

NEW
miVac Lyo
freeze drying option



miVac
DUO concentrator

Genetic

miVac
Concentrator range

Speeding your concentration, improving your drying

Contents

Introduction	2
What is a centrifugal vacuum concentrator?	3
miVac Duo and Quattro Concentrators	4
Vacuum Pumps	5
SpeedTrap	6
Pressure Controller	7
DNA system	8
miVac makes the difference	9
Freeze Drying in the miVac	9
Performance improvement using miVac methods	9
Choosing your system	10
Sample holders	12
miVac accessories	12
Ordering information	12

**Introducing
the miVac
range**

miVac from Genevac is a range of centrifugal concentrators capable of removing water and organic solvents from a variety of sample formats including tubes, microplates and vials. miVac can also be used to freeze dry aqueous samples. There are three concentrators, three pumps and a novel refrigerated trap in the miVac range. miVac concentrators feature built-in special methods for working with alcohols, water and water mixtures to improve performance and optimise concentration times. The miVac Pressure Controller helps to further optimise concentration and provides the user with full control of the concentration process. There are two sizes of system available; the larger Quattro concentrator and the smaller Duo. miVac systems are suitable for use with a wide range of solvents, from volatile organic types through to water and many medium boiling point solvents. There is a choice of medium or high vacuum pump and a dedicated DNA system with built-in pump. Rotors are chosen according to the type of sample format

in use and can include both deep and shallow well microplates, glass vials and tubes. Rotors are easily interchangeable. When using the high vacuum pump, samples may be freeze dried utilising the freeze drying accessory kit, either in the concentrator rotor or pre-frozen flasks.



For a video demonstration, please visit www.Genevac.com/movie/miVac

What is a centrifugal vacuum concentrator?

The principle behind centrifugal vacuum concentrators is very simple; as atmospheric pressure reduces, the boiling point of a solvent also reduces. When the pressure is low enough, the solvent will boil, enabling removal of solvents at very low temperatures, depending upon solvents used and the vacuum level applied. To prevent the evaporating sample boiling over or ejecting material in an uncontrolled way, samples are spun in a centrifuge. The g-force generated is sufficient to keep each sample in its own tube. When freeze drying water a very deep vacuum is used, boiling the sample below its freezing point.

Samples are placed in a rotor inside the vacuum chamber. The rotor is spun, the vacuum pump switched on, and if required, heat to speed concentration is provided by electrical heaters in the centrifuge wall. Solvent vapour boiling off the samples is then pumped away by the vacuum pump. Unless a refrigerated condenser or cold trap is used, the flow rate of the vacuum pump limits the speed of concentration. A well designed cold trap, such as the miVac SpeedTrap, is used to recover the waste solvent before the pump, which further speeds the process by maintaining a good vacuum in the system.



miVac Duo and Quattro Concentrators



miVac concentrators are extremely quiet when in use and typical results with water show that miVac systems are up to 40% faster than comparable machines, due to the very high displacement pumps. Performance can be further enhanced through the use of the miVac SpeedTrap refrigerated condenser – see page six for details. A large, clear acrylic lid allows you to monitor the drying process and is specially treated with a novel coating to resist the most aggressive chemicals and solvents.

These two precision-engineered systems allow you to safely concentrate your samples or take them through to complete dryness. The miVac Duo system has been designed to accept a two-swing position microplate holder or disc rotors for tubes and vials.



The miVac Quattro is a bigger system with a larger capacity bowl, enabling it to use a four-swing position rotor and much higher capacity disc rotors. In both swing rotors, each position for shallow well microplates can

accept multiple plates through the use of stackers, so that a miVac Duo can hold six shallow plates. In the larger miVac Quattro, up to twenty shallow-well microplates or eight deep-well plates can be used simultaneously, vastly increasing your throughput and slashing drying times.

With such a wide variety of available rotors, the miVac evaporators are suited to many different tasks. These include drying or concentration in microcentrifuge tubes, conical centrifuge or other plastic tubes, glass vials and shallow or deep well microplates. miVac concentrators can be used in a wide range of application areas such as ADME / toxicology, polymer chemistry, DNA, RNA & peptides, oligosynthesis, forensics / drugs of abuse testing, food science and agrochemical research.

The compact size of the miVac concentrators saves valuable bench space; even the busiest lab will have room for a miVac. Their simple, robust design will ensure years of reliable service, even when used intensively, such as in teaching or multi-user laboratories. Intuitive controls allow inexperienced users to get first-class results first time with most samples, while allowing more sophisticated programming for experienced workers.

The large display makes miVac very easy to use and can show the actual temperature and elapsed time. Setting is simple, with just one 'set and select' knob and a minimum of keys. All status and programme information is displayed alphanumerically on the large LCD display, giving every user confidence in their run conditions and results.

Specifications	Duo	Quattro
Dimensions mm (in.) WxDxH	360x424x300 (14.2x16.7x11.8)	480x594x300 (18.9x23.4x11.8)
Max g-force	250	250
Vacuum connection	0.5 in. or 12.7 mm	0.5 in. or 12.7 mm
Weight	21 kg (46.3 lbs)	35 kg (77.2 lbs)
Temperature range	Ambient, 30°C - 80°C	Ambient, 30°C - 80°C



Vacuum Pumps

There is a choice of three oil-free pumps to complement the miVac concentrators according to your application. For most people, the high-displacement miVac Duo Pump will be quite sufficient

to give excellent results with either the miVac Duo or Quattro concentrator. This quiet and compact two-head diaphragm pump will remove 38 l/min (2.3 m³ h) of solvent vapour and is housed in a smart case to match the other miVac components. It is suitable for removing solvents that boil below 130°C, including water, methanol, ethanol and their mixtures.



For more demanding applications, we recommend the miVac Quattro Pump, as this four-head diaphragm pump can reach pressures of 2mbar or below, which are needed for successful drying of medium boiling point solvents. Both pumps are controlled automatically by the miVac evaporation chamber.

Exceptionally demanding uses will require a special scroll-type vacuum pump, as used on larger Genevac systems. This pump is capable of routinely removing solvents at pressures down to 0.15 mbar and must be used if you wish to freeze dry samples. You should consult your local sales person about the exact pump configuration your application requires.

When using solvent mixtures and/or a wide range of solvents, a high vacuum pump and the miVac Pressure Controller are recommended.

Specifications	Duo Pump	Quattro Pump	Scroll Pump
Vacuum level (Maximum)	10 mbar	<2 mbar	0.15 mbar
Flow rate	38 l/min (2.3 m ³ h)	33 l/min (2 m ³ h)	83 l/min (5 m ³ h)
Vacuum connection	0.5 in. or 12.7 mm	0.5 in. or 12.7 mm	0.5 in. or 12.7 mm
Outlet connection	3/8 in. or 9.5 mm	3/8 in. or 9.5 mm	3/8 in. or 9.5 mm
Dimensions mm (in.) WxDxH	215x394x300 (8.5x15.5x11.8)	215x394x300 (8.5x15.5x11.8)	249x427x288 (9.8x16.8x11.3)
Weight	13 kg (28.6 lbs)	18 kg (39.6 lbs)	23 kg (50.7 lbs)

Genevac scroll-type pumps are capable of routinely removing solvents at pressures down to 0.15 mbar.



SpeedTrap

The miVac SpeedTrap is a uniquely designed high power cold trap used to condense solvent vapours. Cold traps can significantly improve the performance of any vacuum concentration system. When a cold trap condenses vapours back to liquid, there is a corresponding massive volume reduction helping to pull a vacuum and speeding up the concentration process considerably.



The miVac SpeedTrap is radically different. It is very small in size and requires little bench space, being only 212 mm (8.3 in.) wide. The SpeedTrap operates with the cold condenser coils suspended in the vapour path, solvent vapours condense directly on to the coils and run off into the collection vessel below. There are many benefits of this method; it is highly efficient, with more than twice the condensing power of a similar system, the user can quickly see the solvents in the trap, and emptying the trap is easy. The automatic defrost mode ensures that the user does not need to spend time defrosting the system, even when using water. The collection vessel is removed with a simple quarter turn, allowing safe disposal of the solvents.

The miVac SpeedTrap has three applications:

1. Automatic defrost – for collection of solvents liable to freeze

In automatic mode the system periodically defrosts for a few minutes without interrupting the concentration process, ensuring that the coils are free from a build up of ice. At the end of the process, the system requires no further defrosting.



The SpeedTrap jar is extremely easy to remove and empty, requiring just a quarter-turn.

2. Continuous chilling – for collection of solvents that do not freeze above -50°C

Select this mode for most organic solvents, ensuring the highest recovery of solvents. There is no need to defrost at the end of the process, switch off the system, or start another batch.



3. Freeze Drying

Continuous chilling may also be used with water to enable up to 250ml of water to be freeze dried from the miVac concentrator, or from vials or flasks. During freeze drying, ice will accumulate on the coils, therefore they must be defrosted afterwards. Switch the system into defrost mode to clear this build up.

When selecting a cold trap, it is important to note that condensing power is more important than low trap temperatures. Most traditional traps are very large and based on a stainless steel vessel with cooling coils attached to the outside. The vessel walls are chilled to sub zero temperatures by a gas compressor system, similar to that used in a refrigerator. These older traps are inefficient, difficult to use, and if water is condensed it freezes – so must then be defrosted before the trap can be emptied. Some systems require the use of an interchangeable glass flask and thermal transfer fluid; however a flask covered in slippery, cold silicone fluid at -40°C may become a dangerous liability when it needs to be emptied. Recent studies performed on these older designs of cold trap have shown that the actual temperature of the glass flask during concentration can be near to 0°C.

Specifications	
Temperature	Minimum temperature -50°C; nominal operating temperature -35°C
Cooling power	134 Watts
Refrigerant medium	R404A
Glass vessel capacity	1 litre
Ice capacity when freeze drying	250ml
Vacuum connections	0.5 in. or 12.7 mm
Dimensions mm (in.) WxDxH	212x563x450 (8.3x22.2x17.7)
Weight	25 kg (55.1 lbs)



Pressure Controller



miVac modular concentrators are excellent laboratory work horses! To enhance their performance further, a pressure display and controller is recommended. A pressure controller is ideal for systems which are to be used for many different applications, e.g. concentration of organic solvents and freeze drying.

The miVac pressure controller can be added to any modular miVac system and allows the user full control over the running pressure in the system. A vacuum ramping mode is included so that concentration can be commenced gently and is used to help prevent bumping or spitting. For users who are uncertain of the appropriate pressures to choose, an automatic mode can be used which controls the vacuum profile.

Correct use of pressure control with the miVac SpeedTrap will make concentration faster and will enable more solvents to be caught in the SpeedTrap, reducing volatile solvent emissions. Pressure control enables the user to set the optimum boiling (and therefore condensation) temperature for the solvent which is being concentrated so that the cold trap can condense it easily. It is not always true to say that a cold trap with a very low temperature, say -104°C is better than a cold trap of -50°C – please ask for a copy of our paper comparing cold trap performance, or contact your local agent for a full explanation.

Specifications	
Voltage	90V - 250V
Frequency	50Hz - 60Hz
Display range	0 to 1100 mbar
Control	1 mbar increments
Connections	3/8 in. or 9.5 mm
Dimensions mm (in.) WxDxH	195x178x105 (7.7x7.0x4.1)

The pressure controller includes a large, clear display of current pressure.

4 modes of operation:

- 1 Full vacuum
- 2 Control at one set pressure
- 3 Programmable vacuum ramp followed by control at one set pressure
- 4 Automatic – sensing the optimum pressure



DNA system

The miVac DNA integrated system is a centrifugal concentrator capable of removing water and organic solvents from a variety of sample formats including tubes, microplates, and vials. It is designed specifically for working with nucleic acids (RNA and DNA) and is supplied complete with everything the scientist requires; built in high performance



vacuum pump, concentration chamber with electro-magnetic drive for quiet, maintenance free operation, and a fixed angle aluminium rotor for 1.5 ml or 2 ml micro-centrifuge tubes. Simply position the system on the bench, connect the power lead and exhaust tube and look forward to faster, trouble free concentration!

in its class, due to the high displacement vacuum pump. The clear acrylic lid allows you to monitor progress and is specially treated with a novel coating to resist the most aggressive chemicals and solvents. The miVac DNA system is everything you would expect of a DNA concentrator, and more!

The miVac DNA is suitable for simple organic solvents, e.g. methanol, ethanol, up to 100°C boiling point, and water in low sample numbers and volumes. There is a range of possible rotors including an option for microtitre plates. For a wider range of solvents and/or a larger range of sample formats, select miVac Duo or Quattro concentrator with miVac SpeedTrap, Pressure Controller and pump.

The miVac DNA system is very simple to use. Concentration time and temperature are readily monitored on the large clear display. Parameters can be easily set and selected using the friendly dial. To improve performance there are built-in special modes for working with water and alcohols, which optimise concentration time. Concentration using the miVac DNA is faster than any other system



Specifications	
Dimensions mm (in.) WxDxH	360x597x300 (14.2x23.5x11.8)
Max g-force	250
Pump details	See Duo Pump on page 5
Weight	34 kg (75 lbs)
Temperature range	Ambient, 30°C - 80°C



miVac makes the difference

miVac systems have many features to make concentration faster and safer. Taken together, these make miVac a very powerful concentration system.

- Concentration methods – speed up concentration of water and alcohols
- JetRotors – further speed concentration
- miVac SpeedTrap – reduces solvent emissions and speeds concentration
- miVac Pressure Controller – enhances the performance of the SpeedTrap and allows optimisation of concentration parameters for a wide range of solvents
- Freeze drying option for aqueous samples

Concentration methods are available on every concentrator and provide three options for control; full vacuum, a method for water and a method for alcohols. In a concentrator, the heat source is the chamber, as the heat is needed at the rotor, where the solvents are. Between these two there is a vacuum, across which heat does not travel well. To improve the concentration speed, the methods allow some air to enter the chamber at set intervals, the air acting as a heat transfer medium. Use of these methods makes a significant difference in concentration speed, as the chart opposite shows.

JetRotors help to conduct the heat to the samples. Using a solid aluminium holder is the most efficient method for optimal heat transfer. The **miVac SpeedTrap** condenses the solvent vapours, returning them to the liquid state. The volume reduction of condensation helps to pull a vacuum, and prevents solvents being taken through the pump. If no cold trap is present, the pump must pump away all the solvent vapours, which is a time consuming process.

Freeze Drying with a SpeedTrap

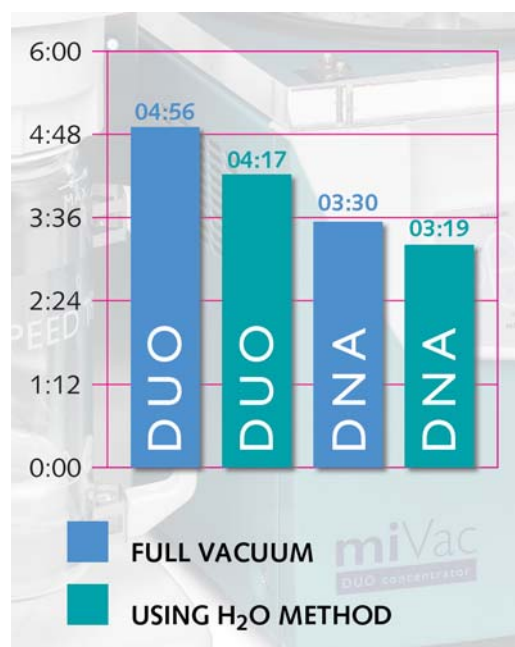


The new miVac SpeedTrap has a continuous chill mode, which can be used to freeze dry up to 250ml of water or other suitable solvent, such as, 1,4-dioxane. Samples to be dried may be placed in a suitable rotor in the miVac concentrator, and dried at full vacuum using the miVac scroll pump. The low vacuum level boils the samples at below their freezing point, therefore, they freeze and the ice then sublimates away, leaving a dry powder.

Alternatively, the miVac SpeedTrap may be used as a stand alone freeze drier when connected to the scroll pump. A range of accessories has been designed to allow the SpeedTrap to directly accept pre-frozen samples in either flasks or vials.

The **miVac Pressure Controller** helps the user to optimise concentration conditions for every solvent or solvent mixture that they are processing. Choosing the correct pressure setting for each solvent will further enhance recovery in the cold trap and help to keep concentration times as short as possible.

Performance improvement using miVac H₂O method



Simply attach the freeze drying accessory jar in place of the regular SpeedTrap collection vessel, and attach the freeze drying valves. Flasks can be attached to the valves, or vials may be placed directly in the accessory jar, using the holders provided.

The freeze drying accessory kit comprises: freeze drying jar, 3 freeze drying valves, 3 vial holders and handle, and a vacuum isolation valve. The vacuum valve can be used to seal off the SpeedTrap from the concentrator should you wish to configure your system as a freeze drier and a concentrator. In such situations we recommend using the miVac pressure controller to allow selection of optimal vacuum levels for each process.

Please note
The miVac Duo pump and Quattro pump are not suitable for freeze drying.

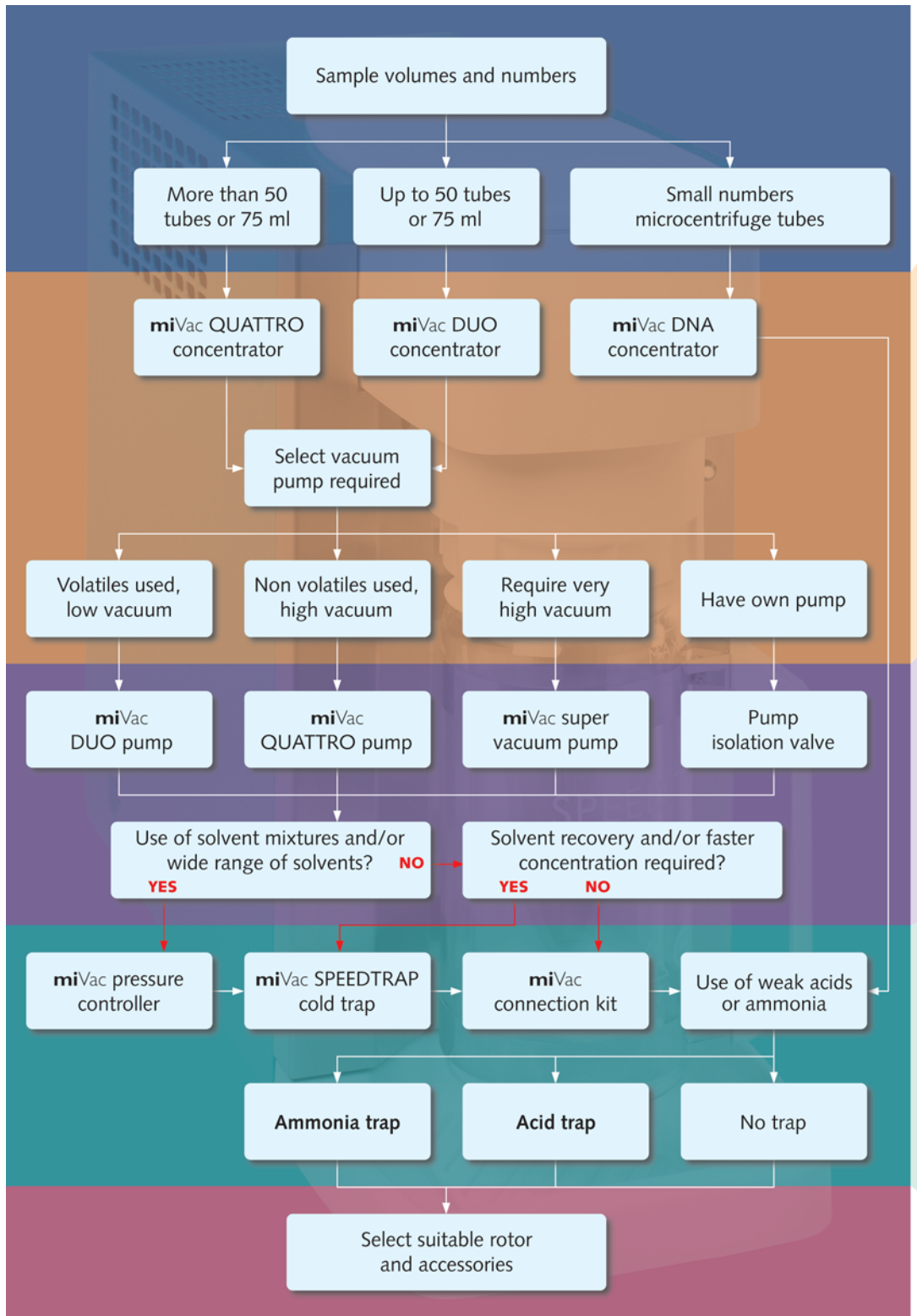
Choosing your system

Choose your concentrator

Choose your pump

Choose your condenser and traps

Choose your rotor



For small numbers of small samples containing simple alcohols and/or water the miVac DNA is recommended. For larger numbers of samples and larger tube sizes the miVac modular concentrators are recommended. Please consult our JetRotors brochure, available via www.miVac.co.uk for up to date information on the available rotors.



miVac Quattro concentrator



miVac Duo concentrator



miVac DNA concentrator

If you have a range of solvents, you should choose the highest specification pump based on the highest boiling point solvent.

miVac Duo pump



miVac Quattro pump

Genevac scroll pump



miVac pressure controller

If you have a solvent mixture or a wide range of solvents the miVac Pressure Controller will enable you to select the optimum parameters for each solvent and for mixtures.



miVac SpeedTrap

This will provide solvent recovery, speeding up concentration and helping protect you and the environment. The new miVac SpeedTrap has a continuous chill mode, which can be used to freeze dry up to 250ml of water, or other suitable solvent. It can also function as a stand alone freeze drier when connected to a scroll pump, using the miVac Lyo range of accessories.

Ammonia & acid trap

The trap can take either an acid or ammonia neutralising solution to help prevent emissions of noxious vapours.



miVac connection kit

The connection kit is required when choosing a modular concentrator

Sample Holders

miVac are the only concentrators of their class to be supplied with rotors made from solid aluminium. The 'JetRotors' range provides very high performance concentration compared to rotors made from plastic, or of an open construction. Speed increases compared with polypropylene types range between 40% and 200%, depending on sample format, providing a significant advantage when working with stubborn solvents, such as water. The precision solid aluminium rotors efficiently conduct the heat energy needed for concentration to the samples, whereas in an open or plastic rotor the samples are effectively insulated by the plastic and/or the vacuum in the chamber.



JETROTORS™
INCREASE YOUR POWERS OF CONCENTRATION

miVac accessories



miVac connection kit.

A range of optional accessories is available for the miVac series.

All Duo or Quattro concentrators will need the miVac connection kit. This contains all that is needed to turn the separate units of the miVac series into a fully integrated system. It includes vacuum tubing, a tube cutter, catch pot, and pump control lead.



MCK-00000-Y00
VAP-TRAP0-100

miVac connection kit
Trap for neutralising acid or ammonia vapours, requires neutralising solutions

NH3-REF00-100

Ammonia neutralising solution 4 x 500 ml

ACD-REF00-100

Acid neutralising solution 4 x 500 ml

FDA-IMP00-000

Freeze drying accessory kit

FDA-FL150-000

150ml freeze drying flask

FDA-FL300-000

300ml freeze drying flask

FDA-FL600-000

600ml freeze drying flask

Ordering information

Using the chart on page eleven, simply select the concentration system components you require, not forgetting connection kit, accessories, and rotors. The miVac DNA system is supplied with a rotor which accepts 48 1.5ml or 2ml microcentrifuge tubes. Please note miVac system part numbers vary by voltage and country and are therefore not shown here.

Rotors are available for all common tubes, vials, microtitre plates, centrifuge tubes and microcentrifuge tubes. A full list of available rotors and capacities can be found on the miVac website. A custom rotor service is available to ensure that you gain best use of your system. If you are unsure of the rotor or system you require, or need further information, please contact your local agent for assistance, or visit www.miVac.co.uk for details.



When working with chemicals that may be harmful, such as acids or ammonia, a range of vapour neutralising traps is recommended. A vapour wash bottle with either acid or ammonia neutralising solution is available for use with these chemicals. Solutions change colour when exhausted, indicating when they need to be changed. For neutralising radioactive vapours an activated carbon trap is available. Traps are fitted after the pump and before the vapour is discharged to atmosphere or fume extraction system. For details of freeze drying accessories see page 9.

A full list is available from your local distributor. Information on the connection kit and accessories is found on page nine. Genevac also manufactures an extensive range of high performance evaporators suitable for chemistry and high throughput applications, for details visit www.Genevac.com.

Genevac
SP SCIENTIFIC
Making Time for Science

Genevac Ltd Farthing Road Ipswich UK IP1 5AP
Tel +44 (0)1473 240000 Fax +44 (0)1473 742987

Genevac Inc. 3538 Main Street Stone Ridge NY 12484 USA
Tel | (845) 267 2211 Fax | (845) 267 2212

www.miVac.co.uk

Genevac is a brand of SP Industries Inc. Genevac technology is protected by patents and patent applications in the UK, USA and worldwide. Genevac has a continuous development program aimed at further improving its products and all specifications are, therefore, subject to change. Genevac is a registered trade mark of Genevac Ltd. E&OE. All trade marks acknowledged. miVac Modular Concentrators rev F 10-1613. © 2015 Genevac Ltd, Genevac Inc. & SP Industries Inc.



Printed in the UK on 100% recycled paper using vegetable-based inks.