	Main switch Off / On	11	Check valve integrated
5	Fuse T 630 mA	12	NOT USED
6	Connection vacuum pump	13	Control valve
7	Connection vacuum apparatus		

Safety and Maintenance Notes

Warning Symbol



This symbol is used throughout this manual. It indicates hazards that can lead to injury or material damage to samples or equipment.

Safety



Read the following notes before operating the pressure controller. It is important to understand the implications of safety to personnel and for the protection of sample integrity.

The Pressure Controller is intended for use in conjunction with the miVac Modular Concentrator series in chemical and physical laboratories, and in industry. Applicable regulations must be observed when using hazardous substances (e.g. corrosive, toxic, microbiological, radioactive).

Maintenance

Routine maintenance of the pressure controller is not required, however the valves within the pressure controller may be cleaned whenever necessary.

Any repair of this product should be carried out by Genevac personnel (or approved representatives of Genevac) using only approved Genevac spare parts.

Limitations of use

Your miVac Pressure Controller is unsuitable for use with strong acids such as HCl, TFA and HBr at all concentrations.

Installation

Upon Delivery

Please unpack your system at the point of receipt. Check the contents of the delivery as soon as possible against the delivery note. Notify your miVac Distributor immediately of any missing or damaged parts.

Installation Overview

Follow the step by step instructions on the following page to install the pressure controller. The illustration below shows a typical installation of a miVac concentrator, speedTrap, pressure controller and pump.



- Leave approximately a 50mm air gap between each unit and ensure there is adequate ventilation.
- Observe local safety regulations.
- Use the pipes and connectors supplied in the pressure controller connection kit, this minimises the possibility of faulty connections.
- Check all of the system vacuum lines and connections for leaks before operating the system.

Parts of the Pressure Controller Connection Kit



1/2" Hose - 55mm long x 2

3/8" Hose - 1m long x 2

33mm Hose Clips x 2

25mm Hose Clips x 4

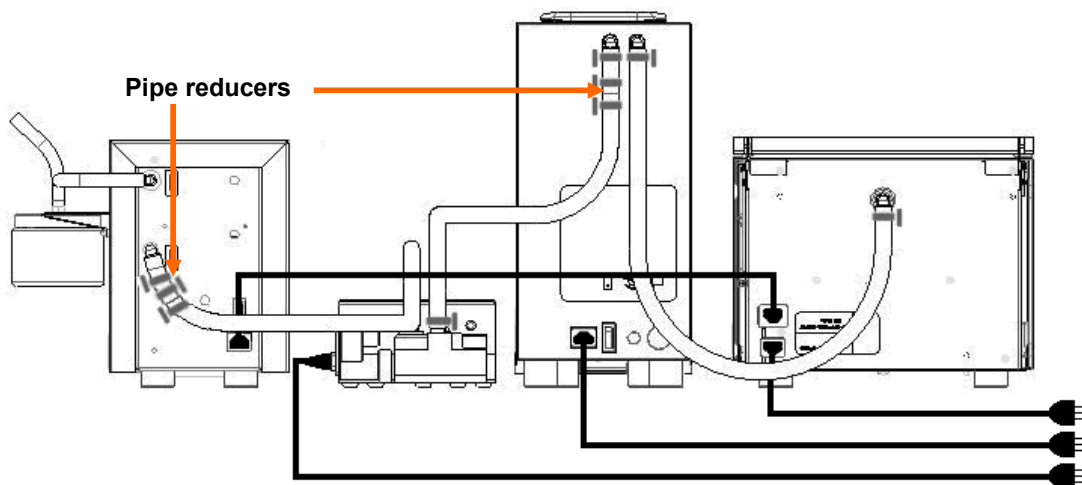
1/2"- 3/8" Reducer x 2

Electrical Cable

Installing the Pressure Controller

If connecting the pressure controller to an existing miVac concentrator system, first remove the 1/2" hose that connects the pump to the speedTrap. Then proceed as follows.

1. Connect a 1/2" hose (55mm long) to a 3/8" hose (1m long) using a 1/2"- 3/8" reducer. Seal the connections using a 33mm and 25mm hose clip.
2. Connect the 1/2" end of the hose assembly to the hose spigot of the speedTrap (as shown) using a 33mm hose clip.
3. Repeat the procedure to make a second hose assembly and connect this to the hose spigot of the pump as shown.
4. Cut each of the hose assemblies to an appropriate length and connect them to the hose spigots of the pressure controller using 25mm hose clips as shown (remove the blanking plugs from the pressure controller spigots if these are fitted).



Connect the pressure controller to the mains power supply using the power cable supplied.

General

Good Procedural Practice

General rules for safe operation of a system:

- Ensure only users familiar with all the issues outlined in this User Manual should be permitted to operate the equipment.
- Do not place any objects on top of any of the system components during a run.

Routine Checks

Check all hose joints regularly to ensure that they are secure. Clean the exterior paintwork with a soft, lint free cloth using one of the following:

- Detergent solution
- Bleach solution (if using biological agents)
- Methanol
- Ethanol

List of Acceptable Solvents

Acetic Acid	1,2-Dichloroethane	Methyl Tertiary Butyl Ether
Acetonitrile (ACN)	Dioxane	Methylene Chloride (DCM)
Acetone	Ethanol (EtOH)	Propan-1-ol or Propanol
Ammonium Hydroxide (NH ₃ OH)	Ethyl Acetate	Propan-2-ol or isopropyl
Butan-1-ol	Formic Acid	alcohol (IPA)
Butan-2-ol	Heptane	THF
Butyl Acetate	Hexane (Hex)	Toluene
Chloroform (TCM)	Methanol (MeOH)	Water



Only use the solvents shown in **red** in systems where all units (concentrator, speedTrap and pump) were manufactured after April 2007. The date of manufacture is shown on the instrument's serial plate.

miVac Systems and Combustible Solvents

Please note it remains the responsibility of the user to consider safety when evaporating any combustible solvents and to ensure the system is placed in a well-ventilated environment.

Genevac and the ATEX Directive

This Statement is applicable only to Member Countries of the EU.

Please note that it remains the responsibility of the user to consider any solvents being evaporated within the context of the ATEX directive. The presence of solvents on the list above indicates only that they will not damage the system. If further information is required, please contact your Sales Representative or visit <http://www.miVac.co.uk>

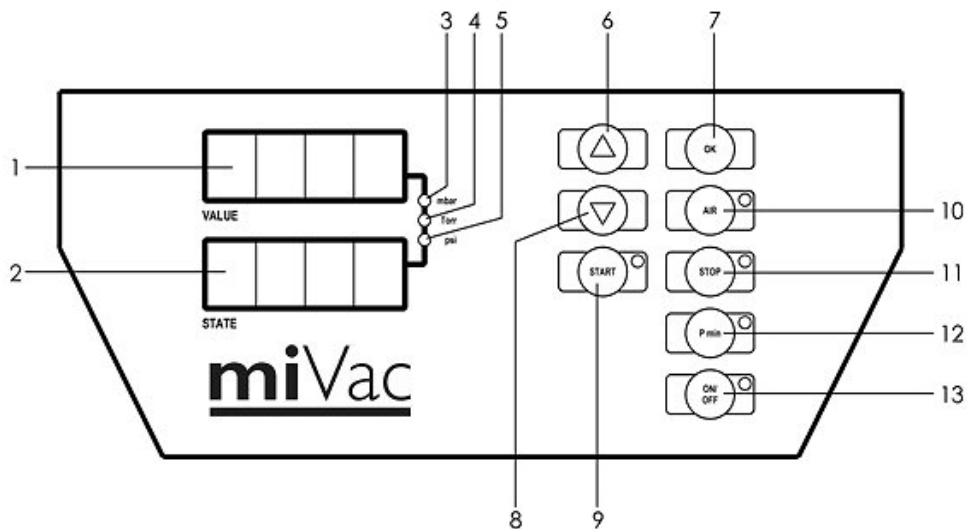
Operation

Switching on

Switch on the miVac Pressure Controller using the OFF / ON power switch located above the mains inlet connector. There is a short initialising routine, during which a beep sounds and all light elements light up briefly to confirm operation.

Switch on the miVac Modular Concentrator and set the run type to “---” (no venting) see the miVac Modular Concentrator User Manual for details. The operation of the pressure controller may be erratic if alternative concentrator methods **H2O** (water) or **-OH** (alcohols) are selected.

Control Panel



1	VALUE:	4 digit display: shows pressure value, parameter value
2	STATE:	4 digit display: shows operating mode, type of parameter
3	mbar:	LED Identifies the unit of measurement mbar (<i>factory setting</i>)
4	Torr:	Not applicable
5	psi:	Not applicable
6	UP:	Arrow key: increments values upwards
7	OK:	Setting level: selects the parameters to be set – activates the setting value Transfers temporary values into the memory during operation
8	DOWN:	Arrow key changes values downwards
9	START:	Activates a procedure. LED illuminates when active
10	AIR:	Vents the vacuum system (and LED illuminates) while the button is pressed
11	STOP:	Ends a procedure. LED illuminates when active
12	P min	Reduces the pressure to the lowest attainable pressure. LED illuminates when active
13	ON/OFF	Power ON/OFF Switch. LED illuminates when OFF (in standby)

Operating Modes of the Pressure Controller: an Overview

Set the miVac concentrator run type to “---” (no venting) before operating the miVac system with the pressure controller.

One of four operating modes may be selected on the miVac Pressure Controller. Enter control parameter settings for each operating mode to set up optimum vacuum control profiles for specific applications.

The distinguishing characteristic of each mode is as follows:

Manual Modes:

- **Mode1:** Reduces the pressure to a set point (**PS**). Then controls the pressure at **PS** within a hysteresis allowance defined by the value **PH**.
- **Mode 2:** Reduces the pressure to a set point (**PS**). Then reduces the pressure further by value **PL** in equal increments over time **tL** (the maximum rate of change of pressure is limited to 1 mbar/s). Then reverts to mode 1 and continues, controlling the pressure at a new set point which is equal to **PS – PL**, within a hysteresis allowance defined by the value **PH**.

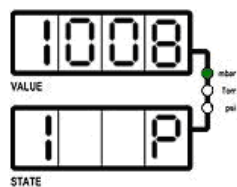
Automatic Modes:

- **Mode 5:** Reduces the pressure until the sample's boiling point is detected. Defines this point as set point (**PS**). Then reverts to mode 1 and continues, controlling the pressure at **PS** within a hysteresis allowance defined by **PH**.
- **Mode 6:** reduces pressure until the sample's boiling point is detected. Defines this point as the set point (**PS**). Then switches to mode 2, reduces the pressure further by value **PL** in equal increments over time **tL**. Then reverts to mode 1 and continues, controlling the pressure at a new set point which is equal to **PS – PL**, within a hysteresis allowance defined by the value **PH**.

Fuller details of the features of each operating mode are discussed in later sections of this user manual, see **Operating Modes of the Pressure Controller: in Detail**. Experimentation will be required to determine the optimum settings for a particular application.

Selecting the Operating Mode

Select the operating mode using the \uparrow **UP** or \downarrow **DOWN** keys. The operating mode may not be changed when the system is operating.

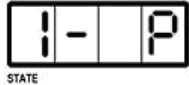


The first position of the **STATE** display shows the selected mode.

Activating / Deactivating the Selected Operating Mode

Switch on the miVac system and the pressure controller. Select the "---" (no venting) run setting on the miVac concentrator.

Press either the the **Manual** start key or the **Auto** start key on the miVac concentrator. Wait for the pump to start, then press the **START** key on the pressure controller. A dash symbol appears in the second position of the **STATE** display to confirm the system is operating in the displayed mode.



Press the **STOP** key on the pressure controller to end the operation of the system. The dash symbol disappears and control is disabled. The vacuum system vents to atmospheric pressure. Then press the **STOP** key on the miVac concentrator.

If the system stops automatically (under **Auto** control of the miVac concentrator) press the **STOP** key on the pressure controller.

Setting Full Vacuum

Press the **P_{min}** key. An LED illuminates to show the control is active. The pressure in the system reduces to the lowest attainable level.

Press the **P_{min}** key again to deactivate the full vacuum control and resume vacuum control at the previous setting.

Venting the System

Press and hold the **AIR** key to vent the system. Release the air key to cease venting and resume vacuum control at the previous setting.

Note: If the system is operating in an automatic mode (mode 5 or mode 6) the search for the boiling point ends. The pressure controller switches to mode 1, and continues, controlling the vacuum system at the current pressure.

Control Parameters

The following tables list the settable mode parameters.

P Pressure settings in mbar		
PS	Pressure S et point	Modes 1, 2,
PH	Pressure H ysteresis	Modes 1, 2, 5, 6
PL	Pressure reduction (P ressure L owered by value)	Modes 2, 6
PA	Threshold value for detecting the boiling P oint in A utomatic mode	Modes 5, 6

t Time setting		
tL	Time for the pressure reduction to PL (pressure L owered)	Modes 2, 6
tH	Not relevant for miVac application	Modes 1, 2, 5, 6

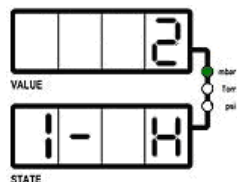
C Pressure sensor calibration		
CH	Calibration point at normal pressure (H igh)	Set this last
CL	Calibration point at L ow pressure (at lowest possible pressure, e.g. 10 mbar)	Set this first

F Frequency reduction in %, starting from the maximum operating frequency		
FA	Not relevant for miVac application	Modes 5, 6

Viewing the Parameter Setting during Operation

Press the **START** key whilst the pressure controller is operating.

The fourth position of the **STATE** display shows a parameter code letter. The **VALUE** display shows the associated programmed value.



Press the **↑ UP** or **↓ DOWN** keys to select other parameters. **Note:** only parameters applicable to the currently selected mode are shown.

The pressure controller display automatically reverts to the mode operating display after a short period.

The programme continues to operate without interruption during this time.

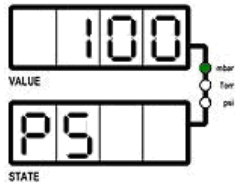
Changing the Control Parameters

The Pressure Controller must be inactive to allow access to the control parameter settings. Press the **STOP** key to deactivate the pressure controller.

Select the required operating mode. See **Selecting the Operating Mode** for details.

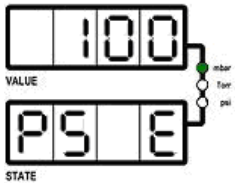
Press the **OK** key for three seconds.

The **STATE** display shows the parameter. The **VALUE** display shows the current setting for the associated parameter.



Press the **↑UP** or **↓DOWN** keys to select the required parameter. Only the control parameters associated with the selected mode are displayed.

Press the **OK** key. The fourth position of the **STATE** display shows an **E** to indicate the parameter value may now be edited.



Press the **↑UP** or **↓DOWN** keys to select a new value for the parameter.

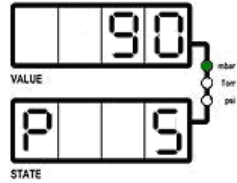
Press the **OK** key to select the new parameter value.

Repeat the procedure for other parameters as required.

Press the **STOP** key to finish the parameter setting operation and return to the mode selector.

Changing the Pressure Set Point during Operation

Press and hold the **↑ UP** or **↓ DOWN** keys while the pressure controller is operating. The fourth position of the **STATE** display changes to **S** and the **VALUE** display increments up or down.



Release the **↑ UP** or **↓ DOWN** key to select the required set point value.

Note: The pressure set point can be reduced, but not increased, once the vacuum system reaches the pressure set point.

The pressure controller changes the pressure in the vacuum system and continues controlling the pressure at the new set point.

There are now two options:-

- Press the **OK** key to permanently store the new set point value.
- Take no action. The set point reverts to the previously set value when the **STOP** key is pressed.

Additional Information

The **miVac Pressure Controller** is not compatible for use with the **H2O** (water) and **-OH** (alcohols) run type settings of the miVac concentrator. This is because the concentrator controls the system vacuum using a timed pump venting sequence when these run types are selected. The pressure controller would have conflicting requirements for control of the vacuum system, causing the system to behave erratically, particularly when the pressure controller is searching for a boiling point.

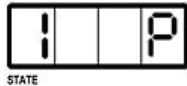
However, for applications where the **H2O** or **-OH** run type settings offer considerable advantages over using the “---” (no venting) setting, improved performance can be achieved by starting system with the pressure controller in an automatic mode (mode 5 or 6, see **Operating Modes of the Pressure Controller: an Overview**) and switching the miVac concentrator run type setting after the system pressure has reached the boiling point. Wait until the system reaches final control pressure (this is where the pressure controller switches to mode 1). Then switch the miVac concentrator to either **H2O** or **-OH** as required.

Operating Modes of the Pressure Controller: in Detail

Mode 1

Switch on the miVac Modular Concentrator system and miVac Pressure Controller, set the concentrator run type to “---” (no venting) using the **Select** control.

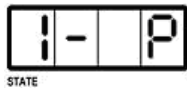
Select mode 1 on the pressure controller using the **↑UP** or **↓DOWN** keys.



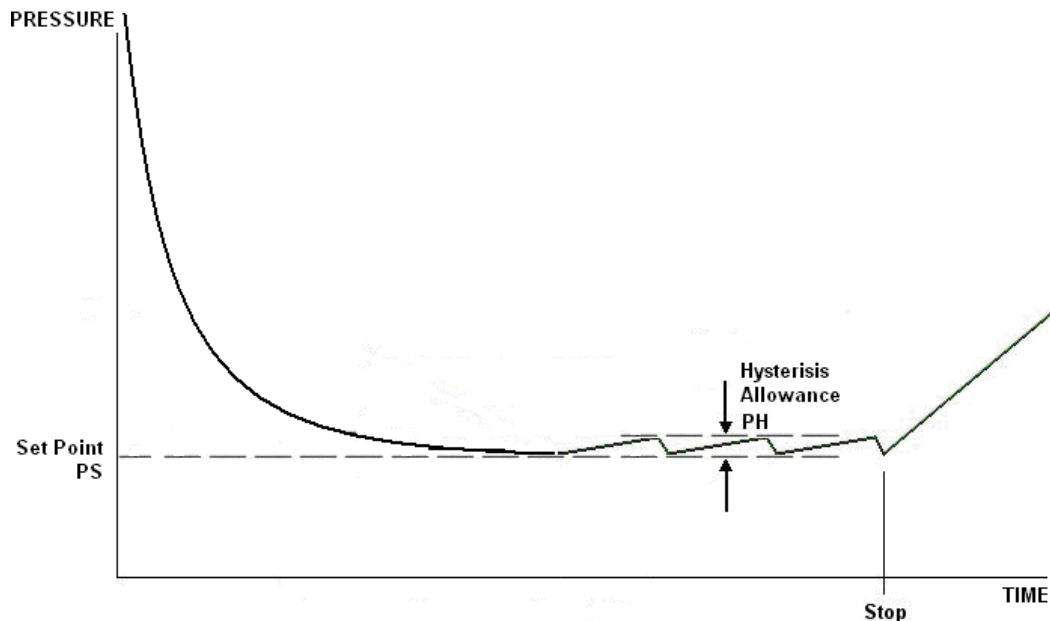
Reset the control parameters (if required) using the procedure **Changing the Control Parameters** on page 11.

Press a miVac concentrator **START** key. Wait until the vacuum pump starts before proceeding.

Press the **START** key on the pressure controller to operate the mode.



The pressure reduces to the set point (**PS**). The pressure controller then controls the pressure at **PS** within a hysteresis allowance defined by the value **PH**.



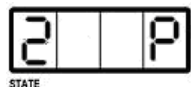
The set point (**PS**) may be altered while the mode is operating. See **Changing the Pressure during Operation** for details.

To end the operation: press the **STOP** key on the pressure controller. Then press the **STOP** key on the concentrator.

Mode 2

Switch on the miVac Modular Concentrator system and miVac Pressure Controller, set the concentrator run type to "---" (no venting) using the **Select** control.

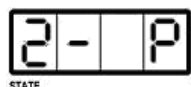
Select mode 2 on the pressure controller using the \uparrow **UP** or \downarrow **DOWN** keys.



Reset the control parameters (if required) using the procedure **Changing the Control Parameters** on page 11.

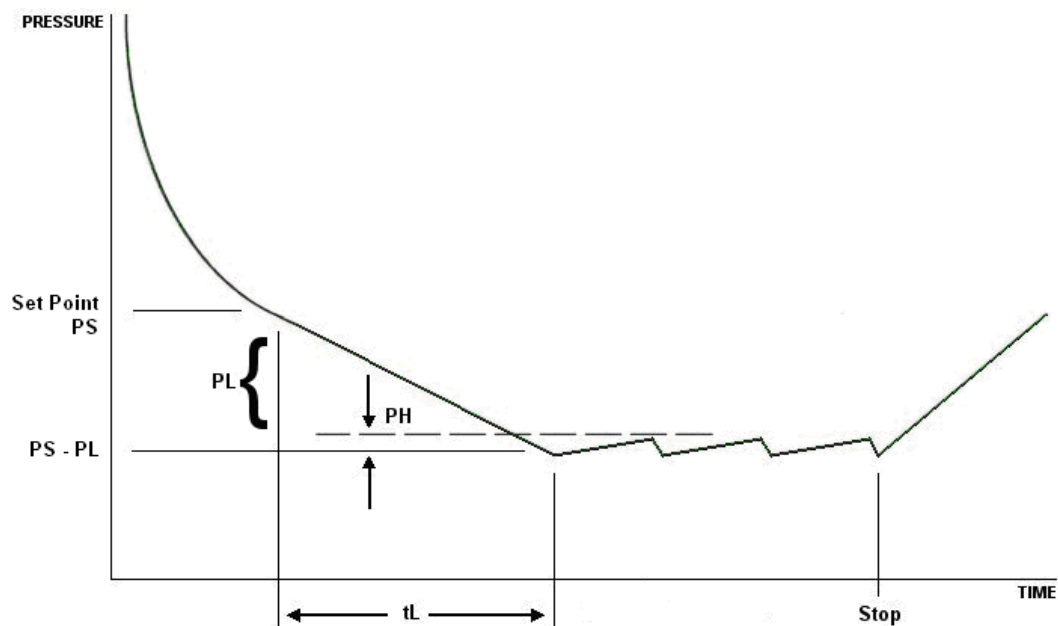
Press a miVac concentrator **START** key. Wait until the vacuum pump starts before proceeding.

Press the **START** key on the pressure controller to operate the mode.



The pressure reduces to the set point (**PS**). Then reduces further by value **PL** in equal increments over time **tL**. The pressure controller then changes to mode 1 and controls the pressure at the value defined by **PS - PL** within a hysteresis allowance defined by the value **PH**.

Use mode 2 when bumping is anticipated or when a shift in boiling point results from the concentration of a volatile component of a mixture.



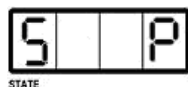
Example: If **PS** = 30 and **PL** = 10, then the final pressure = 20

To end the operation: press the **STOP** key on the pressure controller. Then press the **STOP** key on the concentrator.

Mode 5

Switch on the miVac Modular Concentrator system and miVac Pressure Controller, set the concentrator run type to "---" (no venting) using the **Select** control.

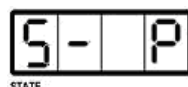
Select mode 5 on the pressure controller using the **↑UP** or **↓DOWN** keys.



Reset the control parameters (if required) using the procedure **Changing the Control Parameters** on page 11.

Press a miVac concentrator **START** key. Wait until the vacuum pump starts before proceeding.

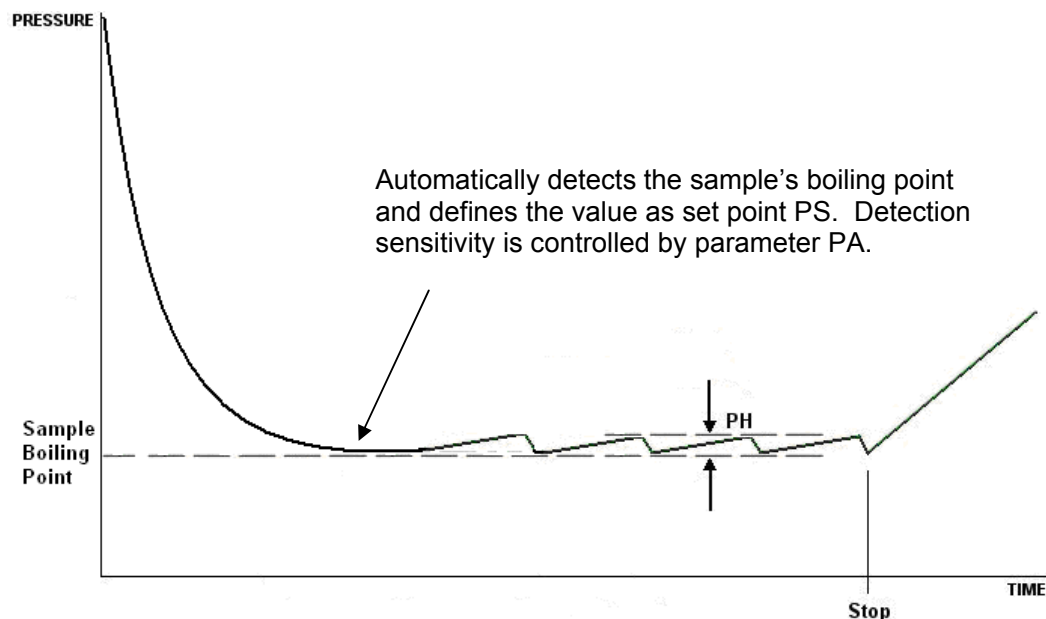
Press the **START** key on the pressure controller to operate the mode.



The pressure reduces until the sample's boiling point is detected. The pressure controller defines this point as set pressure (**PS**). The pressure controller then changes to mode 1 and controls the pressure at **PS** within a hysteresis allowance defined by the value **PH**.

The sensitivity of the controllers' ability to detect the boiling point can be set using parameter **PA**. As a starting point, use a value of 10 for Quattro concentrators and a value of 40 for Duo concentrators. Optimise the sensitivity by increasing the **PA** value for volatiles and reducing the **PA** value for non-volatiles.

Use mode 5 when optimum solvent recovery is paramount.

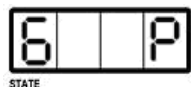


To end the operation: press the **STOP** key on the pressure controller. Then press the **STOP** key on the concentrator.

Mode 6

Switch on the miVac Modular Concentrator system and miVac Pressure Controller, set the concentrator run type to "---" (no venting) using the **Select** control.

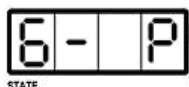
Select mode 6 on the pressure controller using the \uparrow **UP** or \downarrow **DOWN** keys.



Reset the control parameters (if required) using the procedure **Changing the Control Parameters** on page 11.

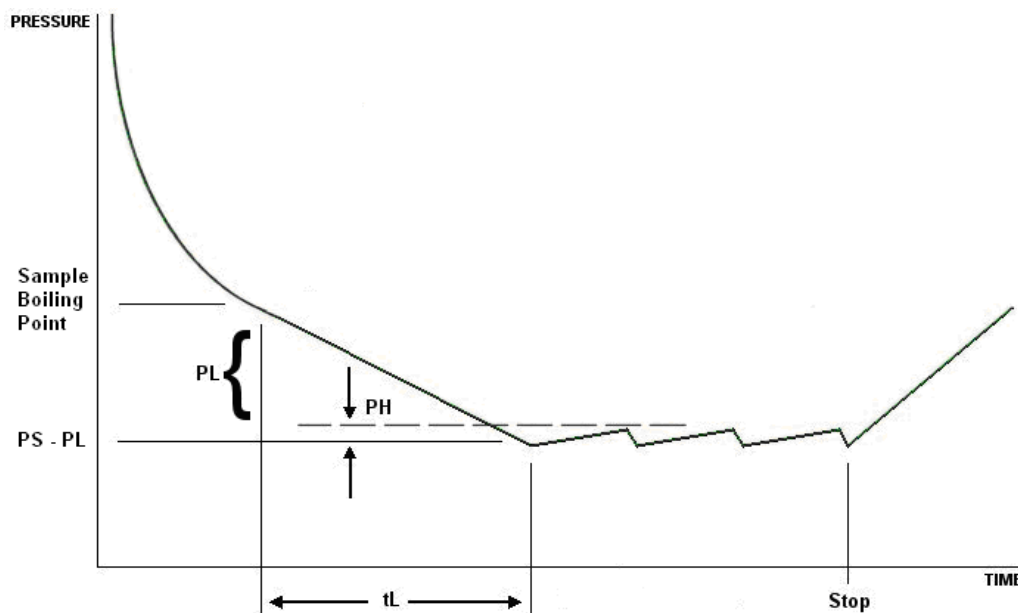
Press a miVac concentrator **START** key. Wait until the vacuum pump starts before proceeding.

Press the **START** key on the pressure controller to operate the mode.



The pressure reduces until the sample's boiling point is detected. The pressure controller defines this point as set pressure (**PS**). The pressure controller then changes to mode 2 and reduces the pressure further by value **PL** in equal increments over time duration **tL** (the maximum rate of change of pressure is limited to 1 mbar/s). The pressure controller then changes to mode 1 and controls the pressure at **PS - PL** within a hysteresis allowance defined by the value **PH**. The sensitivity of the controller's ability to detect the boiling point can be set using parameter **PA** (see **Mode 5** for details).

Use mode 6 when rapid concentration time is paramount. Reducing the pressure below the boiling point causes the evaporation rate to increase, but this is at the expense of solvent recovery. Some experimentation is required to determine the optimum settings for a particular application.



To end the operation: press the **STOP** key on the pressure controller. Then press the **STOP** key on the concentrator.

Calibration

Recalibrate the pressure controller every six months to compensate for any drift in the pressure sensor output signal. Recalibrate also if the pressure shown on the display is implausible.

Connect a comparison measurement device (a vacuum gauge) to a vacuum pipe of the miVac system via a T piece.

1. Press the miVac concentrator manual **START** key. Wait until the vacuum pump starts before proceeding.
2. Press the **OK** key for three seconds.
3. Press the pressure controller **START** key, then press the **P_{MIN}** key.
4. Wait until the pressure stabilises at the lowest attainable pressure.
5. Press the **OK** key for three seconds.
6. Press the **↑UP** or **↓DOWN** keys to select **Calibrate Low**. **Calibrate Low** is selected when the **STATE** display shows **CL**.
7. Press the **OK** key to enable the setting to be changed. The fourth position of the **STATE** display shows an **E** to indicate the value can now be edited.
8. Press the **↑UP** or **↓DOWN** keys to reset the value shown in the **VALUE** display to the same as the value shown on the vacuum gauge.
9. Press **OK** to enter the new **CL** value. The **E** disappears from the **STATE** display.
10. Press the **STOP** key to exit the **Calibrate low** operation. The system vents.
11. Wait until the vacuum system vents to atmospheric pressure.
12. Press the **↑UP** or **↓DOWN** keys to select **Calibrate High**. **Calibrate High** is selected when the **STATE** display shows **CH**.
13. Press the **OK** key to enable the setting to be changed. The fourth position of the **STATE** display shows an **E** to indicate the value can be edited.
14. Press the **↑UP** or **↓DOWN** keys to reset the value shown in the **VALUE** display to the same value as shown on the vacuum gauge.
15. Press the **OK** key to enter the new **CH** value. The **E** disappears from the **STATE** display.
16. Press the **STOP** key to exit the **Calibrate High** operation.
17. Press the **START** key, then press the **P_{MIN}** key.
18. Wait until the pressure stabilises at the lowest attainable pressure.
19. Verify that the pressure shown on the pressure controller is that same as that shown on the vacuum gauge. Repeat the calibration procedure if there is a significant discrepancy.

Technical Data

Sensor

Sensor type	Integrated
Measuring Range	Ceramic
Measuring uncertainty	1-1100mbar
	±2; FS mbar

Controller

Sensor interface	Conductor interface
Scan frequency	10Hz
Resolution ADC	12Hz
Power Supply	+5V stabilised
Sensor signal	0.5 to 4.5V (optimally also 0..5V or 4..20mA)
Pressure indicator	Digital display: mbar, torr or PSI
Switching control accuracy	±1 digit
Power consumption (controller in normal operation)	Max 20W (depending on control power)
Fuse (internal controller)	5A

Power pack

Operating voltage	Internal
Operating frequency	90..264V AC
Output voltage	50 / 60Hz
Output current	24V DC
Output power	1.25A
	30W

Entire Unit

Protective system	IP20
Working temperature	15 – 40°C
Device fuse	T0.630A
Dimensions (W/D/H)	195 / 178 / 105mm
weight	1.6kg

Connectors

IN/OUT:RS232	Not available
OUT: control valve	Integrated
Out: water valve	Not available
Inert gas	Not available
Vacuum apparatus	Hose nozzle DN4
Vacuum pump	Hose nozzle DN8

Other components

Check valve	integrated
-------------	------------

Environment

Ambient temperature	Operating
Relative humidity	0°C – 30°C
Altitude	0 – 95%
	Sea level - 1,600m
	Storage
Ambient temperature	5°C – 40°C
Relative humidity	0 – 90%
Altitude	Sea level - 12,000m

EC Declaration of Conformity

The miVac Pressure Controller conform to the following directives:

73/23/EU	Low Voltage Directive
98/37/EU	Machinery Directive
89/336/EU	Electromagnetic Compatibility Directive

The miVac Pressure Controller fulfils the following product standards:

BS EN 61010-1	Safety requirements for electrical equipment for measurement, control, or laboratory use.
BS EN 60204-1	Electrical equipment of machines.
BS EN 50110-1 (DIN VDE 0105-100)	Operation of electrical installations
BS EN 292-1 and 292-2	Safety of machines, devices and plants.

The CE sign is located on the rating plate.

Observe the binding national, local and plant-specific regulations.

This system is to be used in a pollution degree 1 environment (no pollution, or only dry non-conductive pollution).

Electrical Safety



This pressure controller is a class 1 product according to IEC classification. It must never be used with any interruption to the safety earth conductor. It is an installation category II product and is intended to operate from a normal single phase supply.

Notes

Notes



**Genevac Limited
The Sovereign Centre
Farthing Road
Ipswich
IP1 5AP
United Kingdom**

Sales and Service Hotlines

Service Hotline: +44 (0) 1473 243000

Sales Hotline: +44 (0) 1473 240000

Fax: +44 (0) 1473 461176

Email: salesinfo@genevac.co.uk

Web site: www.miVac.co.uk

**Genevac Inc
SP Industries
815 State Route 208
Gardiner
NY 12525
United States of America**

Sales and Service Hotline

(1) 845 687 5303

Fax (1) 845 267 2212

Email: salesinfo@genevacusa.com

For main Distributor listing, visit:

www.mivac.co.uk/contact/distributors.html

Warranty Statement

This product is guaranteed for period of 12 months from the date of delivery to site. In the unlikely event of any defect arising due to faulty materials or construction resulting in system failure, the unit will be repaired free of charge. This to include all labour and component costs incurred.

This warranty is subject to the following provisions:

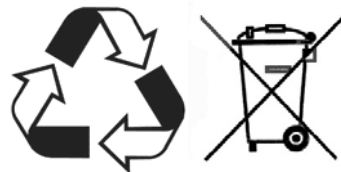
1. System must be sited, installed and operated in accordance with User Manual.
2. Unit only used for the purpose it was sold, and in accordance with Genevac published compatible solvent list.
3. Regular cleaning and preventative maintenance schedule to be adhered to as detailed in User Manual. See item 3.5 Routine Checks on Page 6.
4. Warranty does not cover accidental damage, misuse, modifications or inappropriate repair by untrained personnel.
5. Warranty does not cover consumable items.

Failure to adhere to the above would invalidate the warranty and result in the costs of repairs being charged.

Contact Information

See opposite; please ensure that you have the serial numbers at hand for the components of your system.

Disposal and Recycling



The miVac product should not be discarded in your regular disposal stream. Contact your Distributor or Genevac for proper disposal instructions.

Within the EU, it is Genevac's responsibility under the WEEE directive to provide for the recycling of their products.