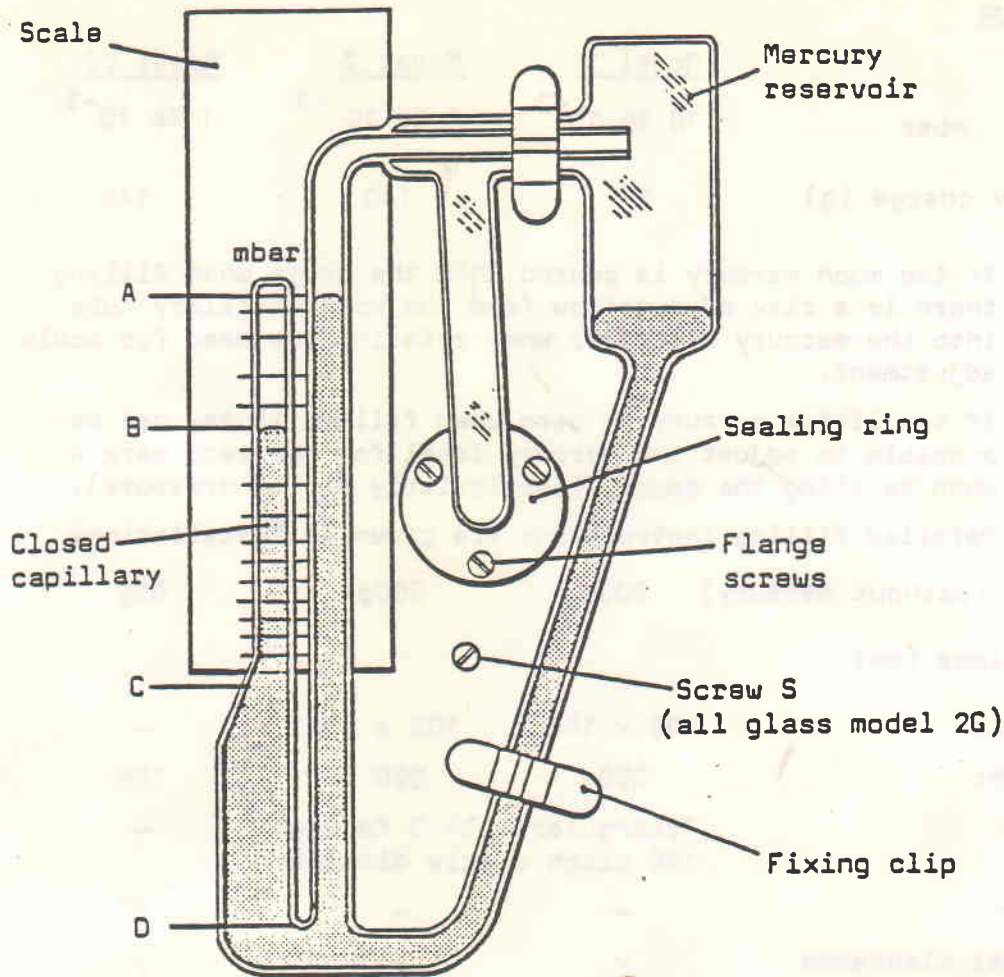


## Instructions

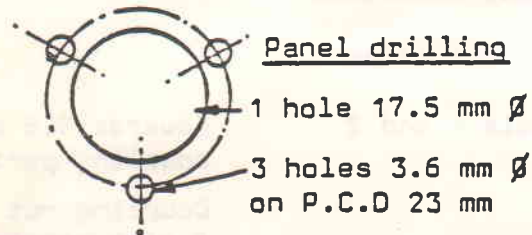
07-D063-13-881  
February 1980  
Supersedes  
07-D063-13-880

## VACUSTAT GAUGES

Model 1	Code	07-D063-13-000
2		07-D063-14-000
2G		07-D064-05-000



Art 318



## Description

The Vacustats are a family of three miniature McLeod gauges, designed for general laboratory or industrial use.

The gauge is operated by rotating the head. To permit this, the head is joined to the vacuum connexion through a rotary seal with two O-rings which are compressed by the three flange screws.

Normally, the capillary and measuring scale are kept horizontal; to make a measurement, the head is slowly turned through 90° to bring the scale and tube upright. The rotation causes the mercury to move so as to isolate (at D) a fixed volume of gas and compress it into the closed capillary tube C. When the mercury in the open capillary is level with the zero mark A on the measuring scale, the pressure is given directly by the height B of the mercury column in the closed capillary against the scale which is calibrated directly in mbar

Models 1 and 2 are free standing as supplied, but can also easily be panel mounted. Model 2G mounts directly on the vacuum system.

# Data

	<u>Model 1</u>	<u>Model 2</u>	<u>Model 2G</u>
Range mbar	10 to $10^{-2}$	1 to $10^{-3}$	1 to $10^{-3}$
Mercury charge (g)	97	140	140

Note: If too much mercury is poured into the gauge when filling there is a risk of overflow from the open capillary tube into the mercury reservoir when rotating the head for scale adjustment.

If too little mercury is used when filling it may not be possible to adjust the mercury level for the zero mark A when rotating the gauge, (particularly at low pressure).

Detailed filling instructions are given in Installation.

Weight (without mercury)	900g	900g	85g
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## Dimensions (mm)

Fascia	105 x 180	105 x 180	-
Height	220	220	159
Base	Triangular with 3 feet on 190 pitch circle diameter		-
Width	-	-	87
Radial clearance	-	-	92

## Vacuum connexion

Models 1 and 2 Edwards SCS screwed union; the following coupling parts are supplied:

Coupling nut	Code 08-C110-01-031
O-ring carrier	08-C110-01-036
O-ring (nitrile)	08-H021-20-027
Nozzle for 7mm hose	08-0063-13-004

Model 2G B14 cone  
Socket with tube supplied 08-H016-00-008

## Accessories

Mercury, triple distilled, 0.23kg	09-H034-00-001
Vacuum tube, rubber, 7mm bore	08-H021-00-003

# Installation

## Warning

Mercury is poisonous. Study the document M 08780 supplied.

### FILLING

#### Models 1 and 2

Check that the inside of the glassware is quite clean. Weigh out the required amount of triple-distilled mercury as specified above.

Remove the SC5 coupling nut, O-ring and O-ring carrier from the gauge.

Lay the gauge flat, face down, and carefully pour the mercury in through the vacuum connexion. Tilt the gauge so that the mercury flows into the reservoir; make sure none is left in the connexion tube. Stand the gauge up on its base, moving it slowly.

#### Model 2G

Remove the screw S; remove the glass tube and the female cone from the gauge. Proceed as for Models 1 and 2. Keep screw S to be replaced later.

### PANEL MOUNTING Models 1 and 2

Maximum panel thickness: 13 mm

Drill the panel as shown on the drawing.

Remove the SC5 coupling parts from the vacuum connexion.

While supporting the gauge head, remove the three mounting screws around the vacuum connexion so as to detach the complete head from the stand.

Handle the head carefully as it contains the mercury.

Mount the head on the panel using the original three screws.

### VACUUM CONNEXION

If the gauge is a replacement for an earlier model (one calibrated in torr) it will fit directly. For a new installation, see below.

The tube connecting the gauge to the vacuum system should always be as short as possible.

If mercury vapour must not be allowed to enter the vacuum system, include a cold trap in the branch tube.

#### Models'1 and 2 - Flexible connexion

Fit the adaptor nozzle to the gauge. Connect to the vacuum system with the shortest possible rubber hose.

Rubber hose 7mm i.d. x 17mm o.d. Code 08-H021-00-003

Specify the length required.

## Models 1 and 2 - Rigid connexion

Branch tube required: 6mm outside diameter. The tube may be left plain (for muff coupling) or fitted with an Edwards SC5 screwed coupling body.

The following parts are needed.

### For muff coupling to plain tube

Compression sleeve                      Code 08-C110-01-421 (pack of 10)  
O-ring, nitrile                            08-H021-21-027 (pack of 10)

### For screwed coupling

Screwed coupling body, SC5            Code 08-C110-01-401 (pack of 10)

## Model 2G

Fuse the female B14 cone (supplied with the gauge) to the vacuum system. The cone is made of borosilicate glass; soda glass joints can be supplied if required.

Smear a thin film of soft vacuum grease on to the large end of the male cone and press gently but firmly into the socket. Tighten the clip to secure the joint. Replace screw S. Check that the gauge rotates freely.

Grease:    Apiezon AP101                      Code 09-H023-01-044 (50g tube)

### Caution

Do not allow grease to enter the vacuum system. It will degas under vacuum.

## OPERATION

### DEGAS

Degas the gauge before using it. Pump down to a low pressure with the gauge horizontal. Turn the gauge slowly to the vertical position and back again. Continue pumping and occasionally turning the gauge until bubbles no longer appear between the mercury and the glass. Finally leave the gauge horizontal.

### READING PRESSURE

Turn the gauge slowly to the vertical position. Adjust the position slightly to bring the mercury level in the open capillary to the scale mark 0. Read the pressure from the mercury level B in the closed capillary C.

Return the gauge to the horizontal.

## Caution

Take care not to strain the glasswork, especially on Model 2G.

Never break the vacuum with the gauge vertical; it could shatter the glass.

Note: If the mercury column breaks in the capillaries, tap gently until it joins up again.

## Comparison with other gauges

Vacustats, being McLeod gauges, measure the pressures of permanent gases. Any vapours, including moisture, are likely to condense as the gas sample is compressed. The composition of the permanent gases does not affect the Vacustat.

Electrical gauges, including the Edwards Thermocouple, Pirani and Penning types, are affected by both the composition of the permanent gases and by vapours.

In comparing Vacustat readings with those of an electrical gauge, it is therefore necessary (1) to remove vapours by using a cold trap, (2) to know the composition of the permanent gas and to correct the reading of the electrical gauge accordingly.

## Maintenance

No routine maintenance is required.

The Edwards exchange-replacement scheme applies to Vacustats.

### CLEANING

If the glasswork gets contaminated internally by oil, grease or mercury scum, it can be cleaned as follows:

#### 1 Dismantle the gauge

Allow the pressure to rise to atmospheric.

Models 1 and 2

Remove the transparent cover. Remove the two saddle clips from the glasswork. Loosen - but do not remove - the three flange screws. Carefully withdraw the glasswork from the flange.

Pour out the mercury.

Model 2G

Remove screw S. Remove the three saddle clips. Carefully withdraw the glasswork. Pour out the mercury.

#### 2 Wash out grease

Wash with an organic solvent. Rinse with methylated spirit. Rinse with water.

## Warning

The acids specified below are highly corrosive and must be handled and disposed of accordingly.

#### 3 Dissolve mercury sludge

Use 10% nitric acid. Rinse with tap water and then distilled water.

#### 4 Clean the glass

Fill the glassware with a chromic acid\* solution and allow to stand for ten minutes. Drain and wash out well with tap water. Finally rinse with distilled water. Dry thoroughly by warming the glass gently while pumping it through a desiccant trap.

\* To make the chromic acid solution, take equal volumes of (1) concentrated sulphuric acid and (2) saturated solution of potassium bichromate in water.

Add the acid to the bichromate solution a little at a time while stirring. DO NOT add the bichromate solution to the acid.

#### 5 Re-assemble the gauge

Follow the dismantling instructions in reverse.

#### 6 Check the scale setting

The 0 line of the scale must be exactly level with the end of the closed capillary. If necessary, slacken the scale fixing screws and reset.

7 Refill with the correct weight of clean mercury.

8 Re-fit the gauge to the vacuum system as described under Installation.

### Spares

	Code No.
Gauge head glassware Model 1	07-0063-01-001
Model 2	07-0063-03-001
Model 2G	07-0064-02-001
Nozzle for hose connexion	08-0063-13-004
B14 socket with tube	08-H016-00-008
Rotary seal O-ring, VIT4A	08-H021-06-116

#### COMMUNICATION WITH EDWARDS

Any communication relating to the subject of this instruction should be addressed to Edwards High Vacuum or to the supplier from whom it was purchased.

Please specify:

- 1) The model, serial number and code etc.
- 2) The date of purchase.
- 3) Your order number and the suppliers sales reference.

Equipment should not be returned to the supplier without prior arrangement.

Damage in transit.

If any damage has occurred in transit, it is important to inform both the carrier and the supplier within three days of delivery.

WARNING	X	MERCURY - is dangerous to health and the toxic effects are readily recognisable - headaches, tiredness, nausea, diarrhoea, muscular tremors, kidney troubles etc.
MERCURY		

Mercury can be readily inhaled as a vapour, absorbed through the skin or ingested.

It should be noted that the vapour pressure is such that if sufficient liquid mercury is exposed in an enclosed area at normal temperature, the concentration of mercury vapour in the air may rise to more than 100 times the generally accepted maximum concentration of 50  $\mu\text{g}/\text{m}^3$ .

#### Storage and Handling

It is particularly important to control the surface area of liquid mercury exposed to the air and the following precautions should be observed during storage and handling:

1. Good general ventilation (preferably by mechanical means) should be provided.
2. Storage should be in air-tight or water-sealed vessels.
3. Containers of mercury should be kept on trays (plastic types are very suitable) which will catch and retain any spillage which may result from the breakage of glass containers or from other causes.
4. When pouring mercury from container, pour close to receptacle to avoid formation of droplets in the atmosphere. Use syphon method where practicable.
5. As a precaution against migration of mercury from the diffusion pump, the exhaust from the rotary backing pump should be vented outside the work room at a safe height.
6. Do not remove the diffusion pump from the system until the pump has cooled. Cover the pump inlet immediately after removal.



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- 3) your order number and the suppliers sales reference.

Equipment **MUST NOT** be returned to the supplier without prior arrangement.

### IMPORTANT Health and Safety

Under Section 3 of the Health and Safety at Work Etc Act 1974 every employer has a duty to conduct his business so as not to expose persons not in his employment to risks to their health and safety. When goods are returned to the supplier, therefore, warning must be given if their usage is likely to render the equipment hazardous in any way. Your attention is drawn to FORM HSC001 attached.

Edwards High Vacuum and its distributors reserve the right to refuse acceptance of any equipment returned which they have reason to believe may be hazardous.

### Damage in transit

If any damage has occurred in transit, it is important to inform both the carrier and the supplier within three days of delivery.

## PROCEDURE FOR RETURNING CONTAMINATED PUMPS TO EDWARDS HIGH VACUUM OR EDWARDS HIGH VACUUM DISTRIBUTOR

When returning a pump to EHV, the following procedure should be followed:

1. All fluid **must** be drained prior to despatching the pumps.
2. All pump outlets must be sealed with suitable blanking covers or PVC tape.
3. All accessories should be removed and if they require servicing, sealed in heavy-duty polythene bags and secured to the pallet with the pump.
4. Inlet and outer mist filters should be removed. All filter elements **must** be removed and disposed of as contaminated waste.
5. Any openings left by removing accessories must be sealed with suitable covers or PVC tape.
6. Pumps and accessories must be sealed in a heavy duty polythene bag and securely strapped to a suitable pallet (*the dimensions of which should not exceed 510mm by 915mm*).
7. The pallet must be labelled in accordance with current Packaging and Labelling Dangerous Substances regulations 1978 (SI No. 209) and subsequent amendments. At the present time (1985) the following labels should be used:
  8. The Service Department at EHV or EHV Distributor must be notified in writing of the nature of the hazard, the name of the carrier and anticipated delivery date, using Form HSC 001. This should be either Faxed (*Fax No. 0293 33453*) or sent by 1st class post to ensure that we have this information before we receive the equipment.
  9. A copy of form HSC 001 should be handed to the carrier who must be informed that the cargo may be contaminated and who should present this copy of HSC 001 with the delivery note at EHV.
  10. It is recommended that such pumps should only be transported in vehicles where the driver is in a separate cab, *eg open back lorry*.
  11. Failure to comply with this procedure will lead to delays in servicing the equipment.



**MAY CONTAIN TOXIC  
OR CORROSIVE CHEMICALS**



## HEALTH AND SAFETY CLEARANCE FORM HSC 001

1.0 This form must be used when returning pumps and equipment for service at EHV or EHV distributor as per EHV procedure.

2.0 A completed copy of this form should be Faxed (Fax No. 0293 33453) or sent by 1st class post to ensure that we have this information before we receive the equipment.

A further copy should be handed to the carrier with the equipment.

3.0 Failure to complete the form or comply with the procedure will lead to delays in servicing the equipment.

4.0 Please complete the following sections:

4.1 Pump/Equipment Type .....

4.2 Serial No. ....

4.3.0 Details of all substances pumped.

4.3.1 Chemical names:

(a) .....

(b) .....

(c) .....

(d) .....

4.3.2 Precautions to be taken in handling of these substances:

(a) .....

(b) .....

(c) .....

(d) .....

4.3.3 Action to be taken in the event of human contact or spillage:

(a) .....

(b) .....

(c) .....

(d) .....

4.4 Any further information which you consider relevant:

4.5 Please complete section 4.5.1 if substances are not toxic or hazardous or 4.5.2 if they are.

4.5.1 I hereby confirm that the equipment specified above has **not** pumped or come into contact with any toxic or hazardous substances and that the equipment has been drained of lubricant.

Signed: .....

Name: .....

Position .....

For and on behalf of: .....

Date .....

4.5.2 I hereby confirm that the only toxic or hazardous substances that the equipment specified above has pumped or been in contact with are named above, that the information given is correct and that the following actions have been taken:

1. The equipment has been drained of lubricant.

2. The inlet/outlet ports have been sealed and the equipment has been securely packed and labelled in accordance with EHV procedure.

3. The carrier has been informed of the hazardous nature of the consignment.

Signed: .....

Name: .....

Position: .....

For and on behalf of: .....

Date: .....

4.6 Carrier to be used: .....

Delivery date to EHV: .....

### IMPORTANT

Before returning any product for service this form must be completed and sent to the Edwards company or official distributor undertaking the service.