The Genevac EZ-2 Series
Personal Evaporator

User Manual

Issue 1-6 –October 2008

Part Number 04-5359

General Information

This manual has been produced to assist in the daily running and routine maintenance of the Genevac Evaporator.

Amendment Control Form

Only the affected pages and the Front Page will display the Revision Number all others will stay at initial issue.

Revision Number.	Issue and Reason for Change	Date Issued
2	Introduction of Inert Gas Purge (IGP). Additional advice regarding the use of Hydrogen peroxide.	25 August 2006
3	Minor updates	13 February 2007
4	WARNING regarding lamp replacement on EZ-2 with Inert Gas Purge	26 April 2007
5	Information regarding ice formation and thawing in Condenser Jar	16 January 2008
1-6	Update U.S. address	24 October 2008

These instructions are subject to change without notice.

These operating instructions should be read before you use the Genevac EZ-2 Series Personal Evaporator.

Keep them near the system for easy reference.

Your attention is drawn in particular to Page (vi), Paragraph 2.2, Safety.

CONTENTS

SECTION 3 MAINTENANCE

1 Introduction

Using the most advanced proven technology in evaporation science, the EZ-2 Series has been designed specifically for solvent removal in life science research, be that concentration of samples or complete drying. Genevac's fifteen years of experience in vacuum engineering has resulted in the creation of a compact sample concentrator combining great performance, ease of use greater than a rotary evaporator and compatibility with all commonly used solvents and acids.

The innovative design of the EZ-2 presents real advantages within parallel synthesis and medicinal chemistry, as well as for general-purpose solvent removal needs in life science laboratories. At the heart of the evaporator are a robust, solvent resistant, oil free pump from ILMVAC, and the high efficiency, defrost free, SpeedTrap, designed by Genevac engineers, which traps all solvents as liquids, even water.

There are three EZ-2 models, Standard, Plus and Bio:

- The **Standard** (EZ-2) is suitable for water and volatile solvents.
- The **Plus** (EZ-2^{plus}) is recommended for more difficult solvents with higher boiling points, as it is equipped with chamber heating and a more powerful pump.

Either model can be specified with resistance to chlorinated acids.

- The **Bio** (EZ-Bio) is suitable for low to medium boiling point solvents in the range up to 120°C. There are pre-programmed methods for DNA purification and extraction, oligosynthesis, protein purification and removing aqueous mixtures. There is even a special method for HPLC fractions such as Acetonitrile/water mixtures.

Fig 1

The use of the high-efficiency solvent resistant Teflon diaphragm pump, which is integral to the evaporator, saves you space and provides quiet, efficient control of the vacuum. Combined with a new glass jar condenser that's easy to empty, the "Next Generation" EZ-2 Series is our most compact and reliable sample evaporator yet.

Fig 2 - EZ-2^{plus} Control Panel

Compared with a typical rotary evaporator, the EZ-2 Series can process many more samples per unit time. Simply select the solvent type and the maximum allowable sample temperature. Smart evaporation software in the EZ-2 Series does the rest for you; setting the vacuum conditions and gradient, whilst controlling the heater lamp and automatically stopping the run once the samples are dry. True walk-away automation so simple, any one can use it with confidence.

Genevac's patented sample protection systems prevent bumping and overheating of delicate samples, whilst ensuring a smooth fast evaporation of the solvent, even with difficult mixtures. A wide selection of popular sample holders accommodate most common sample formats including round-bottom flasks up to 500ml, tubes up to 160mm long, custom reaction blocks and, of course, shallow- or deep-well microplates. For real peace of mind with thermally labile samples, the EZ-2 Series automated dryness detection and auto shutdown software is always guarding your samples.

Sample evaporation has never been easier or quicker!

2 Safety and Maintenance Notes

2.1 Symbols

The following safety symbols are used throughout this manual and can be found on the equipment. The definitions and scope of each symbol is as described below.

WARNING

THIS SYMBOL INDICATES HAZARDS THAT CAN LEAD TO SERIOUS MATERIAL DAMAGE OR POTENTIAL SERIOUS INJURY.

THIS SYMBOL MEANS THAT YOU SHOULD NOT TOUCH SURFACES IN THESE AREAS. THESE SURFACES CAN BE VERY HOT AND MAY LEAD TO BURNS.

This symbol indicates that you should refer to the relevant part of the User Manual for additional information.

THESE 2 SYMBOLS COMBINED INDICATES HAZARDS THAT CAN LEAD TO SERIOUS MATERIAL DAMAGE OR POTENTIAL SERIOUS INJURY AND THAT YOU SHOULD READ THE RELEVANT PART OF THE USER MANUAL.

This symbol provides information about hazards that can be harmful to your health or lead to material damage.

This symbol provides information about technical requirements, which if not followed, can lead to malfunctions, inefficiency and reduced productivity.

This symbol indicates that there may be a risk to sample integrity.

2.2 Safety

Please be assured that sudden boiling of solvent within the condenser jar is normal and it will re-condense. You may also see ice forming in the jar, this is normal under certain conditions.

The condenser jar is only to be emptied at the end of a run when the evaporator has stopped but not when DEF is displayed.

If ice forms in the Condenser jar, allow it to thaw naturally. Do not use implements to try and break the ice as this may damage the jar. Cold water may be added to the jar to accelerate the thawing process.

BEFORE OPERATING THE SYSTEM, IT IS IMPORTANT THAT THE FOLLOWING NOTES ARE READ TO ENSURE THAT THE IMPLICATIONS TO THE SAFETY OF PERSONNEL OPERATING THE SYSTEM AND FOR THE PROTECTION OF SAMPLE INTEGRITY ARE UNDERSTOOD.

CARE IS TO BE TAKEN WHEN REMOVING THE COLLECTION JAR, AS IT IS HEAVY, ESPECIALLY WHEN FULL OF SOLVENT.

INSPECT THE COLLECTION JAR BEFORE EVERY USE FOR DAMAGE, CRACKS ETC.

DO NOT ALLOW TO FILL ABOVE "MAX" LINE AS IT MAY CAUSE DAMAGE TO THE PUMP AND STOP CONCENTRATION.

EMPTY THE COLLECTION JAR AFTER EVERY RUN.

REFER TO LIST OF ACCEPTABLE SOLVENTS BEFORE USE

Samples in the chamber are subjected to accelerations of up to 500G with a maximum load capacity of 1.5 kg per swing.

Do not place any objects on top of the evaporator during a run

The following precautions should always be observed:

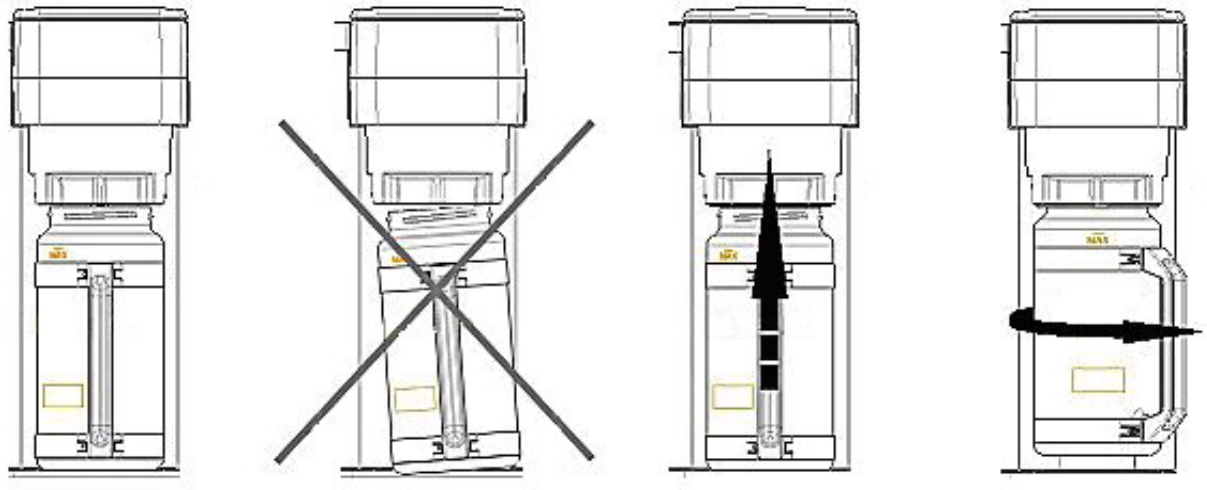
Ensure the catchpot or an alternative exhaust condenser is fitted prior to operation of the system.

Solvents condense in the condenser jar and catchpot (and any exhaust condenser when used). These solvents should be disposed of appropriately.

Solvent vapour is present in the exhaust line, this line should be run to a safe extraction source. This is particularly important if HCl or other acids are being used

Solvents can condense in the exhaust line and suitable precautions should be taken when working on the EZ-2. This is particularly important if HCl or other acids have been used.

2.3 Collection jar – fitting and removing



To fit the jar, position so that the handle is to the front, lift the jar and rotate to the right a quarter turn until resistance is felt.

The collection jar is removed by rotating the jar to the left a quarter turn.

- Always ensure that the condenser jar is emptied before every run.
- Clean the condenser jar at regular intervals.

2.4 Cleaning

Clean the lid, lid seal, exterior paintwork and inside of the chamber with a soft, lint free cloth using one of the following:

Detergent solution - e.g. fairy liquid
Bleach solution (if using biological agents) – On inside of chamber and underside of lid ONLY.
Methanol
Ethanol

2.5 Genevac Evaporators and Combustible Solvents

Please note it remains the responsibility of the user to consider safety when evaporating any combustible solvents and ensure the system is placed in a well ventilated environment. Genevac's position regarding evaporation of such solvents, particularly with respect to the European ATEX directive, is available on our website or from your local sales representative.

2.6 Safe loading of rotor

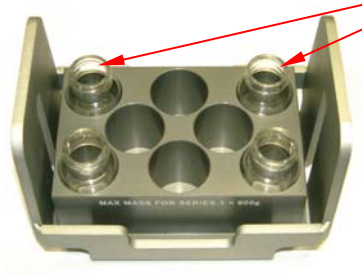
Never exceed the maximum load capacity of 1.5 kg per swing.

Balance sample holders to within 10g (approximately).

Locate tubes correctly in tube holders.

Load tube holders in balanced configurations.

Distribute tubes in sample holders symmetrically in both directions.



Genevac Ltd will accept no responsibility for any loss or damage incurred by improperly or excessively loaded rotors.

Locate sample blocks correctly in sample swings.

Before starting or restarting a run, check the following:

Ensure that both sample holders swing freely by swinging them by hand after loading.
The white PTFE washers located on each rotor pin are in place and in good condition.
All tube plates are correctly located.

Use only tubes that are able to withstand significant loads. Medium or thick wall Borosilicate glass tubes with a wall thickness of no less than 1.2mm are recommended.

Do not use worn or scratched tubes or vials.

Do not load tubes or vials into sample holders other than those types that have been approved by Genevac Ltd.

Do not use sample holders that have not been supplied with this system without consulting Genevac Service.

2.7 Lid operation

The lid has an electrical lock and is opened and closed manually after pressing the LID unlock button.

There is a safety device fitted that prevents the lid from being unlocked and opened whilst the rotor is rotating or until the chamber pressure has equalised.

2.8 Limitations of use

Accuracy of IR Sensor is dependant upon condition of Sample Holders and Swings. To ensure correct operation, Sample Holders and Swings are to be kept clean and free from contamination and corrosion.

Your evaporating system is **unsuitable** for use under the following circumstances:

- With strong mineral acids such as HCl and HBr at all concentrations, unless specifically built to order.

EVAPORATING DIETHYL ETHER AND SIMILAR LOW AUTO-IGNITION SOLVENTS WITHOUT A GENEVAC INERT GAS PURGE SYSTEM FITTED TO THE EVAPORATOR AND PUMP.

- For use as a pressure vessel.

SECTION 1

GENERAL

Chapter 1

UNPACKING AND SETTING UP

Flight Case.

1. Undo 4 quick release fasteners.

2. Carefully remove lid.

Refer to photographs on Pages 2 to 4 inclusive of this Chapter for aditional guidance.

3. Position base and EZ-2 near to operating bench / location.

4. With assistance (3 people total) lift EZ-2 from base and position where required on bench.

5. Ensure that there is 50mm clearance from edge of bench and other equipment.

6. Refit lid and store flight case.

7. Check contents of accessories container.

8. Fit inlet filter.

9. Fit condenser jar.

10. Fit Catchpot.

DURING ITEM 11. THE EXHAUST HOSE MUST BE FITTED; THIS HOSE MUST THEN BE DUCTED TO A SUITABLE EXTRACTION UNIT/AREA OR A FUME HOOD.

11. Connect the long exhaust hose (supplied) and duct into fume hood. This is particularly important if HCl or other acids are being used.

To maintain a solvent vapour free environment around your EZ-2, we suggest that you do not use free space within the hood for storage of vessels containing solvents or acids. Users should also ensure that tubing leading to and from the solvent condenser, leads solvents and solvent vapours away from the machine in a safe manner. In particular, the exhaust tube must be fitted to the outlet from the condenser and lead away to the laboratory fume extraction system. This will ensure that any residual vapour which passes through the condenser and pump does not cause damage to your system.

12. Connect mains supply lead (supplied).

Consumer Packaging

1. Before signing for package or before opening case, check for damage.
   (If there is, contact Genevac service):

   UK Service: +44 (0) 1473 243000
   USA Service: (1) 845-267-2211

2. Remove clips that retain the lid, and remove lid.

3. Check contents against packing list.

4. Remove the screws from the timber sleeve and carefully lift clear.

5. Position base and EZ-2 near to operating bench / location.

6. With assistance (3 people total) lift EZ-2 from base using hand-holds and position where required on to bench.

LEFT HAND SIDE HAND-HOLDS

RIGHT HAND SIDE HAND-HOLDS

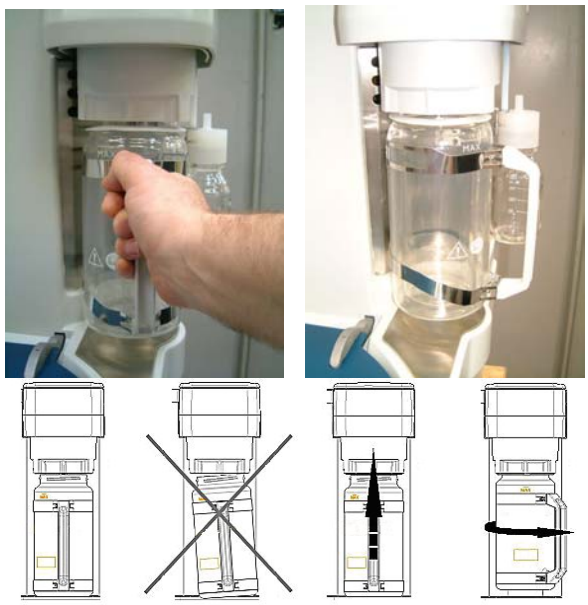
7. Ensure that there is 50mm clearance from edge of bench and other equipment. (The system can be easily moved by placing paper or similar under feet. If this is employed, ensure all traces are removed on completion.)

8. Remove accessories containers and check contents against packing note.

9. If not already fitted, fit inlet filter.

10. Fit CatchPot (Not on EZ-Bio – refer to separate sheet supplied with evaporator).

11. Fit Condenser Jar.



DURING ITEM 12. THE EXHAUST HOSE MUST BE FITTED; THIS HOSE MUST THEN BE DUCTED TO A SUITABLE EXTRACTION UNIT/AREA OR A FUME HOOD.

12. Connect the long exhaust hose (supplied) and duct into fume hood. This is particularly important if HCl or other acids are being used.

To maintain a solvent vapour free environment around your EZ-2, we suggest that you do not use free space within the hood for storage of vessels containing solvents or acids. Users should also ensure that tubing leading to and from the solvent condenser, leads solvents and solvent vapours away from the machine in a safe manner. In particular, the exhaust tube must be fitted to the outlet from the condenser and lead away to the laboratory fume extraction system. This will ensure that any residual vapour which passes through the condenser and pump does not cause damage to your system.

13. Connect mains supply lead (supplied).

Chapter 2

QUICK START

1 Empty Condenser Jar.

2 Switch ON.

3 Press ▶ and wait for 90 second safety countdown.

4 Press ⏏ when LED is lit.

5 Open lid.

6 Load your samples into the holders. Ensure that samples are balanced and suitable for use in the EZ-2. (Please refer to User Manual, Page viii Safety).

7 Close lid.

8 Set Max temperature as you would on a rotary evaporator.

9 Select solvent type (see Quick Reference).

10 Press ▶, your run will start.

Whilst the system is running the screen will indicate the progress of the run.

Please see Section 1 Chapter 3 for more details.

A5 Quick reference card

Please see the A5 reference card located in the slot on the EZ-2 for the quick start guide.

Contents are as follows:

To start a run

1. Empty condenser jar
2. Turn on. (It is recommended that the evaporator is left on.)
3. Press .
4. Open lid.
5. Load the system with your samples, balanced to within ≈10g.
6. Close Lid.
7. Select Solvent Group using rotary selector.
8. Set the desired Maximum Sample Temperature using rotary selector.
9. Press .

To disable the Auto Stop facility, press and hold button for 5 seconds, maximum run duration is now set. Actual duration is governed by the run and sample temperature selected. Run duration may now be adjusted by pressing the button to increase the duration and by pressing the button to decrease the duration.

Evaporation of HCl, Thionyl Chloride or other acid chlorides

The solvent compatibility of your EZ-2 evaporator is indicated on the lid. If 'NOT HCl COMPATIBLE' is indicated then do not attempt to evaporate this class of solvent in your system. If 'HCl COMPATIBLE' is indicated, your system is compatible with HCl. Set the Solvent Group Selector to Aqueous and press .

Evaporation of Di-ethyl ether

Genevac supply an optional inert gas purge system, this is mandatory if Di-ethyl ether is to be evaporated safely.

SOLVENT GROUP GUIDE EZ-2 & EZ-2^{PLUS} (QUICK GUIDE)

Solvent group	Description	Boiling point range (at atmosphere)	Examples of solvents
Low BP	Volatile solvents where bumping is not expected	40 – 90º C	DCM through to Pyridine
Low BP Mixture	Mixtures of volatile solvents, bumping can be expected.	40 – 90º C	DCM / Methanol mixture
Aqueous	Water based where freezing at 0º C is anticipated but bumping is not expected	N/A	Water
Medium BP*	Less volatile solvents, generally bumping is not expected.	90 – 155º C	Ethyl Acetate through to DMF
Med + Low BP mixture*	Mixtures with a volatile solvent that is prone to bumping with a less volatile solvent that requires low pressure to evaporate	40 – 155º C	DMF / Methanol mixture
HPLC Fraction	Water / Acetonitrile or Water Methanol fractions	60 to 100º C	Water / Methanol or Water / Acetonitrile
⊙	500G Centrifuge at atmosphere with temperature control		

* Available on EZ-2^{plus} only.

For EZ-Bio see Section 1 Chapter 3 - Page 2, "Detailed Operation" for Solvent Group Guide and Run Selection.

ERROR WARNINGS

If an error occurs during a run then one of 2 things will happen:

1 The run will be terminated.

This means that the EZ-2 has detected a failure in something that may have an effect on:

Sample Integrity
The physical condition of the evaporator

An error code will be displayed when the rotor has stopped spinning and the pressure is at atmosphere.

2 The run will continue in a reduced features mode.

This means that the EZ-2 has detected a failure in something that does not have any effect on:

Sample Integrity
The physical condition of the evaporator

An error code will be displayed when the rotor has stopped spinning and the pressure is at atmosphere.

INDICATION	CAUSE OF ERROR	RECTIFICATION
PSH Strt	NO ERROR	Push button
OPn Lid	NO ERROR	Open Lid
Err 05**	Lid closed but not locked	Open and re-close lid. Check lid lock release screw.
Err 06**	Tried to open lid before it is unlocked	Reset and try again, this time wait for beep before lifting lid.
Err Lid**	Lid open during run	Open and re-close lid.
Err Loc**	Lid not locked during run	Open and re-close lid.
Err bAL**	Out Of Balance Trip	Check samples balanced to within ≈10g
run SEL	Rotary Run Selecter Switch in incorrect position	Ensure Rotary Run Selecter Switch is in correct position.
Err UAC**	Failure to pull a Vacuum or Vacuum fails mid run	Check lid seal. Refer to Section 2 of Owners Manual.

** Clear error by pressing and holding  for 5 seconds.

Chapter 3

DETAILED OPERATION

SOLVENT LIMITATIONS

Evaporation of Acid Chlorides

The solvent compatibility of your EZ-2 Series evaporator is indicated on the lid. If 'NOT HCl COMPATIBLE VERSION' is indicated then do not attempt to evaporate this class of solvent in your system. If 'HCl COMPATIBLE' is indicated, your system is compatible with HCl. Set the Solvent Group Selector to Aqueous and press 'Start'.

Evaporation of Di-ethyl ether

Genevac supply an optional inert gas purge system, this is mandatory if Di-ethyl ether is to be evaporated safely.

Evaporation of High Boiling Point Solvents

Genevac does not recommend the EZ-2 Series for use with solvents whose boiling points at atmospheric pressure are 170º C or above. This includes DMSO, DMI and NMP.

Solvent Group Guide – EZ-2 & EZ-2^{plus} (Quick Guide)

Solvent group	Description	Boiling point range (at atmosphere)	Examples of solvents
Low BP	Volatile solvents where bumping is not expected	40 – 90º C	DCM through to Pyridine
Low BP Mixture	Mixtures of volatile solvents, bumping can be expected.	40 – 90º C	DCM / Methanol mixture
Aqueous	Water based where freezing at 0º C is anticipated but bumping is not expected	N/A	Water
Medium BP*	Less volatile solvents, generally bumping is not expected.	90 – 155º C	Ethyl Acetate through to DMF
Med + Low BP mixture*	Mixtures with a volatile solvent that is prone to bumping with a less volatile solvent that requires low pressure to evaporate	40 – 155º C	DMF / Methanol mixture
HPLC Fraction	Water / Acetonitrile or Water Methanol fractions	60 to 100º C	Water / Methanol or Water / Acetonitrile
⊙	500G Centrifuge at atmosphere with temperature control		

* Available on EZ-2^{plus} only.

Maximum Run Times

The maximum run times are specified in the table below. These times have been calculated assuming the maximum volume of solvent is present in the system. The maximum run time is affected by the Program setting and the maximum temperature selected for the run.

Run Selector Setting	ASSUMED MAXIMUM TIME APPROPRIATE FOR TEMPERATURE SETTING					
	Lamp Off Time (mins)	30-39 C Time (mins)	40 – 49 C Time (mins)	50 – 59 C Time (mins)	60 – 69 C Time (mins)	70 – 80 C Time (mins)
Low BP	617	309	309	309	309	309
Low BP Mixture	550	275	275	275	275	275
Aqueous	2111	990	791	565	495	495
HPLC Fraction	1889	885	709	506	443	443
Medium BP	833	695	416	260	209	174
Medium + low BP	1041	1041	1041	695	521	416
Spare	1440	1440	1440	1440	1440	1440

Low Solvent Volumes

Where the volume of solvent is low and/or the number of Samples Tubes is small the total run time may need to be adjusted to ensure that the samples are dry. See Setting Run Time for details.

Genevac and the ATEX Directive:

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

Solvent Group Guide – EZ-2 & EZ-2^{plus} (Complete)

Solvent	Abbreviation	Group
Acetic acid	HOAc, EtOOH (ethanoic acid)	LOW BP/MEDIUM BP
Acetonitrile	ACN	LOW BP
Ammonia	NH_3	LOW BP/MEDIUM BP
Dimethylamine	DMA	LOW BP
N,N-Dimethylformamide	DMF	MEDIUM BP
Chloroform	TCE (trichloroethane), chl	LOW BP
1,2-Dichloroethane	DCE	LOW BP
Dichloromethane	DCM	LOW BP
Diethyl ether	DEE	LOW BP
1,4-Dioxane	1,4-diox	LOW BP/MEDIUM BP
Ethanol	EtOH	LOW BP
Ethyl acetate	EtAc, AcOEt	LOW BP
Formic acid	MeOOH	LOW BP/MEDIUM BP
Heptane	Hept, hp	LOW BP
Hexane	Hex, hx	LOW BP
Hydrogen chloride	HCl (non aqueous)	LOW BP
Hydrogen peroxide *See Note*	H_2O_2	MEDIUM BP
Isopropanol	IPA (isopropyl alcohol)	LOW BP
Methanol	MeOH	LOW BP
Pyridine	py	LOW BP/MEDIUM BP
Trifluoroacetic acid	TFA	LOW BP
Tetrahydrofuran	THF	LOW BP
Toluene	PhMe	LOW BP/MEDIUM BP
Water	H_2O	AQUEOUS

Examples: HPLC FRACTIONS = WATER/METHANOL or WATER/ACETRONITRILE
LOW BP MIXTURES = DCM/METHANOL
MED-LOW BP MIXTURES = DMF/DCM

Note A risk assessment must be carried out before use, especially when used in conjunction with other organic solvents, because H_2O_2 will give off O_2 when under vacuum creating an oxygen rich atmosphere.

Solvent Group Guide – EZ-Bio (Complete)

SOLVENT	ABBREVIATION	BEST PROGRAM TO USE
Acetic acid	HOAc, EtOOH	H_2O
Acetonitrile	ACN, MeCN	BP < 75
Ammonia	NH_3	H_2O + NH_4OH
Dimethylamine	DMA	BP < 50
Chloroform	TCE (Tri chloroethane)	BP < 50
1,2 dichloroethane	DCE	H_2O
Dichoromethane	DCM, methylene chloride	BP < 50
1,4 Dioxane	1,4 Diox	BP < 75
Ethanol	EtOH	H_2O
Ethyl Acetate	EtAc, AcOEt	BP < 75
Heptane	Hept	H_2O
Hexane	Hex	BP < 75
Isopropanol	IPA	BP < 75 / H_2O
Methanol	MeOH	BP < 75
Pyridine	Py	H_2O
Trifluoroacetic acid	TFA	MIXTURE BP < 75
Tetrahydrofuran	THF	BP < 50 / BP < 75
Toluene	PhMe	H_2O
Water	H_2O	H_2O
Water and Ammonia	H_2O + NH_3	H_2O + NH_4OH
Water and Acetonitrile	H_2O + MeCN	H_2O + BP < 75
Water and Methanol	H_2O + MeOH	H_2O + BP < 75

Note that where there are two programs listed, the first will give better solvent recovery, while the second may give slightly faster drying.

Power Up

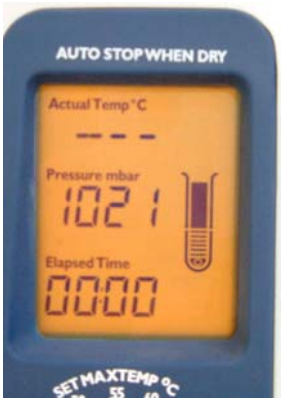
The LCD (See Display) is made up of 110 segments and when the system is switched ON, it will illuminate for 1 second so that the you have time to observe that there are no segments missing. The display will then clear and display “Sys Test” for a few seconds before displaying the software version (Version displayed may be different to this image).

Please note that the countdown timer counts down from 96 to 0, (Do not press the START button until the countdown completed). This feature ensures that the EZ-2 is in a safe mode for continued operation. There could have been a power failure or power fluctuation in the lab that caused the EZ-2 to reset.

When the countdown timer reaches 0, the system will automatically enter the normal operation mode.

Starting a Run

The LCD display then becomes illuminated, showing pressure, temperature and an elapsed time of 00:00.



Note that the lid will remain locked when there is no power to the system.

Refer to Page vi Paragraph 2 Safety and Maintenance Notes.

To open the lid press LID button – then open the lid. The lid remains unlocked for 10 seconds once the LCD indicates '**OPn Lid**'.

Place your samples into the EZ-2.

Close the lid.

Select desired Solvent Type from rotary selector.

Select the required rotor temperature on the control knob.

Press START button.

When the start button is pressed the system will check that the lid is closed and locked.

The condenser will start. The pump starts when a vacuum is applied.

See the paragraph on Lid Messages to view displays.

Pre-heat / Pre-cool Stage

Preheating and cooling is automatically selected when required. If the chamber is not at, or sufficiently close to, the required temperature when the start button is pressed then the system will enter pre-heat or pre-cool mode. Pre-heat is sometimes required to avoid condensation on the inside of the chamber. Pre-cool is sometimes required to avoid bumping of volatile solution.

If the system enters pre-heat / pre-cool mode then the rotor will spin up.

The pre-heat/cool temperature is determined by the run selected.

Changing the Run

You are able to change the run type at any time, even during a run. The system will automatically re-program the system to the new settings. The new run is only accepted after a 3 second 'thinking time', incase you change your mind and re-select the original run. Acceptance is confirmed by a short beep

The state of the Dri-Pure™ LED indicates if Dri-Pure™ is used in the run indicated.

Max Sample temperature can be adjusted throughout the run and will be accepted immediately.

Irrespecitve of run selection, elapsed time will not be reset.

If the new run is a two-stage run and the time already elapsed is greater than the 1st stage time then the run continues with the 2nd stage settings.

If the maximum allowable time for the new run is shorter than the time already elapsed, then the run will terminate.

Setting Run Time

The run time can be changed during a run should the need be to concentrate samples rather than dry them. This can achieved in increments of 1 minute going up to hourly increments.

Press and hold the START button for 5 seconds, the pressure indication will change to display SEt, which will flash rapidly. The Elapsed Time display will now indicate the proposed maximum run time.

By pressing the START button you can increase the time and by pressing the LID button you can decrease the time.

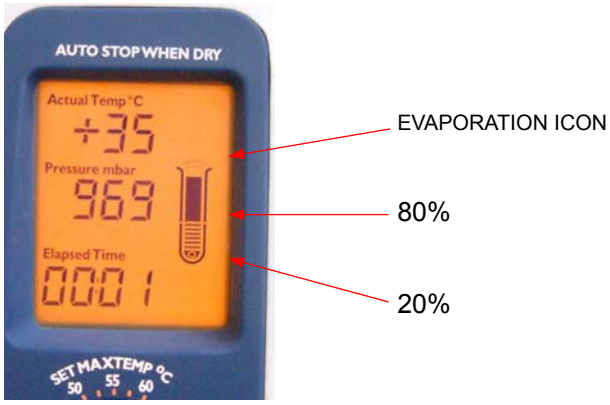
Once you have set the required run time, release the buttons. 5 seconds later the EZ-2 display will revert back to the current run status and the run will continue for the duration that you have just set.

All run duration changes are saved, so that the next time that you select the same run, the time that you previously set will be used.

Another feature of the software is the ability to adjust the maximum run time further. If the previous procedure has been used then you can also adjust the maximum run time by increments of 10 minutes by momentarily pressing the START or LID buttons. If the maximum run time is 2 hours or less then you can only adjust the time by 1 minute increments. This adjustment is not saved so will not affect future runs.

During a run

Elapsed time will be incrementing as the run progresses (HH:MM). The run progress indicator (Test tube) will show that the run is in progress by repeatedly lighting the 'solvent vapour' icon.



There are 9 segments within the test tube: when the top one is extinguished it indicates that the run is 80% complete, the next 7 indicate progress through the the last 20% of the run. Note that these are for guidance only and give no real timing information. The 'sample pellet' icon, in the bottom of the test tube, flashes when the run has finished.

The Dri-Pure™ LED indicator will be lit during any Dri-Pure™ enabled run. During the Dri-Pure™ part of a run, the word *Ramping* will appear below *Pressure* on the LCD display.

During certain runs the message dEF will be seen flashing on the LCD display, this is quite normal and indicates the automatic defrost operation of the SpeedTrap.

Pausing a Run

Press the Pause button.

System will vent and stop the rotor, coundown timer will count from 96 down to 0.
The lid can then be opened and the samples examined.
The run can be re-started within the next 5 minutes (by closing the lid and pressing Start).
If Dri-Pure™ had finished before the pause button was pressed, then Dri-Pure™ will not be re-applied.

During the 5 minutes wait for a restart, the elapsed time indicator will be counting down in MM:SS from 05:00 mins

Pause mode can be cancelled by pressing *Stop* while *paused* or by leaving the machine in *pause* mode for longer than 5 minutes.

You can restart the run by pressing the PAUSE button again.

Stopping a Run

This can be manual or automatic:

Manual:

Press the Stop button while in the run. The system will vent and then the rotor will be brought to a halt.

Automatic:

Without any user input, the run will be automatically terminated when the system senses that the samples are dry. It will do this by monitoring the amount of Coolheat required to keep the samples at their pre-programmed temperature during evaporation. When no further heat is required the samples will be subjected to a final drying phase where evaporation continues (this is dependant on the run selected). The system will then vent and the rotor will be brought to a halt, so ending the run.

For situations where very little heat is required and the above method is inappropriate, the system will run for a pre-programmed time. The time required depends on run selected and control temperature. See Section 1 Chapter 3. Under both conditions the samples are perfectly safe.

Once the run has ended the system beeps 3 times and flashes the Lid button to attract attention to the end of run

When the run has stopped the message dEF will be seen flashing on the LCD display, this is quite normal and indicates the automatic defrost operation of the condenser.

Shutdown

Shutdown is when the pump and condenser is shutdown. This can be manual or automatic:

Manual:

To shutdown, simply press the Stop button (when not in a run).

Automatic

The system will also shutdown automatically if left unattended for 15 minutes at the end of a run. This allows the evaporator to be loaded at the end of the day safe in the knowledge that it will turn itself off when done. The display will clear to the software version and the LCD backlight will turn off.

Defrosting

Defrosting is automatic, although under certain conditions you may need to force an additional defrost cycle. This can be done by pressing and holding down the PAUSE button for 5 seconds, dEF will be displayed and the defrost cycle will last for 30 minutes. You can cancel the defrost cycle by again pressing and holding down the PAUSE button for 5 seconds.

Out of Balance

Should the evaporator be loaded incorrectly or go out of balance during a run the system will end the run automatically, venting and bringing the rotor to rest safely.

The LCD will show ‘Err BAL’.

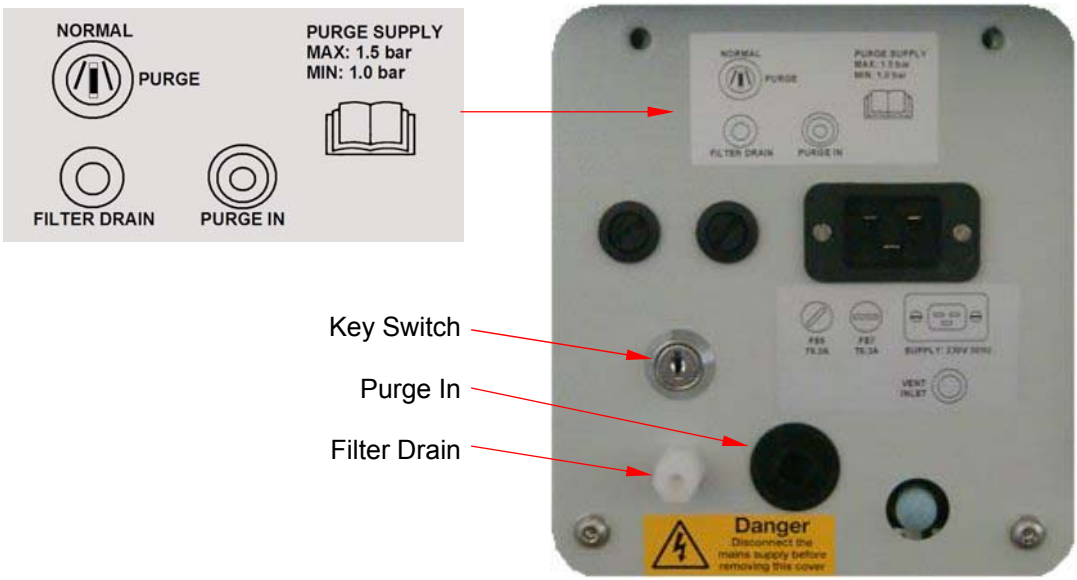
Inert Gas Purge

The primary function of the Inert Gas Purge system is to control the supply of inert gas to the evaporating system during the evaporation of low flash point solvents, such as diethyl ether, to prevent the possibility of explosion.

Operation

Ensure that both the Condenser Jar and the Catchpot are emptied prior to starting the run.

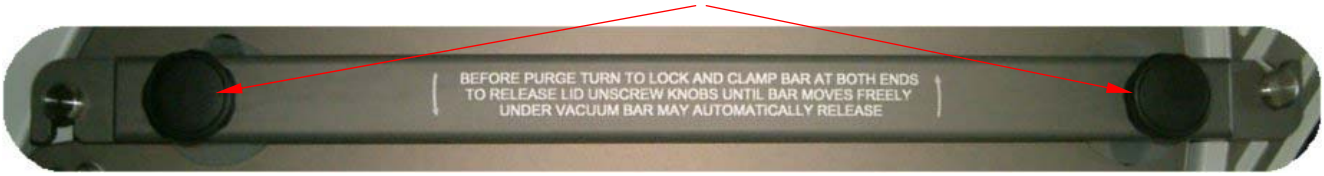
With the key selector set to NORMAL, the EZ-2 can be used without an inert gas supply being available.



With the key selector set to PURGE, the purge function is available.

Ensure that the inert gas supply meets the pressure requirements as detailed in the 'Technical data' section.

Ensure that the EZ-2 lid is closed and that the holding bar latched and the thumb screws (qty 2) tightened.



Press 'START' on EZ-2 control panel, screen will display 'PrG'.

The purge period is set for 300 seconds (5 Mins).

If you pause a run at any time during the purge cycle, the system will reset and automatically purge the system again.

When the run is complete or is stopped, the system will automatically vent and return the chamber to atmospheric pressure, during which time a blanket of inert gas is maintained in the chamber to protect the samples.

With inert gas purge unit (IGP) key selector set to PURGE, ensure that the gas supply is always available during the runs.

Inert purge gases

The system is suitable for use with either nitrogen or argon, which should be dry.

Consult Genevac Service if you intend to use an alternative inert gas.

SECTION 2

FAULT FINDING / DIAGNOSTICS

Safety Interlocks and Errors

Audible Warnings

User Vacuum test

Trouble shooting

Safety Interlocks and Errors

If an error occurs during a run then one of 2 things will happen:

1 The run will be terminated.

This means that the EZ-2 has detected a failure in something that may have an effect on:

Sample Integrity
The physical condition of the evaporator (Safety Critical)

An error code will be displayed when the rotor has stopped spinning and the pressure is at atmosphere.

2 The run will continue in a reduced features mode.

This means that the EZ-2 has detected a failure in something that **does not** have any effect on:

Sample Integrity
The physical condition of the evaporator (Safety Critical)

An error code will be displayed when the rotor has stopped spinning and the pressure is at atmosphere.

INDICATION	CAUSE OF ERROR	RECTIFICATION
AT START		
PrG LO	Low inert gas pressure Inert gas supply switched OFF	Check Gas supply, ensure within limits specified in Technical Specification
PrG HI	High inert gas pressure	Check Gas supply, ensure within limits specified in Technical Specification
DURING RUN		
Err Lid	Lid Closed indicating 'Not Closed' mid run	Operate lid "Unlock" button. Open and re-close lid if required.
Err Loc	Lid Locked indicating Not Locked mid run	Operate lid "Unlock" button. Open and re-close lid if required.
Err bAL	Out Of Balance Trip	Check samples balanced to within ≈10g
Err UAC1	Failure to pull a Vacuum	Check lid seal. Check pump connections if disturbed.
Err UAC2	Vacuum fails mid run	Check lid seal. Check pump connections if disturbed.
MISCELLANEOUS		
run SEL	Rotary Run Selector Switch in incorrect position	Ensure Rotary Run Selector Switch is in correct position.
OPn Lid	Lid Unlock activated	Open Lid
Err 06	Tried to open lid before it is unlocked	Reset and try again, this time listen for solenoid unlocking before lifting lid.
Err 59	Lid closed switch stuck in closed position	Consult Genevac for advice

* PrG LO and PrG HI are only displayed on an EZ-2 with the Inert Gas Purge (IGP) option fitted.

All error messages can be cancelled by holding the Stop button down for 5 seconds.

Audible Warnings

Critical Error / User Warning	Audible warning format
Shutdown Errors	Series of 4 long beeps as run ends Repeats every 5 minutes until any user interaction (Button pressed, Run select switch moved, Lid opened)
Run finished	Three long beeps when system comes to rest Repeats every 5 minutes until any user interaction (Button pressed, Run select switch moved, Lid opened)
Key Acknowledge	Short beep
Illegal key press	Short double beep

Other Troubleshooting

SYMPTOM	CAUSE	ACTION
Mains switch not illuminated	Supply failure	Check the system is switched on and supply is available
	Fuse failure	Refer to maintenance section
LCD not operating		As above
LCD not illuminated	System in shutdown mode	Press start button
Run does not appear to start	Chamber preheating/cooling	Pre-heat and pre-cool are indicated on the display. The run will start when the system is ready
	Error has occurred	Check display for information messages and take appropriate action (See previous table)
Rotor will not start to spin	Drive belt failure	Refer to maintenance section
	Drive motor fuse failure	Consult Genevac for advice
No vacuum	Pump fuse failure	Consult Genevac for advice
	Pump failure	Refer to maintenance section
Vacuum fails to pull down below 900mbar at start of a run	Lid not fully closed	Stop run and check for obstructions
	Lid not sealing	Stop run and check for obstructions, fit and condition of lid seal. Replace if required
Vacuum pulls down to 500mbar but rate slows dramatically	DriPure	The system is running correctly
Vacuum pulls below 900mbar at start of a run but takes longer than usual to achieve a level of vacuum.	Condenser jar seal damaged	Carry out user vacuum test to verify problem.
	Lamp glass cracked	Stop run and inspect/ replace lamp glass assembly
	Condenser jar full of volatile solvent	Ensure condenser jar is emptied after every run
	Condenser fuse failed	Consult Genevac for advice
	Lamp glass seal damaged	Carry out user vacuum test to verify problem.
Vacuum stops pulling down at 215mbar, 115mbar and/or 30mbar.	System waitng for condenser to cool.	This is correct and no action is required. It ensures maximum solvent recovery and pump life.
Boiling of solvent in condenser	No problem	This occurs normally
Lid will not open despite ‘OPn Lid’ displayed	Vent blocked	Remove blockage.
	Lid seal stuck to glass due to excessive solvent on the lid seal.	Allow the solvent to evaporate before further use. Clean seal and lid.

Other Troubleshooting (Continued)

SYMPTOM	CAUSE	ACTION
Lid glass is loose.	The lid is designed so that the glass 'floats' this makes it feel loose.	This is correct an no action is required.
Runs take longer than expected	Lamp failure	Check lamp is illuminated (by looking through lid glass) and replace if failed.
	Vacuum leak	Carry out user vacuum test
	Incorrect run selected	Check that the run selected is most appropriate
	Low control temperature set	Check that correct temperature is set for the compound
	Contamination of lamp glass	Clean lamp glass
	Contamination of IR sensor lens	Clean IR sensor lens (Caution: refer to maintenance section)
	Condenser fuse failure	Refer maintenance section
	Incorrect sample holder for sample format	Consult Genevac for advice
Samples not dry when "auto end of run" stops run	Individual sample volumes were very different or low	De-select auto end of run when carrying out such runs or better still, top up samples to the same level with solvent.
Samples dry but not dry enough	Various factors can cause this	Consult Genevac for advice
Excessive quantity of solvent present in catchpot / exhaust condenser Or poor solvent recovery.	Incorrect run selected	Check that the run selected is most appropriate
	Condenser jar full	Ensure condenser jar is emptied after every run
	Vacuum leak	Verify by user vacuum test and check causes above
	Condenser fuse failed	Consult Genevac for advice
	Volatile solvent	Some very volatile solvents will not be trapped in the internal condenser jar – use a Genevac external exhaust condenser
Body of system gets hot	This is acceptable under normal operation	
Excessive vibration	High out of balance	Ensure balanced to avoid vibration.
Excessive noise	Incorrectly fitted pump	Remove and refit pump
Condensation inside chamber	Incorrect run selected	Check that the run selected is most appropriate
	Run changed after run started	Avoid doing this as the system will have skipped the pre-heat
Cannot unlock and open lid (lid LED not lit)	Spin down timer still active	Wait until timer reaches zero then try again
	Lid button pressed too often in 5 minutes	Wait for system to re-enable lid open mechanism (LED will re light)

If action fails to resolve problem contact Genevac.

User Vacuum Test

Start Aqueous run on EZ-2, Medium Boiling Point run on EZ-2^{plus} or H2O run on EZ-Bio.

SECTION 3

MAINTENANCE

To request your spares and consumables online, click on the link below or copy and paste it into your browser.

http://www.genevac.com/contact/ezspares.html

Chapter 1

Software

1 Introduction

This chapter provides guidance in the updating of:

Software

Software Data Key

2 Safety and Maintenance Notes

Ensure that safety and maintenance notes, Page vi, are complied with throughout this work instruction.

3 Special tools and equipment

Description	Part number	Quantity
Software Data Key	Dependant upon	1
	Machine and Software	
	requirements	

ANY MAINTENANCE OR REPAIR OF THIS PRODUCT NOT DETAILED IN THIS MANUAL SHALL BE CARRIED OUT BY GENEVAC PERSONNEL (OR APPROVED REPRESENTATIVES OF GENEVAC) USING ONLY APPROVED SPARE PARTS.

OBSERVE PRECAUTIONS, ELECTROSTATIC SENSITIVE DEVICES.

4 Preparation

4.1 Ensure that evaporator is switched OFF.

4.2 Remove blanking cap from connector on evaporator.

4.3 Plug software “Data Key” into connector.

5 Uploading

5.1 Switch on evaporator.

5.2 The evaporator will automatically load software.

The existing code has to be deleted first. The display will show ‘ErS bLc n’ where n is the block number. Each block could take up to 8 seconds and there are 4 blocks to erase. There will be no progress indication during each block erase cycle. The block number will increment as each block has been erased.

The software will then load code data from key, storing at the appropriate destination with the ‘Hour Glass’ symbol animated in the top right hand corner of the LCD display. During upload, the system displays ‘**LoA**d codE’ . This process can take up to 34.

5.3 When the ‘’rSt SYS’ message is displayed:

5.3.1 Switch off.

5.3.2 Remove the software “Data Key”.

5.3.3 Refit blanking cap onto connector.

5.3.4 Switch back on (the new code is then used by the system).

6 Testing

6.1 No formal testing is required.

7 Errors

7.1 If any errors are observed and/or the evaporator fails to operate, make a note of the error code(s) displayed and contact Genevac service.

8 Completion

8.1 Place software “Data Key” in a safe and secure place.

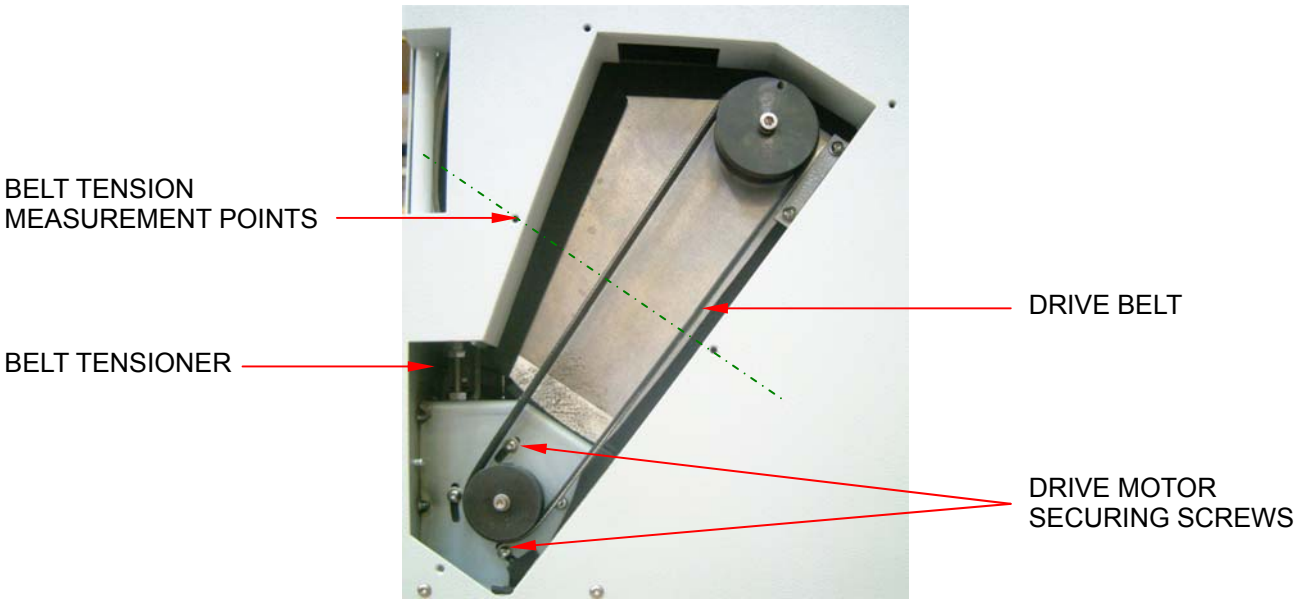
Chapter 2

Drive Belt

1 Introduction

This chapter provides guidance in the removal and refitting of:

Drive Belt



2 Safety and Maintenance Notes

Ensure that safety and maintenance notes, Page vi, are complied with throughout this work instruction.

3 Special tools and equipment

Description	Part number	Quantity
DRIVE BELT	04-2770	1
BELT TENSIONING TOOL	04-3658	1
		1

ENSURE THAT EVAPORATOR IS ISOLATED FROM MAINS POWER SUPPLY.

ANY MAINTENANCE OR REPAIR OF THIS PRODUCT NOT DETAILED IN THIS MANUAL SHALL BE CARRIED OUT BY GENEVAC PERSONNEL (OR APPROVED REPRESENTATIVES OF GENEVAC) USING ONLY APPROVED SPARE PARTS.

4 Removal

4.1 Remove ALL samples, sample holders and swings from evaporator.

4.2 Remove condenser jar, catchpot and drip plate.

4.3 Ensure that the lid is closed and locked. Failure to do so could result in damage to the system when placing evaporator on its back/side.

4.4 Disconnect mains power supply.

During item 4.5 place protective padding between evaporator and bench surface.

4.5 With assistance move evaporator to suitable bench and carefully lower evaporator onto its back.

4.6 Remove drive belt access panel securing screws.

4.7 Remove drive belt access panel.

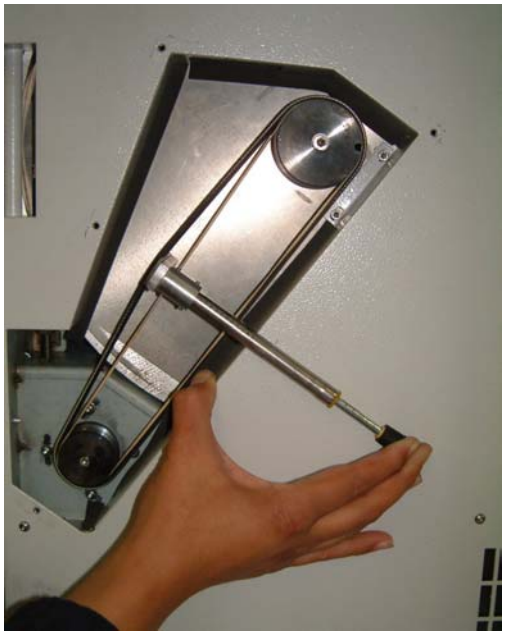
4.8 Visually check condition of belt, ensure free from splits or tears.

4.9 If drive belt is intact and condition is acceptable check tension using special tool (04-3658).

4.10 Rotate the pulleys so that the tightest part of the belt is at the measurement point. This is done by feel only. Mark this point on the belt using marker pen or chalk.

4.11 Place a rubber band (nominally 160mm long, 1mm thick, 6mm wide max) over plain part of pulleys. Ensure band is sitting flat and not on either the groove or the edge.

4.12 Slide the tensioning tool (tool) between the belt and the elastic band at a position along the belt immediately adjacent to the tapped holes. Ensure min. gap between the tool shaft and the base of the system.



4.13 Hold the tool such that a steady load can be applied to the rubber-covered end.

During item 4.14 the yellow end of the tool body should meet the mark of 3.5kg (Do not hold the body of the tool).

4.14 Compress the tool so that the small spindle is just touching the rubber band.

4.15 If required, adjust tension as detailed in item 5.

4.16 If belt tension cannot be achieved replace belt as detailed in items 4.18 to 4.21 inclusive.

4.17 If belt is broken remove belt and check condition of drive pulleys.

4.18 Loosen the 4 drive motor securing screws (maximum 3 turns).

4.19 Loosen the lock-nut on the adjuster screw.

4.20 Rotate belt tension adjuster fully anticlockwise to loosen belt.

4.21 Remove belt.

5 Refitting

5.1 Ensure that the 4 drive motor securing screws are loosened.

5.2 Ensure that belt tensioner is fully unscrewed anticlockwise.

5.3 Position replacement belt over drive pulleys.

During item 5.4 check belt tension with special tool.

5.4 Screw in belt tension adjuster (clockwise) to tighten belt until correct tension is obtained.

5.5 Tighten the 4 drive motor securing screws.

5.6 Rotate belt one complete revolution.

5.7 Recheck belt tension and adjust accordingly.

5.8 Tighten lock-nut on adjuster screw against chassis.

5.9 Recheck belt tension and adjust accordingly.

5.10 Remove rubber band.

6 Testing

6.1 Ensure that rotor rotates freely by hand.

7 Completion

7.1 Replace belt access panel.

7.2 Refit securing screws.

7.3 With assistance carefully stand the system back upright on it's feet. Once upright it is acceptable to open the lid again.

7.4 Refit drip plate, catchpot and condenser jar.

7.5 Reconnect mains power lead.

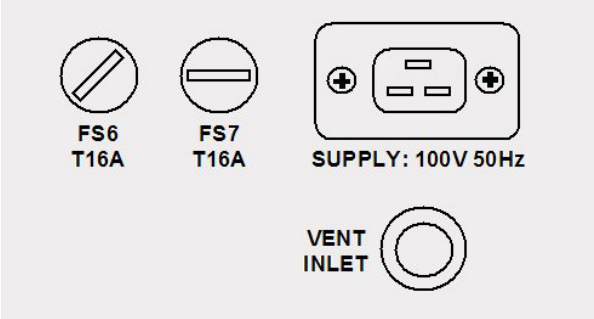
Chapter 3

Fuses

1 Introduction

This chapter provides guidance in the removal, replacement and refitting of:

Fuses



2 Safety and Maintenance Notes

Ensure that safety and maintenance notes, Page vi, are complied with throughout this work instruction.

3 Special tools and equipment

Description	Part number	Quantity
100 Volt – 50Hz System		
F6 Main Supply= 16.0A	04-3766	1
F7 Main Supply= 16.0A	04-3766	1
100 Volt – 60Hz System		
F6 Main Supply= 16.0A	04-3766	1
F7 Main Supply= 16.0A	04-3766	1
120 Volt System		
F6 Main Supply= 10.0A	04-3588	1
F7 Main Supply= 10.0A	04-3588	1
230/240 Volt System		
F6 Main Supply= 6.3A	04-3587	1
F7 Main Supply= 6.3A	04-3587	1

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The 2 mains supply fuse holders F6 and F7 are standard screw type located next to the mains power connector on the left hand side of the evaporator (viewed from the front).

Label identifies Power Supply requirements and Fuse ratings.

4 Removal

4.1 Ensure evaporator is isolated from mains supply.

4.2 Unscrew both fuse holders.

4.3 Remove defective fuses.

5 Refitting

5.1 Fit replacement fuses to holders.

5.2 Refit fuse holders to evaporator.

6 Testing

6.1 Re apply mains power.

7 Completion

7.1 Dispose of defective fuses.

If a fuse blows more than once, please contact Genevac Service Department. To ensure uninterrupted service always ensure a spare fuse is available.

Chapter 4

Lamp Unit

1 Introduction

This chapter provides guidance in the removal, replacement and refitting of:

Lamp Unit

2 Safety and Maintenance Notes

Ensure that safety and maintenance notes, Page vi, are complied with throughout this work instruction.

3 Special tools and equipment

Description	Part number	Quantity
LAMP	AC9060	1
ALLEN KEY 4mm	AB9603	1

ENSURE THAT EVAPORATOR IS ISOLATED FROM MAINS POWER SUPPLY.

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THIS SYMBOL MEANS THAT YOU SHOULD NOT TOUCH SURFACES IN THESE AREAS. THESE SURFACES CAN BE VERY HOT AND MAY LEAD TO BURNS.

Traces of solvents may be present that could be harmful to your health or lead to material damage.

There may be a risk to sample integrity if lamp fails to operate or required vacuum is not achieved.

4 Removal

4.1 Open lid.

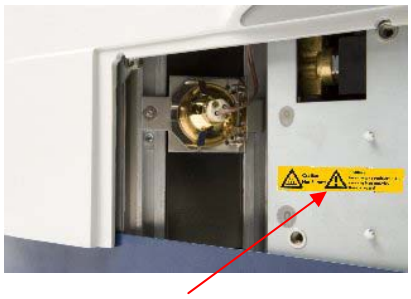
LAMP UNIT MAY BE HOT!

4.2 Allow lamp to cool if system used recently.

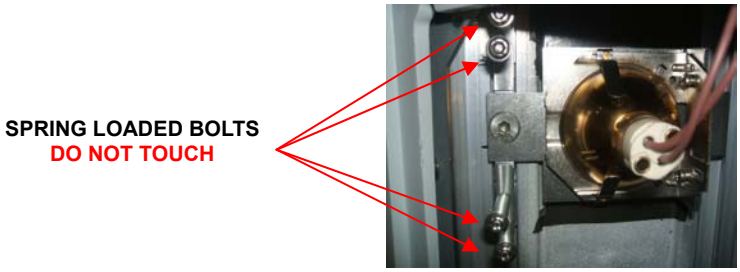
4.3 Disconnect mains power supply.

4.4 Using allen key remove the 3 securing screws from lamp access panel (located on the right hand side, viewed from the front).

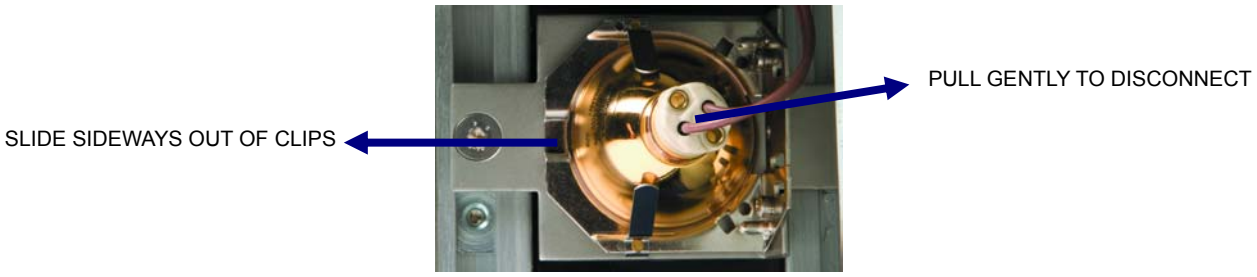
4.5 Remove panel.



THE FOLLOWING WARNING IS ONLY APPLICABLE TO AN EZ-2 FITTED WITH INERT GAS PURGE - DO NOT ATTEMPT TO ADJUST OR REMOVE THE SPRING LOADED BOLTS AS INDICATED BELOW



4.6 Disconnect lamp power lead from lamp unit by pulling gently on ceramic holder (not leads).



4.7 Carefully withdraw lamp unit from clip assembly by sliding sideways.

5 Refitting

5.1 Unpack replacement lamp unit.

5.2 Locate lamp unit in to clip by sliding sideways.

5.3 Connect lamp power lead by gently pushing on to lamp contacts.

5.4 Refit access panel and secure with screws.

DO NOT USE SYSTEM WITHOUT PANEL BEING FITTED!

5.5 Reconnect Mains power supply.

6 Testing

6.1 For an EZ-2, select AQUEOUS.

6.2 For an EZ-2plus, select Medium Boiling Point.

6.3 For an EZ-Bio, select H2O.

6.4 Set temperature to 60ºC

6.5 Press START button.

6.6 Check that lamp illuminates.

7 Completion

7.1 Dispose of defective lamp and packaging.

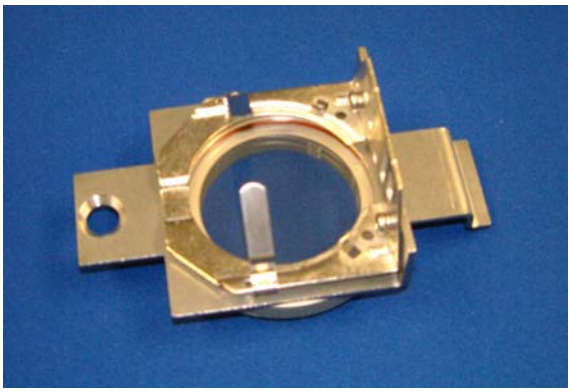
Chapter 5

Lamp Glass Assembly

1 Introduction

This chapter provides guidance in the removal, replacement and refitting of:

Lamp Glass Assembly



2 Safety and Maintenance Notes

Ensure that safety and maintenance notes, Page vi, are complied with throughout this work instruction.

3 Special tools and equipment

Description	Part number	Quantity
LAMP GLASS ASSEMBLY	70-1116/S	1
ALLEN KEY 4mm	AB9603	1

ENSURE THAT EVAPORATOR IS ISOLATED FROM MAINS POWER SUPPLY.

ANY MAINTENANCE OR REPAIR OF THIS PRODUCT NOT DETAILED IN THIS MANUAL SHALL BE CARRIED OUT BY GENEVAC PERSONNEL (OR APPROVED REPRESENTATIVES OF GENEVAC) USING ONLY APPROVED SPARE PARTS.

THIS SYMBOL MEANS THAT YOU SHOULD NOT TOUCH SURFACES IN THESE AREAS. THESE SURFACES CAN BE VERY HOT AND MAY LEAD TO BURNS.

Traces of solvents may be present that could be harmful to your health or lead to material damage.

There may be a risk to sample integrity if lamp fails to operate or required vacuum is not achieved.

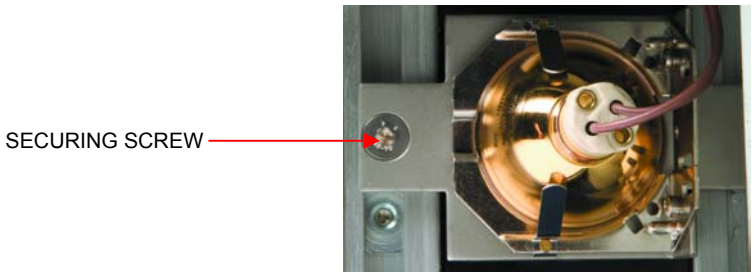
4 Removal

4.1 Remove Lamp as detailed in Chapter 4.

LAMP GLASS ASSEMBLY MAY BE HOT!

4.2 Allow assembly to cool if system used recently.

4.3 Using allen key remove lamp assembly securing screw.



4.4 Remove lamp assembly.

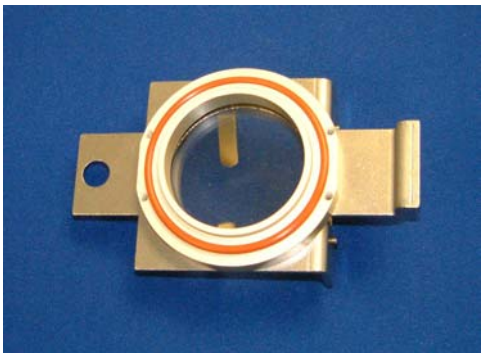
4.5 Check lamp assembly to chamber location face for damage.

4.6 Clean using approved method, see item 2.4 Cleaning on page vii of this manual.

5 Refitting

5.1 Unpack replacement lamp glass assembly.

5.2 Check that lamp glass assembly chamber seal is correctly located.



5.3 Locate lamp glass assembly in to EZ-2.

5.4 Refit securing screw.

5.5 Refit lamp unit as detailed in Chapter 4 items 5.2 to 5.5 inclusive.

6 Testing

6.1 For an EZ-2, select AQUEOUS.

6.2 For an EZ-2plus, select Medium Boiling Point.

6.3 For an EZ-Bio, select H2O.

6.4 Set temperature to 60ºC

6.5 Press START button.

6.6 Ensure that pressure drops to below 500 mbar and continues to drop.

If pressure fails to drop, check that lamp glass assembly to chamber seal is correctly located and repeat items 6.1 to 6.6 inclusive.

6.7 Carry out required run, ensure that desired pressure is achieved.

6.8 Check that lamp illuminates.

7 Completion

7.1 Dispose of defective lamp glass assembly and packaging.

Chapter 6

Lid Seal

1 Introduction

This chapter provides guidance in the removal, replacement and refitting of:

Lid Seal

2 Safety and Maintenance Notes

Ensure that safety and maintenance notes, Page vi, are complied with throughout this work instruction.

3 Special tools and equipment

Description	Part number	Quantity
LID SEAL	04-5094/S	1

ANY MAINTENANCE OR REPAIR OF THIS PRODUCT NOT DETAILED IN THIS MANUAL SHALL BE CARRIED OUT BY GENEVAC PERSONNEL (OR APPROVED REPRESENTATIVES OF GENEVAC) USING ONLY APPROVED SPARE PARTS.

Traces of solvents may be present that could be harmful to your health or lead to material damage.

There may be a risk to sample integrity if required vacuum is not achieved.

4 Removal

4.1 Switch evaporator ON.

4.2 Press LID OPEN button.

4.3 Open lid.

Check for traces of solvent on seal and wipe clean before removing seal.

The seal material may absorb significant quantities of some solvents.

Do not use tools, they may damage the chamber

4.4 Manually remove seal from chamber by carefully pulling away from chamber working on a 200mm section at a time. Once one comes out the remainder is removed easily.

5 Refitting

5.1 Unpack replacement lid seal.

5.2 Position on top of chamber wall with 'lip' pointing inwards towards centre.

5.3 Work firmly into position using only fingers, ensuring the seal is fully home.

6 Testing

6.1 Close lid.

6.2 For an EZ-2 select AQUEOUS.

6.3 For an EZ-2^{plus} select Medium Boiling Point.

6.4 For an EZ-Bio select H2O.

6.5 Press START button.

6.6 Ensure that pressure drops to below 500 mbar and continues to drop.

When a new seal is fitted manual pressure may be required on the lid to assist to bed in the seal.

If pressure fails to drop, check that seal is correctly located on chamber wall and repeat items 6.1 to 6.6 inclusive.

6.7 Carry out required run, ensure that desired pressure is achieved.

7 Completion

7.1 Dispose of defective seal and packaging.

Chapter 7

Pump

1 Introduction

This chapter provides guidance in the removal, replacement and refitting of:

Pump

2 Safety and Maintenance Notes

Ensure that safety and maintenance notes, Page vi, are complied with throughout this work instruction.

3 Special tools and equipment

Description	Part number	Quantity
Pump 2 head 100/120 Volt	70-1117/S	AR
Pump 4 head 100/120 Volt	70-1118/S	AR
Pump 2 head 230 Volt	70-1119/S	AR
Pump 4 head 230 Volt	70-1120/S	AR

ENSURE THAT EVAPORATOR IS ISOLATED FROM MAINS POWER SUPPLY.

ANY MAINTENANCE OR REPAIR OF THIS PRODUCT NOT DETAILED IN THIS MANUAL SHALL BE CARRIED OUT BY GENEVAC PERSONNEL (OR APPROVED REPRESENTATIVES OF GENEVAC) USING ONLY APPROVED SPARE PARTS.

Traces of solvents may be present that could be harmful to your health or lead to material damage.

There may be a risk to sample integrity if required vacuum is not achieved.

4 Removal

4.1 Disconect mains power supply.

4.2 From rear of evaporator undo the securing screws (qty 4) that secure pump tray assembly.

Do not subject the PTFE hoses and cables to undue strain.

4.3 Carefully withdraw pump tray assembly.

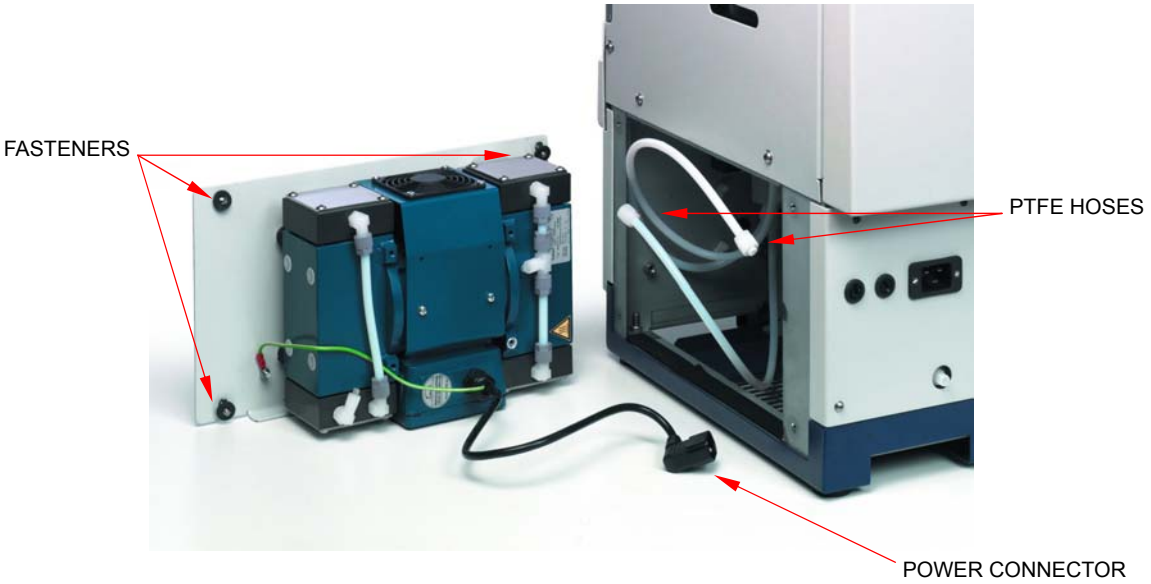


Fig 1 – 4 Head Pump

4.4 Disconnect pump power connector.

4.5 Carefully note position of the 2 PTFE hoses and disconnect from pump.

5 Refitting

5.1 Unpack replacement pump and retain packaging.

5.2 Remove blanking caps from the two hoses and retain.

5.3 Position pump assembly and connect PTFE hoses to positions noted at item 4.5.

5.4 Connect pump power connector.

During item 5.5 ensure that the PTFE hoses and cables are not trapped or distorted.

5.5 Carefully slide pump assembly into back of evaporator.

5.6 Secure with the screws (qty 4).

6 Testing

6.1 Reconnect mains power supply.

6.2 Power up evaporator.

6.3 For an EZ-2 select AQUEOUS.

6.4 For an EZ-2plus select Medium Boiling Point.

6.5 For an EZ-Bio select H2O.

6.6 Press START button.

IF PUMP LINES ARE INCORRECTLY FITTED THE PUMP COULD PRESSURISE THE SYSTEM CAUSING DAMAGE: TURN SYSTEM OFF IF PRESSURE INCREASE OCCURS DURING ITEM 6.7.

6.7 Ensure that pressure drops to below 500 mbar and continues to drop.

6.8 If pressure fails to drop, repeat items 4.1 to 4.3 inclusive and check condition of PTFE hoses and connections repeat items 6.1 to 6.7 inclusive.

6.9 Carry out required run, ensure that desired pressure is achieved.

7 Completion

7.1 Fit hose blanking caps to defective pump.

7.2 Place pump into packaging for despatch back to Genevac.

7.3 Return to Genevac.

Chapter 8

Pump Head Components

1 Introduction

This chapter provides guidance in the removal, replacement and refitting of:

Pump Head Components

2 Safety and Maintenance Notes

Ensure that safety and maintenance notes, Page vi, are complied with throughout this work instruction.

3 Special tools and equipment

Description	Part number	Quantity
2 Head - Pump Head Service Kit	04-3715	AR
4 Head - Pump Head Service Kit	04-3716	AR
Pulley Spanner 44/3 3mm	AC2370	1
Allen Key 4mm	AB9603	1
Spanner Open Ended 17mm		1

ENSURE THAT EVAPORATOR IS ISOLATED FROM MAINS POWER SUPPLY.

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Traces of solvents may be present that could be harmful to your health or lead to material damage.

There may be a risk to sample integrity if required vacuum is not achieved.

4 Removal

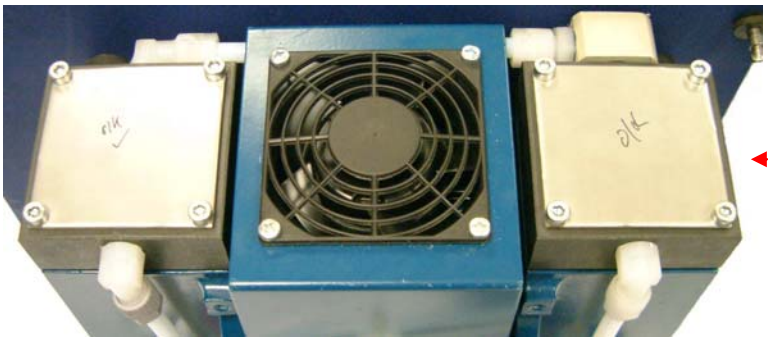

Fig 1

4.1 Remove pump as detailed in Chapter 7. and place on suitable work surface.

4.2 Remove pump from tray by removing attachment screws.

4.3 Note and mark position of PTFE tubes.

4.4 Disconnect the 2 PTFE tubes from the connectors on the pump head.

4.5 Using Allen Key, remove the 4 retaining screws from the pump head.

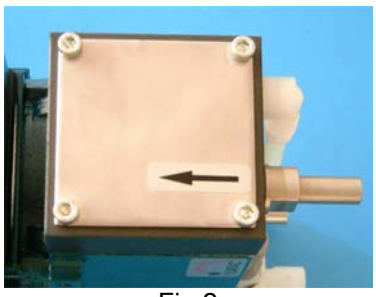

Fig 2

4.6 Remove pressure plate.

4.7 Carefully remove the connecting head.

4.8 Carefully remove valves (qty 2) and “O” ring seals (qty 2).

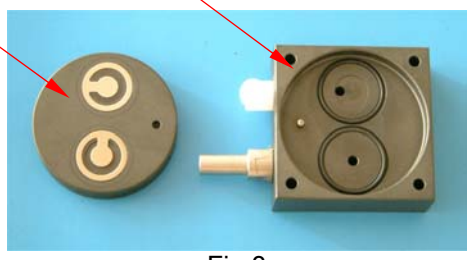

Fig 3

4.9 Carefully remove pump head.

4.10 Using Pulley Spanner, carefully locate in Strain Washer and rotate anticlockwise.

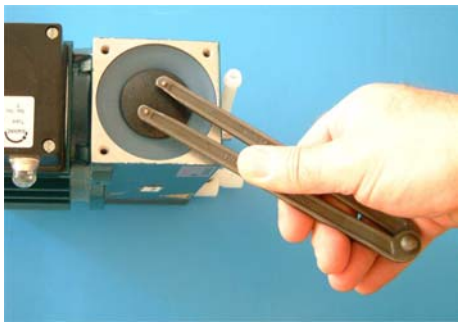

Fig 4

4.11 Remove Strain Washer, Diaphragm and Pressure Disc assembly.

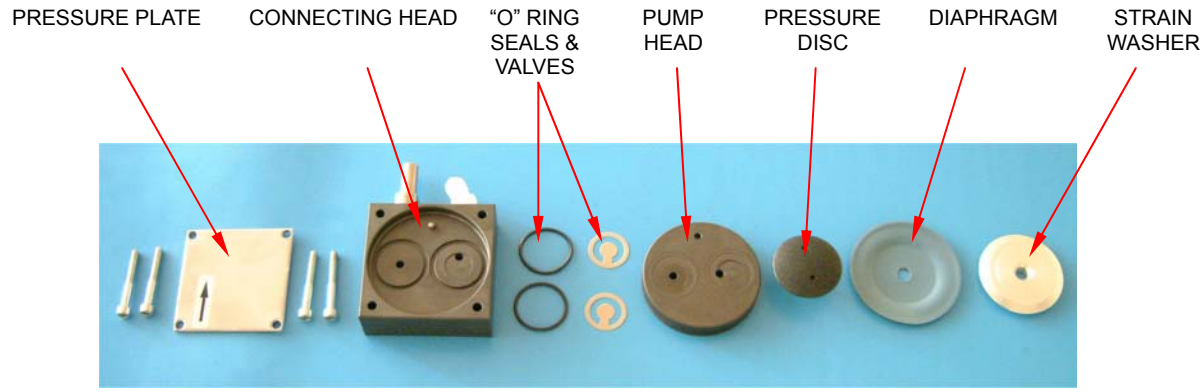

Fig 5

4.12 Separate the three items

5 Refitting

5.1 Remove replacement components from service kit packaging.

5.2 Ensure that all items are correct (Fig 5).

Do not use any assembly oils or fluids when reassembling the pump. Clean distilled water may be used to locate seals and valves during assembly.

5.3 Assemble Strain Washer, Diaghragm and Pressure Disc (Fig 5).

5.4 Carefully locate onto pump connecting rod.

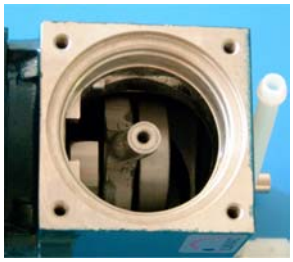

Fig 6

5.5 Using Pulley Spanner, carefully locate in Strain Washer and rotate clockwise (Fig 4).

5.6 Carefully refit pump head.

5.7 Carefully fit valves (qty 2) into pump head (Fig 3).

5.8 Carefully fit “O” ring seals (qty 2) into pump connecting head (Fig 3).

5.9 Carefully fit pump connecting head.

5.10 Refit pressure plate.

5.11 Refit securing screws (qty 4).

5.12 Reconnect the 2 PTFE tubes to the pump head connections.

5.13 Refit pump tray and secure with attachment screws

5.14 Refit pump as detailed in Chapter 7.

6 Testing

6.1 Test as detailed in Chapter 7.

7 Completion

7.1 Safely discard old seals and valves.

SECTION 4

TECHNICAL SPECIFICATION

MODEL:	EZ-2	EZ-2^{plus}	EZ-Bio
Mechanical Data			
Max RPM	2150	2150	2150
Max G	500 G	500 G	500 G
Drive system	Direct	Direct	Direct
Sample load including swings	1.5 kg	1.5 kg	1.5 kg
Max. imbalance	40g	40g	40g
IR lamps number	1	1	1
Vacuum system			
Pressure display	0-1150 mbar	0-1150 mbar	0-1150 mbar
Automatic Pressure control	10 mbar -atm	<2 mbar -atm	10 mbar -atm
Bump protection	Yes	Yes	Yes
System ultimate pressure	10 mbar	2 mbar	10 mbar
Auto vacuum vent valve	Yes	Yes	Yes
Temperature controls			
Temperature control range	Ambient to 80°C	Ambient to 80°C	Ambient to 80°C
Temperature control accuracy	+/- 2.5°C	+/- 2.5°C	+/- 2.5°C
Temperature sensing	infra red pyrometer	infra red pyrometer	infra red pyrometer
Temperature display range	-99 to + 99°C	-99 to + 99°C	-99 to + 99°C
Chamber temp. range	Ambient	Ambient to 80°C	Ambient
End of run determination	Automatic / Timed	Automatic / Timed	Timed
Condenser Data			
Condenser temperature	-40°C	-40°C	-40°C
Vacuum pots (number)	1	1	1
Useable Capacity - vacuum pot	1 litre	1 litre	1 litre
Materials – condenser jar	Borosilicate glass	Borosilicate glass	Borosilicate glass
Refrigerant	R404a	R404a	R404a
Solvent compatibility			
Boiling points	Up to 120°C	Up to 165°C	Up to 120°C
HCl compatibility	Only with option	Only with option	N/A
Diethyl Ether compatibility	Only with option	Only with option	N/A
Dimensions			
Width - Without Catchpot	570 mm	570 mm	570 mm
- With Catchpot	597 mm	597 mm	N/A
Depth	645 mm	645 mm	645 mm
Height	700 mm	700 mm	700 mm
Weight	82 kg	88 kg	82 kg

Inert Gas supply	
Max pressure	1.5 bar
Min pressure	1.0 bar
Flow 30 litres/min @ STP	
Purge system filter draining	Automatic

Power Supplies

120V (±10%)	60Hz	15A	(USA)
230V (±10%)	50Hz	13A	(UK + Europe)
100V (±10%)	50Hz	15A	(Japan)
100V (±10%)	60Hz	15A	(Japan)

Power Consumption

Peak:

230V 50Hz	1610VA
120V 60Hz	1800VA
100V 50/60Hz	1200VA

Note: The systems may momentarily take current in excess of the figures quoted above. Genevac therefore recommends the use of appropriately rated type D circuit breakers on the main supply to the EZ-2.

Environment

The following figures apply:

Operating

Ambient Temperature:	15°C to 30°C
Relative Humidity:	10 – 60%
Altitude:	Sea Level to 1,600m

Storage

Ambient Temperature:	-10°C to 60°C
Relative Humidity:	10 – 80%
Altitude:	Sea Level to 12,000m

Emissions:

Noise levels do not exceed 55dBA at one metre from the evaporator.

EC Declaration of Conformity

We Genevac Limited

Declare that this product:

EZ-2 Evaporating System

Complies with the relevant Essential Health and Safety Requirements of the European Machinery Directive (89/392/EEC as amended by 91/368 EEC and 93/44/EEC). The EMC Directive 89/336/EEC and the Low voltage Directive 73/23/EEC.

Conformity is demonstrated by compliance with the following specifications:-

EN 60204-1:1998, Safety of machinery– Electrical equipment of machines-Pt 1 General Requirements

EN 249: 1992, Safety of machinery– Safety distances to prevent danger zones being reached by upper limbs.

EN 1088: 1996, Safety of machinery. Interlocking devices associated with guards. Principles of design and selection.

BS EN ISO 12100 pts 1 & 2:2003, Safety of Machinery - Basic concepts, general principles for design.

BS EN 50082-1: 1998, Electromagnetic compatibility-Generic immunity standard.

BS EN 61010-2-020: 1995, Safety requirements for electrical equipment for measurement, control and laboratory use. Particular requirements for laboratory centrifuges.

Safety

WARNING!

THIS SYSTEM MUST BE EARTHED

THIS EVAPORATOR IS A SAFETY CLASS 1 PRODUCT ACCORDING TO IEC CLASSIFICATION. IT MUST NEVER BE USED WITH ANY INTERRUPTION TO THE SAFETY EARTH CONDUCTOR. IT IS AN INSTALLATION CATEGORY II PRODUCT AND IS INTENDED TO OPERATE FROM A NORMAL SINGLE-PHASE SUPPLY.

THIS EVAPORATOR HAS BEEN DESIGNED TO BE USED IN A POLLUTION DEGREE 1 ENVIRONMENT (NO POLLUTION, OR ONLY DRY NON-CONDUCTIVE POLLUTION).

ANY MAINTENANCE OR REPAIR OF THIS PRODUCT NOT DETAILED IN THIS MANUAL SHALL BE CARRIED OUT BY GENEVAC PERSONNEL (OR APPROVED REPRESENTATIVES OF GENEVAC) USING ONLY APPROVED SPARE PARTS

Warranty Statement

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

This warranty is subject to the following provisions:

1. System to be returned to Genevac in appropriate packaging* for repair.
2. System must be sited, installed and operated in accordance with operator instruction manual.
3. All vapours must be ducted away from the system as described in the installation instructions and operator manual
4. Unit only used for purpose it was sold, and in accordance with Genevac published solvent list.
5. Preventative maintenance to be adhered to as detailed in operator's manual.
6. When items are replaced by the customer; Only Genevac approved parts are to be used.
7. Vacuum pump to be exchanged for refurbished unit in event of failure. Owner responsible for exchange and return of failed unit.
8. Warranty does not cover accidental damage, misuse or inappropriate repair by untrained personnel.

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

*Unit supplied in reusable packaging. This is to be retained for reuse by client in the unlikely event that system needs to be returned for repair. If package not retained, a charge will be made for replacement packaging and shipping costs incurred.

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Useful information

If you need to contact Genevac for assistance, use either the telephone or fax Hotlines given.

It will always help Genevac Service if you have the model and serial numbers at hand for the components of your system

If you need to contact Genevac Sales for information on Service Contracts or products, use the telephone or fax Hotlines given.

Alternatively, Email or visit our web site.