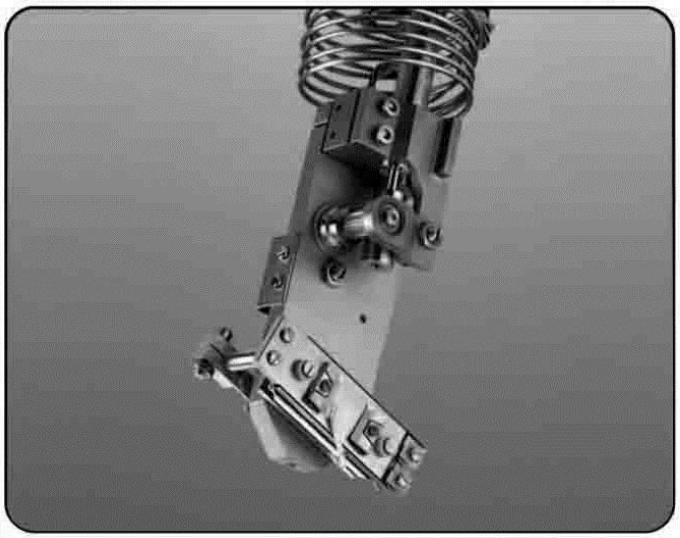
Operating and Maintenance Handbook

SH1 and SH2 SAMPLE HOLDERS



REVISION	DATE	COMMENTS	INITIALS
1	Jan 1995	Original release	MJD
2	Aug 2015	VACGEN rebrand	AJL

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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 center 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, Maunsell Road, Castleham Industrial Estate St. Leonards on Sea, East Sussex, TN38 9NN, United Kingdom.

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1.0 The SH1 Sample Holder

The SH1 sample holder (see figure 1) provides a means of mounting equipment which may include sample heating, cooling and condition monitoring options. It is designed for attachment to rotary drives such as the RD1 to give primary rotation. The mounting plate itself can be preset to orientate the azimuthal angle of the sample, although this cannot be changed during use.

The material used for construction is principally non-magnetic stainless steel. The sample holder is of robust design and is readily adjusted. The mounting plate is removable without disturbing equipment or a sample fitted to it, and is electrically insulated from the supporting structure.

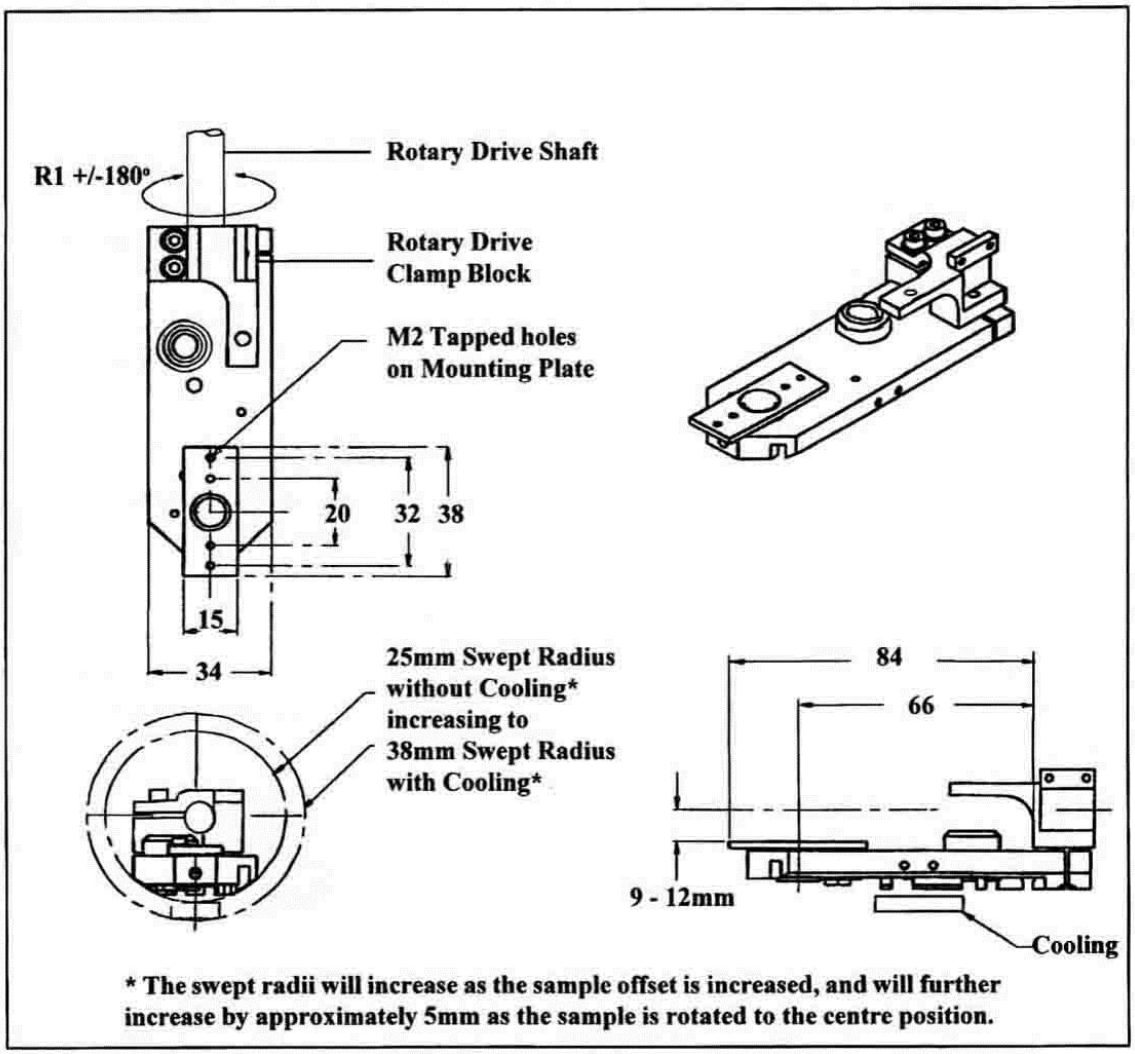

Figure 1 - The SH1 sample holder

1.1 Specification of the SH1 Sample Holder

Mating Rotary Drive Module	RD1, RD7
Secondary Rotation (Azimuthal)	+/- 1800 - preset only

Specimen Potential	2kVdc (10^{-4} Torr and below)
Pressure Range	Atmosphere to less than 10^{-11} Torr
Bakeout Temperature	250°C
Swept Radius	25mm including heating attachments, but without cooling attachments

1.2 Operation of the SH1

To alter the position of the surface of the specimen mounting plate relative to the primary axis of rotation, proceed as follows:

1) Release the M4 cap head bolt (located on the edge of the main body of the SH1 beneath the clamp block - see figure 1) retaining the clamping block pins to the SH1 body.

2) Adjustment may then be made to achieve the desired sample position, and the M4 bolt retightened.

The range of adjustment is from 9 to 12mm (see figure 1).

To adjust the secondary rotation (azimuthal) slacken the three screws which clamp the azimuthal bearing in position (on the back of the sample holder). Adjust the sample plate to the required position and then retighten the three screws.

1.3 Bakeout

The sample holder is fully bakeable to 250°C.

1.4 Spares for the SH1

Replacements for any part of the SH1 sample holder are available on request. The range of accessories for the SH1 is listed in section 4.

2.0 The SH2 Sample Holder

The SH2 sample holder (see figure 2) is constructed from high quality materials and has been designed to give accurate and reproducible movements. It is designed for use with the model RD2 rotary drive. The SH2 is very similar to the SHI (described in section 1), but is fitted with a precision mechanism which allows adjustment of the azimuthal angle during use.

Note:
The user is requested to exercise reasonable care in the use of this sample holder in order to avoid possible damage to the precision drive mechanism.

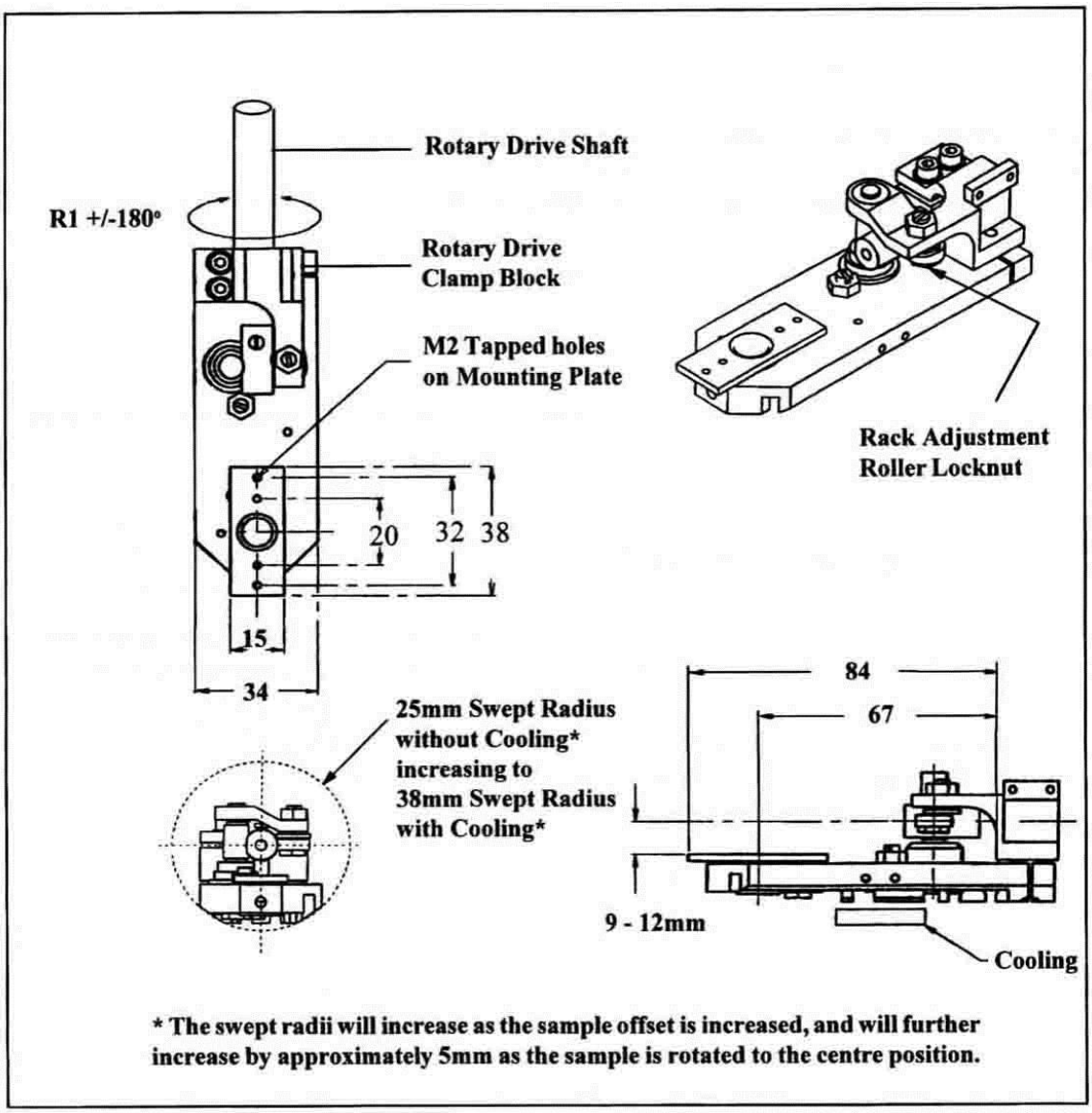

Figure 2 - The SH2 sample holder

2.1 Specification of the SH2 Sample Holder

Mating Rotary Drive Module	RD2
Construction	Stainless steel
Specimen Plate	Stainless Steel 38mm x 15mm, removable
Guidance Constraints	Sapphire Ball Bearings
Drive Mechanism	Wire belt Drive via Precision Rack and Pinion
Angular Motion (Azimuthal)	+/- 108^{o}
Angular Resolution (Azimuthal)	+/- 0.3^{o}
Maximum Specimen Voltage	2kVdc (< 10^{-4} mbar), 750Vdc with attachments
Pressure Range	Atmosphere to less than 10^{-11} mbar
Baking Temperature	250^{o}C
Swept Radius (mounting plate on axis)	25mm including heating attachments (may increase with thick samples) 38mm with cooling attachments

2.2 Construction of the SH2

The materials used are principally low magnetic stainless steel and all permanent joints are welded. The conversion of linear motion (from the RD2 rotary drive) to rotary azimuthal motion is achieved by means of a precision rack and pinion drive. The final drive to the sample plate is by means of a wire belt arrangement. Both the rack and pinion are located by miniature beryllium copper bearings. Provision is made for adjustment of the rack and pinion mesh (see section 2.4.3). The specimen mounting plate is insulated electrically from the body of the sample holder.

2.3 Limits of Rotation of the SH2

Rotation about the primary axis (of the RD2 rotary drive) can be continuous unless limited by attachments to the specimen. For example, if heating and/or cooling accessories have been fitted, rotation is limited to +/- 180^{o}. Rotation about the secondary axis is limited to +/- 108^{o}; however, the angular position of the specimen mounting plate is adjustable (by adjustment of the wire drive) relative to the drive mechanism, thus rotation can be about any desired datum.

2.4 SH2 Mechanical Adjustments

2.4.1 Adjusting the Mounting Plate Offset to the Primary Rotation Axis

Release the M4 cap head bolt (located on the edge of the main body of the SH2 beneath the clamp block - see figure 2) retaining the clamping block pins to the SH2 body. Loosen the set screws on the drive pulley and the adjustable spacer. The body may then be set at the required position, and the screws re-tightened. Ensure that no pre-load is applied to the bearings on the pinion shaft.

The range of adjustment is 9 to 12mm (see figure 2).

2.4.2 Setting the SH2 Rotation Datum

To adjust the angular position of the SH2 specimen plate, slacken the tensioning roller locknut (see figure 3). Rotate the sample plate to the desired datum position. Tension the wire to 0. 17Nm using a suitable torque screwdriver. Retighten the tensioning roller locknut.

Note: Ensure that the setting torque is not exceeded. Failure to do this may result in premature failure of the drive wire.

2.4.3 Adjusting the Rack and Pinion Mechanism

The meshing of the rack and pinion should be adjusted to allow the drive to run smoothly over the full extent of the travel with a minimum amount of backlash. If backlash is completely eliminated, the drive will be rough and damage to the gearing will result (see below). Should it be necessary to make this adjustment, proceed as follows (referring to figure 2).

1) Slacken the rack adjustment roller locknut.

2) Adjust the roller to give the required amount of rack engagement, and hence the required backlash. Do not attempt to remove the entire backlash; this could cause damage to the rack and pinion gears, and will result in the drive feeling "rough".

3) When the adjustment is complete, retighten the roller locknut and then check once more that the required backlash has been achieved.

2.5 Bakeout

The SH2 specimen attachment is fully bakeable to 250^{o}C.

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2.6 Maintenance

With the exercise of reasonable care in the use, the SH2 sample holder should give accurate and reproducible operation over an extended period. Only two adjustments (detailed in 2.4.2 and 2.4.3 above) are provided; either of these can affect the accuracy and life of the secondary rotation.

2.6.1 Replacing the Drive Wire

Should it become necessary, the drive wire can be replaced as follows (refer to figure 3, and to section 2.4.2 above):

1) Release the tension on the drive wire (see section 2.4.2).

2) Remove the old drive wire belt from the drive pulleys.

3) Fit the new drive wire belt (Part Code ZSHWDB) to the drive pulleys as shown in figure 2. Ensure that the wire is routed around the pulleys as shown in this figure.

4) Re-tension the wire to the correct torque setting as described in section 2.4.2.

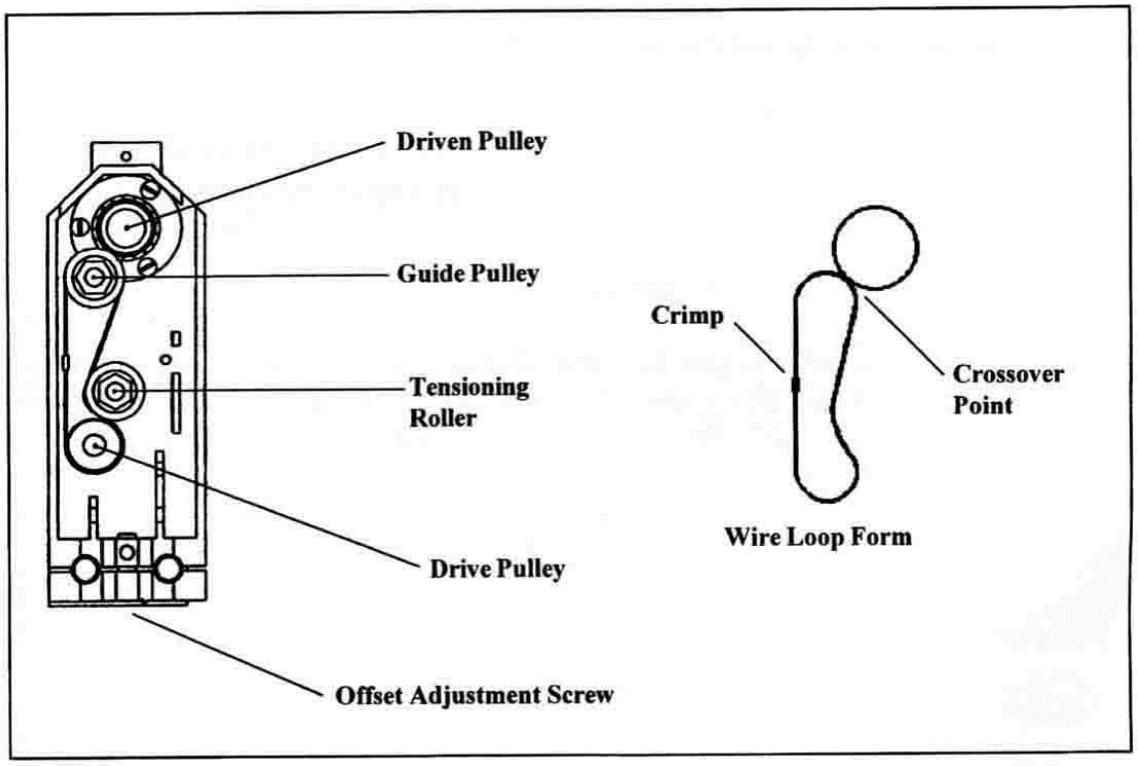

Figure 3 - Replacement of the drive wire

3.0 Spares for the SH2

Spare sapphire and beryllium-copper bearing sets, specimen mounting plates (with screws etc.) are available on application. A wire drive kit and wire drive belts are also available:

Part Code	Description
ZSHWDK	SH2 Wire Drive Kit including Torque Screwdriver and Drive Belts
ZSHWDB	SH2 Wire Drive Belts

4.0 Accessories for the SHI and SH2 Sample Holders

PartCode	Description
ZRD1	Rotary Drive (primary rotation)
ZRD2	Rotary Drive (secondary rotation)
ZLN Series	Liquid Nitrogen Cooling Accessory
ZHST Series	Non-inductive Resistive Heater Accessory
ZEBH Series	Electron Beam Heater Accessory
ZCLNHST Series	Combined Liquid Nitrogen Cooling and Resistive Heating Accessory
ZCLNEBH Series	Combined Liquid Nitrogen Cooling and Electron Beam Heating
ZSHESK	Electrostatic Shielding Kit for Heating Accessories

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Service and Repair Form

Declaration of Contamination of Equipment and Components

Serving and repairs will only be carried out if the conditions for Servicing and Repair are complied with in full, according to the VACGEN Ltd. Conditions of Sale. A summary of these requirements are included on the inside front cover of the Operating Instructions. The manufacturer will refuse to accept any equipment without a signed declaration attached to the OUTSIDE of the packaging. This declaration can only be completed and signed by authorized and qualified staff.

1 Description of Equipment and Components

Equipment Type……Model Number……
Serial Number…… Your Reference Number……

2 Reasons for return……
……
……
……
……
……

3 Condition of Equipment

YES ( ) NO ( ) Toxic?
YES ( ) NO ( ) Explosive?
YES ( ) NO ( ) Radioactive?
YES ( ) NO ( ) Corrosive?
YES ( ) NO ( ) Biological Hazard?
YES ( ) NO ( ) Other Harmful Substances?

Equipment and Components that have been contaminated WILL NOT be accepted without written evidence of decontamination.

5 Contamination Materials

List all the substances, gases and by-products that may have come in contact with the equipment, giving trade name, manufacture, chemicals names or symbols.
Please note that any of these listed, must be completely removed, so it is safe to handle and weld, without giving off health threatening gases. Please enter details below and/or attach data sheets
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……
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6 Legally Binding Declaration

I hereby declare that the information supplied on this form is complete and accurate.
There by stating that the goods offer no risk to health or safety
Organisation…… Name……
Country…… Job Title……
Post/ZIP code…… Telephone……
Email……
Signature…… Date……

Return goods to: Address at top
Phone: (0) 1424 851291 Fax (0) 1424 851489 (Form VGF33)