

This instruction manual provides general instructions for the Vacmobile MODULAR 4S (previously SVM 4S) series of vacuum systems. This series of machines accommodates a number of vacuum pump models. Service information specific to a pump model should be obtained from the pump maker's information.

General information	
<b>Vacuum pump</b> (May be 1 or 2)	Refer to model plate on pump(s).
<b>Pumping capacity</b>	Refer to model plate on pump(s).
<b>Maximum vacuum</b>	Refer to model plate on pump, typically better than 20 mbar, 98% vacuum, 15 Torr, 29.3" Hg, -14.4 psi, -99.3 kPa.
<b>Resin catchpot</b> (May be 1 or 2)	12 litres (3.1 US gallons) for each catchpot.
<b>Trap lid connections</b>	With pressed steel lid - up to 4. With aluminium lid - up to 8. Connections are available in 4 optional sizes to suit the following <b>outside diameter</b> extruded tubes: 3/8" to 10 mm, 1/2" to 13 mm, 5/8" to 16 mm, or 19 mm to 3/4".
<b>Power supply</b>	Refer to model plate for machine. Typically 230 V, 50/60 Hz, or 110 V/60 Hz.
<b>Dimensions</b>	<b>Assembled:</b> Length 775 mm (30.5") Width 490 mm (19.3") Height 1,170 mm (46.1") (Varies slightly with trap options)  <b>With trap(s) and handles removed for transport:</b> Length 680 mm (26.8") Width 490 mm (19.3") Height 638 mm (25.1")
<b>Weight</b>	Varies with pump model, from approximately 47 kg (104 lbs) for 1 pump + 1 trap 101 kg (223 lbs) for 2 pumps + 2 traps



1 pump and 1 resin trap

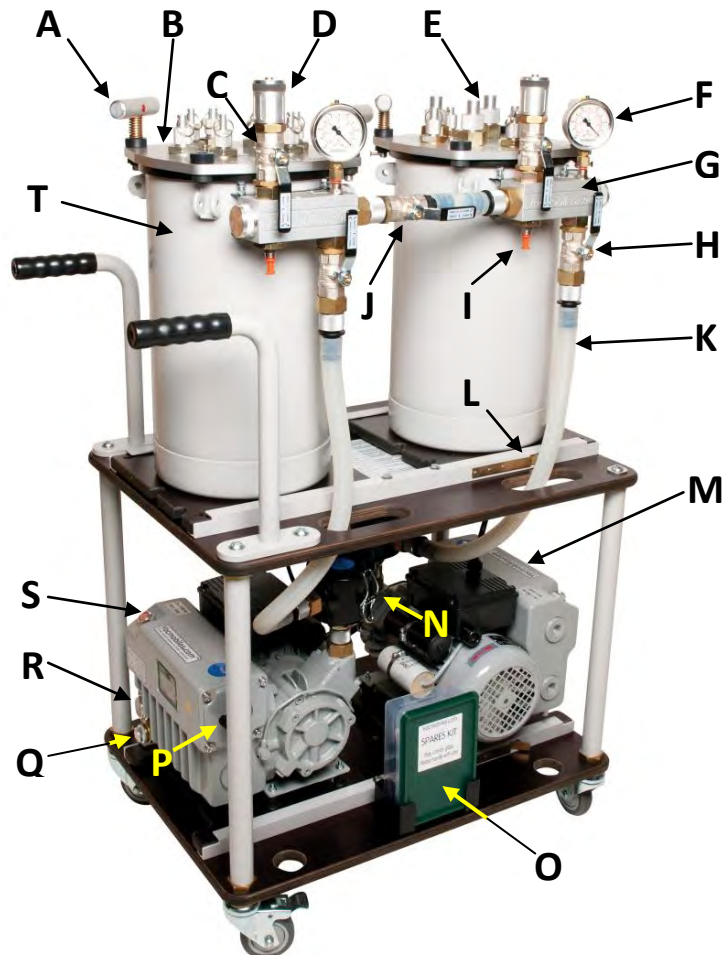


2 pumps and 1 resin trap



2 pumps and 2 resin traps

Main parts – viewed from manifold side  
(Typical parts shown, not necessarily fitted to all machines)



## Key

A Resin trap lid handle (shown for aluminium lid)  
 B Resin trap lid (aluminium lid shown)  
 C Isolation valve for vacuum regulator  
 D Vacuum regulator  
 E O-ring sealed vacuum tubing gland  
 F Vacuum gauge (glycerine filled)  
 G Manifold block (type may vary)  
 H Vacuum pump isolation valve  
 I Absolute pressure gauge connection  
 J Trap interconnect valve (only on twin-trap units)

K Vacuum pump hose  
 L Panel latch  
 M Vacuum pump (may be 1 or 2)  
 N Pump inlet filter  
 O Spare parts box  
 P Vacuum pump exhaust port  
 Q Oil drain plug  
 R Oil level indicator  
 S Oil filler plug  
 T Resin trap outer body

### SAFETY

***Any damaged electrical components on the machine should be repaired or replaced by a qualified electrician before the machine is used.***

***Disconnect the power supply before servicing the pump or its motor. If the power cord is damaged replace it immediately.***

A high level of vacuum is generated. ***Hoses from the machine should not be applied to any part of the body, especially sensitive tissue such as the eyes or ears.***

When used for clamping or lifting, large forces can be generated. ***Care should be taken to avoid trapping any part of the body between clamping surfaces.***

Vacuum may be lost in the event of power or mechanical failure. ***Vacmobiles must not be used for any lifting operation where loss of vacuum could be dangerous.***

This machine is intended for use in dry environments. ***Do not use in wet conditions and do not clean by washing with a liquid spray.***

The electrical components of this machine are not explosion proof. ***Do not use in a potentially explosive atmosphere.***

### LIMITATIONS & CAUTIONS

**The vacuum pump must not be allowed to ingest resin or other liquids.**

**The system must not be operated without a resin catchpot in the resin trap.**

**The vacuum pump must be filled with oil before start-up.**

**The machine must only be transported and operated with its base panel horizontal.**

**The Vacmobile must not be used as a vacuum cleaner. It is designed for use in composite manufacturing processes such as vacuum infusion, vacuum bagging over wet laminate, vacuum bagging over pre-preg and similar applications.**

**Do not lift machine by its pipe work, or attempt to re-tighten any internal joints. Lift from the machine panels or the handles only.**

**Ambient temperature limits.**

**MINIMUM** allowable operating temperature 10°C (50°F)

**MAXIMUM** allowable operating temperature 40°C (100°F).

### PREPARING FOR USE

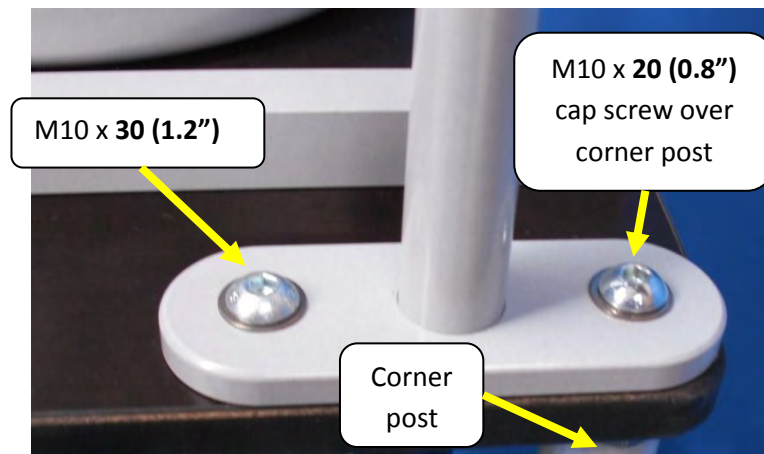
#### Lock the castors prior to working on the machine

Lock castors before doing any work on the machine.



#### Fit handles to the top panel

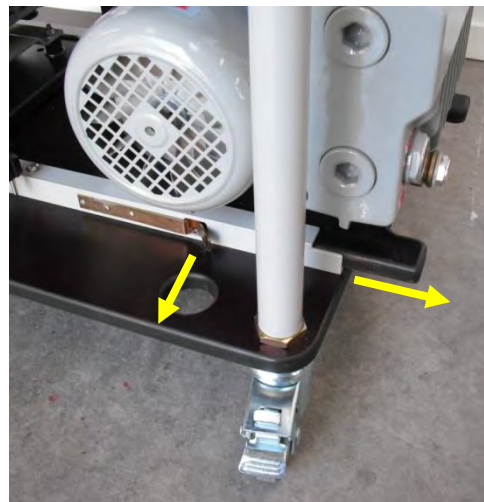
Fit handles using the bolts supplied. Note that the shorter bolt fits over the corner post.



#### Slide pump out one notch before oil filling (EXCLUDING EM12/B PUMP)

To prepare for adding oil to the pump, unlatch the panel locking spring and slide the pump out one notch, about 75 mm (3").

**THIS STEP NOT REQUIRED FOR EM12/B VACUUM PUMP. THIS PUMP MAY BE FILLED IN PLACE**

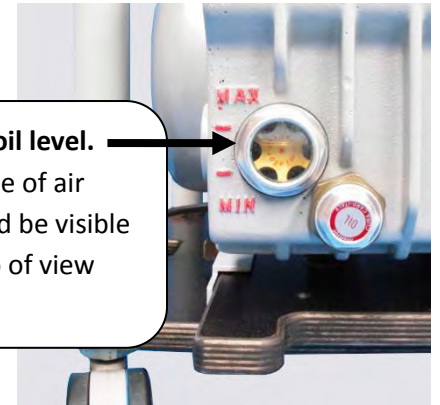
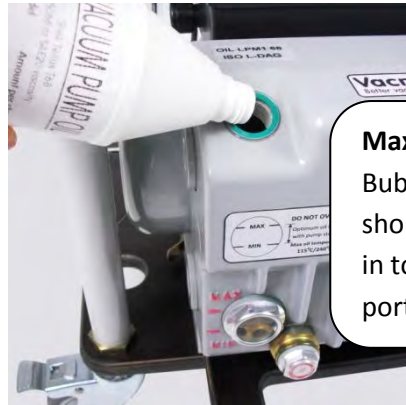


### ADD OIL TO THE VACUUM PUMP!

The pump must be filled with the correct grade of oil before use. For the following pump models, the correct grade will be an ISO 68 (SAE 20) vacuum pump oil. Approximate fill volumes are:

Pump Model	Amount ml/pints
PVR EM12/B	330 ml/0.7 pint
PVR EM20/B	450 ml/0.9 pint
Becker U4.20	450 ml/0.9 pint
PVR EM28/B	750 ml/1.5 pints

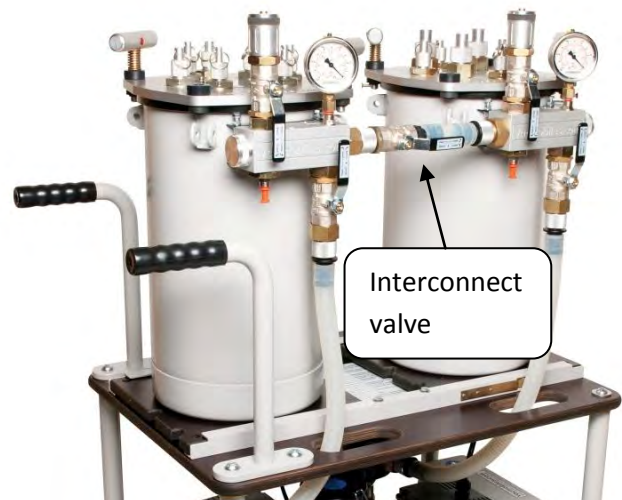
**DO NOT OVERFILL! Fill to  $\frac{3}{4}$  level on the sight glass maximum.**



### Fit the resin trap(s)



Single traps can be positioned at either end. The manifold can face the end of the machine or the parts box side.

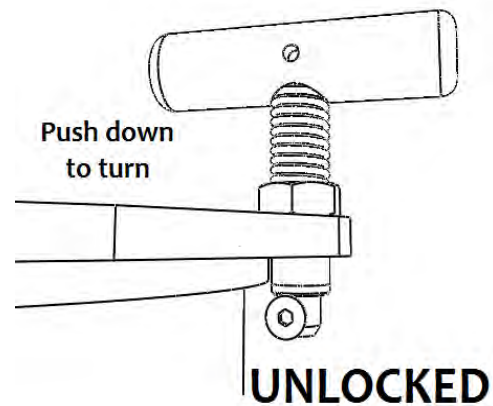


With twin trap machines, if the 2 traps are to be interconnected, they need to be positioned as shown, with both manifolds situated on the parts box side of the machine.

## Removing the resin trap lid (aluminium lid only)

To remove the aluminium resin trap lid, push down on the handles and rotate them until the cap screw below the handle disengages from the trap body. With both cap screws disengaged, the lid may be lifted off.

If the lid gasket is stuck, “bump” the lid with the palm of your hand.



## CHECK THERE IS A CATCHPOT IN THE TRAP!

The machine must not be used without a catchpot in the resin trap!

For resin degassing, a polyethylene bucket is available as an option. The polyethylene bucket must not be used for catching large volumes of exothermic resin, as there is a risk it will melt.

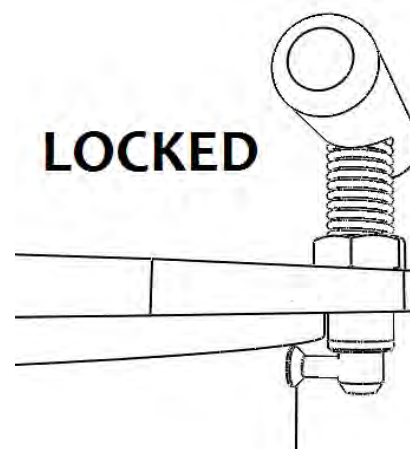
IF USING THE COLLAPSIBLE CATCHPOT, REFER TO SPECIAL INSTRUCTIONS ON PAGE 17



## Fitting the resin trap lid (aluminium lid only)

Before fitting the lid, check that the cap screws below the handles face away from the resin trap body.

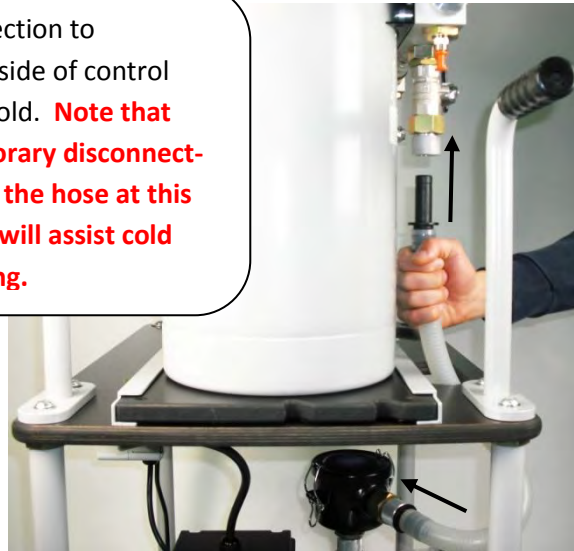
Position the lid on the trap and rotate the two handles until the two cap screws lock underneath the lip on the trap body.



## Connect the resin trap(s) to the vacuum pump(s)

1. Check that the hollow aluminium gland nuts are slightly loose on the connection points below the resin trap control manifold and on the pump's inlet filter.
2. Insert the black plastic ends of the silicone rubber hose into the 2 connections as shown.
3. Tighten the aluminium gland nuts hand tight only. Excessive torque will not be required.

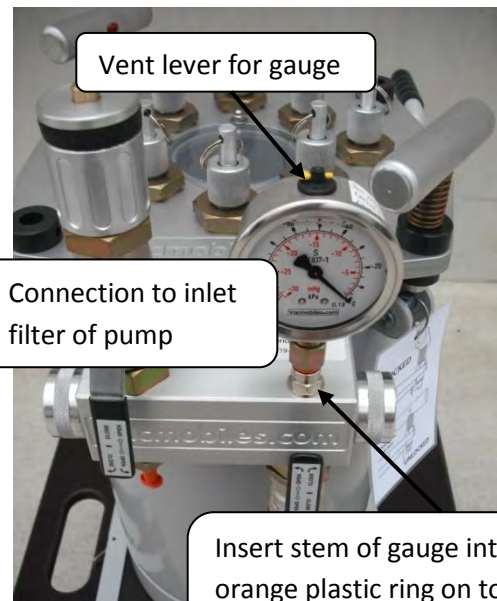
Connection to underside of control manifold. **Note that temporary disconnection of the hose at this point will assist cold starting.**



## Fit the vacuum gauge and vent it

1. The vacuum gauge will have been packed in protective padding for transport. Unpack it and insert the gauge stem into the orange coloured socket on top of the control manifold.
2. When ready to use the machine, flip the yellow lever on top of the gauge to the OPEN position. This allows the gauge to vent to atmosphere.

Note: To remove the gauge for future transport, push down on the orange socket to release the lock.



### Connect and retain the power cord

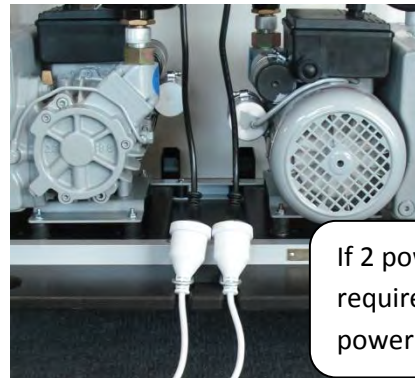
Connect the power cord(s) and retain as shown.

If the power supply permits, dual pumps may be supplied from one power outlet. Check current rating on pump nameplate.



Retain the power cord in one of the clip recesses

If a single power supply is insufficient for a dual pump machine, run 2 power cords from 2 separate power outlets and retain each one separately.

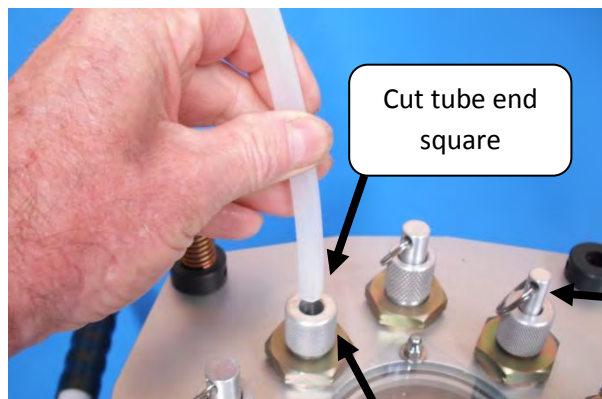


If 2 power supplies are required, retain each power cord separately

### Blanking plugs and vacuum tubing connections

The vacuum tubing connections are designed for smooth walled extruded vacuum tubing, usually translucent polyethylene. To fit a tube:

1. Unscrew the knurled aluminium nut approx half a turn
2. Pull out the blanking plug and store safely for re-use
3. Cut tube end square with a tubing cutter and push through the hollow gland nut until it comes to a firm stop
4. Tighten the gland nut finger tight only.



Cut tube end square

Blanking plug. Keep for re-use!

Tighten gland nuts finger-tight only



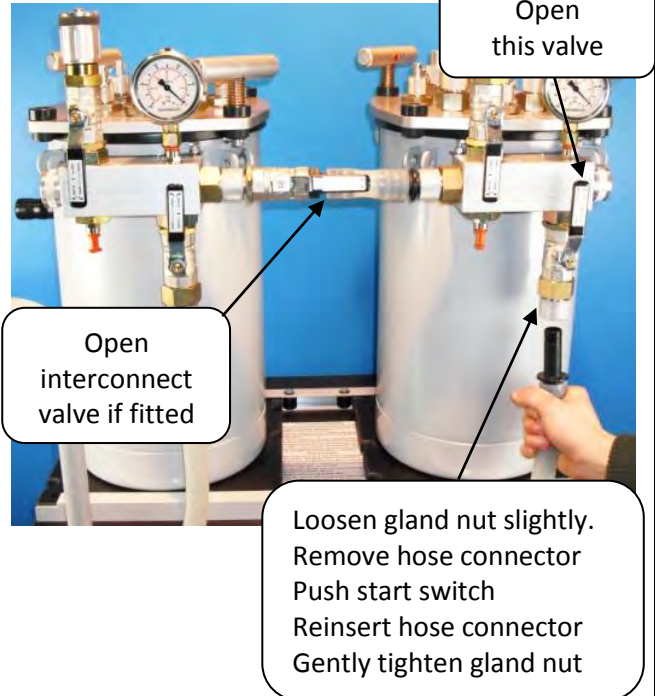
### Cold start-up (less than 20 °C/70 °F)

Oil sealed rotary vane vacuum pumps have a very high compression ratio and can be difficult to start in cold conditions. For easy cold starts, there should be a completely free flow of air through the pump. This is best achieved as follows:

1. Loosen the gland nut at the top of the hose from each pump by approximately 1/2 turn (or just from one pump if the interconnect valve is open)
2. Pull out the hose connection
3. Operate the start switch for each pump
4. As soon as the pump(s) have started, replace the hose connection and gently tighten the gland nut.

If there are 2 pumps and 2 resin traps which are not interconnected, start both pump separately as above.

If the pump temperature is above 20 °C (70 °F), the pump may be started with the hose connected and the valves in any position.

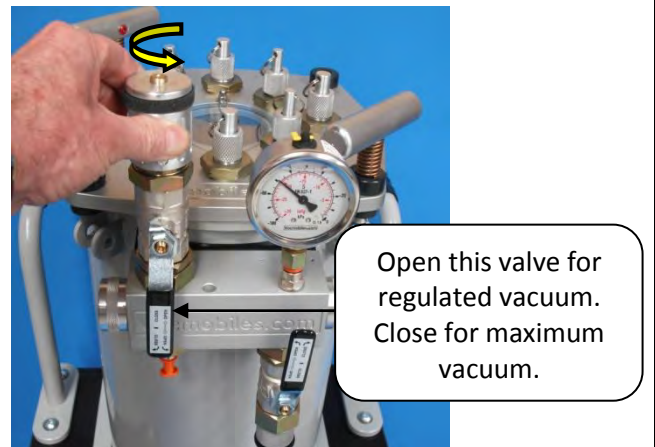


### Adjusting the vacuum level

For a regulated level of vacuum, open the valve below the vacuum regulation valve. Adjust the vacuum level by turning the aluminium cap on the vacuum regulation valve.

Some resin systems such as polyester and vinyl ester may require a reduced level of vacuum to avoid resin "boil-off". Check with your resin supplier, or set the vacuum to -75 kPa (22.5" Hg).

For maximum vacuum, close the valve below the vacuum regulator.



### Special note for machines fitted with 2 pumps – when only one pump is operating

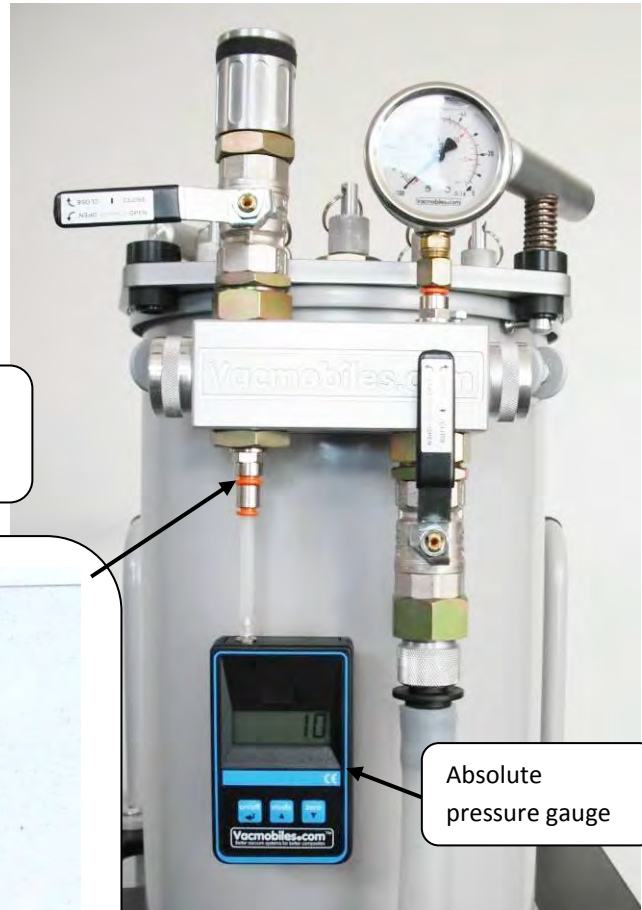
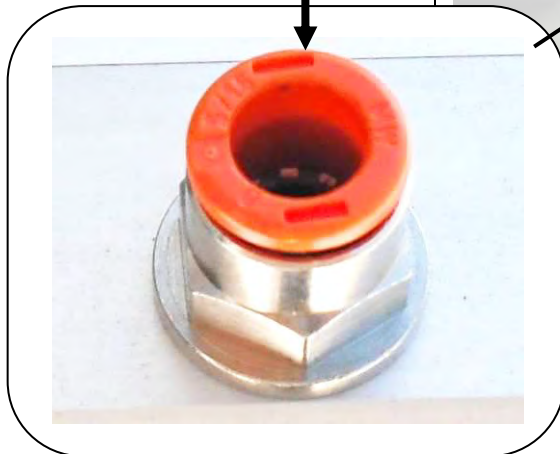
In applications where 2 vacuum pumps are connected to the same resin trap, or where the 2 resin traps are connected together – but only one pump is operating - it is good practice to close the valve above the stopped pump. While the vacuum pumps have internal non-return valves, it is possible for the non-return valves to jam in the open position. This could potentially result in oil being sucked out of the stopped pump.

### Fitting of absolute pressure gauge (optional accessory)

#### Fitting of absolute pressure gauge (optional accessory)

An absolute pressure gauge is useful for precision vacuum measurement, faster detection of vacuum leaks and the detection of water vapour. Plug the gauge into accessory socket provided. (Note that socket position may vary from one machine model to another.)

To release accessory from socket, push orange ring toward base of fitting



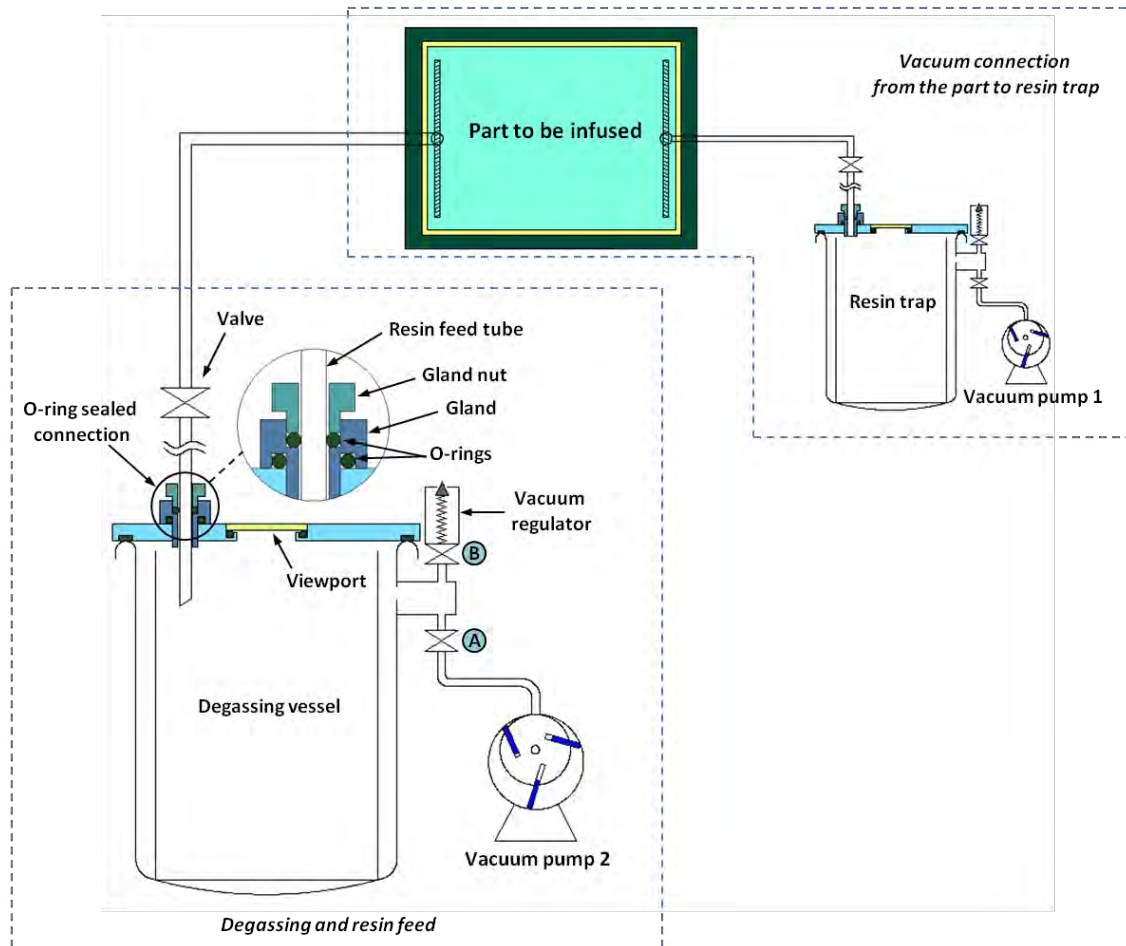
### Use of torch illumination kit accessory

If a torch kit has been provided to improve visibility inside the vessel, simply stand the torch kit over the small glass viewport.



### Operation as a degassing vessel

The RT19 may be used for degassing small batches of resin, say up to 4 litres (1 US gallon). For instructions, please refer to our detailed note "Feeding degassed resin to infused parts". This may be downloaded from the Vacman's Notes section of [www.vacmobiles.com](http://www.vacmobiles.com). An excerpt appears below:



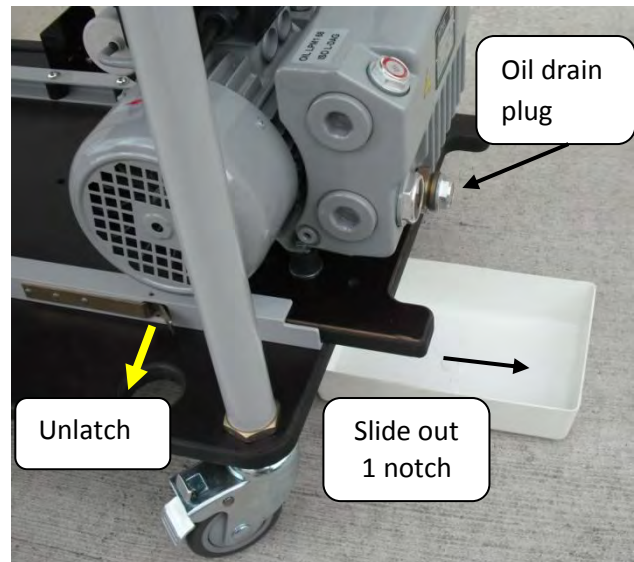
### OIL CHANGING – EVERY 500 HOURS, OR WHEN OIL IS NOTICEABLY DISCOLOURED

Regular pump oil changes and dust removal from the motor and pump services will prolong pump life. While 500 hours is the maximum recommended service interval, the pump should be serviced as soon as the oil becomes noticeably discoloured.

#### Draining the oil

**Make sure the old oil is hot before draining it – after the pump has been running for at least 1 hour.**

1. Lock castors
2. Unlatch base panel of pump and slide pump out 1 notch (about 75 mm, or 3")
3. Place an oil collection container tray of at least 1litre (2 US pints) capacity under the oil drain outlet
4. Undo the oil drain plug with the appropriate wrench:  
For PVR EM12 pump – 17 mm (11/16") AF socket  
For PVR 20/28 pumps – 22 mm (7/8") AF socket  
For Becker pumps – 8 mm (5/16") Allen wrench  
**A sharp anti-clockwise tap on the wrench with a soft hammer will help release the plug.**
5. To speed oil drainage, also remove the oil filler plug.
6. Dispose of old oil carefully; bearing in mind that it will be hot.



Oil drain plug

Unlatch

Slide out 1 notch

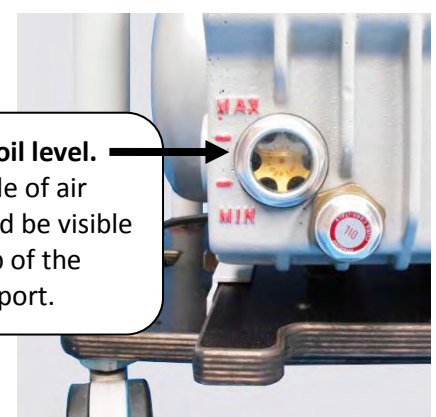
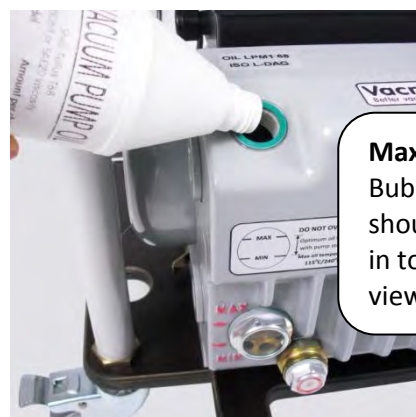
Drain tray. At least 1 litre (2 US pints)

#### Add new oil

Refill the pump with the correct grade of oil. For the following pump models, the correct grade will be an ISO 68 (SAE 20) vacuum pump oil. Approximate fill volumes are:

Pump Model	Amount ml/pints
PVR EM12/B	330 ml/0.7 pint
PVR EM20/B	450 ml/0.9 pint
Becker U4.20	450 ml/0.9 pint
PVR EM28/B	750 ml/1.5 pints

**DO NOT OVERFILL! Fill to ¾ level on the sight glass maximum.**



**Max oil level.**  
Bubble of air should be visible in top of the view port.

### Remove surface dust at each oil change

Use a compressed air nozzle to remove dust from pump and motor surfaces whenever the oil is changed. This is most effective when the pump is running but do not insert nozzle into moving motor fan!



**DO NOT INSERT NOZZLE  
INTO MOVING MOTOR FAN!**

### Inspect the inlet filter element at each oil change

Unclip the filter cap and inspect the inlet filter element. Replace if badly contaminated.

**Make sure that loose dust does not fall into the inlet of the pump!** If badly contaminated, remove the complete filter unit before removing the filter element.



### REPLACE EXHAUST OIL MIST FILTER – EVERY 2,000 HOURS, OR WHEN MOTOR OVERLOAD TRIPS

A very fine filter is fitted inside the exhaust cavity of the vacuum pump. (Refer to pump maker's exploded parts drawing). In heavy use, with insufficient oil changes, or with contamination in the incoming air stream this filter will become blocked. Blockage of the filter may show up in the following ways:

- Electric motor overload tripping out (especially on start-up)
- Oil becoming black and replacement oil discolouring rapidly.

The filter should be replaced whenever these problems occur, or as routine maintenance at approximately 2,000 operating hours.

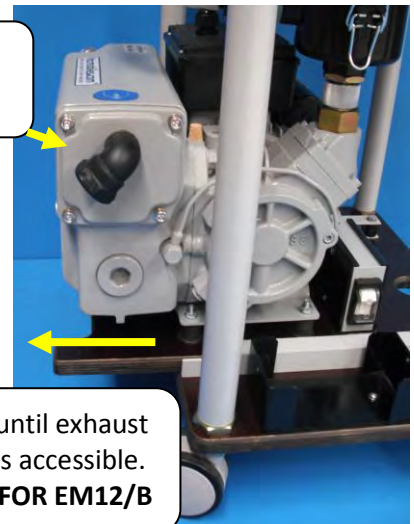
#### Parts required for exhaust oil mist filter change

<p>The illustrated parts are required for this service. Also have access to the exploded parts drawing for the appropriate pump model. Refer to pump section of this manual.</p>	 <p>Exhaust oil mist filter (typical)</p>	 <p>Cover gasket (typical)</p>																			
			<table border="1"> <thead> <tr> <th>Pump model</th> <th>Part Number</th> </tr> </thead> <tbody> <tr> <td>Becker U4.20</td> <td>BKR 965413</td> </tr> <tr> <td>PVR EM12/B</td> <td>PVR 004926</td> </tr> <tr> <td>PVR EM20/B</td> <td>PVR 004538</td> </tr> <tr> <td>PVR EM28/B</td> <td>PVR 004457</td> </tr> </tbody> </table>	Pump model	Part Number	Becker U4.20	BKR 965413	PVR EM12/B	PVR 004926	PVR EM20/B	PVR 004538	PVR EM28/B	PVR 004457	<table border="1"> <thead> <tr> <th>Pump model</th> <th>Part Number</th> </tr> </thead> <tbody> <tr> <td>Becker U4.20</td> <td>BKR 00300040300</td> </tr> <tr> <td>PVR EM12/B</td> <td>PVR 004992</td> </tr> <tr> <td>PVR EM20/B</td> <td>PVR 004539</td> </tr> <tr> <td>PVR EM28/B</td> <td>PVR 004222</td> </tr> </tbody> </table>	Pump model	Part Number	Becker U4.20	BKR 00300040300	PVR EM12/B	PVR 004992	PVR EM20/B
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#### Procedure for replacing the exhaust oil mist filter

1. If the pump oil is dirty, first run the pump until hot - ideally about 1 hour. Stop the pump and drain the oil as previously described. If the oil is very dirty, replace the drain plug and run the pump briefly (less than 5 seconds). This will remove oil from the pumping chamber. After stopping the pump, remove the drain plug and drain the remaining oil. Do not run the pump with the drain plug removed!
2. Replacement of the exhaust oil mist filter may be performed with the pump in the docking cart, or with the pump removed and placed on a workbench. If performed in the docking cart, unlatch the pump and slide it out until all of the exhaust cover bolts become accessible.
3. Barely loosen the cap screws using a 5 mm AF Allen wrench.
4. Give the cover a sharp sideways tap with a soft faced hammer to break the paint film over the gasket which seals the cover to the exhaust box casting. This may reduce the risk of breaking the gasket when the cover plate is removed. Completely remove the cap screws holding the cover in place.

Exhaust cover  
(typical)



Slide pump out until exhaust cover cap screws accessible.  
**NOT REQUIRED FOR EM12/B**

5. Once the exhaust cover plate is removed, the exhaust oil mist filter will be accessible. Depending on pump model, remove the filter with either an Allen wrench or by removing the fixing knob by hand
6. The filter cannot be cleaned and must be replaced with a new one
7. Inspect the gasket and replace if necessary
8. Refit the cover plate, noting that the lowest cap screw on some pump models may have a copper washer to prevent oil leakage. If a copper washer is present make sure it is fitted to the lowest cap screw.

Exhaust oil  
mist filter  
(typical)



### Clean the gas ballast filter – annually and whenever oil mist is replaced

Mounted on top of the pump is a small external filter. Its purpose is to introduce a small flow of filtered air into the pump to help discharge contaminants such as water vapour and styrene vapour from the pump. In dusty atmospheres, this external filter may block. When the gas ballast filter becomes blocked the pump oil will contaminate more quickly. In most environments, the gas ballast filter should be cleaned annually. In very dusty atmospheres, more frequent cleaning may be necessary.

To clean the filter.

1. Using compressed air, first blow all loose dust from all external surfaces of the vacuum pump – including around the gas ballast filter
2. Unscrew the gas ballast filter by hand
3. Blow the filter clean with compressed air from the inside and check that air passes freely through the filter
4. Replace the filter.

Gas ballast filter  
(typical)



## RESIN TRAP MAINTENANCE (PERFORM AS REQUIRED)

### Remove hardened resin from connection glands

Remove aluminium gland nuts.  
Remove and inspect O-rings.  
Inspect internals of gland fitting and clean out accumulated resin. If necessary, drill out resin from **UNDERSIDE** of the fitting using the appropriate drill bit. Twisting the bit by hand will usually suffice.

#### Tubing gland size

#### Drill bit size

10 mm (3/8") OD tube	8.5 mm (21/64")
13 mm (1/2") OD tube	10.5 mm (13/32")
16 mm (5/8") OD tube	14 mm (17/32")
19 mm (3/4") OD tube	17.5 mm (11/16")

**DO NOT DRILL OUT THE TUBE STOP!**



### Apply liquid mould release to connection glands

After removing hardened resin, coat all internal surfaces with liquid mould release.  
Refit O-rings, replacing any damaged ones.  
Replace aluminium gland nuts, but do not tighten  
Fit tube or plugs as required and hand tighten gland nuts.



### Apply liquid mould release to resin trap body

Apply liquid mould release to all internal surfaces (and external surfaces if you wish). Apply a minimum of 2 wiped on coats or as recommended by the mould release supplier.



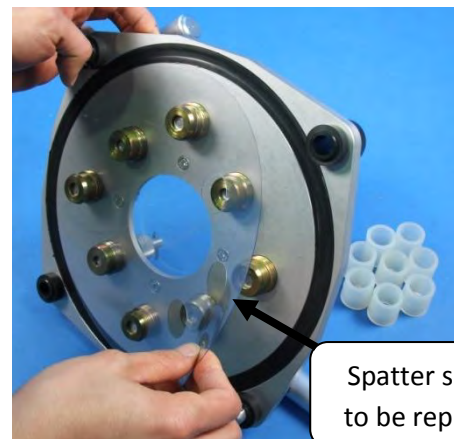
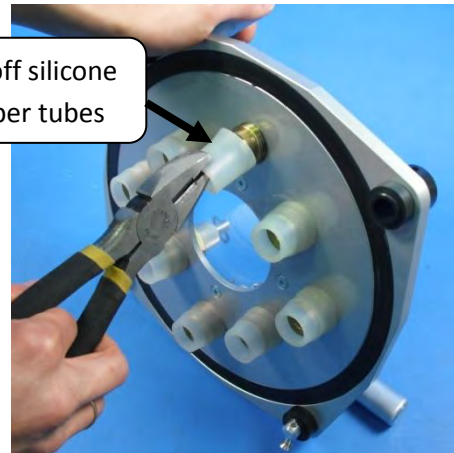


## Replacement of spatter shield on the underside of the resin trap lid

If the PVC spatter shield underside of the lid become obscured, replace it as follows:

1. Pull off silicone rubber tubes and break off any adhering resin by deforming the tube a few times
2. Fit a new spatter shield
3. Push the silicone tubes back over the projecting ends of the gland nipples until the shield is in firm contact with the underside of the lid.

Pull off silicone rubber tubes



Spatter shield to be replaced

### INSTRUCTIONS FOR PREPARING COLLAPSIBLE CATCHPOT FOR USE

While our rigid cardboard catchpot is very effective for catching resin that may reach a high temperature during exotherm, the rigid catchpots are expensive to freight. We are experimenting with a collapsible catchpot which will freight more cost effectively. This seems to work well up to about 200 °C (400 °F) but may weep slightly when subject to higher temperature. To provide security against resin leakage, we are providing a high temperature nylon outer bag for added protection. The collapsible catchpot will need to be discarded when full, but the nylon outer bag should be reusable. To prepare the collapsible catchpot for use, proceed as follows:

#### Extend the collapsible catchpot

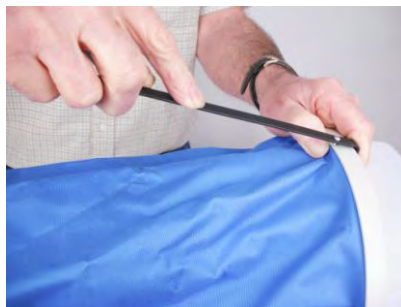
Extend the bag and note the marks on both end rings at right angles to the handle axis.



#### Fit one end of the extender rib

Hook one of the extender ribs over one of the plastic bucket rings approximately at the marked position. Exact positioning is not critical.

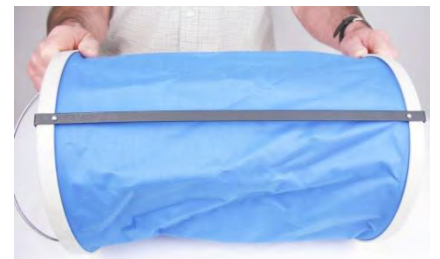
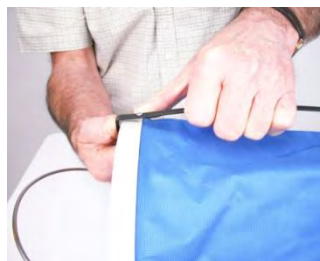
Push down on the rib until clips tight over the plastic ring.



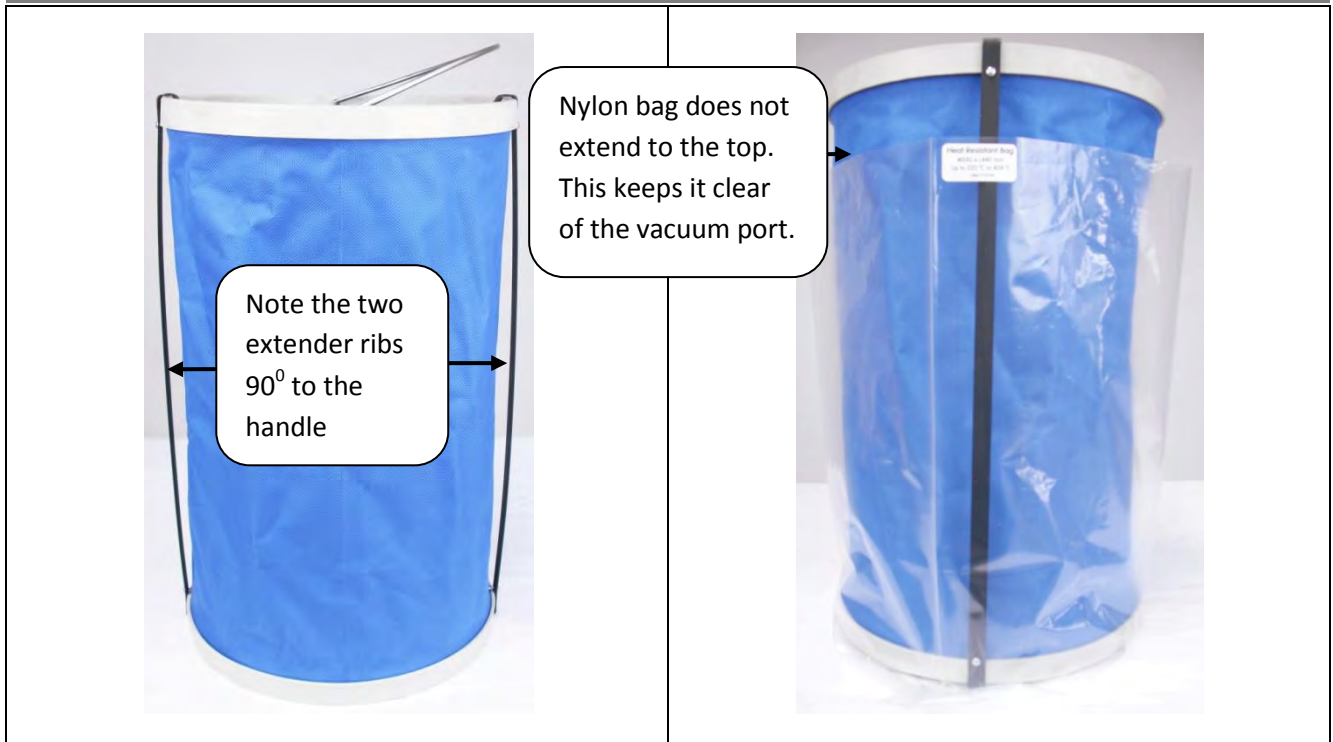
#### Clip on the other end of the extender rib

Clip the other end of the extender rib to the opposite plastic ring. Bow the rib out wards slightly to make it easier to fit, then push down

Repeat process for the second extender rib.



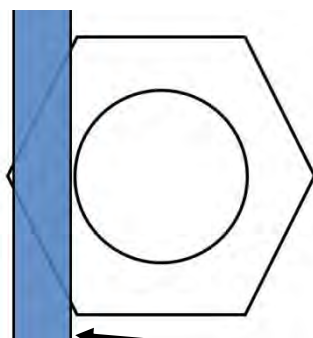
### Assembled catchpot | Assembled catchpot with nylon outer bag



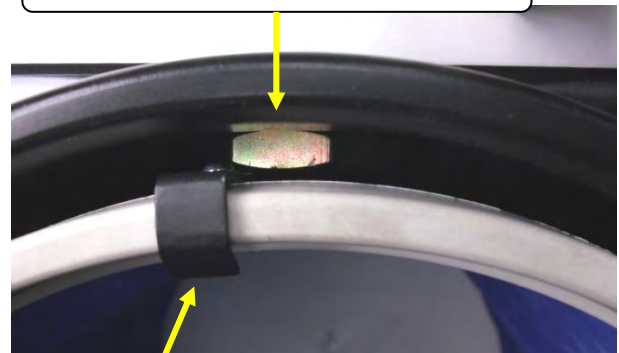
### Positioning the collapsible catchpot inside the RT19 trap

Position one of the extenders so that it touches one side of the hollow vacuum pump connection port. This will prevent the collapsible catchpot material being sucked into the vacuum port.

**MAKE SURE THE CATCHPOT EXTENDER DOES NOT OBSCURE THE VACUUM PORT.**



Hollow vacuum pump connection port



Catchpot extender rib offset to the side of the pump connection port