



This instruction manual provides general instructions for the Vacmobile 20/2 vacuum system. This machine may use either the Becker U4.20 or the PVR EM 20/B vacuum pump. Service information specific to a pump model should be obtained from the pump maker's information.

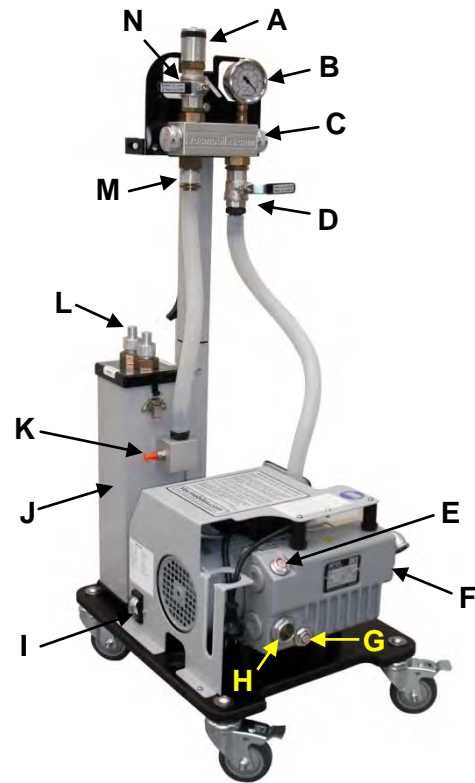
General information

<p>Vacuum pump</p> <p>Pumping capacity</p> <p>Maximum vacuum</p> <p>Resin catchpot</p> <p>Trap lid connections</p> <p>Power supply</p> <p>Dimensions</p> <p>Weight (varies with pump)</p>	<p>Becker U.20 or PVR EM20/B</p> <p>50 Hz capacity 18 m³/h (10.6 cfm). 60 Hz capacity 21.6 m³/h (12.7 cfm).</p> <p>10 mbar, 99% vacuum, 8 Torr, 29.6" Hg, -14.55 psi, -100.3 kPa.</p> <p>2 litres (4.2 US pints)</p> <p>2 connections in 4 optional sizes to suit the following outside diameter extruded tubes: 3/8" to 10 mm, 1/2" to 13 mm, 5/8" to 16 mm, or 19 mm to 3/4". With adaptors, also suitable for 1/2" and 3/4" inside diameter tubing.</p> <p>Single phase, either: 230 V, 50/60 Hz, or 110 V, 60 Hz</p> <p>In working mode: Length 470 mm (18.5") Width 390 mm (15.4") Height 1,065 mm (42.0")</p> <p>In transport mode Height 620 mm (24.4")</p> <p>Becker U4.20 pump: 40 kg (88 lbs) PVR EM20/B pump: 33.5 kg (74 lbs)</p>	<p>Working mode</p>  <p>Transport mode</p> 
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Main parts – viewed from manifold side
(Typical parts shown, not necessarily fitted to all machines)

Key

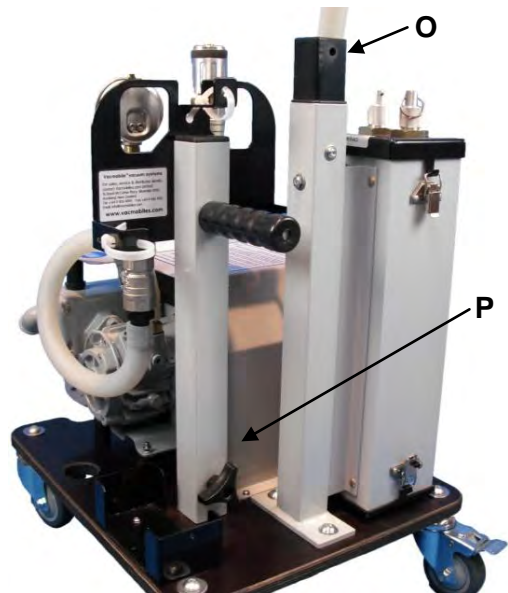
- A Vacuum regulation valve
- B Vacuum gauge
- C Manifold block with filter
- D Pump isolation valve
- E Oil fill port
- F Vacuum pump
- G Oil drain port (typical position)
- H Oil level indicator (typical position)
- I Power on/off switch
- J Resin trap
- K Absolute gauge connection
- L Vacuum connections to part (maximum of 2)
- M Resin trap hose connection
- N Vacuum regulator on/off valve



Main parts – viewed from handle side

Key

- O Handle mounting point for working position
- P Handle in transport position



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 machine is provided with a catchpot to collect a limited amount of resin - approximately 2 litres (4.2 US pints) with the machine sitting on a level surface. If there is a possibility of the resin overflow exceeding the catchpot capacity another resin trap should be placed upstream of the Vacmobile 20/2. For example, the Vacmobile RT19 resin trap which has a 12 litre (3.1 US gallon) catchpot.

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 base panel or the handle only.

Ambient temperature limits.

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

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

PREPARING FOR USE

Positioning the handle at normal working height

If the handle and manifold is in the lowered transport position, unscrew the black handled Tri-knob and lift the handle to the upper position. Refit the Tri-knob.

Lift handle to upper mounting point and refit the Tri-knob

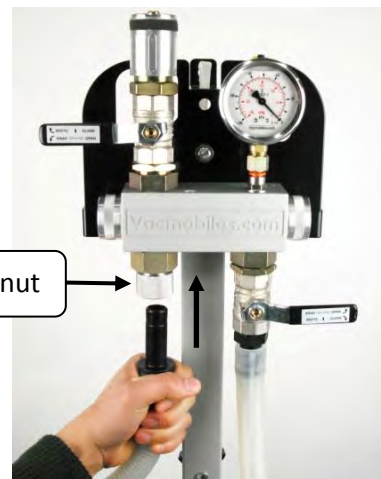


Connecting the resin trap hose

Check that the aluminium gland nut (arrowed) under the manifold is slightly loose. Insert the tail-piece on the loose end of the trap hose into the nut and push until a “click” is heard. See illustration. Tighten the nut gently by hand. **Do not tighten the gland nut excessively.**

Note that temporary disconnection of the hose at this point will assist cold starting.

Gland nut



Vacuum gauge positioning and venting

The vacuum gauge is mounted on an O-ring sealed stem. The gauge may be rotated to any desired viewing position at any time. See illustration.

The glycerine filled gauge needs to be vented when in use. When the machine is being transported, the vent should be closed to avoid fluid loss. The vent is the small lever on top of the gauge. **Flip the lever to “Open” for normal use, or to “Close” for transport.**

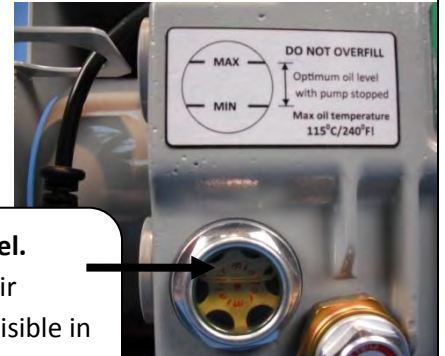
Gauge vent lever



ADD OIL TO THE VACUUM PUMP!

The pump must be filled with the correct grade of oil before use. For the pump models fitted to the Vacmobile 20/2, the correct grade will be an ISO 68 (SAE 20) vacuum pump oil. The approximate fill volume is 450 ml/0.9 pint.

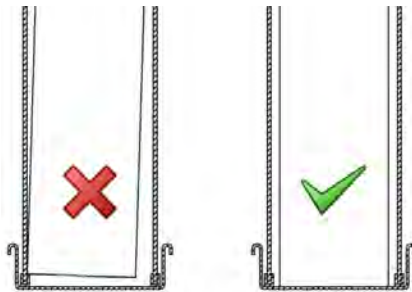
DO NOT OVERFILL! Fill to $\frac{3}{4}$ level on the sight glass maximum.



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

CHECK THERE IS A CATCHPOT IN THE TRAP!

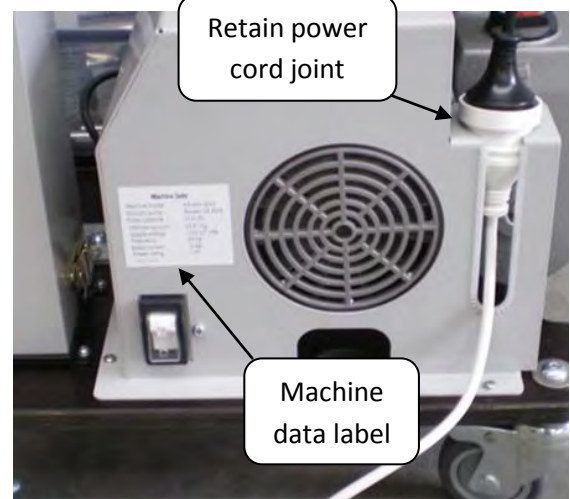
The machine must not be used without a catchpot in the resin trap! Make sure the bottom of the catchpot does not sit on the bottom rubber gasket. See below.



Power supply and power cord connection

Make sure the local power supply is suitable for the machine – refer to data label on the machine. To reduce the likelihood of accidental power disconnection, support the power cord joint in the retainer provided on the side of the pump cover, as illustrated.

Always use the shortest practical heavy duty power cord for delivering power to the machine. This will minimize the voltage drop in the power cord and reduce the likelihood of starting problems and motor overloads.



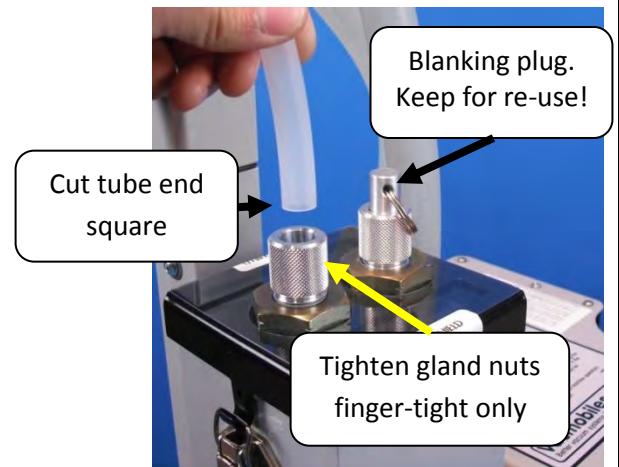
Retain power cord joint

Machine data label

Blanking plugs and vacuum tubing connections

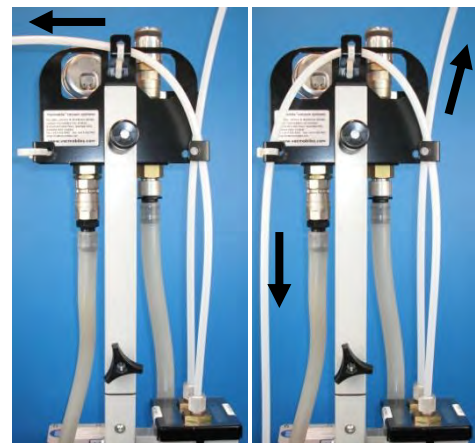
The vacuum tubing connections are designed for smooth walled extruded vacuum tubing, usually translucent polyethylene. To fit a tube:

1. Unscrew the knurled aluminium nut approx half a turn
2. Pull out the blanking plug and **STORE SAFELY FOR RE-USE**. If stuck, twist the plug while pulling it out
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.



Vacuum tubing support

Three slotted sheet metal arms are situated on either side and above the plastic covered handle bar. In conjunction with the releasable nylon ties provided with the machine, the vacuum tubing may be held vertically upwards, horizontally or vertically downwards. Refer to illustrations.

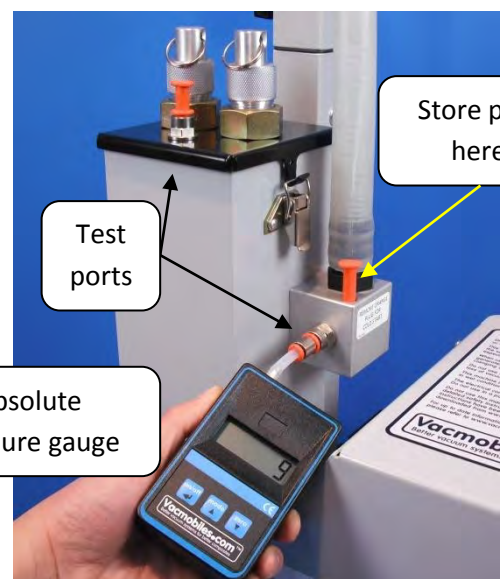


Fitting of absolute pressure gauge (optional accessory)

An 8 mm (5/16") absolute pressure gauge connection is located on the aluminium block on the side of the resin trap (with possibly a further one on the resin trap lid).



To release accessory from socket, push orange ring in towards base of socket

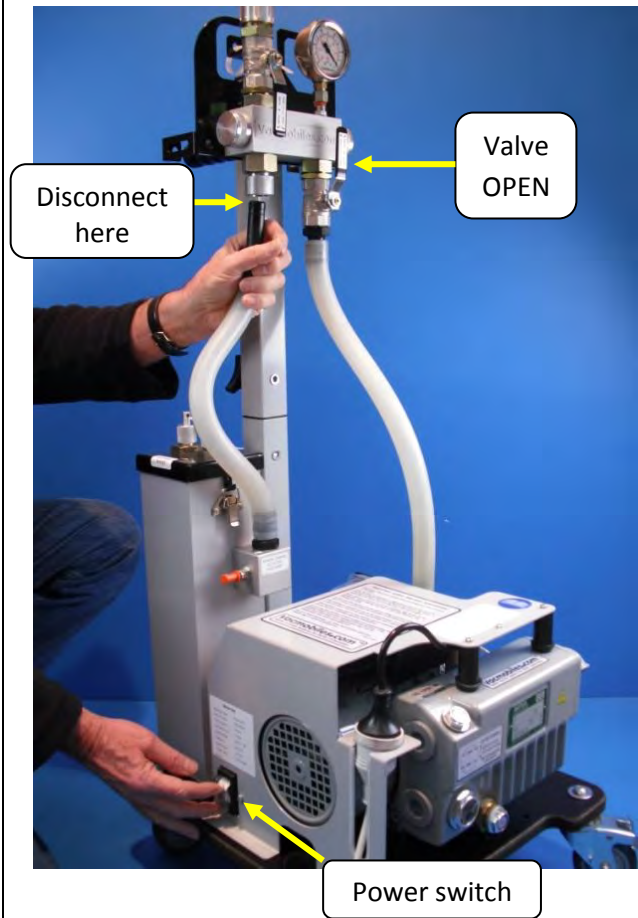


Cold start procedure for pump temperature less than 20 °C (70 °F)

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. Open the valve above the vacuum pump
2. Loosen the gland nut at the top of the hose from the resin trap by approximately 1/2 turn
3. Pull out the hose connection and hold the hose as shown while operating the start switch
4. As soon as the pump starts, replace the hose connection and gently tighten the gland nut.

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

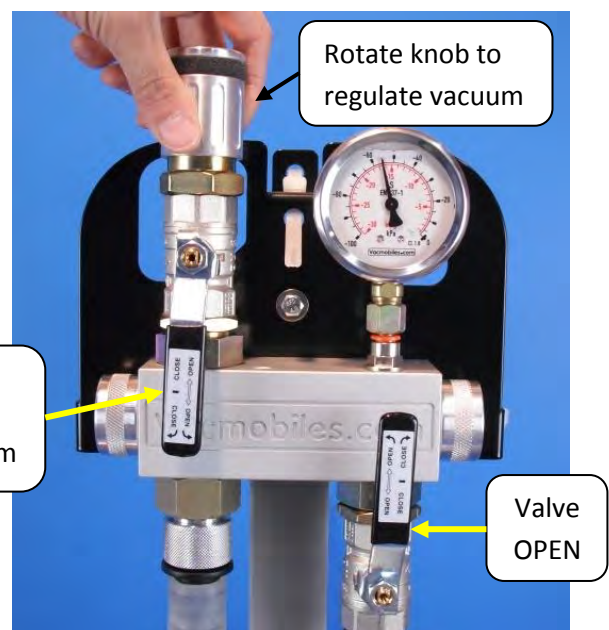


Adjusting the vacuum level

For a regulated level of vacuum, open the valve below the vacuum regulation valve. Adjust the vacuum level by rotating 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.

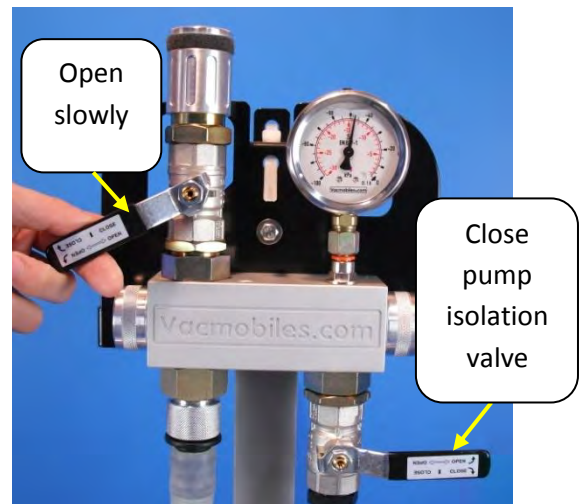


OPEN this valve for a regulated vacuum.
CLOSE for maximum vacuum

Complete vacuum release

To release vacuum from the part, first close the pump isolation valve. For a gradual release of vacuum, slowly open the valve below the regulator. This will allow air to enter gradually via the restrictions in the vacuum regulator. To release vacuum below the level set by the vacuum regulator, depress the knob of the vacuum regulator until the system is completely vented. A zero reading will show on the vacuum gauge when venting is complete.

The reason for releasing vacuum slowly is to avoid disturbing any liquid resin which may have been collected in the catchpot.



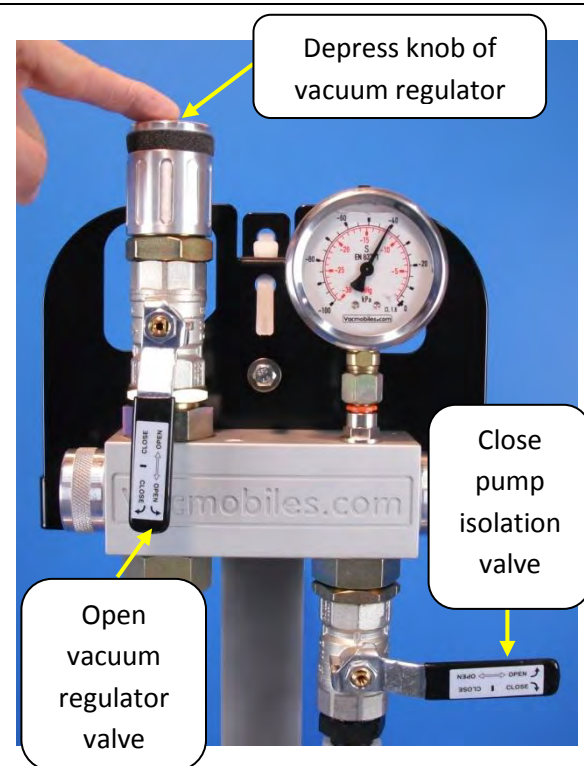
Shut-down and vacuum release

The lubricating qualities of the oil in the vacuum pump will be best preserved if the pump is allowed to run on at maximum vacuum for at least 30 minutes after the end of the job. To do this, while also venting the trap, the normal shut-down procedure is:

1. Leave the pump running.
2. Close the pump isolation valve.
3. If not already vented, open the rest of the system up to atmosphere by opening the valve below the vacuum regulator and depressing the knob of the vacuum regulator.
4. Run pump for at least 30 minutes before switching off.
5. After the pump has been switched off, open the pump isolation valve to release vacuum from the pump itself and to prepare the system for its next start.

If the system is to be left at vacuum when the pump is turned off:

1. Close the pump isolation valve.
2. Run pump for at least 30 minutes before switching off.



SERVICE

GENERAL SERVICE CAUTION!

Do not attempt to loosen or tighten any pipe joints on the manifold or side port of the resin trap during machine service! The threaded pipe connections to the manifold block and to the side port on the resin trap are permanently bonded with sealant. Using force to loosen or tighten any of these joints will break the vacuum seal and possibly break the components. If a problem is suspected in a permanently sealed joint, contact us for advice before attempting to repair the joint.

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

The pump oil should be changed as soon as it discolours (turns milky white or a dark brown/black), or every 500 operating hours – whichever is the sooner.

Change the oil when the pump is hot. Take care when removing the oil drain plug, as both it and the drained oil may be hot enough to cause burns!

Loosen the oil drain plug

The oil drain plug is located near and below the oil sight glass on the vacuum pump. Removal of the drain plug may require either a hex spanner or an Allen wrench depending on the pump type. **The drain plug may be hard to loosen. If so, do not apply excessive force, as this may damage the pump feet. To loosen the plug, position the wrench approximately as shown and tap the wrench sharply anti-clockwise with a soft hammer. Do not use a pipe to apply more torque to the wrench.** Do not remove the plug at this point; just loosen it so it can be easily removed.



Oil drain on PVR EM20 pump



Oil drain on Becker U4.20 pump

Drain the old oil

To aid complete removal of old oil and to ensure the oil drips clear of the machine's base panel, lock the pump end castors outwards and elevate the handle end of the machine by 150 mm to 200 mm (6" to 8"), using a block of wood or similar.

Place a shallow tray or old plastic ice cream container capable of holding at least 0.75 litre (1.5 US pints) of oil under the oil drain port. Remove the plug completely and drain the oil. If the oil is very dirty, replace the drain plug loosely 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 – as it will make a big mess!**

Dispose of the old oil in accordance with good environmental practice and local regulations.



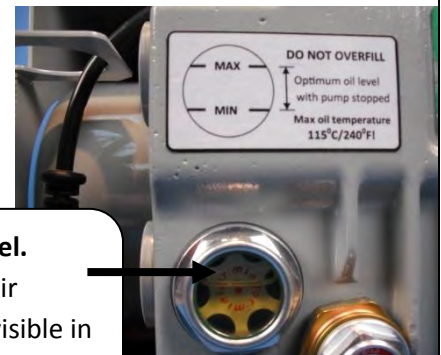
REFILL WITH NEW OIL!

The pump must be refilled with the correct grade of oil before the machine is returned to service. For the pump models fitted to the Vacmobile 20/2, the correct grade will be an ISO 68 (SAE 20) vacuum pump oil. The approximate fill volume is 450 ml/0.9 pint.

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



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



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.

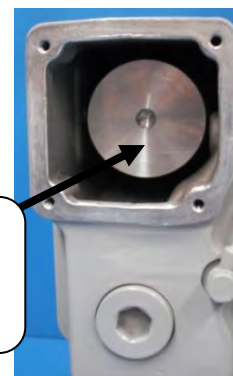
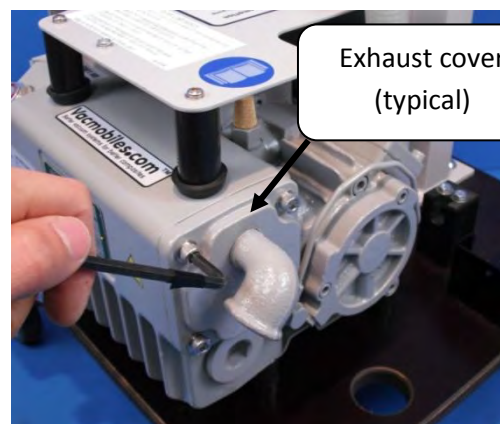
The filter should be replaced whenever these problems occur, or as routine maintenance at approximately 2,000 operating hours.

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 manufacturer's information.</p>				
	Exhaust oil mist filter (typical)		Cover gasket (typical)	
	Pump model	Part Number	Pump model	Part Number
	Becker U4.20	BKR 965413	Becker U4.20	BKR 00300040300
PVR EM20/B	PVR 005224	PVR EM20/B	PVR 004539	

Procedure for replacing the exhaust oil mist filter

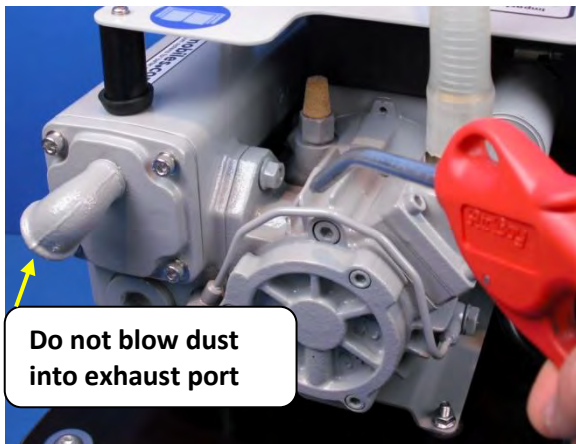
1. Drain the oil as described earlier.
2. Barely loosen the exhaust cover cap screws using a 5 mm AF Allen wrench. Give the cover a sharp sideways tap with a soft faced hammer to break the paint film over the gasket which seals the cover to the exhaust box casting. This will reduce the risk of breaking the gasket when the cover plate is removed. Completely remove the cap screws holding the cover in place.
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.



Routine cleaning of external surfaces

The vacuum pump needs to run at a temperature hot enough to minimise water vapour condensation in the pump, but not so hot that the oil, bearings and seals will be damaged. Regular cleaning of external surfaces will help to maintain the pump at an optimal running temperature. Clean the pump and motor external surfaces with compressed air, paying particular attention to the fan end of the motor. Best results can usually be achieved with the pump running, **but take care not to insert the cleaning nozzle into the moving motor fan!**

Also avoid blowing dust into the pump's exhaust port.



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.



Other vacuum pump service

For other owner-performed pump service items, refer to the pump manufacturer's service instructions. For more complex pump service, contact your Vacmobile dealer, your nearest vacuum pump service centre or email info@vacmobiles.com.

GENERAL SERVICE CAUTION!

Do not attempt to loosen or tighten any pipe joints on the manifold or side port of the resin trap during machine service! The threaded pipe connections to the manifold block and to the side port on the resin trap are permanently bonded with sealant. Using force to loosen or tighten any of these joints will break the vacuum seal and possibly break the components. If a problem is suspected in a permanently sealed joint, contact us for advice before attempting to repair the joint.

RESIN TRAP MAINTENANCE (PERFORM AS REQUIRED)

Cleaning the resin trap lid connection ports

Although periodic treatment with a liquid mould release, correct insertion of the vacuum tubing and correct venting procedures will minimize resin build-up in the trap connections, some resin may accumulate in the connection ports and reduce the air flow into the trap. Hardened resin is best removed as follows:

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.

Tube gland size

10 mm (3/8") OD tube

13 mm (1/2") OD tube

16 mm (5/8") OD tube

19 mm (3/4") OD tube

Drill bit size

8.5 mm (21/64")

10.5 mm (13/32")

14 mm (17/32")

17.5 mm (11/16")

DO NOT DRILL OUT THE TUBE STOP!

When cleaning the resin trap take care not to damage the top face of the trap body. This is a critical vacuum sealing surface.



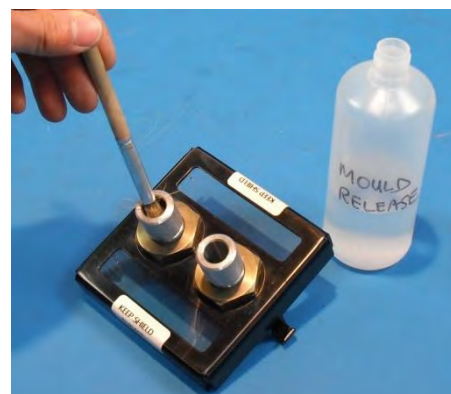
Apply liquid mould release to connection glands

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.



Resin trap removal and replacement of bottom trap U-seal

The resin trap body is fixed to the main handle upright via a locating bush at the bottom of the top hat section attached to the trap and a fixing bolt at the top. Removal of the trap is required to service/replace the bottom trap U-seal and to clean the trap. To remove the trap, proceed as follows:

1. Disconnect the trap hose from the manifold.
2. Unscrew the hexagonal head fixing bolt just below the joint in the handle upright. This is an M6 bolt requiring a 10 mm AF spanner, or an adjustable wrench. Withdraw the bolt enough to let the trap come free of the handle.
3. Lift the resin trap upwards and away from the handle.
4. If the bottom trap U-seal is to be serviced, unclip the bottom lid from the trap body.
5. After servicing, reassemble in reverse order – taking care to check that the bottom U-seal is properly seated around the body of the resin trap. Do not twist the seal when clipping the bottom lid back on.



1. Disconnect trap hose



2. Unscrew top fixing bolt



3. Lift resin trap upwards

Manifold filter element service

Before servicing the filter element close the pump isolation valve. Closing this valve will avoid the possibility of debris falling into the pump. Then:

1. Unscrew both of the aluminium filter knobs from the manifold/filter housing.
2. Grip one end of the aluminium rod extending from the foam filter element and withdraw the filter element. Refer to illustration.
3. Apply a compressed air nozzle to the pump isolation valve side of the manifold block and blow right through the manifold with compressed air.
4. Clean around the sealing surfaces for the aluminium filter knobs.
5. Clean the foam element in warm soapy water and gently blow it dry with compressed air. If embrittled by resin solvent, heavily soiled or damaged, replace the element.
6. Push and rotate the foam element back into position and screw the filter knobs back into place **with firm hand pressure only. Do not use a wrench!** If there is any concern about leakage from the filter knobs, replace the O-rings and lubricate the threads and O-rings with silicone lubricant.

