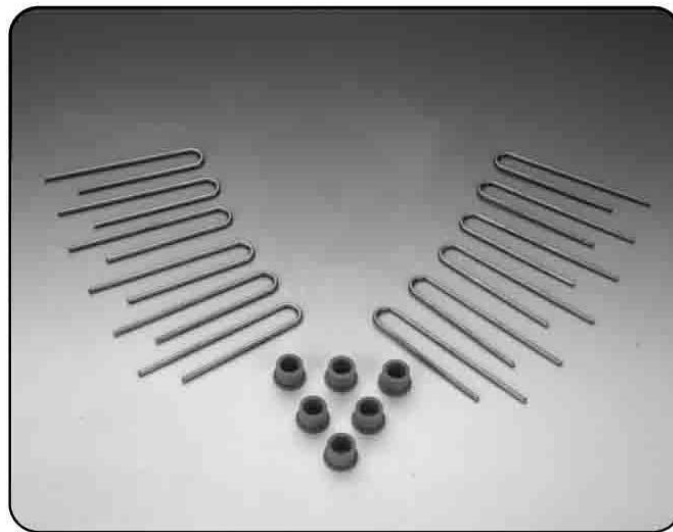


# Operating and Maintenance Handbook

## ST22 SUBLIMATION PUMP CARTRIDGE



REVISION	DATE	COMMENTS	INITIALS
1	Jan 1996	Original release	MJD

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## **WARRANTY**

1. Subject to fair wear and tear and the due, observance of any installation user, storage, operating or maintenance instructions the Seller undertakes to replace or, at its option repair free of charge to the purchaser, any goods which the purchaser can establish are defective by reason of defective workmanship or materials which are returned to the Seller, carriage paid, within 12 months of the date of dispatch by the Seller. In the event, however, that the Seller supplies spare parts either direct, or that are fitted or installed or replaced by the Sellers' service center such spare parts will be subject to a warranty period of six months only.
2. The Purchaser cannot return any product for warranty repair without the prior approval of VACGEN and the issue of a Goods Return Number (GRN). This shall be obtained by contacting the service centre at VACGEN. All returned products must be accompanied by a completed Declaration of Contamination form. Customers must, in the first instance, contact the local selling agent.
3. We reserve the right to decline to service equipment, we consider is in any way hazardous until a clearance or safety certificate, in a form satisfactory to VACGEN, has been completed and returned by the customer.

## **REPAIR**

The following additional terms and conditions apply in the event that the customer elects to use the services of VACGEN workshop on a chargeable basis.

1. At its own cost the customer shall dispatch the equipment to the workshop, carriage paid, suitably packaged, protected and insured, bearing, a Goods Return Number (GRN) and a completed Declaration of Contamination certificate obtained from VACGEN in advance of shipment.
2. During the period that the equipment is on VACGEN premises, VACGEN will insure the equipment against all risks.
3. Vacuum Generator will provide an acknowledgement of the receipt together with an estimate of the repair charges. Such estimates are carried out on a visual basis and are therefore intended as a guide only. Formal fixed price repair quotations are available and involve the disassembly of the equipment to determine the full extent of the work necessary to restore the equipment to an acceptable standard. In the event that the customer chooses not to proceed with the repair VACGEN will make a charge to cover this examination effort.

Note:

The above are extracts from VACGEN Conditions of sale. Complete copies can be obtained from: VACGEN, Diamond Drive, Lower Dicker, BN27 4EL

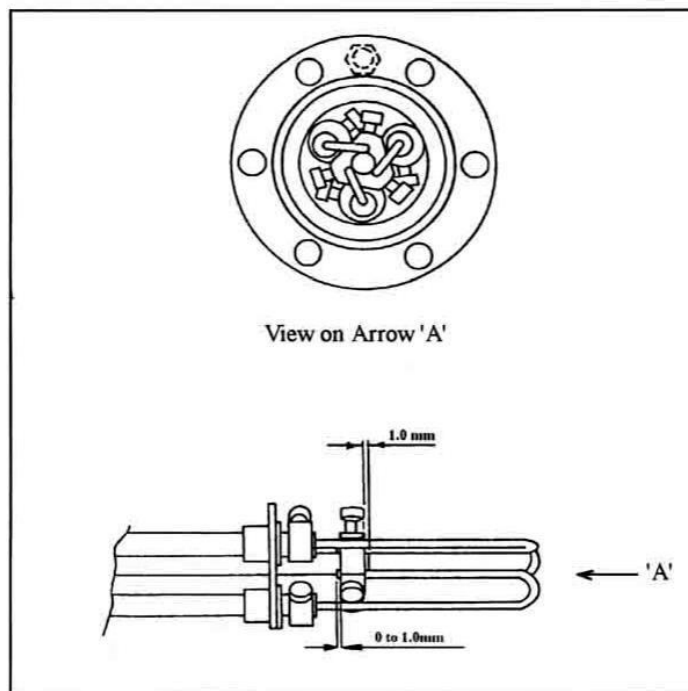
## 1.0 Specification for ST22F Filaments

Filament Material:	2.0mm diameter Ti Mo alloy wire hairpin
Operating Pressure:	$10^{-1}$ to $10^{-11}$ mbar
Maximum Evaporation Rate:	10mg per minute
Usable Titanium:	0.6g maximum per filament
Maximum Current Setting:	52 Amps (degas current)
Normal Initial Setting:	48 Amps

Refer to the ST22 Sublimation Pump Cartridge Operating Instructions (06 204 94B) for further information on the operation of sublimation pump filaments.

## 2.0 Replacing the Filaments

It is essential to apply 2 or 3 drops of a vacuum compatible solvent or degreasant (such as trichlorethylene, ethanol or acetone) to the threads of each filament clamping screw (six in all), BEFORE any attempt is made to undo the screw. Failure to do this is likely to cause the seizure of the screw in the filament clamp. This will result in damage to the screw and the clamp, both of which will have to be replaced (see section 5.0). To aid the penetration of the "lubricant" it is a good idea to initially rotate the screw a small amount in both directions ie. anti-clockwise then clock-wise, after which the screw can be easily removed, or partially removed. Unless the clamps are to be removed for cleaning (see section 3.0), it is only necessary to undo the screws sufficiently to enable the used filaments to be removed.



**Figure 1- Diagram showing the correct orientation of the filaments**



When replacing the filaments, it is important that they are orientated only as shown in figure 1. Having inserted the filaments, position the triangular clamp approximately 1 mm below the end of the central support rod. Set the ends of the filaments level with, or slightly projecting below, the underside of the triangular clamp. Evenly tighten the three screws in the triangular clamp, and then the screws in each of the three collars. The screws should be checked once again to ensure that they are all firmly tightened.

### **3.0 Removal of Excess Titanium from the ST22 Cartridge**

Periodically it is desirable to remove the titanium that has accumulated on the clamps, insulation bushes, conductor ends etc. This is usually done at the same time as filament replacement; however, it may not be necessary to clean off the titanium every time filaments are replaced. Completely remove the screws from the clamps, as described above, and remove the four clamps. It is suggested that a suitable (clean) wire brush be used to remove the titanium film from the ends of the four conductors and from the insulator support plate.

When this has been done, remove the 3 insulators and examine them. If they are very heavily coated with material that is not readily removed, they should be replaced. Details of standard replacement parts for the ST22 pump cartridge are given in section 5.0.

After cleaning, the metal parts should be wiped over with a lint-free Cloth and suitable solvent and left to dry. The components should then be reassembled; new filaments should always be used after any procedure which requires disassembling the pump cartridge.

### **4.0 Degassing**

Before initial use it is desirable to degas, or condition, all 3 filaments. This may be done in one or two stages according to preference, and to the nature of the pumping system. With an ion pumped system it may be desirable to initially outgas the filaments at, or towards the end of, the rough pumping stage to avoid trapping the initial outgassing load in the ion pump. At a later stage, the filaments should be outgassed again into the ion pump (usually at the end of the bakeout cycle whilst the system is still hot). With a diffusion or turbomolecular pumped system the first stage degassing is normally omitted, since these pumps do not trap gases within the system. A general outline of the procedure is given below (this is given for guidance only)-

1. Check that the filament current control is at the minimum setting.
2. Select filament number 1.
3. Set the controller to manual mode or set the timer to give a long on period (e.g. 5 minutes).
4. Gradually increase the filament current to 52 amperes. At the same time ensure that the system pressure does not exceed the following limits-

10<sup>-1</sup> mbar when degassing into the roughing pump, or around  
10<sup>-4</sup> mbar when degassing into a diffusion or turbomolecular-pumped system, or  
10<sup>-5</sup> mbar into an ion-pumped system.

When the pressures returns to, or close to, its original level, (typically this may take a few minutes depending on the available pumping speed), reduce the filament current to a minimum, switch to Filament 2 and repeat step 4 above, Do the same for Filament 3.



On completion return the filament selector switch to position 1; this is the filament that will be used first. It is important to do this to ensure that the filaments are used in the correct sequence.

When changing from continuous operation to cyclic, or automatic operation, it will be observed that as the heavy current conductors cool the current taken by the filament may rise momentarily beyond the required level on switch-on, and then fall back during the ON period, to the level selected during continuous running. Normally this is perfectly satisfactory, and it should not be necessary to re-adjust the current level.

The normal filament life, under constant voltage operation is from 8 to 12 hours, dependent on the current setting.

When the first filament is exhausted, it is usually possible to switch directly to filament number 2 without the need to adjust the current setting. However, it is a good idea to slightly reduce the current setting prior to switching to the new filament and to finally adjust the current to the required level towards the end of the On period. Again, as mentioned previously, this applies only in the case of a filament in a new condition.

## 5.0 Accessories and Spare Parts

Order Code	Description
ZST22	ST22 Sublimation Pump Cartridge
ZST22F	Replacement Filaments for the ST22
ZST22FC	Replacement Filament Clamps for the ST22
ZST22IB	Replacement Insulator Bushes for the ST22
ZST22CS	Replacement Screws for the ST22 Filament Clamps
ZSPC8	Titanium Sublimation Pump Power Supply
ZSPCCB	Non-bakeable Pump Lead, 4 Filament plus Common, 5m
ZSPCIB	Bakeout Interface Box With 1.5m Bakeable Cables

Note-

Pump leads and bakeable leads of non-standard length are also available – contact VACGEN for further details

