The miVac Modular Concentrator Series

User Manual

Original instructions

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Contents

Introduction

The miVac modular concentrator series is a range of units that can be combined in a number of ways to provide great flexibility for a variety of centrifugal concentrator applications. Concentrators feature built in methods for alcohol and for water, they come in two different sizes and an optional SpeedTrap™ can be added to dramatically improve performance; a pressure controller can also be added to further enhance the system's flexibility. A choice of oil free vacuum pumps completes the system.

Components from the miVac range may be used with similar equipment from other manufacturers. All equipment is designed for ease of use, offers very high performance and takes up a small amount of bench space in the laboratory.

Set-up is simple with just one set and select control and a minimum number of push button controls. When the system is operating, an LCD screen shows the sample temperature and elapsed time.

This manual will explain the set-up process and show you how to operate the system. It will guide you through the maintenance requirements and provide information to facilitate the most efficient procedure to protect the integrity of your samples and ensure optimum performance from the system at all times.

Safety

Warnings and cautions

This symbol is used within this manual to highlight ***warnings*** and ***cautions***.

Warning: highlights a risk of personal injury or material damage.

Caution: highlights a risk of material damage.

The following symbols may be found on the equipment:

This symbol means surfaces may be hot and could cause burns.

This symbol means there is risk of hand entrapment.

Refer to the relevant part of the User Manual for additional information.

These Two symbols combined, indicate hazards that can lead to serious material damage or potential serious injury. Refer to the relevant part of the User Manual.

Precautions

Observe the following safety precautions when using the miVac system:

- Only use rotors that are approved for use by Genevac
- Do not leave the system unevenly loaded, someone may start it
- Do not start or restart a system without checking it is evenly loaded
- Do not place objects on top of the system.

Caution: Incorrect loading may result in damage to samples and to the miVac system.

Only allow users who are familiar with all the issues outlined in this User Manual to operate the equipment. If personnel lack the training or experience to comprehend the hazards that can arise when operating the miVac system, do not allow them to use it; personnel without such training require thorough instruction and the instructions contained within this User Manual may form the basis of such training.

Combustible solvents

Warning: Risk of vapour ignition. Only operate the miVac system in a well-ventilated environment and consider safety when evaporating any combustible solvents.

Genevac's position regarding the evaporation of such solvents, particularly with respect to the European ATEX directive, is available on our website, at www.genevac.com, or from your local Genevac distributor.

Electrical earthing

Warning: Risk of electric shock. This equipment must be earthed. The evaporation system is a safety class I product according to IEC classification. It must never be used with any interruption to the safety earth conductor. For systems with multiple power leads, each lead requires a separate earth connection and must be plugged into a separate power socket which is connected directly into the laboratory electrical supply; do not use extension leads.

This equipment is an installation class II product and is intended to operate from a normal single-phase supply.

Strong acids

Caution: The miVac concentrator is unsuitable for use with strong acids. Do not attempt to evaporate strong acids such as HCl, TFA or HBr, at any concentrations.

Limitations of use

Caution: Rotary-vane oil-filled vacuum pumps are not recommended for use with miVac systems. Vapours from the system may cause damage to the pump.

Notwithstanding the above advice, if a rotary vane oil pump is used, the pump should be run with the gas ballast set to position 1; this will help to prevent damage to the pump. Oil pumps should then be run for one hour after the end of the concentration process (with ballast still engaged) to ensure that there is no condensed vapour in the pump. Ultimately, it is the responsibility of the user to check with the pump manufacturer as to how the pump should be operated.

Options

Items shown in this section can be combined in numerous ways to form the basis of a miVac concentration system. The DNA concentrator is an exception; it offers the option to purchase a complete stand-alone system.

Duo concentrator

The ***Duo concentrator*** is designed to accept a two swing position microplate holder, or a range of disc rotors for tubes or vials.

Quattro concentrator

The larger ***Quattro concentrator*** can accommodate a four swing position rotor, larger capacity disc rotors and can also accept Duo rotors.

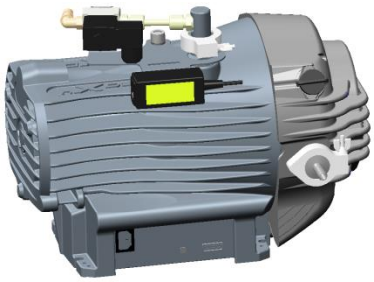
SpeedTrap™

SpeedTrap (condenser) can improve the performance of any miVac system by removing large volumes of vapour and condensing them to liquid. The effect is a dramatic improvement in the system's ability to maintain vacuum and is reflected in reduced concentration times.

Duo / Quattro pump

A choice of either ***Duo*** (< 10 mbar) or ***Quattro*** (< 3 mbar) diaphragm pump can be selected to complement either Duo or Quattro concentrator. Both pumps offer oil free, low maintenance operation.

Super vacuum pump

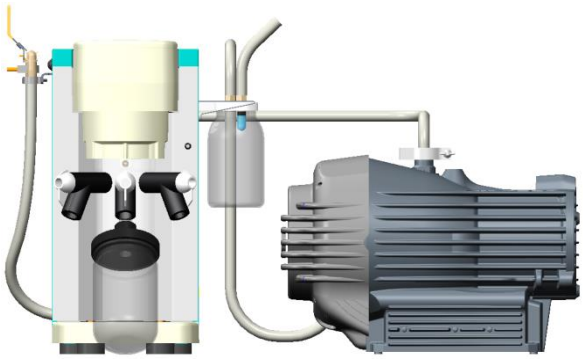


For exceptionally demanding applications, a ***super vacuum*** (0.15 mbar) scroll pump can be selected. This pump offers oil free, low maintenance operation.

Pressure controller

For enhanced performance, a pressure controller can be added to any modular miVac system. The device can automatically sense the control pressure for any solvent, or can provide vacuum ramping to reduce the risk of bumping.

Lyo-option



A ***Lyo-option*** can be added to any modular miVac system that features a SpeedTrap with switchable defrost mode (manufactured from March 2011) and must be installed in conjunction with a ***super vacuum*** pump. The miVac Lyo-option includes:

- vacuum isolation valve and mounting bracket
- cascade condenser pot
- three quick seal valves
- three insulated vial holders.

Additional accessories can be ordered individually.

DNA concentrator

The ***DNA*** concentrator offers an alternative to modular units, combining a Duo concentrator and Duo pump into an integrated unit. The DNA is capable of removing small volumes of water and organic solvents; the unit is extremely compact and will easily fit on a bench top. There is no option to add a SpeedTrap.

Rotors

A full range of rotors is available for the miVac range, including:

- open sample holders
- solid aluminium JetRotors
- swing rotors for microtitre plates.

Your local miVac distributor will be happy to offer advice or information on the full range of miVac rotors available.

Vapour trap

For neutralising ammonia or acid vapours on systems with Duo or Quattro pumps, the vapour trap replaces the pump exhaust catch-pot and comes complete with all connectors required to fit it to the system.

Order using Genevac part number: VAP-TRAP0-100

Note: Requires neutralising solution, see: ***Accessories***.

Two litre jar for SpeedTrap

Larger capacity jar replaces one litre jar supplied with SpeedTrap.

Accessories

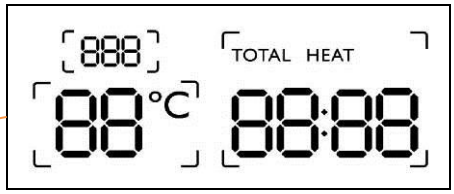
Part number	Description
STJ-10000-000	1 litre jar for miVac SpeedTrap
STJ-20000-000	2 litre jar for miVac SpeedTrap
MCK-00000-Y00	miVac connection kit for connecting pump and / or SpeedTrap trap to concentrator. Comes complete with two vacuum hoses (length 1 m and 1.5 m), pump control cable and pump catch-pot assembly.
RTR-FRCTN-001	Spindle friction washer (prevents rotor slippage during spin-up / spin-down).
MCK-EXTN1-000	Vacuum hose extension, length one metre.
04-5016	Exhaust hose (specify length when ordering).
AB7210	Clip for vacuum hose.
VAP-TRAP0-100	Vapour trap (requires neutralising solution).
NH3-REF00-100	Neutralising solution for ammonia, 4 x 500 ml Citric acid 10M solution – changes colour from green to violet.
ACD-REF00-100	Neutralising solution for acid, 4 x 500 ml Sodium hydroxide 2 mol/l (2N) solution – changes from colourless to pink.
FDA-IMP00-000	Freeze drying accessory kit (lyo-option) requires super vacuum pump and SpeedTrap with switchable defrost mode.

Concentrator - Basic Operation

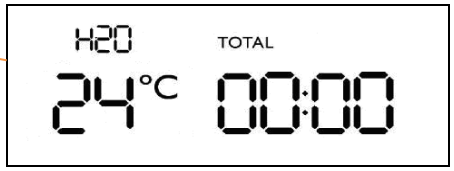
Before powering up, the concentrator must be set-up in accordance with instructions in the section: ***Unpacking and Setting-up***. Find the description that most closely resembles the system you have and follow the appropriate set-up instructions. Operation of the controls is the same for Duo, Quattro and DNA concentrators.

Power up

The concentrator powers up as soon as it is connected to mains power. All segments of the LCD screen temporarily switch on and illuminate to test they are functioning correctly.

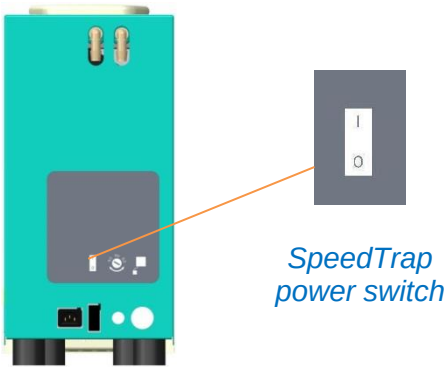


When the display reverts to showing the current settings, the system is ready to be used.



The vacuum pump remains in standby mode until the system is started, refer to:
Starting the concentrator.

For systems with a SpeedTrap, a power switch on the back allows the SpeedTrap to be switched off while it remains connected to mains power.



SpeedTrap power switch

Standby mode

When the system is idle (powered-up but not operating) press the ***STOP*** ■ button to enter ***standby mode***.

Press any button to restart the system.

Opening the lid

The concentrator automatically locks the lid to prevent it being opened when the rotor is spinning, the lid unlocks only when it is safe to open.

To open the lid, manually lift the front edge and raise it to the fully open position. For Quattro concentrators, the lid latches in the fully open position. To close, lift again top release the latch, then lower the lid.

Warning: Risk of hand entrapment. Lift the lid to the fully open position and make sure it is secure before placing hands near the concentrator.

Controls

On the front panel are four push buttons, a rotary ***SELECT*** control and an LCD screen.

1. ***MANUAL ▶:*** Press once to start the system in ***manual mode.*** The concentrator emits a single beep as it starts; it continues to operate until the ***STOP*** button is pressed. Whilst operating in manual mode the respective LED lights up and a timer counts up to show the total time elapsed since starting.

2. ***PRE-HEAT:*** Press once to pre-heat the chamber to the control temperature, ***PRE-HEAT*** is disabled when either the ***MANUAL*** or ***AUTO*** button is pressed. Alternatively, press and hold for five seconds to latch-on chamber heater continually.

3. ***STOP ■:*** Press once to stop the system, the concentrator emits a single beep and stops. The ***STOP*** button can be pressed at any time, the system will shut down safely. If the ***STOP*** button is pressed when the system is idle, it will enter standby mode. Press any button to bring the system out of standby.

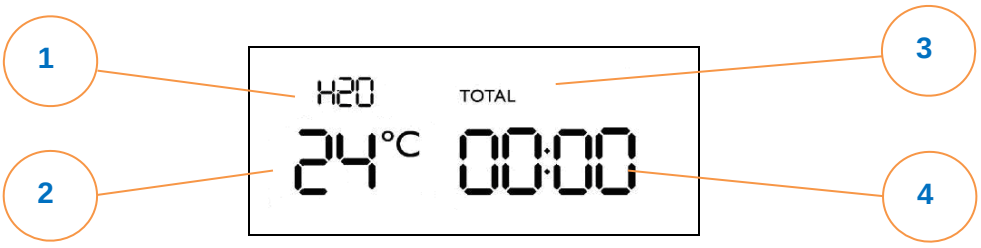
4. ***AUTO ▶:*** Press once to start the system in ***auto mode***. The concentrator emits a single beep and starts; it continues to operate until the ***TOTAL*** time set has elapsed. Whilst operating in this mode, the respective LED lights up and the timer counts down to show the time remaining.

5. ***SELECT:*** Turn the control to select a parameter (frame it with brackets) then press it to select (brackets flash to indicate adjustment mode). Ti increment a setting up or down, turn the control and then press to enter the new value. After 30 seconds without input, the display reverts back to normal mode.

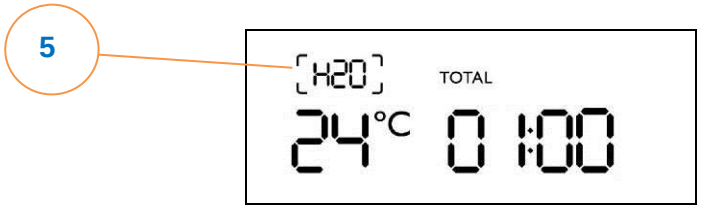
6. ***Display:*** LCD screen with backlight.

LCD screen

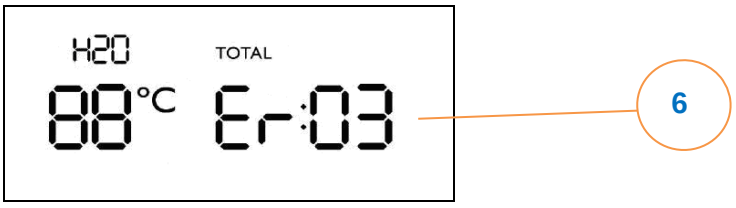
The LCD screen provides numeric information for setting control parameters and monitoring evaporation progress.



1. ***Method indicator:*** ***H20*** (water) ***-OH*** (alcohol) or ***---*** (full vacuum)
2. ***Temperature:*** Chamber temperature
3. ***Timing mode:*** ***TOTAL*** time from start, or ***HEAT*** time
4. ***Timer:*** Time elapsed (in ***manual mode***) or time remaining (in ***auto mode***)



5. ***Adjustment mode:*** Brackets appear around parameter to indicate it can be adjusted using the ***SELECT*** control



6. ***Error:*** The LCD screen also advises of any problems that occur during operation or with the settings being entered.

Getting started

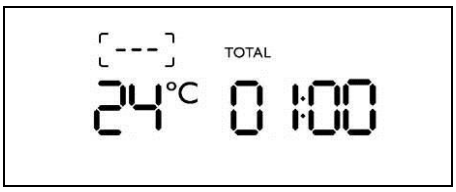
The following is a quick reference guide only; detailed operating instructions and descriptions of features are provided later in this user manual.

1. Switch on the power at the mains supply.
2. If pre-heat is required, use the ***SELECT*** control to set the pre-heat temperature, then press the ***PRE-HEAT*** button.
3. Open the lid (for Quattro concentrators, make sure the latch engages).
4. Fit the rotor by lowering it on to the shaft.
5. Load the rotor with samples; make sure the rotor is evenly balanced.
6. Close the lid (for Quattro concentrators: lift the lid to disengage the latch).
7. Using the ***SELECT*** control:
   - Set the chamber temperature
   - Set the method type
   - Set the total run time
   - Set the heat time.

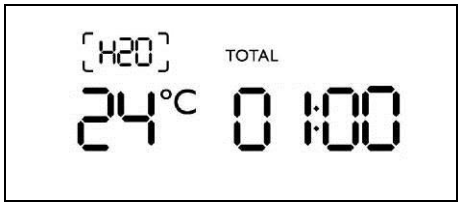
   Note: the last entered settings will be used if new settings are not entered.
8. Press the ***MANUAL*** or ***AUTO*** button to start the concentrator.

Selecting a method

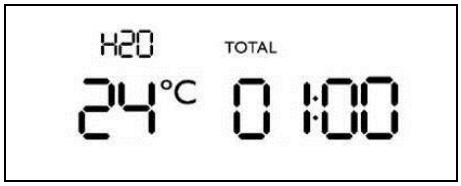
To select the required method, turn the ***SELECT*** control until brackets appear around the method indicator.



Press the ***SELECT*** control, the brackets begin to flash to indicate the parameter may be adjusted. Turn the control until the required method is shown, then press to select.



The LCD display shows the selected method.



Starting the concentrator

The concentrator can be started in either ***manual mode*** or ***auto mode***.

Select the required method and set the temperature before starting the concentrator.

Manual mode

To start in ***manual mode***, press the ***MANUAL*** ► button. The concentrator emits a single beep to confirm acceptance of the command and the rotor begins to spin (if the lid is not closed, a double beep sounds and the concentrator will not start).

The LED adjacent to the ***MANUAL*** ► button lights up to indicate the system is operating in manual mode. Once a safe rotor speed is reached, the system begins to apply vacuum and the timer starts to count up, indicating the time accumulated. The concentrator continues until the ***STOP*** ■ button is pressed.

Auto mode

To start in auto mode, press the ***AUTO*** ► button. The concentrator emits a single beep to confirm acceptance of the command and the rotor begins to spin (if the lid is not closed, a double beep sounds and the concentrator will not start).

The LED adjacent to the ***AUTO*** ► button lights up to show the system is operating in auto mode. Once a safe rotor speed is reached, the system begins to apply vacuum and the timer starts to count down from the set time, indicating the time remaining. The concentrator stops when the timer reaches zero or if the ***STOP*** ■ button is pressed.

Evaporation in progress

While the evaporation is in progress, the LCD screen shows the elapsed time when operating in manual mode, or the time remaining when operating in auto mode. When the time displayed is greater than one hour, it is shown in hours and minutes (HH:MM) when the time displayed is less than one hour, it is shown in minutes and seconds (MM:SS).

Stopping the concentrator

To stop the concentrator, press the ***STOP*** ■ button, the concentrator emits a single beep to acknowledge acceptance of the command. The ***STOP*** ■ button can be pressed at any time, the system will always stop safely.

When operating in auto mode, the concentrator stops automatically when the timer reaches zero. The ***STOP*** ■ button can also be used to stop the system when it is operating in ***auto mode***.

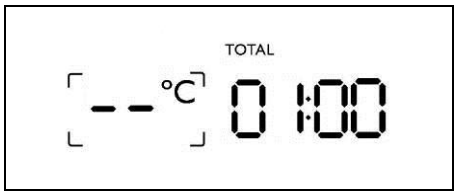
The auto or manual LED flashes to indicate the system is stopping, four longer beeps sound when the rotor is about to stop.

The time remains on the LCD screen until the lid is opened.

Concentrator - Advanced Operation

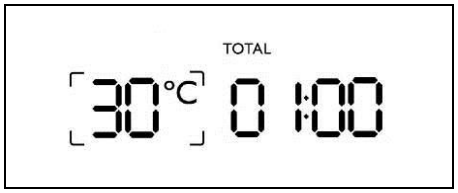
Method parameters can be adjusted at any time, including when the concentrator is operating. To adjust a method parameter:

Turn the ***SELECT*** control - brackets appear around different areas of the LCD display.



Press the ***SELECT*** control – the brackets begin to flash.

Turn the ***SELECT*** control – the selected value increments up or down.



Press the SELECT control – the new value is entered.

Note: If the ***SELECT*** control is not pressed, the displayed value is automatically entered after 30 seconds.

Method choice

There are three methods to choose from:

- ***H2O*** for water only
- ***-OH*** for alcohols and alcohol mixtures
- ***---*** for all other solvents.

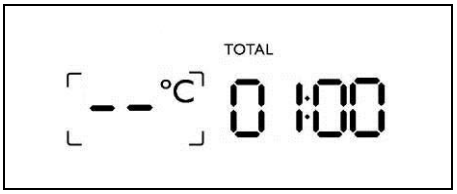
For further information, refer to ***Method Guide***.

Setting chamber temperature

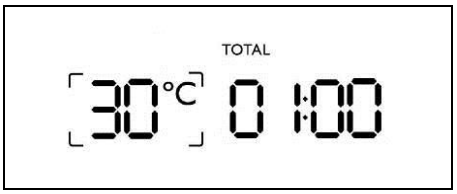
The chamber temperature can be controlled from 30°C to 80°C by 1°C increments. If the temperature is set below 30°C, the display shows **[--°C]** and the chamber heater is turned off.

Once the new value is selected, the display reverts back to showing the current chamber temperature (in the following example, the current chamber temperature is 24°C).

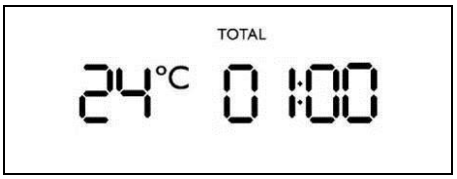
Select parameter.



Adjust the value to the required chamber temperature.



The LCD display reverts to showing the current chamber temperature.



Pre-heat

For solvents with a boiling point greater than 90°C, the chamber should be pre-heated to avoid solvent condensation in the evaporation chamber. Prolonged exposure to certain solvents in liquid form may cause damage to the concentrator lid coating.

To pre-heat the concentrator, press the ***PRE-HEAT*** button. An LED adjacent to the ***PRE-HEAT*** button lights up to show the chamber heater is active, and the chamber warms up to the currently set control temperature. For best results, place the empty rotor in the concentrator and leave the concentrator lid closed while pre-heating.

Caution: Bumping may occur if the sample temperature is too high when the concentrator is started. To avoid the possibility of damage to samples, do not pre-heat the concentrator with samples loaded.

Once the concentrator is started (by pressing either the ***MANUAL*** ► or ***AUTO*** ►start buttons) the chamber remains at the control temperature until the heat time elapses; the chamber heater then switches off.

Latching pre-heat

Pre-heat can be “latched” to stay on continually throughout the evaporation process and after the concentrator stops. This function allows the chamber to be kept warm, ready for the next use.

To latch on pre-heat, press and hold the ***PRE-HEAT*** button for five seconds. A confirmation beep sounds to acknowledge acceptance of the command, the chamber warms up to the control temperature and the heater continues to control the chamber at the control temperature throughout the evaporation process and after the system stops, even if the ***STOP*** ■ button is pressed.

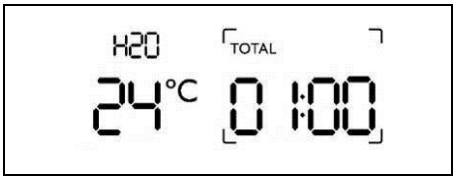
To cancel the function, press the ***PRE-HEAT*** button again.

Note: For older systems (software versions pre V1.09) the chamber preheats to 40°C, irrespective of the chamber control temperature.

Setting total time

This feature allows the user to set the total time duration of the evaporation process when using ***auto mode***.

Select the timer.



Set the time required.

The LCD display counts down the time remaining.

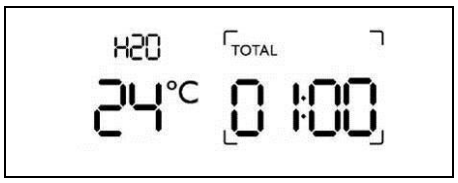
Note: The maximum permissible time setting is 99 hours and 59 minutes (99:59).

Setting heat time

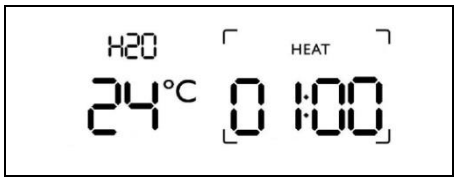
This feature controls the time duration that chamber heating is applied.

Note: The heat time:
- cannot be longer than the ***TOTAL*** time
- has no effect if ***PRE-HEAT*** is latched on.

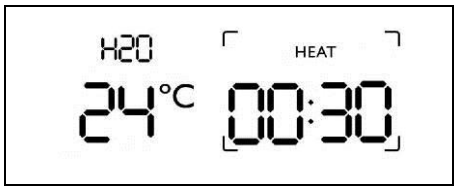
Select the timer.



Select ***HEAT***.



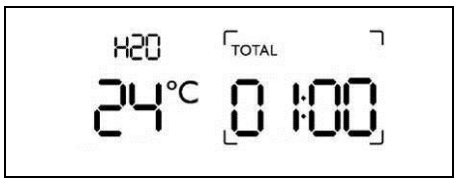
Set the heat time.



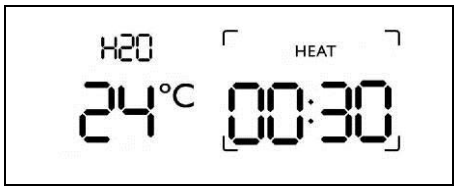
The LCD display counts down the heat time remaining.

Display mode

The LCD display is factory set to show ***TOTAL*** time.

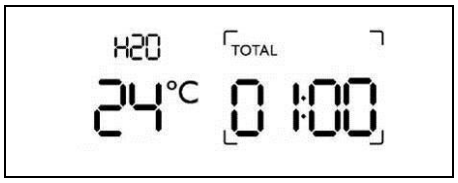


But it can be changed to show ***HEAT*** time when operating in ***auto mode***.



To change the display mode, hold down the ***SELECT*** control for five seconds; a single beep sounds to acknowledge acceptance of the command.

The display changes to indicate ***HEAT*** until the countdown reaches zero, then reverts to showing the ***TOTAL*** time remaining.



To change the display mode back from ***HEAT*** time to ***TOTAL*** time, hold down the ***SELECT*** control again for five seconds.

Loading Samples into Concentrator

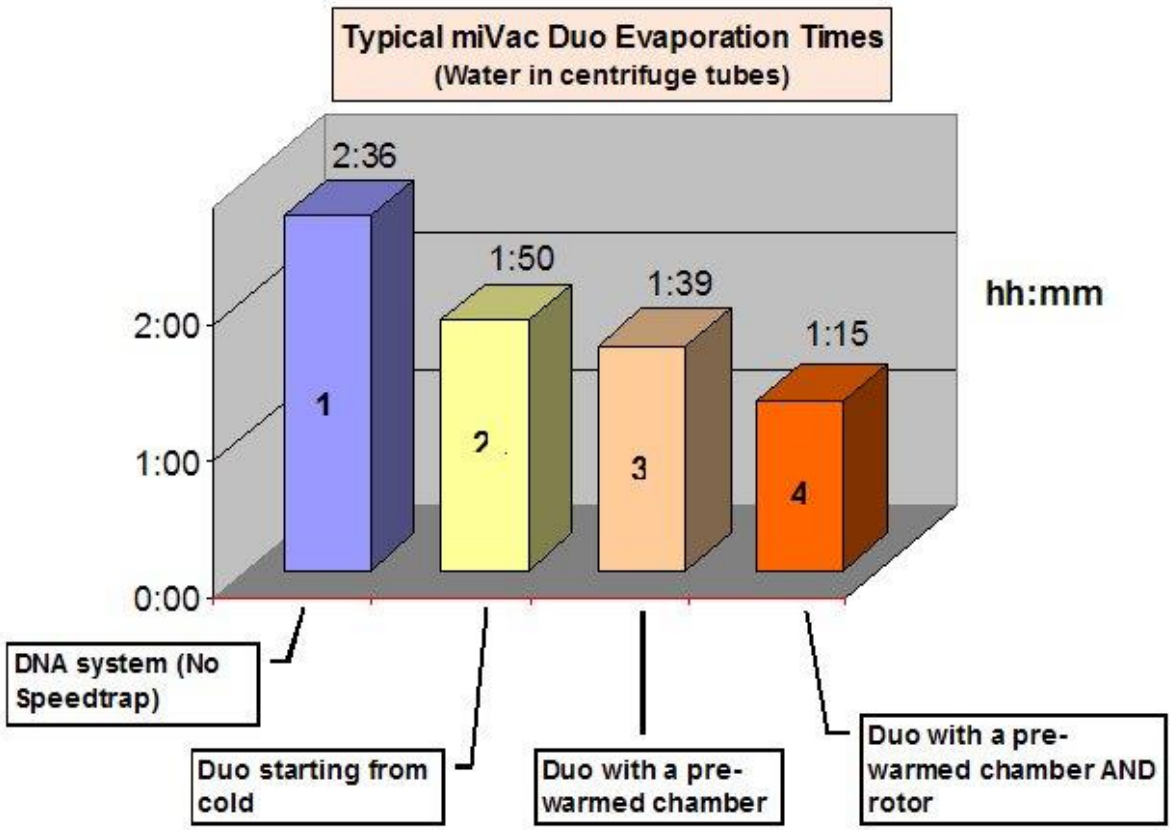
Samples in the concentrator chamber are subjected to accelerations of up to 250 g (250 times greater than the force of gravity). It is therefore important for the operator to understand the safety requirements and to gain familiarity with the safe loading procedure outlined below.

Preparation

To reduce concentration time, the system can be pre-heated before use. If rapid concentration is important, leave the empty rotor in the concentrator with the lid shut and pre-heat enabled; short evaporation runs in particular will benefit from this. Refer to ***Pre-heat*** for further details.

Caution: To avoid damage to samples, do not pre-heat with the samples loaded.

The following graph shows the typical reduction in concentration time that can be achieved, firstly by using a SpeedTrap, and then by pre-heating both chamber and rotor.



Loading

- Balance the rotor within 10 g.
- Only load tubes or vials into the rotors that are specified on the rotor.
- For the Duo, two position swing rotor, use a maximum of three shallow well microplates (with stackers) or one deep-well microplate per rotor location.
- For the Quattro, four position rotor, use a maximum of five shallow well microplates (with stackers) or two deep-well microplates per rotor location.
- Only fill tubes, vials or wells of microplates etc, to 66% of their maximum fill level.
- When using swing rotors, always load opposite swings with the same or similar type of plates.
- Do not exceed the maximum safe loading weight of 0.6 kg per swing for Duo swing rotors, and 1.1 kg per swing for Quattro swing rotors.

Final checks

- Make sure tubes / vials are located correctly in the rotor.
- For swing rotors, rotate a swing rotor by hand after loading to check that all plates are correctly located before starting a run and before re-starting an interrupted run.

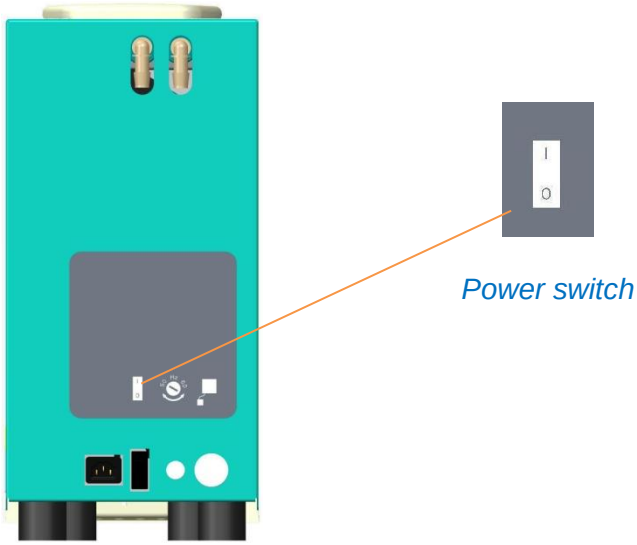
SpeedTrap™

The miVac SpeedTrap offers:

- Unique frost free cold-trap
- Selectable automatic defrosting, all solvents (including water) collect as liquids
- Easy to empty collection jar.

Caution: Refer to list of acceptable solvents before use.

A power switch on the back of the SpeedTrap allows it to be powered down while remaining connected to mains power (unlike the miVac concentrator which powers up as soon as power is connected).



Waste solvent

Waste solvents normally collect as liquid in the SpeedTrap jar; however ice may form under certain conditions. Refer to ***Collection Jar*** for further information.

Occasional sudden boiling within the jar is normal and solvent will re-condense.

Defrosting

The defrosting mode of the SpeedTrap can be set using the switch located on the SpeedTrap splash-back panel.

Periodic defrost

No defrost

Manual defrost

The green LED on front of the SpeedTrap indicates the current state of the defrost cycle.

LED	Condition
Fast flash	Defrosting
Slow flash	Chilling
Steady	Condensing

Automatic defrost

For fully automatic defrosting without the need for intervention by the user, set the switch to ***periodic defrost***. Defrosting of the condenser coil occurs automatically for three minutes in every hour. After defrosting, the SpeedTrap switches to chilling, then condensing.

Manual defrost

For some applications it is preferable to operate the SpeedTrap continually without periodic defrost. In this case, set the switch to ***no defrost***.

A defrost cycle may be initiated manually by momentarily pushing the switch down to the ***manual defrost*** position (the switch does not “latch” in this position). The defrost cycle takes approximately 30 minutes to complete, or can be cancelled manually by momentarily pressing the switch down again.

The defrost mode may be switched while the SpeedTrap is operating. When the mode is switched from ***periodic defrost*** to ***no defrost***, the SpeedTrap performs a short (three minute) defrost before continuing to operate in ***no defrost*** mode. When switched from ***no defrost*** to ***periodic defrost***, the SpeedTrap chills for 57 minutes before performing a short (three minute) defrost.

When choosing which mode of operation to select, consider the solvent being condensed; for further information, refer to ***Method Guide***.

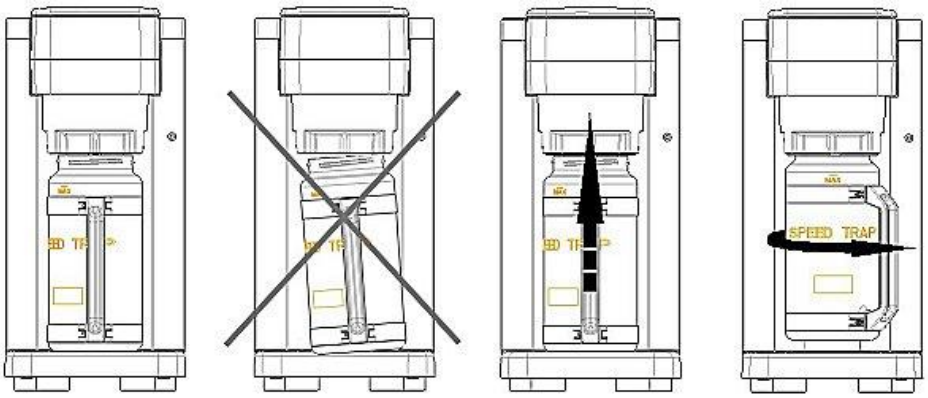
Note: SpeedTraps manufactured before February 2010, do not have switchable defrost modes. These units operate in periodic defrost mode only.

Collection jar

- Empty the collection jar after every use
- Do not empty the collection until the concentrator has stopped
- Take care when removing the collection jar, it may be heavy when full of solvent
- Do not allow the solvent level to fill above the ***max*** line, this may cause damage to the pump
- Inspect the collection jar for damage, cracks etc., before every use
- Empty the drip tray regularly to avoid the risk of splashing.

To remove the collection jar, grasp the handle to support the weight, and rotate the jar a quarter turn to the left.

To refit the jar, position it so that the handle is to the front, lift the jar and rotate a quarter turn to the right; tighten the jar until there is light resistance.



Waste solvents normally collect as liquid in the SpeedTrap jar, however ice may form under certain conditions. If this happens, allow it to thaw naturally; if necessary, add cold water to the jar to accelerate the thawing process.

Caution: Do not use implements to break the ice in the SpeedTrap jar as this may damage the jar.

Lyo-option

On the SpeedTrap, select: ❄, no defrost.

The isolation valve (supplied in the Lyo-option kit) allows flexible configuration of the system:

Stand-alone freeze dryer

- Close the lyo-option vacuum isolation valve
- Remove the collection jar from the SpeedTrap
- Connect either
  - cascade condenser pot (with quick seal valves), or
  - insulated vial holders.

Lyo-option accessories

Combination system

- Open the lyo-option vacuum isolation valve
- For systems that have a control valve fitted to the super vacuum pump, select "**---**" (no venting) on the miVac concentrator
- For systems that have a pressure controller, select ***P*** $_{MIN}$ on the pressure controller.
- Fit the collection jar to the SpeedTrap
- Lyophilise samples directly from the concentrator.

Cascade condenser pot

Note: For lyophilisation, samples must be frozen before loading into the miVac system.

After lyophilisation, defrost the SpeedTrap manually. See ***Manual defrost***.

Insulated vial holders

Method Guide

Pre-programmed methods

The Quattro, Duo and DNA concentrators have three pre-programmed methods which control the rate of air venting into the evaporation chamber in order to optimise evaporation conditions for the solvent.

Method	Venting rate	When to use
H2O	Low	For water only
-OH	High	For alcohols and alcohol mixtures
---	No venting	For all other solvents

The -***OH*** and ***H2O*** methods also turn the pump off periodically to aid the flow of energy into the samples.

For Duo and Quattro concentrators, the ***H2O*** method is optimised for aluminium rotors. This method is recommended when evaporating more than a few tubes of water; however full vacuum **---** may be faster if there are just a few tubes.

For DNA systems, use the ***H2O*** method when evaporating water or solvents with similar boiling points.

Alternatively, the performance of any miVac modular system can be enhanced with the addition of a pressure controller which allows automated pressure control and vacuum ramping. If a pressure controller is used, the miVac concentrator must be set to **"---"** (no venting).

SpeedTrap™

The SpeedTrap mode can be set to optimise conditions for the solvent:

Switch position	SpeedTrap Mode	When to use
	Periodic defrost	For water or water mixtures
	No defrost	For organic solvents that will not freeze For lyo-option

Acceptable solvents

Carry out a risk assessment for each solvent or solvent mixture before use. The common solvents included in the following table are not damaging to the evaporator providing appropriate methods are used. Contact your local Genevac representative for advice before using solvents which are not listed.

Solvent	Abbreviation	Recommended method	SpeedTrap mode	DUP	QUP	SVP
Acetic acid	$MeCO_2H$	---	❄	■	■	■
Acetonitrile	MeCN, ACN	*-OH*	❄	■	■	■
Ammonium Hydroxide	NH_3OH	*H2O*	❄/♨	■	■	■
1-Butanol		---	❄		■	■
Butyl acetate		---	❄		□	□
Chloroform	$CHCl_3$	*-OH*	❄	■	■	■
1,2-Dichloroethane	DCE	*-OH*	❄	□	□	□
Dichloromethane	DCM	*-OH*	❄	■	■	■
1,4-Dioxane		---	❄/♨	□	□	□
Ethanol	EtOH	*H2O or -OH*	❄	■	■	■
Ethyl Acetate	EtOAc	*-OH*	❄	□	□	□
Formic Acid	$HC0_2H$	---	❄/♨	□	□	□
Heptane		---	❄	□	□	□
Hexane		*-OH*	❄	■	■	■
Methanol	MeOH	*H2O or -OH*	❄	■	■	■
Methyl tertiary butyl ether	MTBE	*-OH*	❄	□	□	□
1-Propanol		*-OH*	❄	■	■	■
2-Propanal	IPA	*-OH*	❄	■	■	■
Sodium hydroxide	NaOH	*--- or H20*	❄/♨	■	■	■
Tetrahydrofuran	THF	*-OH*	❄	□	□	□
Toluene		*--- or H2O*	❄	□	□	□
Water	H_2O	*H2O*	❄/♨	■	■	■

■ Compatible
□ Compatible with miVac modules manufactured after April 2007.

Maintenance

In order to provide trouble free operation, Genevac recommend the miVac pump is serviced annually. Any servicing or repair of miVac products, other than that which is specified within this User Manual, should be carried out by Genevac personnel (or approved representatives of Genevac) using only approved spare parts.

Recommended practice

Check before use:

All hose joints are secure

- The SpeedTrap collection jar, empty if necessary
- The catch-pot is connected to the pump exhaust, empty if necessary.

Cleaning

- Clean the SpeedTrap collection jar at regular intervals
  - Collection jar is dishwasher safe but not suitable for an autoclave
- Clean the lid, lid seal, exterior paintwork and inside of the chamber with a soft, lint-free cloth, slightly dampened with:
  - Detergent solution
  - Bleach solution (if using biological agents)
  - Methanol
  - Ethanol.
- Do not use abrasives.

Concentrator lid seal

Description	Part number
Lid seal - Duo	04-4722
Lid seal - Quattro	04-4793

Warning: Risk of contamination. Solvent traces may be present that could be harmful to health or lead to material damage.

Removal

1. Switch on the miVac concentrator and open the lid.
2. Check for solvent traces and wipe the lid seal clean before removal.

Note: The seal may absorb significant quantities of some solvents.

3. Manually remove the lid seal from the chamber by carefully pulling the seal away from the chamber. Do not use tools that may damage the chamber coating.

Refitting

1. Unpack the replacement lid seal.
2. Position the lid seal on top of the vacuum chamber.
3. Work the seal firmly into position using only fingers, press the seal fully home.

Testing

1. Close the lid.
2. Select any method and start the concentrator.
3. Make sure the pressure begins to drop (the lid seal feels tight against the chamber and cannot be opened).

Note: Manually pushing down on the lid may be required to assist the new lid seal to bed in on the first use. If the pressure fails to drop, check the lid seal is correctly located on the vacuum chamber and repeat the test.

4. Allow the concentrator to continue for a while, checking for normal operation.

Spindle friction washer

The friction washer prevents rotor slippage during spin-up and spin-down. Check the condition of the washer frequently and replace it if damaged or worn.

Description	Part number
Friction washer	RTR-FRCTN-001

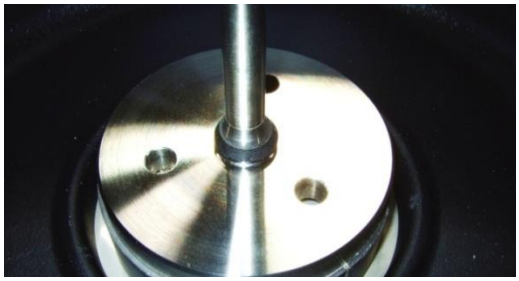
Removal

Remove the damaged washer from the concentrator spindle.

Refitting

1. Place the washer over the spindle.

2. Push down to form a conical shape at the base of the spindle.



SpeedTrap jar seal

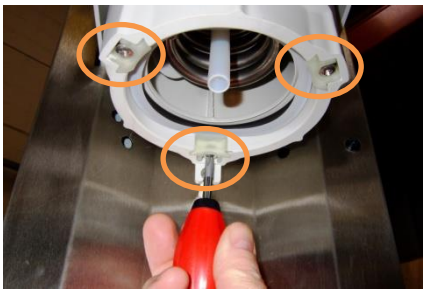
If the SpeedTrap jar fails to seal or does not tighten when inserted and twisted a quarter turn, the seal and thread inserts should be replaced.

Parts required

Description	Part number
Replacement seal and thread insert kit	MST-SEALS-000

Removal

1. Remove the SpeedTrap jar.
2. Using the screw driver, undo the screws and remove the three thread inserts as shown.



3. Remove the PTFE seal and O-ring.

Refitting

1. Insert the O-ring into the SpeedTrap moulding.
2. Insert one of the three retaining features of the PTFE seal into one of the three recesses in the SpeedTrap moulding and secure it in place using a thread insert and screw. Do not tighten the screw.

3. Taking care to avoid creasing or distorting the PTFE seal, fit the remaining two thread inserts.
4. Check the PTFE seal and O-ring are correctly fitted with no creases or bulges, then tighten all three screws.

Testing

1. Fit the SpeedTrap jar and check it jar feels tight.
2. Operate the miVac system to make sure there are no vacuum leaks, use “dummy” samples if necessary to make sure the concentrator operates correctly.

Unpacking and Setting Up

On delivery, please check the contents of the delivery as soon as possible against the delivery note and notify your distributor immediately if any parts are missing or damaged. Refer to our web site for up to date contact details.

Modular systems

Instructions for setting-up miVac modular system will vary, depending upon the combination of miVac units that has been purchased. The following instructions should be considered guidance that may be amended where combinations of units are different to those shown.

miVac connection kit

A ***miVac connection kit*** (Genevac part number MCK-00000-Y00) is supplied when you order a combination of miVac units (not including ***DNA Concentrator***). In it you will find all the items required to set-up a miVac system. The system connection kit includes:

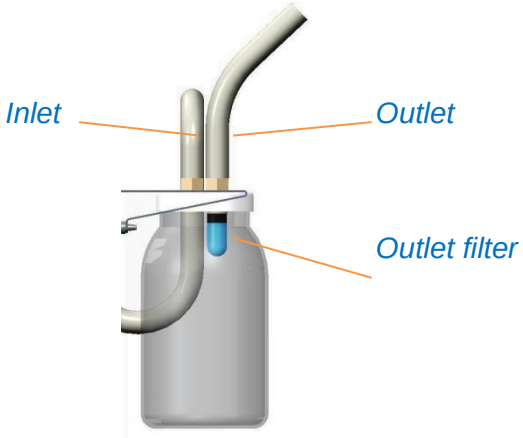
- ***Catch-pot*** for pump exhaust
- ***Pump control cable***
- ***Exhaust hose*** 1.5 m (clear PVC)
- ***Vacuum hoses*** 1 m and 1.5 m (metal reinforced)
- ***Hose clips*** for vacuum hoses.

Additional hoses can be ordered, see: ***Accessories***.

Fitting the catch-pot

The ***catch-pot***, supplied with the ***miVac connection kit***, clips to the ventilation holes on the side of a miVac unit.

When connecting exhaust hoses, please note the catch-pot outlet has a filter on the inside of the glass jar, the inlet is not filtered.



Installation site

Due to the modular design of miVac units, systems can be set-up in a number of ways; the illustrations on the following pages show the most common configurations. Specific requirements of the installation may vary from one system to another, however the following general principals apply to all installations.

The miVac system must be placed on a level, sturdy work surface. There must be a 50 mm air gap between each miVac unit and the edge of the bench, wall or any other equipment.

50 mm air gap around system

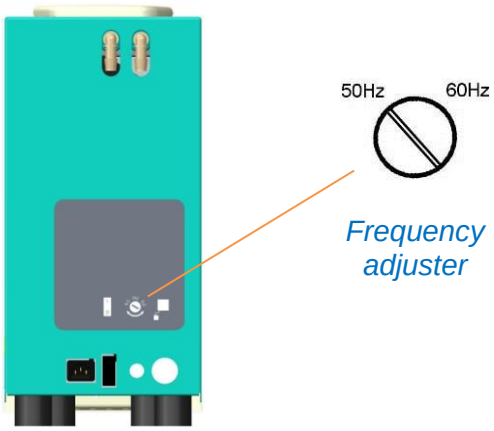
One, two or three mains power cables will be required, depending on the combination of miVac modules. These must be connected to separate mains power supply outlets.

Unequal length vacuum hoses supplied are supplied in the miVac connection kit, these may be configured to suite the system layout. For example, using the longer hose, the pump and SpeedTrap may be positioned on a shelf below the concentrator.

The exhaust hose must be connected so it takes solvent vapours safely away from the concentrator and away from the user; ideally it should be connected to a laboratory fume extraction system.

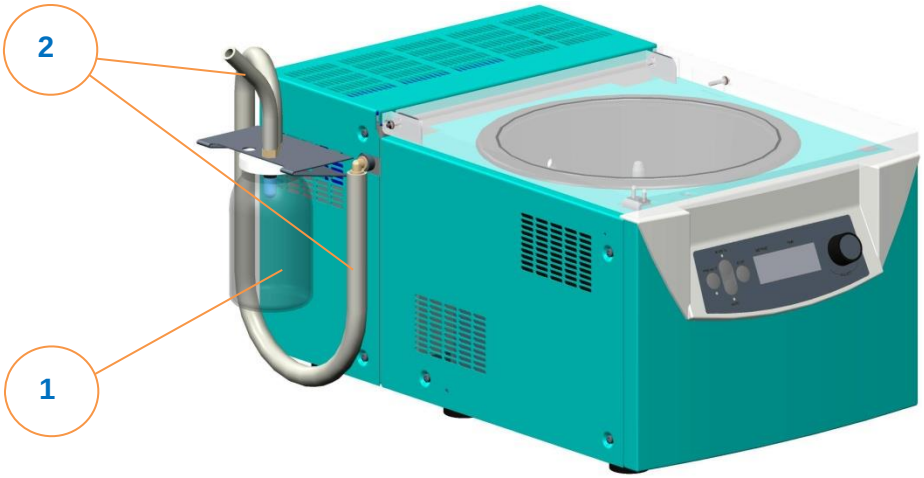
Mains frequency (Japan only)

Caution: If setting-up a system for use in Japan, make sure the frequency adjuster on the rear of the SpeedTrap is set to the correct frequency for the local mains power supply.



DNA

Position the DNA concentrator in the desired location on the bench.



1. ***Catch-pot:*** Fit the catch-pot to the DNA by clipping it to the vent holes near the exhaust outlet. Cut a suitable length of exhaust hose and use it to connect the exhaust outlet to the catch-pot.

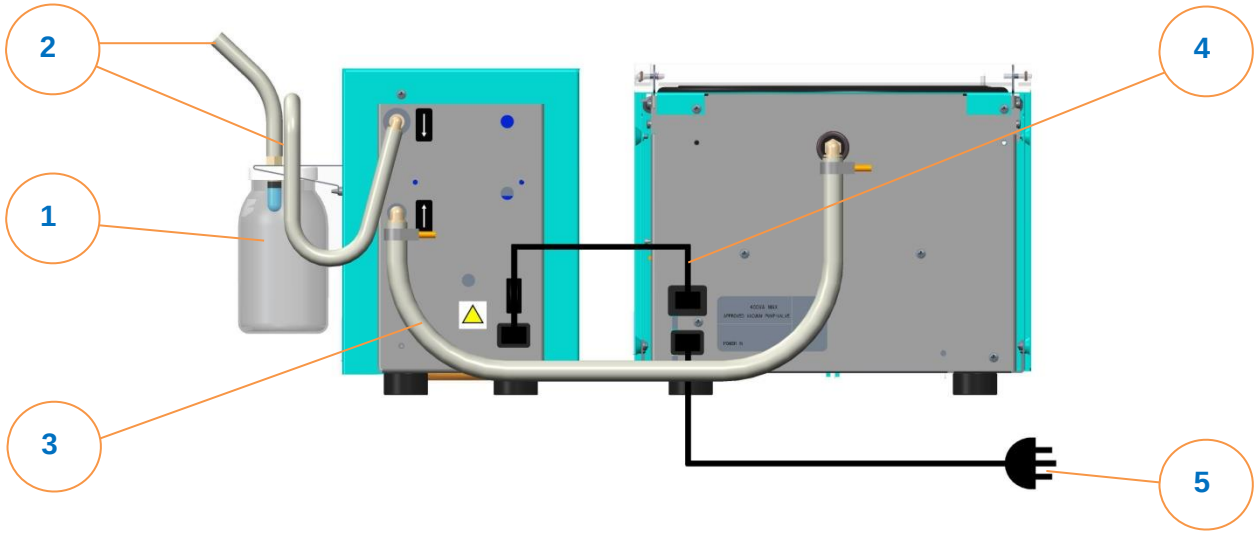
2. ***Exhaust hose:*** Using the short hose supplied, connect the exhaust outlet to the catch-pot inlet (the outlet has a filter on the inside of the glass jar). Cut a suitable length of exhaust hose and use it to connect the catch-pot outlet to the laboratory fume extraction system.

3. ***Power cable:*** Using the power cable supplied, connect the DNA to a mains power outlet.

Concentrator and pump

Requires a ***miVac connection kit***.

Position the concentrator and pump beside each other on the bench.



1. ***Catch-pot:*** Fit the catch-pot to the vacuum pump by clipping it to the ventilation holes on the side of the pump.

2. ***Exhaust hose:*** Cut a suitable length of exhaust hose and use it to connect the pump exhaust outlet to the catch-pot inlet. Using the remaining exhaust hose, connect the catch-pot outlet to the laboratory fume extraction system.

3. ***Vacuum hose:*** Using the vacuum hoses, connect the concentrator vacuum outlet to the SpeedTrap vacuum inlet; also connect the SpeedTrap vacuum outlet to the pump vacuum inlet. Secure the connections using the hose clips supplied.

   Note: Unequal length vacuum hoses are supplied; these may be configured to suite the system layout.

4. ***Pump control cable:*** Using the pump control cable, electrically connect the pump to the concentrator.

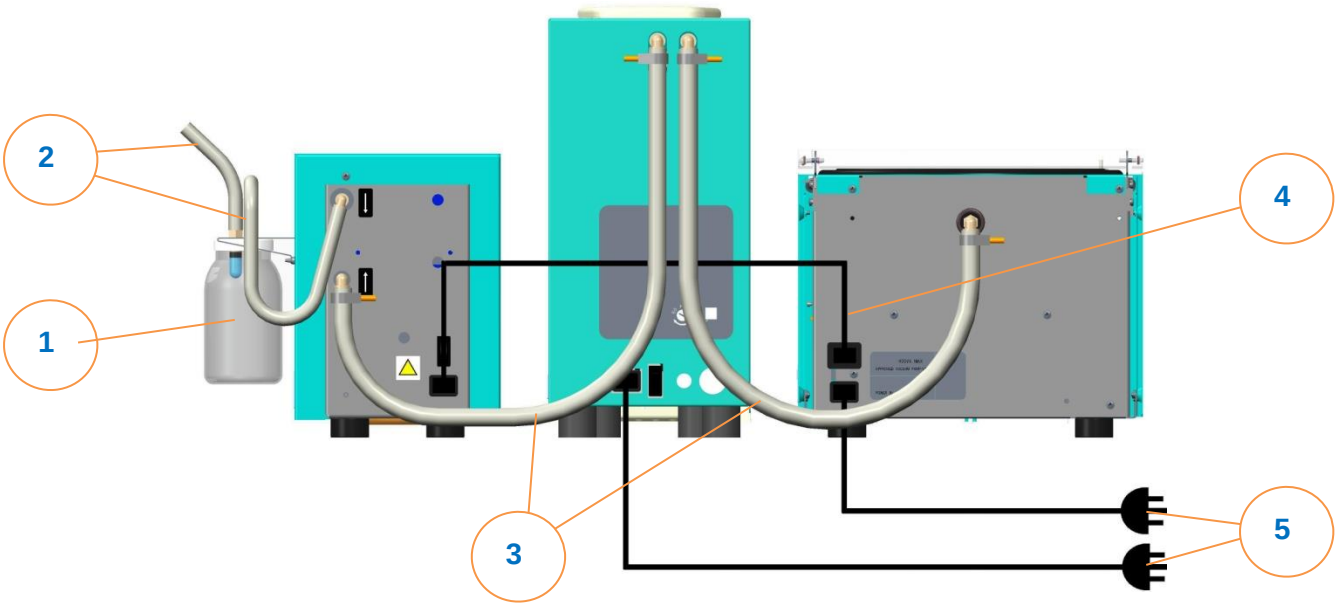
5. ***Power cable:*** Using the power cable syupplied, connect the concentrator to a mains power supply outlet.

   Note: Do not connect the pump directly to the mains power supply; the power cable supplied with the pump is for standalone use of the pump only.

Concentrator, SpeedTrap and pump

Requires a ***miVac connection kit***.

Position the concentrator, SpeedTrap and pump in the desired location.



1. ***Catch-pot:*** Fit the catch-pot to the vacuum pump by clipping it to the ventilation holes on the side of the pump.

2. ***Exhaust hose:*** Cut a suitable length of exhaust hose and use it to connect the pump exhaust outlet to the catch-pot inlet. Using the remaining exhaust hose, connect the catch-pot outlet to the laboratory fume extraction system.

3. ***Vacuum hose:*** Using the vacuum hoses, connect the concentrator vacuum outlet to the SpeedTrap vacuum inlet; also connect the SpeedTrap vacuum outlet to the pump vacuum inlet. Secure the connections using the hose clips supplied.

4. ***Pump control cable:*** Electrically connect the pump to the concentrator.

Caution: After unpacking the ***SpeedTrap*** leave to stand for 24 hours before switching on.

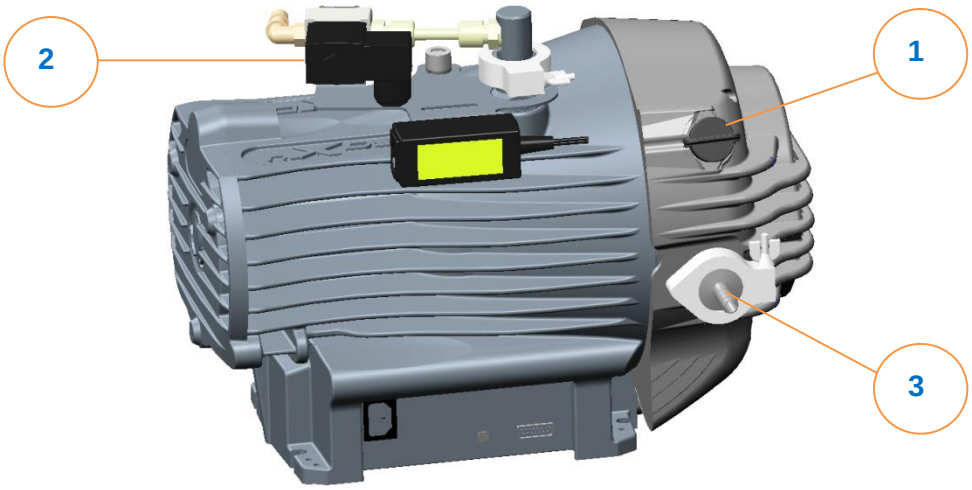
5. ***Power cables:*** Using the power cables supplied, connect the Concentrator and SpeedTrap to two seperate mains power supply outlets.

   Note: Do not connect the pump directly to the mains power supply; the power cable supplied with the pump is for standalone use of the pump only.

Concentrator, SpeedTrap and SVP

Requires a ***miVac connection kit*** plus additional parts supplied with ***miVac super vacuum pump***.

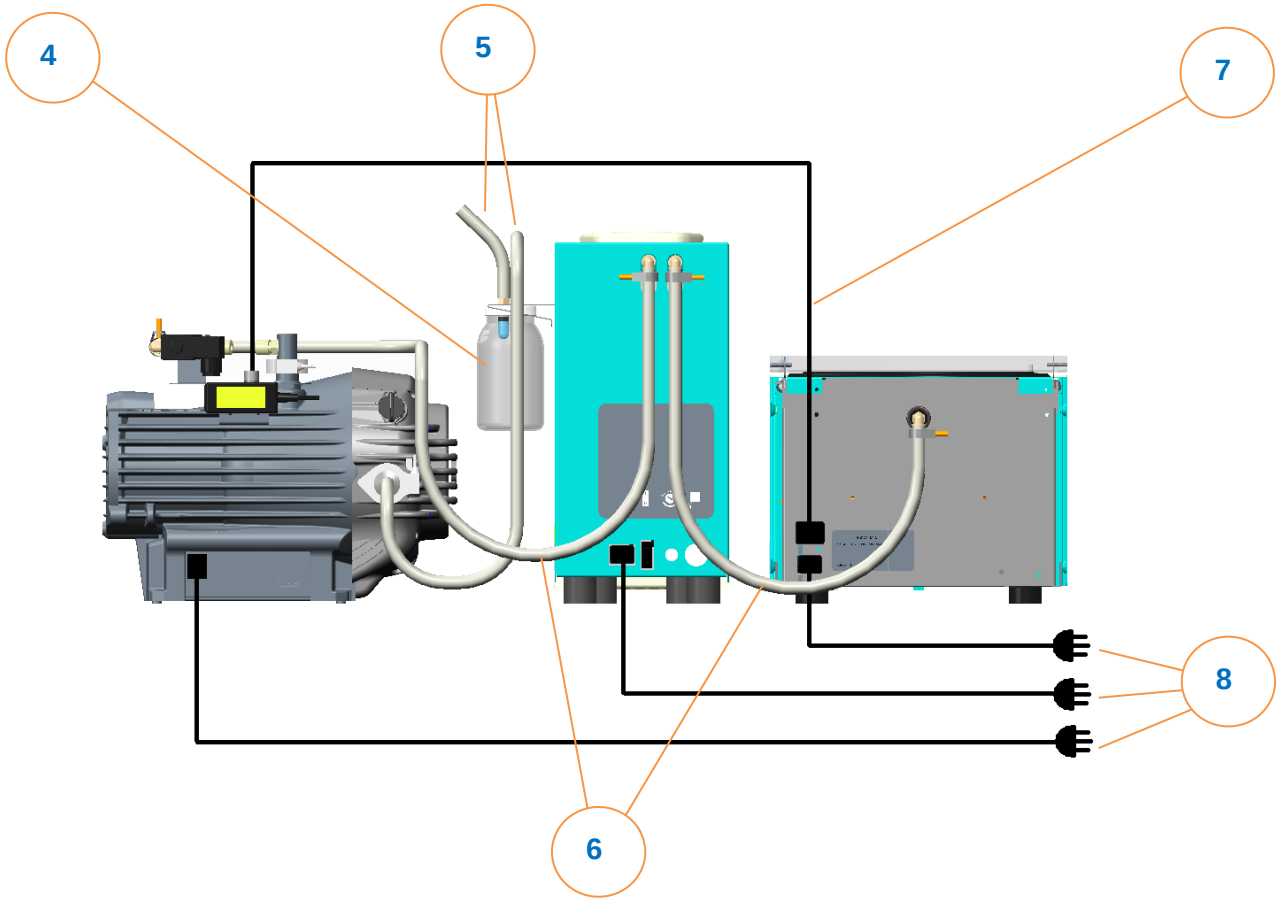
Position the concentrator, SpeedTrap and super vacuum pump in the desired location on the bench.



1. ***Pump gas ballast:*** Set the pump gas ballast control to position 1.

2. ***Pump control valve:*** Using a KF25 ring and clamp (supplied with the SVP) fit the pump control valve to the pump vacuum inlet.

3. ***Exhaust hose adapter:*** Using a KF25 ring and clamp (supplied with the SVP) fit the exhaust hose adapter to the pump exhaust outlet.



4. ***Catch pot:*** Fit the catch-pot to the SpeedTrap by clipping it to the ventillation holes on the side of the unit.

5. ***Exhaust hose:*** Cut a suitable length of exhaust hose and use it to connect the pump exhaust outlet to the catch-pot inlet. With the remaining exhaust hose, connect the second catch-pot spigot to the laboratory fume extraction system.

6. ***Vacuum hoses:*** Using either the 1 m or the 1.5 m vacuum hose (supplied in the connection kit) connect the concentrator vacuum outlet to the SpeedTrap vacuum inlet. Using the second vacuum hose, connect the SpeedTrap vacuum outlet to the pump vacuum inlet. Secure the connections with hose clips.

7. ***Pump control cable:*** Using the pump control cable, electrically connect the pump control valve to the concentrator.

8. ***Power cables:*** Using three power cables, connect the Concentrator, SpeedTrap and super vacuum pump to three separate mains power supply outlets.

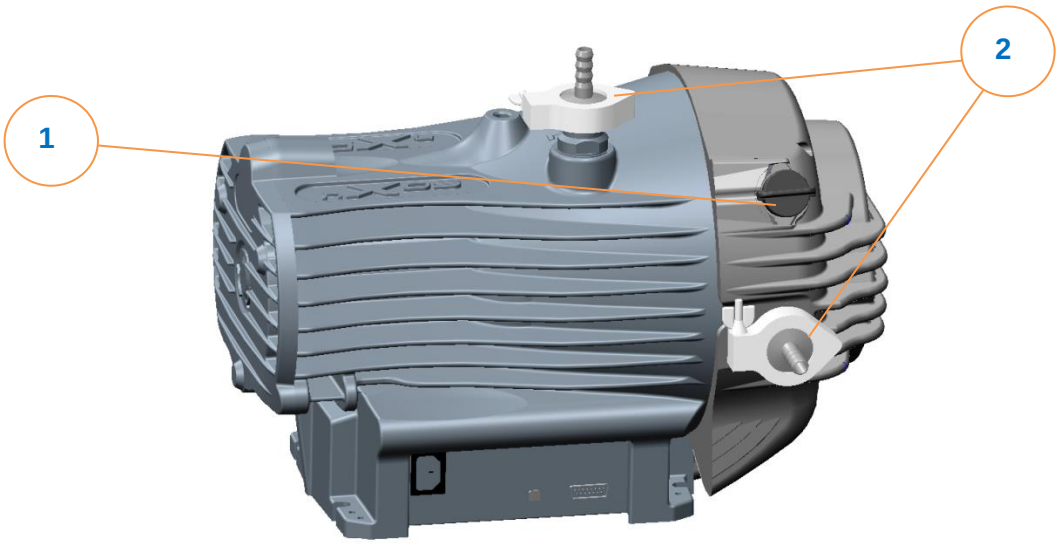
Caution: The electrical interconnecting cable is to be used for connecting between the concentrator and pump isolation valve only. Do not connect the electrical interconnecting cable to the pump power inlet.

Lyo-option

The miVac ***Lyo-option*** can be fitted to any miVac system that has a SpeedTrap with a switchable defrost mode (manufactured from March 2011 onwards) and a miVac super vacuum pump. The lyo-option kit includes an isolation valve that allows the SpeedTrap to be isolated from the concentrator.

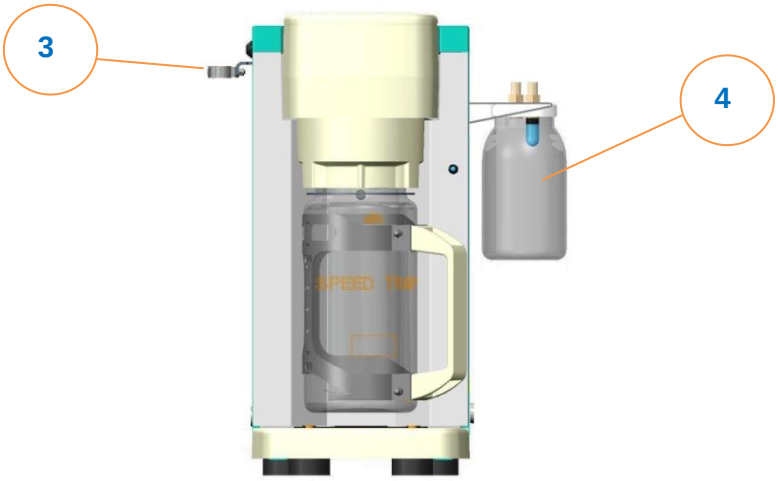
Setting-up

Note: If the super vacuum pump has a pump control valve fitted, remove this before fitting the Lyo-option kit.



1. ***Pump gas ballast:*** Set the pump gas ballast control to position 1.

2. ***Hose adapters:*** Using KF25 centring rings and clamps, fit hose adapters to the pump vacuum inlet (top connector) and pump exhaust (side connector).



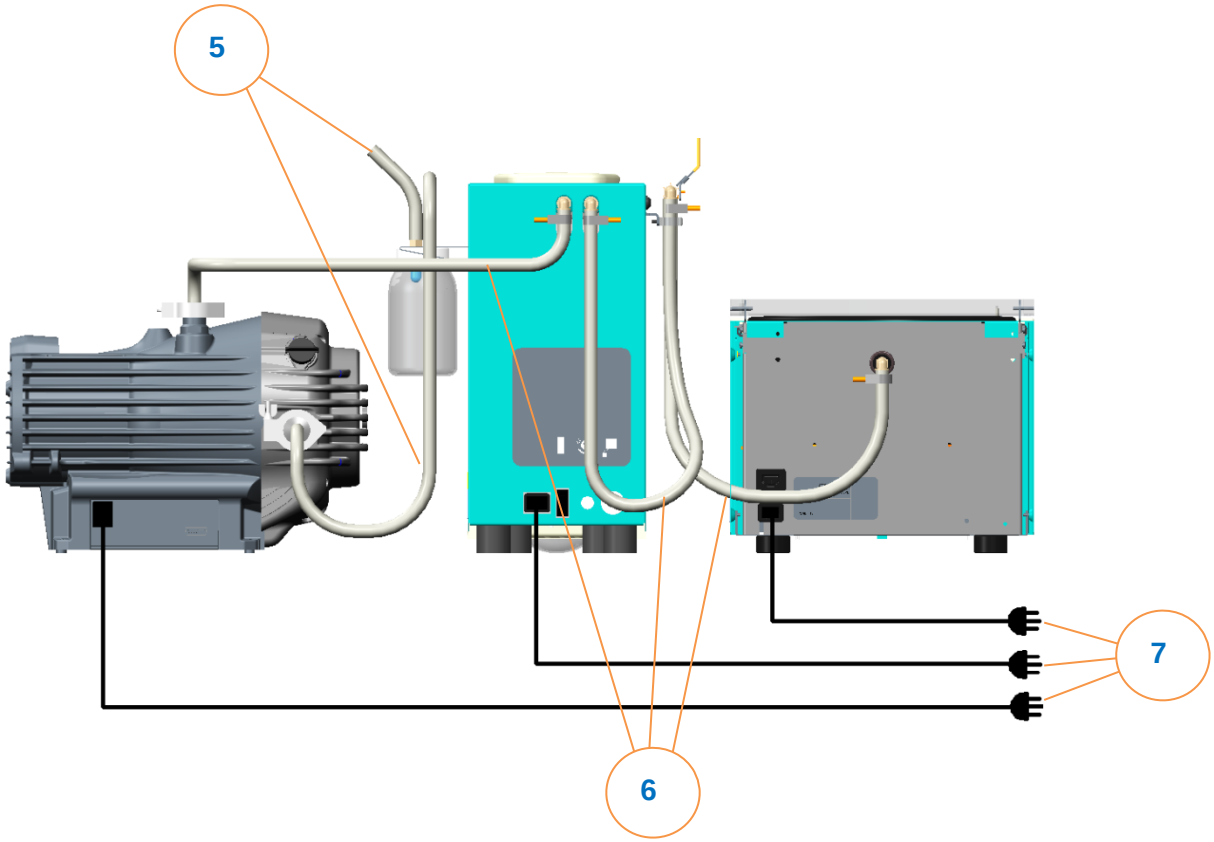
3. ***Iso-valve:*** Fit the iso-valve to the SpeedTrap by clipping it to the ventillatioin holes in the side of the unit and securing it in place with the screws provided.



Note: Large and small screws are provided to enable the bracket to be fitted to either side of the SpeedTrap.

4. Catch-pot: Fit the catch-pot to the SpeedTrap by clipping it to the ventillation holes in the side of the unit.

Lay out the units of the miVac system in the desired location as shown.



5. ***Exhaust hose:*** Cut a suitable length of exhaust hose and use it to connect the pump exhaust (hose adapter) to the catch-pot inlet (the outlet has a filter on the inside of the glass jar). Using the remaining exhaust hose, connect the catch-pot outlet to the laboratory fume extraction system.

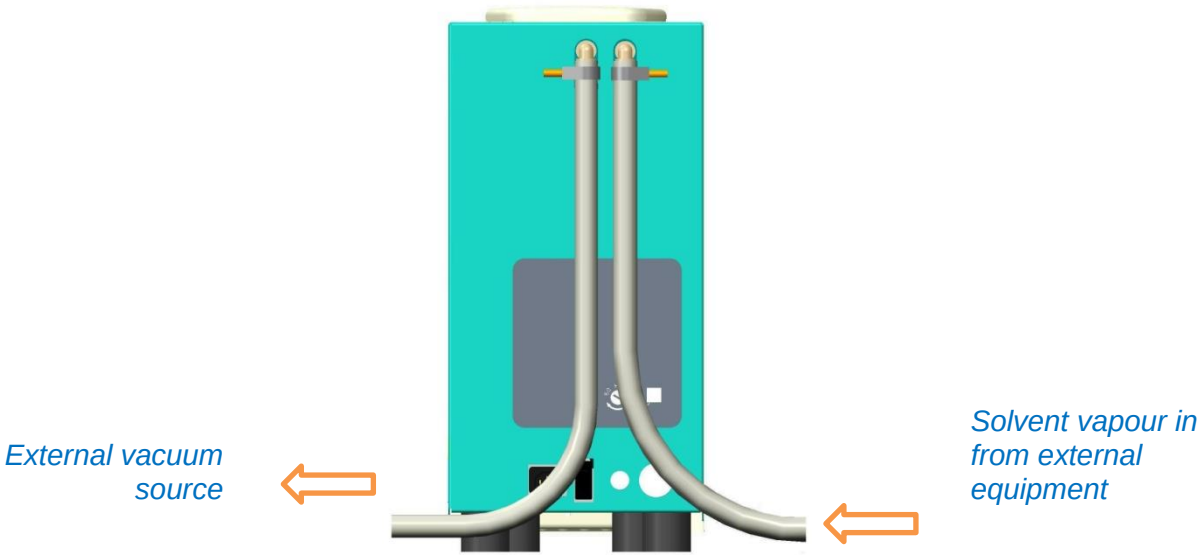
6. ***Vacuum hose:*** Using the vacuum hoses, connect:
   - the concentrator vacuum outlet to the iso-valve inlet.
   - the iso-valve outlet to the SpeedTrap vacuum inlet.
   - the SpeedTrap vacuum outlet to the super pump vacuum pump vacuum inlet. Secure the connections using the hose clips supplied.

   Clip the iso valve to the mounting bracket, making sure the direction of flow (indicated by an arrow on the valve) is from concentrator to SpeedTrap.

7. ***Power cables:*** Using the power cables supplied, connect the super vacuum pump, SpeedTrap and concentrator to three separate mains power supply outlets.

Stand-alone SpeedTrap

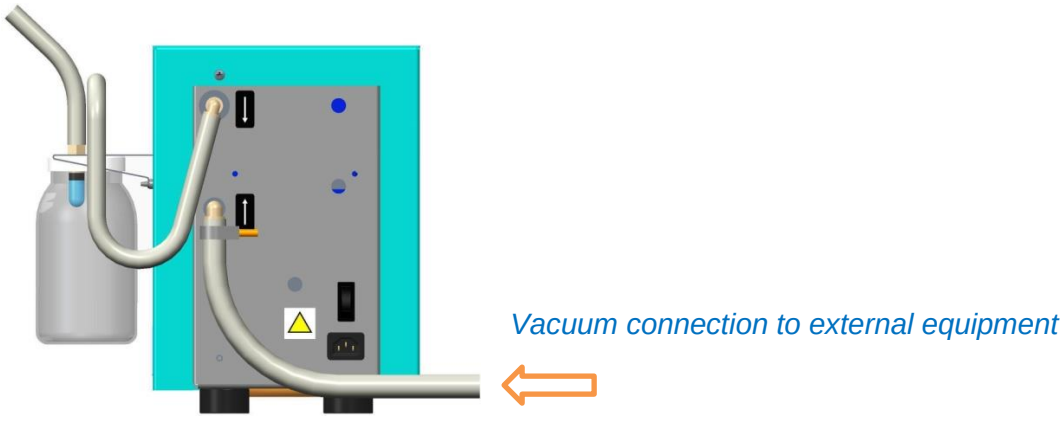
If connecting a miVac SpeedTrap to equipment, other than a miVac modular system, connect it as shown:



Using the power cable supplied with the SpeedTrap, connect the SpeedTrap to the mains power supply.

Stand-alone pump

If connecting a miVac pump to equipment other than a miVac modular system, connect it as shown:



If using a catch-pot, fit it to pump by clipping it to the cladding vent holes, on the side of the vacuum pump. Using the power cable supplied, connect the pump to the mains power supply.

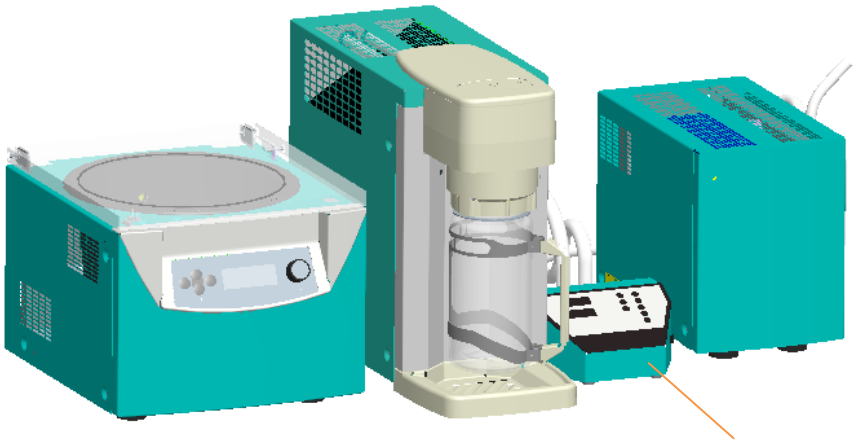
Vapour trap

To install the optional vapour trap, remove the pump catch pot and replace it with the vapour trap. Connect the pump exhaust to the vapour trap top connector (inlet), connect the outlet elbow connector to the laboratory fume extraction system.

Unscrew the jar and fill to the level indicator (approx. 300 ml) with the required neutralising solution. Replace the neutralising solution as required to maintain efficiency.

Pressure controller

To further increase the flexibility of the miVac system, a pressure controller can be connected to the vacuum line between the pump and the SpeedTrap. For details, refer to the ***miVac Pressure Controller User Manual***.



Final checks

Carry out a safety assessment before operating the miVac system. Make sure the exhaust hose takes solvent away from personnel, and from the system, in a safe manner.

If personnel lack the training or experience to comprehend the hazards that can arise when using the miVac system, do not allow them to use it. Personnel without such training require thorough instruction. The instructions contained within this User Manual may form the basis of such training.

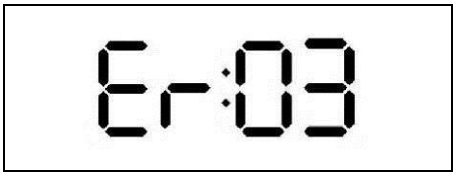
Maintain a solvent vapour free environment around the miVac system. Do not use the free space around the system for the storage of vessels containing solvents or acids. This instruction applies, even if the miVac system is installed in a fume cupboard.

Caution: After setting up, leave the SpeedTrap in the upright position for 24 hours before switching on.

Troubleshooting

Faults and errors

If the miVac system detects a problem; an error number is shown on the LCD display. When errors occur during operation, the error number is shown when the system stops.



Rectifying faults and errors

Err code	Cause of error	Rectification
01	Software error – memory failure	Clear error and attempt to restart
02	Lid not closed during run	Make sure lid is closed and engaged with latch
		Check lid seal is fully seated
03	Lid not locked during run	Make sure lid is closed and engaged with latch
		Check lid seal is fully seated
04	Motor drive error	Clear error and attempt to restart
05	Rotor failed to spin	Manually rotate rotor approximately 45° and restart
06	Rotor failed to reach speed	Make sure rotor spins freely
		Check mains power supply within tolerance
07	Rotor stops unexpectedly	Make sure rotor spins freely
		Check mains power supply within tolerance
08	Lid failed to lock	Make sure lid is closed and engaged with latch
		Check lid seal is fully seated
09	Lid failed to unlock	Make sure lid is closed and engaged with latch
		Make sure user not lifting lid against latch
		Check lid seal is fully seated
10	Software error – sensor read error	Clear error and attempt to restart
11	Software error – chamber temperature low	Clear error and attempt to restart
12	Software error – chamber temperature high	Clear error and attempt to restart

Clearing faults and errors

To clear an error, press and hold the ***STOP*** button for five seconds. Alternatively, switch the system power off, wait five seconds and then switch the power back on again. If the problem is still apparent, contact your distributor or Genevac Service.

Opening lid without power

In the event of a power supply failure, the lid can be unlocked manually to gain access to samples. Insert a narrow tool through the hole in the cladding (above the top left hand side screw) and use it to press on the lid lock actuator to release the lid lock mechanism, simultaneously open the lid.

For emergency lid release without mains power, Insert tool through hole

Note: The lid will be locked if closed when power is not connected to the concentrator.

Warning: Risk of injury, make sure the rotor is stationary and the system has vented to atmospheric pressure before opening the lid. Wait at least two minutes following a power failure before opening the lid.

Other troubleshooting

Symptom	Cause	Corrective action
Display blank	No power	Check power supply / lead
Lid will not open / difficult to open	Dirty lid seal	Clean lid and seal
		External control valve (if fitted) wrong way round
Rotor will not spin - double beep	Lid not fully closed	Open and close lid
		Check lid seal fully seated
		Check for obstructions
	Rotor jammed	Check for freedom of rotor
Rotor will not stop	Rotor spindle greasy or slippery, rotor continues to spin after spindle stops	Clean / degrease rotor and spindle. Fit spindle friction washer (or replace if defective).
Excessive vibration / noise	Rotor imbalanced	Check and rebalance rotor
	Rotor slipping	Clean / degrease rotor and spindle, fit spindle friction washer
	Missing exhaust silencer / muffler	Replace exhaust silencer / muffler
	Uneven work surface	Take corrective action
Chamber fails to reach programmed temperature	Heat time not set or insufficient	Adjust
Solvent splashes / condensation inside vacuum chamber	SpeedTrap not operating correctly	See ***SpeedTrap***
	Poor vacuum	See ***Maintenance***
	Overfull plates	See ***Loading Samples***
	Concentrator vacuum chamber too cold	Pre-heat before use
Vacuum problems	Pump not running	Check connections / mains power supply
	Lid seal leaks	Check for damage / dirt. Clean if required
	Hoses	Check for leaks
		Check for blockages
		Check connections
	Control valve (if fitted) not opening	Check connected to concentrator pump outlet
		Check vapour flow direction
	Condenser jar not sealed	Remove jar and check seal for damage / debris
		Replace seal, see ***Maintenance***
	Pump inefficient	Run system without samples for five minutes. Repeat three times then reload samples
	Exhaust silencer / muffler blocked	Replace exhaust silencer / muffler
	SpeedTrap jar seal leaking	See ***Maintenance***: ***SpeedTrap jar seal***
	Condenser jar full	Empty jar
	Pump needs servicing	Contact your distributor
Excessive concentration times	Poor vacuum	See ***Maintenance***
	SpeedTrap not operating correctly	See ***SpeedTrap***
	Insufficient chamber heat	Adjust Heat time
Excessive solvent in pump	SpeedTrap not operating correctly	See ***SpeedTrap***
	Incorrect run settings	Select run settings suitable for your solvent

Other troubleshooting – continued

Symptom	Cause	Corrective action
miVac pump runs continuously	Connected directly to mains power	Connect to concentrator using interconnecting lead
Excessive sample odour	Solvent vapour exhausting in to lab	Check connections
		Check pump / system exhaust ducted to suitable fume extraction point
No SpeedTrap LED illumination	No mains supply	Check SpeedTrap mains power supply lead
Excessive boiling of solvent in SpeedTrap jar	Warm solvent	Stop run and empty jar, restart run
No solvent in SpeedTrap jar	Excessive vacuum	Check vacuum appropriate to application
	Incorrect run type	Select suitable run type
	Poor cooling	Allow SpeedTrap to cool for 30 minutes with no concentration, then Restart run
		Check LED status
		Check air flow, ensure vents are clear from obstruction
Poor solvent recovery	Excessive vacuum	Check vacuum appropriate to application
	Incorrect run type	Select suitable run type
	Poor cooling	Allow SpeedTrap to cool for 30 minutes with no concentration, then restart run
		Check LED status
		Check air flow, ensure vents are clear from obstruction

Technical Data

Specifications

DNA concentrator	
Max rotor speed	1465 rpm
Sample acceleration	250 G
Drive system	Permanent magnet electronic
Dimensions (w x d x h)	360 x 602 x 300 mm
Catch-pot	Add 141 mm to width
Weight	41.5 kg

Duo Concentrator	
Max rotor speed	1465 rpm
Max sample acceleration	250 G
Drive system	Permanent magnet electronic
Dimensions (w x d x h)	360 x 424 x 300 mm
Weight	21 kg

Quattro concentrator	
Max rotor speed	1130 rpm
Max sample acceleration	250 G
Drive system	Permanent magnet electronic
Dimensions (w x d x h)	480 x 594 x 300 mm
Weight	35 kg

SpeedTrap	
Type	Single stage vapour compression
Refrigerant	R404a
Nominal operating temperature	-35°C
Lowest possible temperature	-50°C
Maximum defrost temperature	+60°C
Rapid defrost	Yes
Rapid defrost over-ride	Yes (after Feb 2011)
Jar	Plastic coated borosilicate glass
Jar capacity	1 litre (optional 2 litres)
Dimensions (w x d x h)	212 x 563 x 450 mm
Weight	25.8 kg

Duo pump	
Ultimate vacuum	< 10.0 mbar (7.5 torr)
Flow rate	38 litres per minute
Dimensions (w x d x h)	215 x 389 x 300 mm
Weight	19 kg

Quattro pump	
Ultimate vacuum	< 3.0 mbar (1.5 torr)
Flow rate	33 litres per minute
Dimensions (w x d x h)	215 x 389 x 300 mm
Weight	18 kg

Super vacuum pump	
Ultimate vacuum	0.05 mbar
Dimensions (w x d x h)	282 x 432 x 302 mm
Weight	26.6 kg

Storage / transportation environment	
Ambient temperature	0°C to 40°C (-10°C permissible during transportation)
Relative humidity	0 to 95% non-condensing
Altitude	Sea level to 12000 m

Operating environment	
Ambient temperature	0°C to 30 °C
Relative humidity	0 to 95%
Altitude	Seal level to 1600 m
Ingress protection rating	IP30

Note: This evaporator is designed for use in a pollution degree 2 environment (normally only non-conductive pollution occurs).

Emissions

Noise level is typically 70 dB (A) at one metre from the concentrator during normal operation.

For the purpose of air conditioning requirement calculations, it can be assumed that all power is dissipated as heat

Note: Dimensions include allowances for pipe connections and for lid opening; figures quoted for weights are for guidance only (actual weights vary with build options such as mains input voltage).

Electrical

Voltage (V)	Freq (Hz)	Power VA (W) DUP & DUC Peak	DUP & DUC Norm	DUP & QUC Peak	DUP & QUC Norm	MST Peak	MST Norm	SVP DUP	SVP QUP	SVP Peak	SVP Norm
100	50	500	360	630	370	605	570	250	150	510	400
100	60	490	350	660	400	535	500	250	150	480	380
120	60	590	390	850	470	495	441	250	150	600	470
230	50	590	380	890	450	435	429	250	150	580	390
220	60	520	340	800	430	495	441	250	150	590	440

Key	
DUP	Duo pump
QUP	Quattro pump
SVP	Super vacuum pump
DUC	Duo concentrator
QUC	Quattro concentrator
MST	SpeedTrap

For DNA concentrator, refer to Duo concentrator with Duo pump. Figures for normal running power (norm) err on the high side (based on the heater being on for 30% of the run time, typically heat is on for 5 to 10% of the run).

Note: The systems may momentarily take current in excess of these figures. Genevac therefore recommend the use of appropriately rated type C or D (or equivalent) circuit breakers on the main supply.

EC declaration of conformity

SP SCIENTIFIC
Making Time for Science

EC Declaration of Conformity: miVac Series

Manufacturer's Name:	Genevac Ltd
Manufacturer's Address:	Farthing Road Ipswich Suffolk IP1 5AP UK
Type of Equipment:	Laboratory Equipment

This is to certify that the following products (including rotors and accessories):

DNA concentrator, models:	DNA-23050-x00*
Duo concentrator, models:	DBP-23050-x00, DUC-23050-x00, DPP-23050-x00
Quattro concentrator, models:	QLP-23050-x00, QUC-23050-x00, QHP-23050-x00
SpeedTrap, models:	MST-23050-x00
Duo pump, models:	DUP-23050-x00
Quattro pump, models:	QUP-23050-x00
Super vacuum pump, models:	SVP-23050-x00
Control valve, model:	UOP-00000-Y00

Conform to the Essential Health and Safety requirements of European Directives:

- Machinery Directive (2006/42/EC)*
- EMC Directive (2004/108/EC) and
- Low Voltage Directive (2006/95/EC)
- RoHS2 Directive (2011-65/EU)

A technical construction file for this product is held at the above address.

Conformity is demonstrated by compliance to the following standards:

- BS EN 61010-1:2010 Safety requirements for electrical equipment for measurement, control, and laboratory use. General requirements.
- BS EN 60204-1:2006 + A1:2009 Safety of machinery. Electrical equipment of machines. General requirements.
- BS EN 61326-1:2006 Electrical equipment for measurement, control and laboratory use. EMC requirements
- BS EN 12100:2010 Safety of machinery. General principles for design. Risk assessment and risk reduction.
- BS EN 378-2:2008 + A1:2009 Refrigerating systems and heat pumps. Safety and environmental requirements. Design, construction, testing, marking and documentation.

CE

Signed:

Name: G Broadbent

Position: Research and Development Manager

Date: 18th July 2014

Being the person appointed by Genevac Ltd to sign on their behalf

* Where "X" = A, B, D or F and denotes the power lead code appropriate to the destination country.

Warranty statement

This product is guaranteed for period of 12 months from the date of delivery. 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 includes all labour and component costs incurred.

This warranty is subject to the following provisions:

- The system must be sited, installed and operated in accordance with the user manual
- The unit may only be used for the purpose it was sold, and in accordance with Genevac published compatible solvent list
- Regular cleaning and preventive maintenance schedule to be adhered to as detailed in the user manual. See ***Maintenance***
- If items are replaced by the owner, only Genevac approved parts may be used
- In the event of a vacuum pump failure, the pump may be exchanged for a refurbished unit. The owner is responsible for the exchange and return of the failed unit.

Failure to adhere to the above would invalidate the warranty and result in the costs of repairs being charged. This warranty does not cover accidental damage, modification, misuse or inappropriate repair by untrained personnel, and does not cover consumable items.

Consumable items

Consumable items include: concentrator lid seal and friction washer, SpeedTrap seals and thread inserts, vacuum and exhaust hoses.

Patents

miVac products are protected by the following patents and patent applications:

1153278 FR

Amendment control

Issue	Reason for change	Date Issued
2-1	Layout revised; includes changes from previous issue.	04-Feb-11
2-2	Pre-heat instructions expanded. Troubleshooting expanded. Chamber temperature and heat time setting instructions expanded. Electrical specifications revised. Opening lid entrapment safety warning added. Recommended pump service interval added.	07-Mar-11
2-3	DNA concentrator in place of DNA. Flow of energy in place of heat-flow. Solvent being condensed in place of solvent being concentrated.	23-Mar-11
2-4	Rotor slipping added to troubleshooting. Standardised conventions: move Standby mode before Controls, Recommended Practice in place of Check Before Use. DNA image updated. Replace catch-pot with vapour trap instruction added. Method and SpeedTrap Mode added to to Acceptable Solvents table.	05-Mar-12
2-6	Add SpeedTrap jar seal maintenance. Add SVP specifications, update dimension and weight specifications. Add Lid seal maintenance. Amend environment specification: pollution degree 2. Add spindle friction washer replacement instructions.	27-Jul-12
2-7	MST seal kit part number and Spindle friction washer part number added. Vapour trap instructions expanded.	06-Sep-12
2-8	Maximum fill level for tubes, vials etc specified.	17-Jan-13
2-9	Emergency lid release procedure expanded. Set-up instructions expanded to include SVP and lyo-option. Defrosting instructions expanded. SpeedTrap expanded to include lyo-option. Basic Operation, Advanced Operation and Loading Samples, now specific to Concentrator.	06-Feb-13
2-10	Consumable items list added.	13-Mar-13
2-11	Electrical earthing for systems with multiple earth leads warning added. miVac connection kit updated with metal reinforced vacuum hose. Catch-pot filter installation instructions added. STJ-20000-000 added to Options and Accessories. Transport / storage environment spec updated. Lyo-option instructions revised.	14-Jun-13
2-12	Acceptable solvents statement added. US contact address updated. Maximum time setting added.	10-Sep-13
2-13	Stop and auto controls: reference number correction. Non-condensing added to operational environment specification. nXDS6 replaces XDS5. Original instructions statement added. FRCTN-001 corrected part number. EC Declaration of Conformity updated. Type “C” or “D” or equivalent, replaces type “C” or “D”.	09-Jan-14
2-14	Ingress protection rating specification added.	18-Feb-14
3-1	Instructions and layout revised. Acceptable solvents updated. Updated SpeedTrap specification.	01-Jul-14
3-2	DoC updated.	21-Jul-14

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Service@spscientific.com

Useful information

Read these instructions before operating the miVac pressure controller and keep them near the system for easy reference. Your attention is drawn in particular to the ***Safety*** section.

These instructions are correct at time of going to press and may be subject to change without notice. Some of the features and software functions described within this user manual may not apply to equipment manufactured before this manual's publication date; this includes systems that have been upgraded.

No part of these instructions may be reproduced in any form or be processed, duplicated or distributed by electronic or optical means without the written permission of Genevac Limited.

If you need to contact Genevac for assistance, use either the telephone or fax Hotlines shown. Please have the instrument serial number at hand. Alternatively, email or visit our web site.

The evaporator should not be discarded in your regular disposal stream. Contact your Representative or Genevac for proper disposal instructions.

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