

MiniVap

Sample Concentrator



Instruction Manual

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Specifications subject to change without notice. E&OE.

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Introduction

Porvair Sciences Limited has introduced the compact, stand-alone blow down sample concentrator, to allow evaporation of solvents from microplates in minutes, rather than hours.

The instrument eliminates the traditional “bottleneck” of solvent evaporation prior to analysis or reconstitution in buffer. It has been designed to be used with ANSI/SBS format 96 well plates (conforming to the standards noted below). The instrument when fitted with compatible straight or spiral needle heads, which offers improved drying efficiency, can be used with 96well plates. It can optionally be supplied with a 24 well straight needle head to allow evaporation of samples stored in standard 3.5ml (Ø13.75mm) glass vials when used in conjunction with a suitable carrier plate. A polypropylene adaptor block designed to hold 48 standard 1.5ml HPLC vials (Chromacol/Agilent type) is available with a matching 48 well head with straight needles. All evaporator heads are easily interchangeable.

The samples concentrator blows heated gas (typically Nitrogen) into the wells and will accommodate both deep and shallow well plates. The location of the needle array is fixed. The platform containing the well plate can be manually elevated to suit well plate dimensions and to optimise dry-down of samples.

The concentrator has been configured to be simple to install, operate and maintain. Installation requires connection to a gas supply and an electrical supply. Safe operation is ensured as the CE marked unit fits into fume cupboards, or may be integrated into a dedicated fume extraction unit.

Installation

Before use, carry out the following steps:

- Visually inspect MiniVap for damage
- Check that correct needle head is supplied and inspect for damage
- Ensure transformer is supplied (if required) and a suitable power cord is available
- Ensure that the hand wheel, used for raising and lowering the platform (plate carrier), on the right side of the instrument moves freely.
- Ensure that gas and electrical supplies are correct – see [System Requirements](#)
- Place MiniVap on a flat surface in a fume hood or well-ventilated area
- Connect the MiniVap to gas and electrical supplies – see [Connecting the MiniVap](#)
- Fit the Needle Head – see [Fitting / Changing Needle Head](#)
- Carry out adjustment of the MiniVap – see [Operating Instructions](#)

Report all damaged or missing components to your supplier or distributor immediately.

Microplate requirements

The MiniVap can be used with 96 well microplates that, as a minimum, conform to the following standards:

- ANSI/SBS 1-2004: Microplates – Footprint dimensions
- ANSI/SBS 4-2004: Microplates – Well positions

Caution Notes

It is important that the **MiniVap** is installed and operated in such a way that all applicable Health and Safety requirements are met. It is the user's responsibility to ensure that all relevant Health and Safety Regulations are identified and complied with. Failure to do so may result in damage to the equipment and could cause personal injury. In particular, the user should study the contents of this guide carefully before handling or operating this equipment.

Under No circumstances will the supplier of this equipment be liable for any incidental, consequential or any special damages of any kind whatsoever, including but not limited to lost profits arising from, or in any way connected with the use of this equipment or this instruction manual.

Warranty is invalidated if the unit is opened or tampered with, in any way, without prior authorisation of Porvair Sciences or the manufacturer.

Warning: The **MiniVap** operates on Dual Voltage mains supply, either 115V or 230V 50Hz or 60Hz

Warning: Only approved, supplied mains cord set must be used with this instrument. Refer to **System Requirements** section for more information.

Warning: If it is required to use an extension lead, the lead must be earthed.

Operational controls

- The height of the platform must be controlled to prevent damage to needles or microplate

Special requirements

- The instrument is designed to operate at a maximum temperature of 60°C. Certain components will become HOT during normal operation of this equipment. Please be aware of all warning signs relating to hot surfaces
- The instrument must be used in a well-ventilated area. Use of fume extractor or use in a fume cupboard is recommended.

Warning Symbols Used

In accordance with IEC 417

RISK OF ELECTRIC SHOCK



WARNING

Refer to accompanying documentation



DANGER – HOT SURFACE / HOT AREA



PROTECTIVE CONDUCTOR TERMINAL



MAINS SWITCH SYMBOLS

I = ON

O = OFF

I – O

Environmental requirements

Temperature range

**Operating
Storage**

**10°C – 30°C
0°C – 40°C**

Relative Humidity (non-condensing)

**Operating
Storage**

**10 – 80%
10 – 80%**

System Requirements

Gas supply

A suitable clean, dry, regulated gas supply should be connected to the instrument using 6mm tubing. Use of a filter / separator in addition to supply regulator is strongly recommended.

Typical gases suitable for use with the **MiniVap** are Nitrogen and compressed air. For samples that are easily oxidised it is strongly recommended that Nitrogen is used. The gas can be supplied from cylinders/bottles, via in-house systems, local compressor (air) or from a gas generator (Nitrogen).

Pressure: 2 bar (30 psi) – 5.3 bar (80 psi)

Flow: 25L/Min – 100 L/min

Optimum conditions: 70 L/min at 5 bar (75 psi)

Warning: Gas pressure must not exceed 5.3 bar (80 psi). Exceeding this pressure may result in damage to the instrument.

Electrical supply

The **MiniVap** operates from an electrical supply of 115/240 volts.

The **MiniVap** utilises a standard fused and switched IEC connector

The **MiniVap** is supplied with power cords for U.K., U.S.A. and Europe. If the plug fitted is not suitable for the available supply DO NOT modify it. A suitable power lead should be available from a reputable local supplier.

The mains inlet on the **MiniVap** should be fitted with the following fuse:

Supply	Fuse fitted in plug	Fuse fitted in MiniVap
230VAC U.K	13 Amp	IEC Main inlet to rear of unit is twin fused, Live & Neutral fuse. (2 x T5AH 250V)
230VAC Europe	No fuse	
115VAC	No fuse	

Only fit the correct type of fuse.

In Europe, ensure that the fuse is IEC 127 approved.

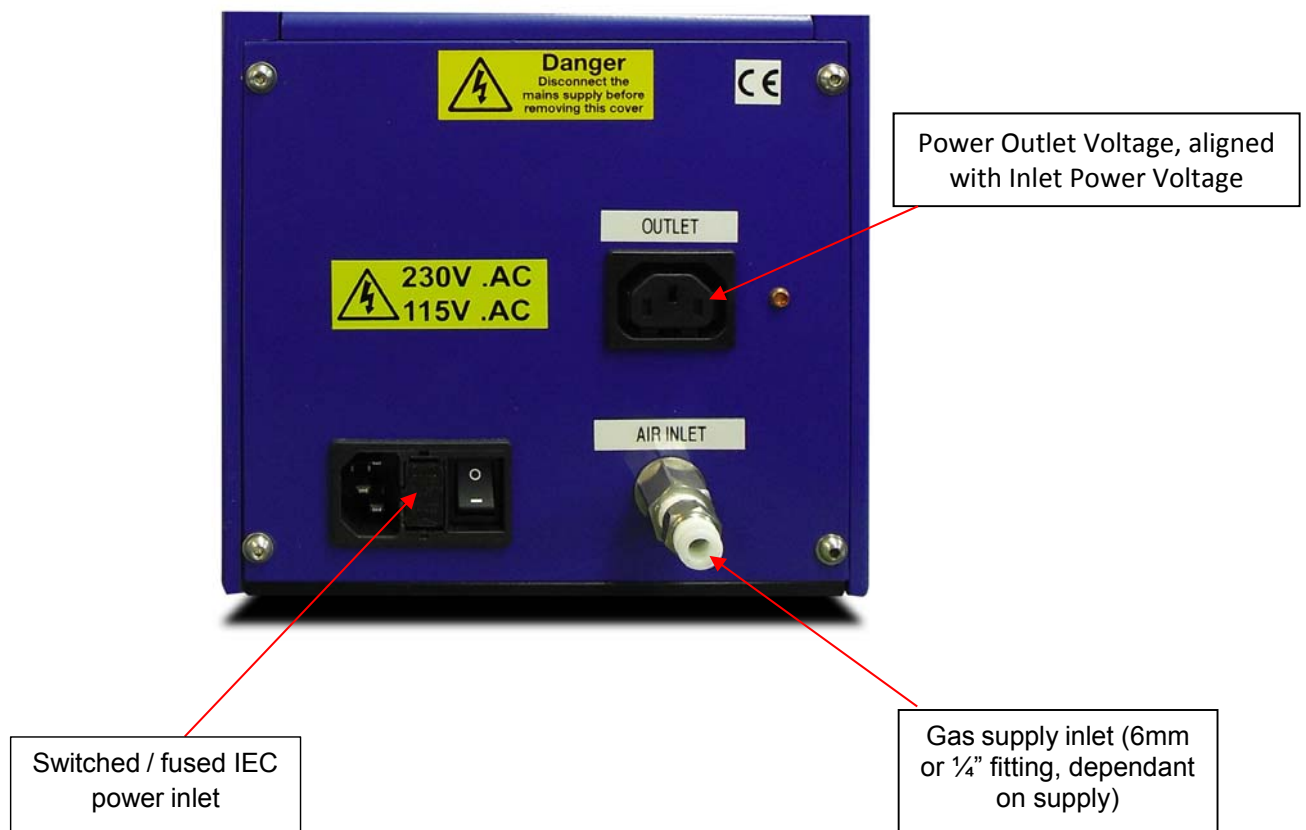
In Canada and U.S.A ensure that the fuse is CSA or UL listed or recognised for use

Connecting the MiniVap

Check gas supply is within system requirements

Connect gas supply using 6mm connector. If a different fitting is required; remove the existing push-fit adapter using two spanners (one to remove the fitting, the other to constrain rotation of the bulkhead fitting. Alternative adapters will require a 1/4" BSP thread.

MiniVap runs on Dual Voltage main supply 115/230V.



Fitting / Changing Needle Head

Important Note

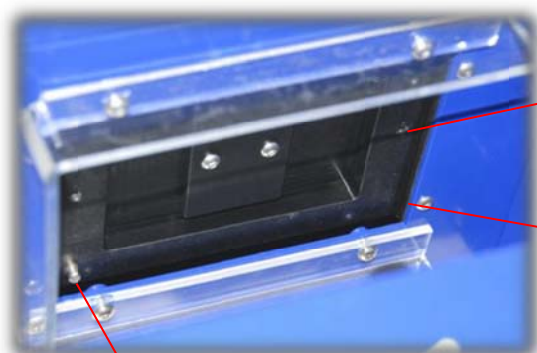
The following pictures illustrate the procedure used for fitting a needle head to either a **MiniVap** or an **Ultravap** Sample Concentrator. Illustrations show Ultravap with splash guard installed. (Not used on MiniVap).

Statement:

It may be easier to carry out the following operations with the Ultravap laid on its side. Please ensure that a suitable soft cloth or tissue is placed on the surface to protect both it and the Ultravap if this is done.

To fit a Needle Head to the instrument, carry out the following steps:

- Disconnect from gas and electrical supplies, to minimise risk during the next steps
- Carefully place supplied gasket over the two location dowels on the underside of the gas manifold – see pictures below:



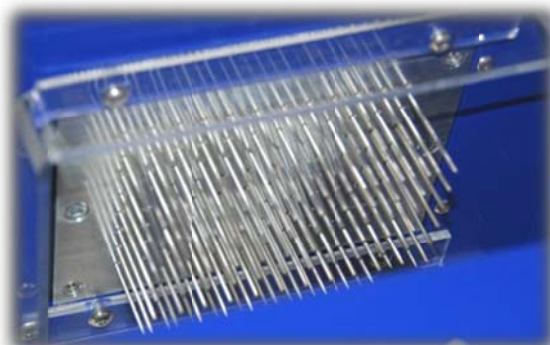
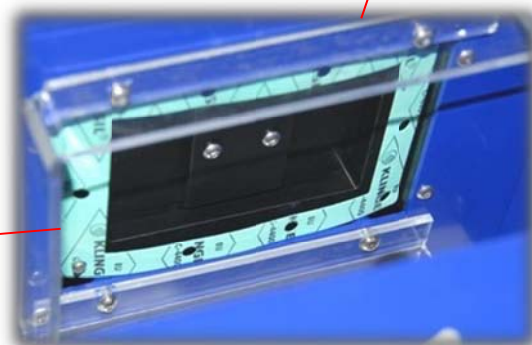
Normal position for head retaining screws

Gas manifold

Splash guard

Location dowel / alternative position for head retaining screws

Gasket located on dowels



Needle head installed on gas manifold

Note: Both older instruments and needle heads manufactured before mid-2009 may have more screw holes than illustrated.

It is not necessary to fit more retaining screws than noted in the instructions.

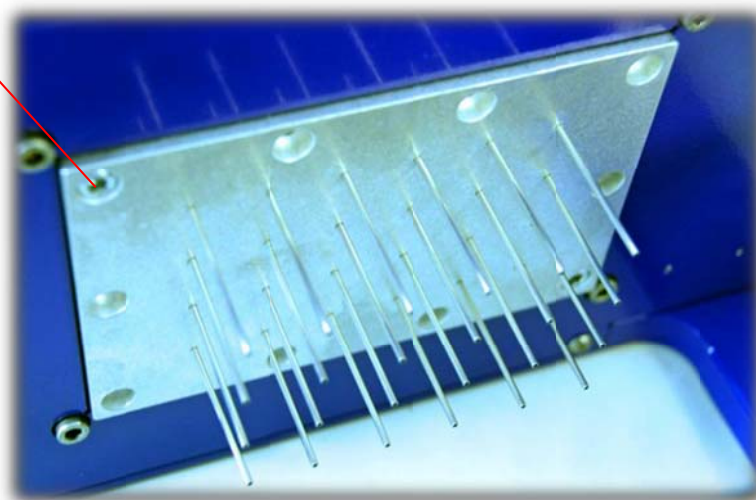
Depending on the design of the head / gas manifold it may be necessary to insert the retaining screws in diagonally opposite corners (alternative position noted in illustration)

- Carefully place Needle Head on top of the gasket and fix it in position using the socket head screws and Allen key (Hex wrench) provided. The screws should be placed in the centre holes at the front and back of the needle head.
- Tighten socket screws securely
- Reconnect gas and electrical supplies

To remove a needle head, typically for cleaning, repair or replacement, carry out the following steps:

- Allow instrument to cool, if it has been in use
- Disconnect from gas and electrical supplies, to minimise risk during the next steps
- Using Allen key (Hex wrench) supplied; remove the socket screws retaining the Needle Head. Retain the screws for re-fitting the head.
- Carefully remove the head – avoid bending or damaging needles
- Inspect gasket for tears and replace if required
- Fit new / cleaned head as instructed above

Alternative position for head retaining screws



MiniVap illustrating optional 24 well Needle Head installed on gas manifold.

Operating Instructions

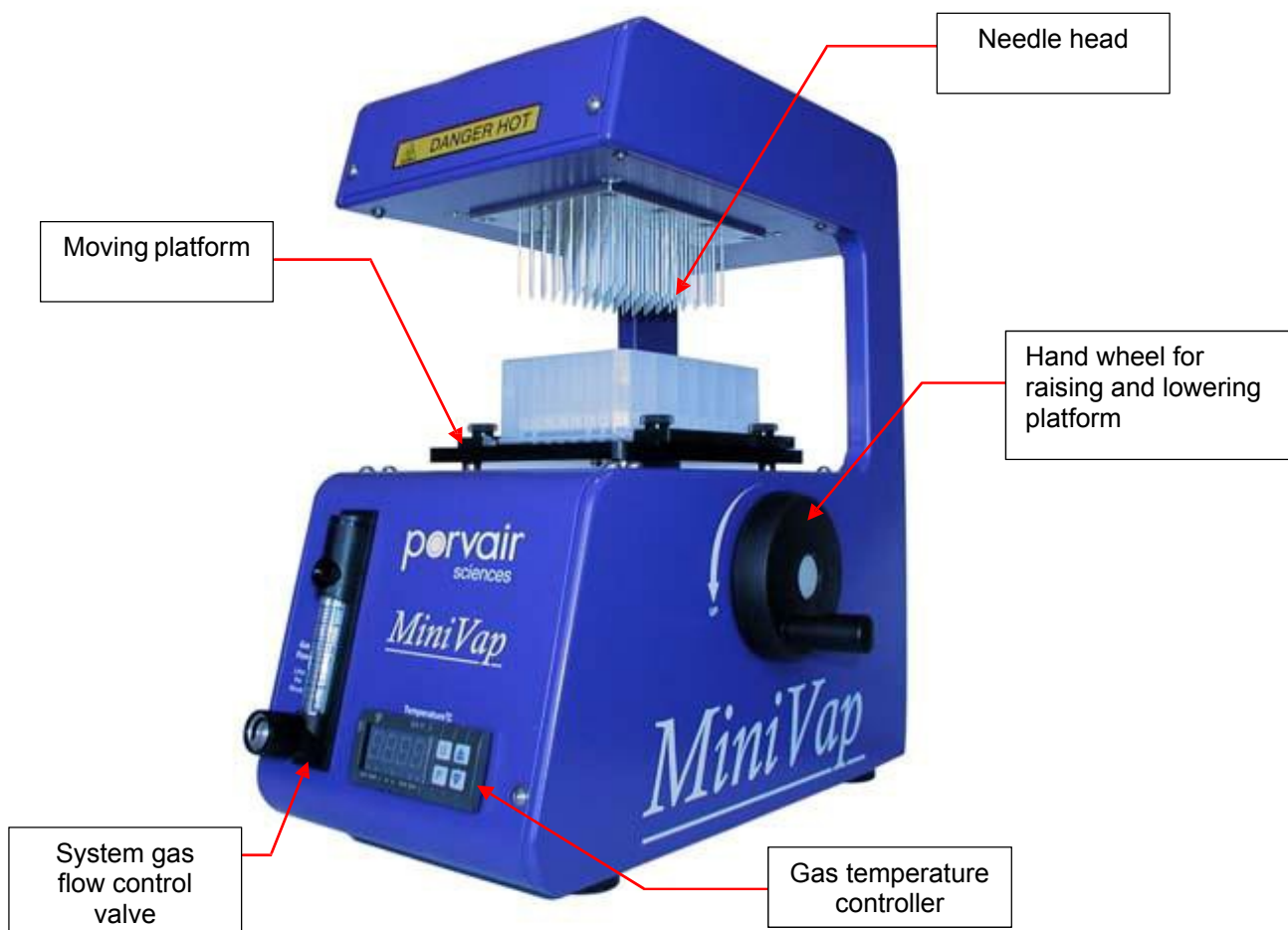
Once the MiniVap is correctly connected to gas and mains power supplies and a suitable Needle Head is installed, as described in the previous sections, the unit is ready to be set up for use.

This involves the following steps:

- Platform adjustment
- Temperature setting
- Setting Inlet Operating Pressure
- Setting System Gas Flow
- Sample concentration using MiniVap

Turn the power on at the IEC power inlet at the rear of the instrument; the temperature controller will display the previously set temperature and ambient temperature of the gas manifold.

Important note: Ensure that the system gas flow control valve is closed otherwise the unit will start to heat up and dispense gas prematurely



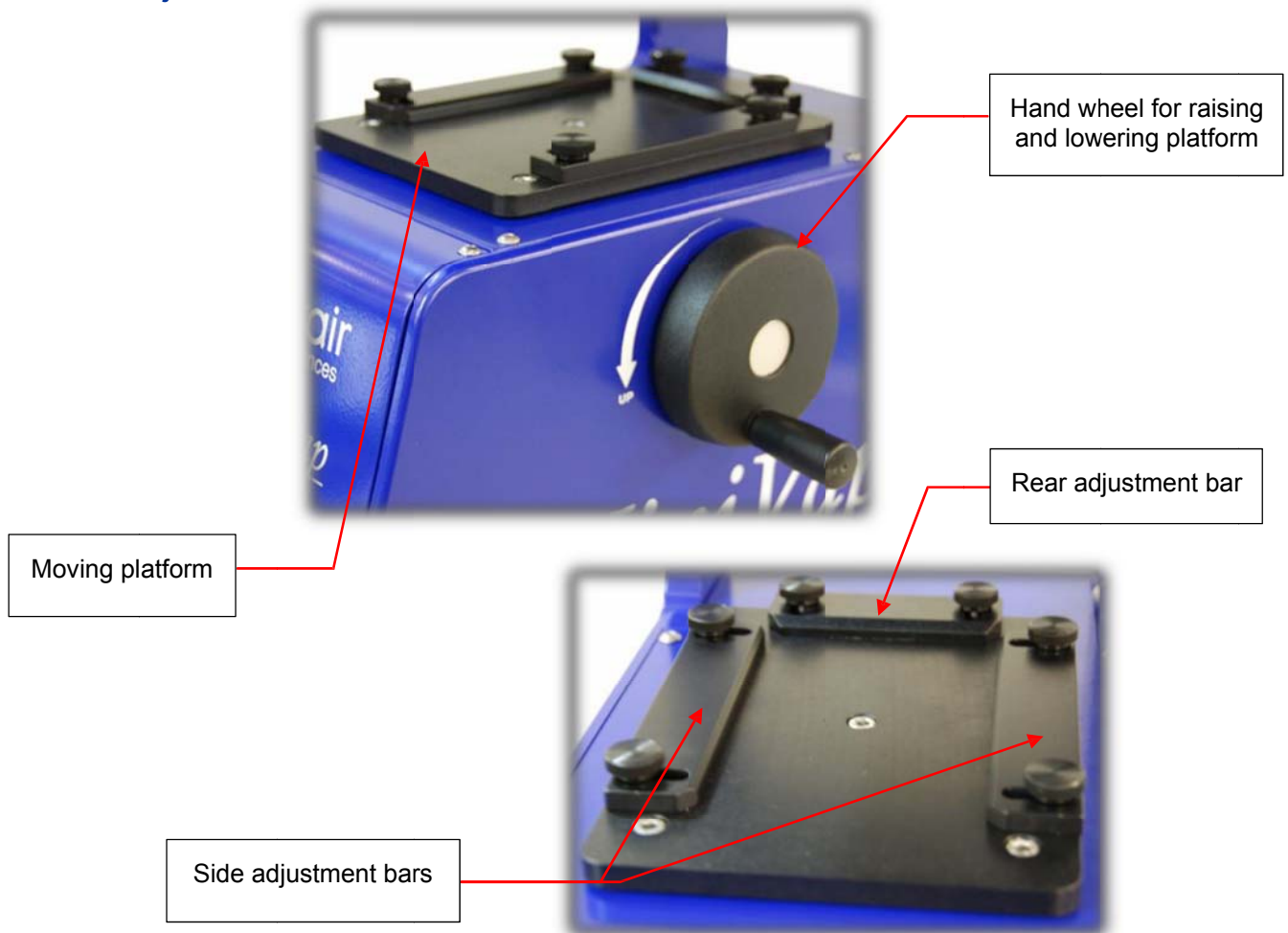
Overview of display screen



Important note:

Only press the keys as outlined in these instructions. Pressing key 'U' has no effect during normal operation – no user functions available. Incorrect pressing of either keys 'P' or 'U' may result in undocumented / error screens. The display will return to the default screen if no keys approximately 15 – 20 seconds.

Platform adjustment



To avoid damage to either Needle Head or sample plates, the position of the microplate to be used should be set on the moving platform before setting the instrument. To allow this, the MiniVap is fitted with adjustable bars mounted on the moving platform – as illustrated above.

To correctly position the microplate, carry out the following steps:

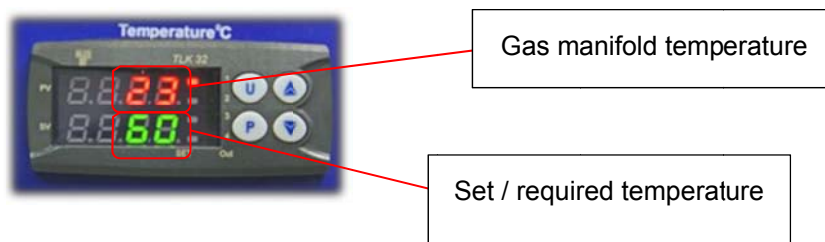
- Loosen both rear and side adjustment bars by rotating knurled retaining screws counter-clockwise.
- Place Microplate on moving platform inside adjustment bars
- Raise platform using hand wheel until needles are just above the top of the plate
- Visually align plate so that the needles are positioned centrally above each well
- Secure in position by moving location bars until they are just touching the microplate and tightening the knurled retaining by rotating clockwise
- Recheck position and adjust if required
- Raise the platform slowly, checking position of the needles, until they are inserted almost to the full depth of the wells. Recheck the position periodically during this process and adjust if necessary. This is particularly important with spiralled needles which could potentially collide with the side of the wells if inserted beyond the vertical sections of the wells. It may be easier to loosen all the adjustment bars and gently move the microplate ensuring that it can move freely without touching the tips of the needles. Secure in position once this check is carried out
- Lower the platform to its home position using the hand wheel.

Temperature setting

Once the gas supply is established and the mains power is switched on at the IEC inlet at the rear of the instrument the temperature controller will display the following screen at start up.



After a few seconds the screen will return to its default display: -
Any new unit (13233 On), may show a negative temperature on power-up (from cold).
This will align itself, once the target temperature has been reached and is perfectly okay.



Press key 'P', the screen will display



Adjust temperature setting using ▲▼ keys

Do not press any keys for approximately 30 seconds

The screen will return to the default display, shown below:



Important note:

The instrument will not start to heat up if the gas flow is less than 25 L/min – see following sections for setting operating pressure and system gas flow.

This information only applies to TLK32 Display AL1 displayed (TLK32)

If key 'P' is incorrectly pressed after setting the temperature, the following screen will be displayed. This function is not used with the MiniVap.



Do not press any keys for approximately 30 seconds

The screen will return to the default display, shown below:

Note: For older instruments with TLK-38 and TLK-31 controllers the default screen will show a single line display indicating the ambient gas manifold temperature:



Typical single line display (TLK-38)

To set temperature using **TLK-38**;

Press 'P' key

Press ▲▼ keys to adjust value

Press 'P' key to save value

The display will return to the default screen indicating current temperature of the gas manifold

To set temperature using **TLK-31**;

Press 'P' key

Press ▲▼ keys to adjust value

Wait 15-20 seconds

The display will return to the default screen indicating current temperature of the gas manifold

Setting Inlet Operating Pressure

To obtain optimum performance it is necessary to correctly set the gas supply to the instrument before adjusting the System Gas Flow – see following section.

Note: This setting is carried out at the supply regulator and is not the value shown on the system gas flow meter.

Due to internal pressure and distribution losses this is not the gas pressure through individual needles.

To set up the Inlet Operating Pressure, carry out the following step:

- Ensure System Gas Flow Meter valve is fully closed (turn clockwise)
- Adjust supply system regulator to a value of between 3 bar (45 psi) and 5 bar (75psi). The instrument will operate with operating pressures as low as 2 bar (30 psi) but for optimum performance it is recommended that the regulator is set to supply a pressure of 5 bar (75 psi)
- The gas supply system should be set to the maximum sustainable pressure if the optimum pressure of 5 bar (75 psi) cannot be achieved or maintained.

Warning: Gas pressure must not exceed 5.3 bar (80 psi). Exceeding this pressure may result in damage to the instrument.

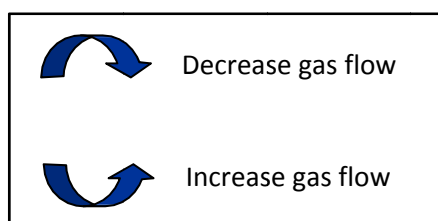
Setting System Gas Flow

The MiniVap is designed to work with a gas flow between 25 and 100 L/min. For optimum performance a setting of 70 L/min is recommended. This is the value shown on the system gas flow meter.

Once the system inlet pressure is set to 5 bar (75 psi), or the maximum that can be maintained, adjust the system gas flow valve to give the desired flow rate by turning the valve counter-clockwise.

Once the flow rate exceeds 25 L/min the instrument will start to heat the gas and the temperature indicated on the display will start to rise.

The diameter of the needles has been optimised to allow high gas flow rates (> 75 L/min) to be used while minimising sample disturbance. This allows quicker sample concentration without the risk of cross contamination.



System gas flow valve



Sample Concentration using MiniVap

To proceed with sample concentration using the MiniVap carry out the following steps:

- Set temperature and gas flow as described in previous sections
- Wait for instrument to reach the set temperature
- Place the microplate containing samples in correct position on platform
- Raise the moving platform by turning the hand wheel, located on right side of the instrument, counter-clockwise until the needles are approximately 4mm from the top of the plate or the sample.
- Allow the MiniVap to concentrate the sample adjusting the position of the moving platform periodically, if required.
- On completion; lower moving platform to its home position by turning the hand wheel clockwise.
- Remove microplate with concentrated sample.

Recalibrating Temperature Controller

Even though the temperature settings have been set under controlled laboratory conditions, it is recognised that they may need to be adjusted to compensate for local environmental conditions. By carrying out the following procedure the operator may introduce an „offset“ temperature adjustment to suit actual conditions.

Important Note: The following procedure must be carried out by a suitably qualified technician. Failure to follow these instructions exactly, or the adjustment of other undocumented parameters, could render the instrument inoperable resulting in the instrument being returned to the manufacturer for repair and re-calibration.

Important Note: Please consult your suppliers or Porvair Sciences directly if you require to carry out recalibration of older TLK-38 or TLK-31 temperature controllers.

For example: If the temperature displayed is 60°C and the temperature measured from the needles is 55°C then an offset of „5“ will typically be required.

After adjustment the temperatures must be allowed to stabilise for a few minutes before checking. All gas temperature measurements should be carried out using a suitable calibrated thermo-probe. For further information, please contact your supplier or Porvair Sciences direct.

K32

Press and hold 'P' for 3 seconds.



Hold 'Up' Arrow until 1400 is reached.



Press 'P'



Press 'U' eleven times until 'cAL' is displayed.



Press 'P' twice to enter Calibration Mode and display 'ALo'



You can now edit the calibration setting. This should be carried out at 40 L/min

Once settings are changed, press 'P' once, then 'U' once.



This will show 'cAL'. Now turn the unit off and re-power.
If re-adjustment is required, repeat the steps above.

TLK32

From the default display, shown below:



Press and hold key 'P', the screen will display:



Press key 'P', the screen will display:



Using the ▲ button, scroll the display to show '381'. The value will increase for each press of the button. Keep the button depressed to scroll rapidly through the available settings. If the value is overshoot use the ▼ button until the screen displays:



Press key 'P', the screen will display:



Press the ▼ button once. The screen displays:



Press key 'P', the screen will display:



Press the ▼ button three times. The screen displays:



Press key 'P', the screen will display a number:



Using the ▲▼ buttons adjust this value to set the temperature offset.

Do not press any keys for approximately 30 seconds

The screen will return to the default display, shown below:

MiniVap Over Temperature Thermal Cut-out

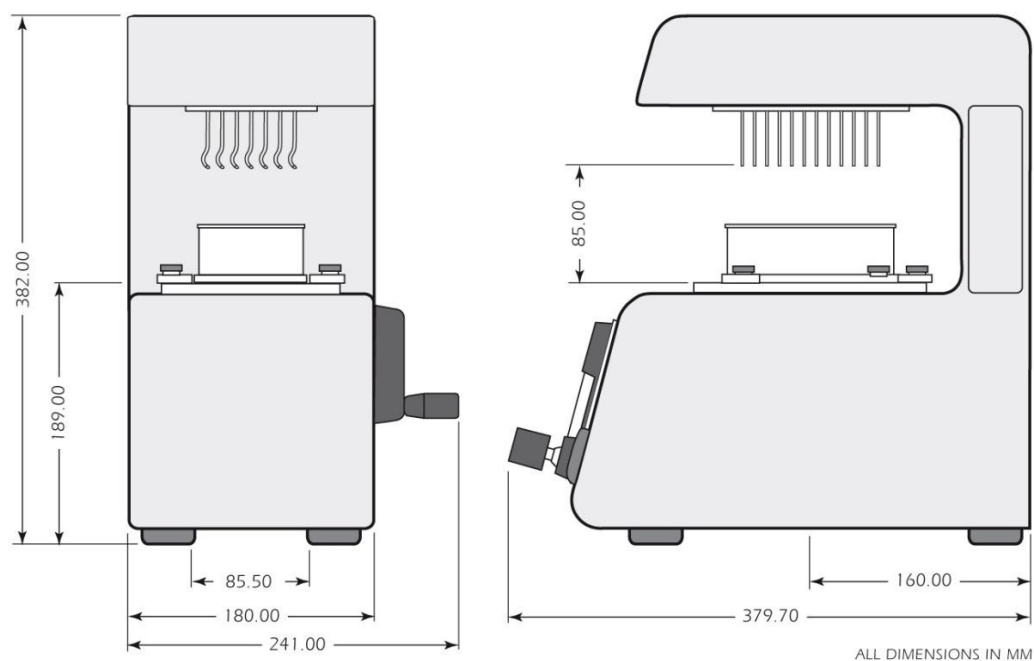
Please note that the MiniVap instruments supplied after November 2013 are fitted with a repositioned thermal cut out switch. If the heater goes above a pre-set safe temperature, the thermal cut out will activate and the heater will be switched off. Once the heater cools down again the cut out will automatically reset itself, and power will be restored to the heaters.

If this occurs frequently, please contact Porvair Sciences immediately as it could indicate a fault.

Specifications

Power Supply:	230/115V	50/60Hz
Power Consumption:	500 Watt Nominal	
Dimensions:	241 x 390 x 380mm (Width x Height x Depth)	
Weight:	11.5kg	
Inlet gas connection:	¼" BSP Female	
Inlet Gas Pressure:	Minimum	2.0 bar (45 psi)
	Maximum	5.3 bar (80 psi)
	Optimum	5.0 bar (75 psi) at 70 L/min
Maximum operating gas temperature:	60°C	
Environmental:		
Temperature range	Operating	10°C – 30°C
	Storage	0°C – 40°C
Relative Humidity	Operating	10 – 80% (non-condensing)
	Storage	10 – 80% (non-condensing)
Protection:	IP40	

Schematic



Declaration of Conformity



This declaration certifies that the instrument meets the requirements of the EEC directives and has been tested according to the specified test methods. Due to the product containing all OEM supplied electrical components; we have taken Supplier CE Conformity as read.

- As detailed under the European Machinery Directive 89/392/EEC, amended by 91/398/EEC and under the U.K. legislation, The Supply of Machinery (Safety) Regulations 1992 (SI 1992/3073).
- As detailed under The Electromagnetic Compatibility Directive 89/336/EEC, amended by 91/263/EEC and 92/31/EEC and the U.K. legislation, The Electromagnetic Compatibility Regulations 1992.
- As detailed under the European Low Voltage Directive 73/23/EEC, amended by 93/68/EEC and the U.K. legislation, The Electrical Equipment (Safety) Regulations 1994

The Declaration of Conformity is supplied for the following equipment:

Product Name: MiniVap
Product Type: Sample Dry-down Concentrator
Serial Number: 13nnn

Produced by: kbiosystems Ltd.
Units 5 to 10 Paycocke Close
Basildon
Essex SS14 3HS
U.K.

Transposed Harmonised Standards

- BS EN 12100-1 Safety of machinery. Basic concepts, general principles for design. Basic terminology, methodology.
- BS EN 12100-2 Safety of machinery. Basic concepts, general principles for design. Technical principles.
- BS EN 61010 Safety requirements for electrical equipment for measurement, control and laboratory use.
- BS EN 60204 Safety of Machinery; electrical equipment of machines (section 19)
- BS EN 50081-2 Electromagnetic Compatibility. Generic emission standard, industrial environment.
- BS EN 50082-2 Electromagnetic Compatibility. Generic immunity standard. Industrial environments.

Spare Parts and Accessories

Description	Part Number
Replacement needle head with 24 straight needles	229409
Replacement needle head with spiral needles for Ultravap 96	229072
Replacement needle head with straight needles for Ultravap 96	229036
Gasket for needle manifold	229048
Dedicated 48 Needle Head straight for use with evaporator HPLC vial adaptor	229410
24 Well 12mm I.D. Vial holder for MiniVap and Ultravap solid aluminium	229650
Vial adaptor for 48 x 1.5ml HPLC vials (Agilent.Chromacol etc.) black polypropylene	500109
Disposable plastic vial rack with clear bottom for 13.75mm glass vials x 24	229216

Troubleshooting

Problem	Probable cause
Nothing happens when the MiniVap is switched on	Check power to unit Check the condition of the fuse
The MiniVap turns on but the gas does not heat up	Check that inlet gas pressure is greater than 2 bar (30 psi) and gas flow is greater than 25 L/min
No gas emits from the needles	Check that gas inlet supply is correct / sufficient. Remove Needle Head and check integrity of the manifold gasket Remove needle head and check for blocked needles Check MiniVap for gas leaks
Individual wells do not dry down	Remove needle head and inspect for blocked needles – clean if necessary Remove needle head and check for incorrectly bent or damaged needles – replace if required

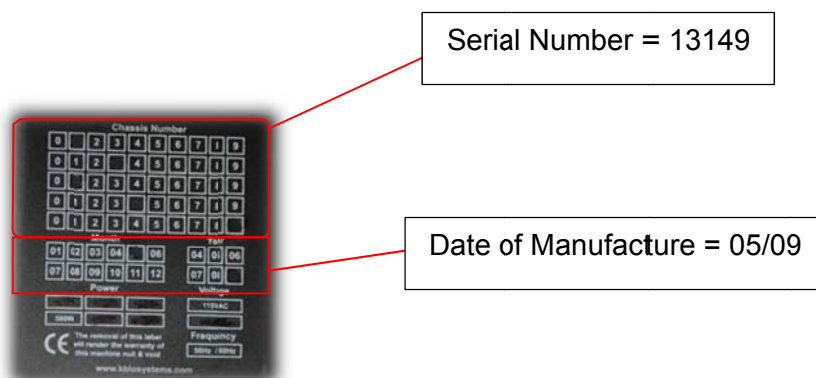
Special Note

For other failures it is recommended that you consult your local supplier directly

Do not dismantle the unit without prior authority of Porvair Sciences or the manufacturer since this will invalidate the warranty

Identifying your MiniVap

For all warranty and service requests the serial number and year of manufacture of the MiniVap are required. These are located on the manufacturer's plate on the underside of the instrument.



Maintenance

Your MiniVap is designed to give years of trouble free operation with virtually no maintenance. To ensure that your MiniVap continues to operate with optimum performance it is recommended that the following simple procedures should be followed, when required.

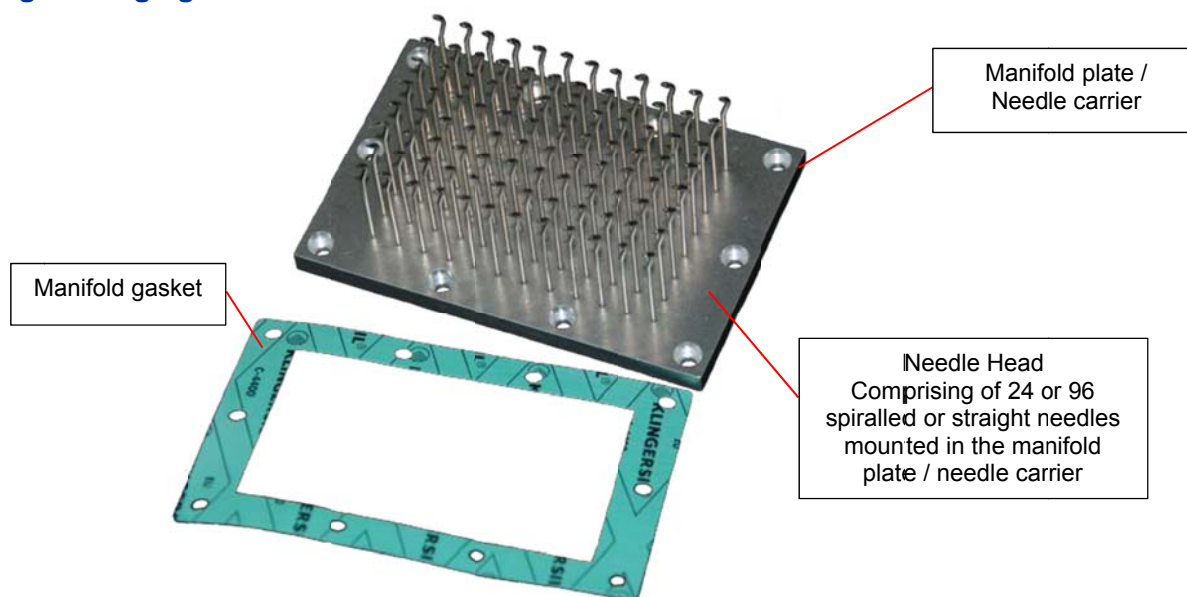
Cleaning the Instrument

- Wipe clean all splashes immediately with a clean tissue or lint-free cloth.
- Switch off and disconnect from mains power supply before cleaning the instrument.
- The instrument is to be cleaned only by wiping with Virkon or similar decontaminating solution at manufacturer's guideline concentration applied using a clean tissue or lint-free cloth.
- Do not allow the instrument to come into direct contact with solvents or other potentially corrosive solutions.
- Do not autoclave any parts of this instrument other than the Needle Head.

Cleaning / Examining Needles

It is occasionally necessary to clean or examine the needles. To facilitate either of these operations remove the Needle Head according to previously noted instructions – refer to

Fitting / Changing Needle Head



To clean contaminated needles carry out one of the following procedures:

1. Autoclave the Needle Head according to your company's standard protocol
2. Using a 2ml deep well microplate (Porvair P/N 219009), immerse the needles fully into the plate, partially filled with a suitable strong solvent. DO NOT use strong alkali solutions since they could damage the aluminium Manifold plate. Ensure that the cleaning solution only comes into contact with the needles.

After a suitable period of time (possibly overnight), remove the Needle Head from the solvent and examine. If it has been cleaned satisfactorily decontaminate it with suitable solvent or de-ionised water.

Reinstall the Needle Head and operate the MiniVap for several minutes until needles are completely dry

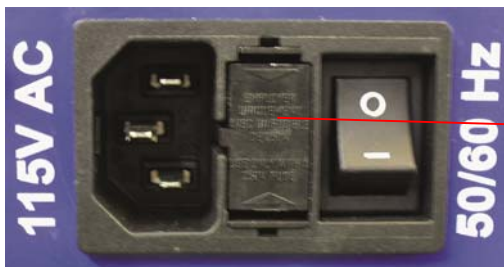
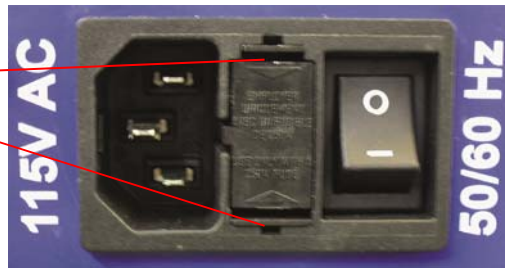
Please note that when reinstalling the Needle Head, great care must be taken to ensure that the gasket is present and positioned correctly.

Changing Mains Protection Fuse

To replace mains protection fuse, in the event of failure, carry out the following procedure:

- Switch off and disconnect from mains power supply.
- Pinch tabs together (can use small flat-bladed screwdriver) to open fuse cover on IEC mains power inlet.
- Replace defective fuse – ensure replacement fuse is of the correct rating – refer to [Specifications](#).
- Close fuse drawer and cover.
- Reconnect to mains power supply, switch on and test.

Pinch tabs toward each other to open cover on IEC power inlet



Remove drawer to reveal fuse

Warranty and Returns

In the event that your MiniVap malfunctions or requires repair it is recommended that you consult your local supplier directly. Alternatively, for warranty issues please contact Porvair Sciences directly at the address below.

Do not dismantle the unit without prior authority of Porvair Sciences or the manufacturer since this will invalidate the warranty. There are no user serviceable parts within the casing of the instrument.

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