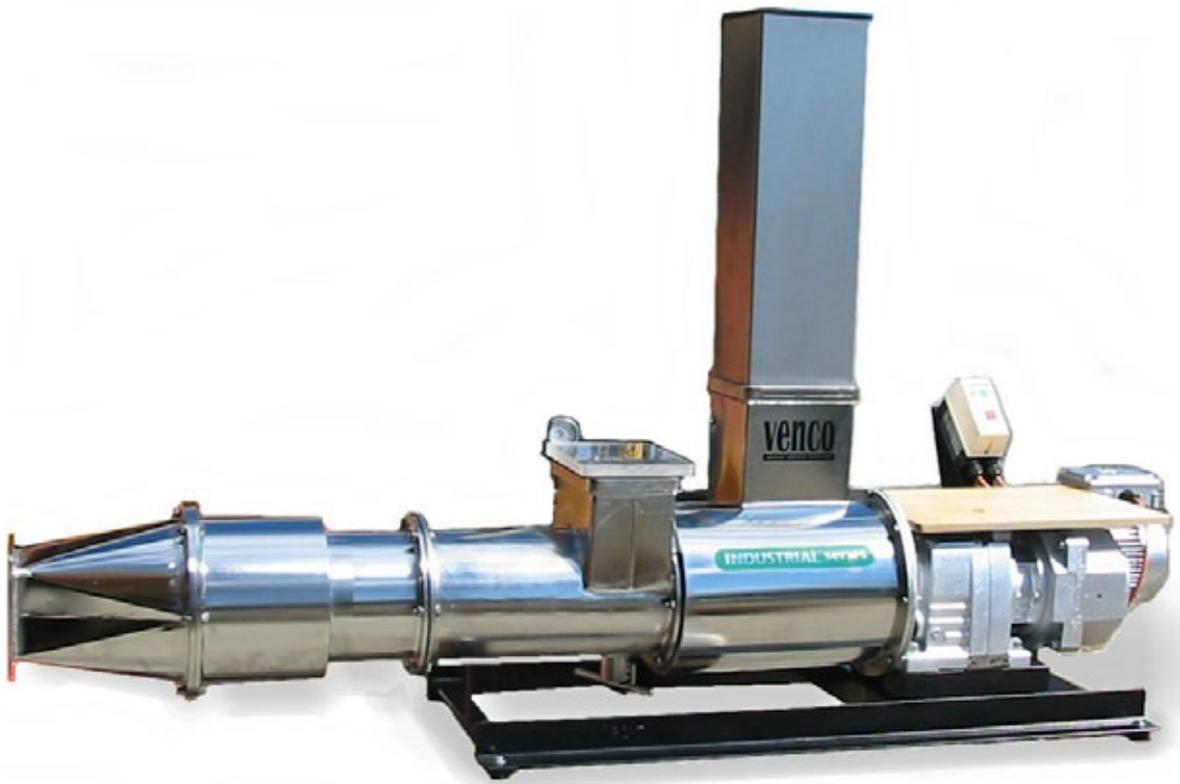


Owner's manual for

Venco

www.venco.com.au

INDUSTRIAL series



ALL STAINLESS STEEL, HIGH CAPACITY PUGMILLS

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VENCO Industrial Series Pugmills

The Venco, Industrial Series pugmill is a heavy duty, all stainless steel pugmill designed for large-scale clay production / processing.

The Industrial Series are manufactured on a semi-custom basis, which allows a degree of user-customisation of the final product. Various options include different motor capacities, mechanical variable speed drive, barrel diameters and nozzle orifice dimensions.

The large volume, twin auger mixing chamber efficiently blends the 'raw' ingredients, and permits effortless feeding. The twin augers, directly beneath the feed hopper, ensure the clay is swiftly drawn away and effectively mixed.

The stainless steel, mesh type, shredder screen may be removed without disassembling the barrel, which is a definite feature on a machine of this physical size.

All stainless components are *electropolished*, which further increases the corrosion resistance of the pugmill. This process concentrates chromium at the surface of the stainless steel producing a harder and more durable surface finish.

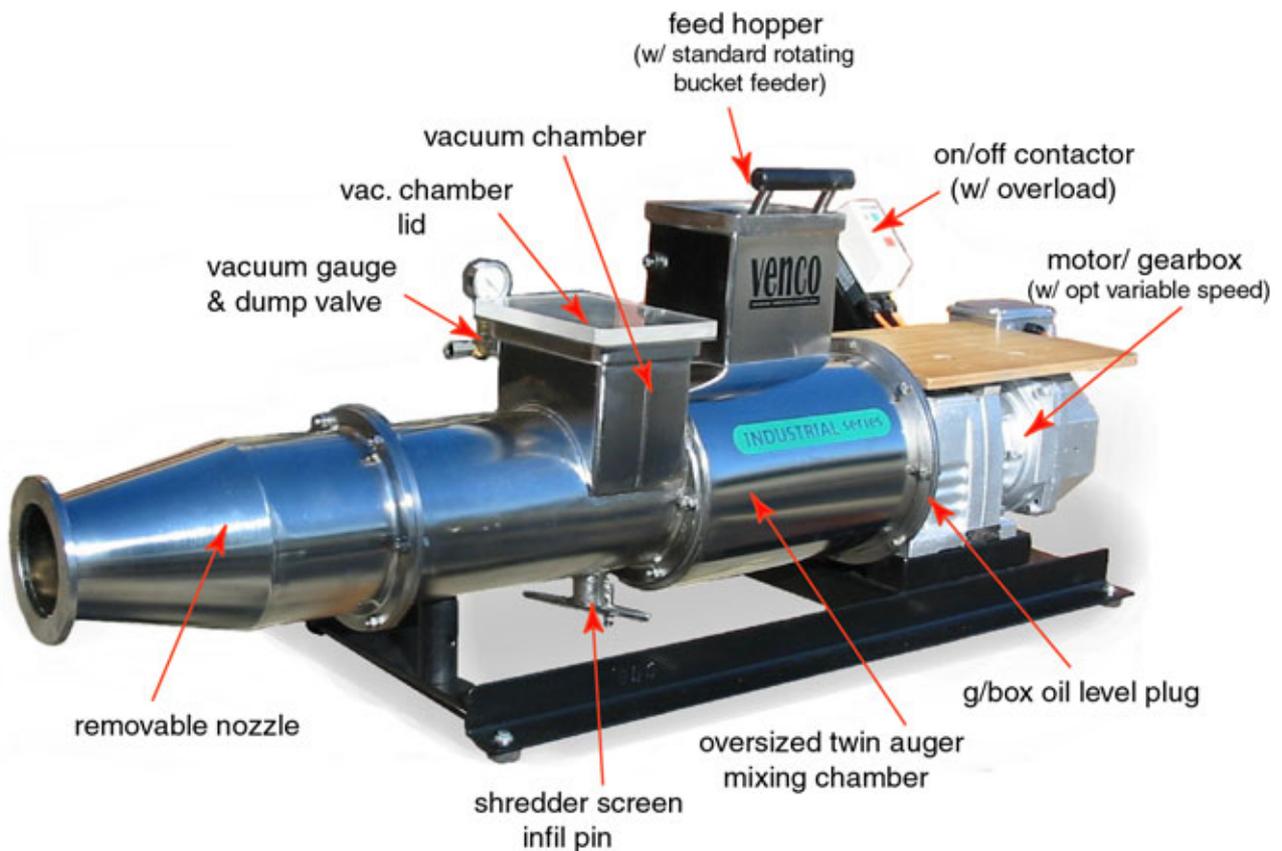


Figure 1: Components of the Industrial Series Pugmill.

UN-PACKING THE PUGMILL

Carefully disassemble the shipping crate and unbolt the pugmill from the wooden baseboard. Locate the four rubber feet and fasten them to the corners of the black frame using a 13mm (1/2") spanner.

The pugmill is insured for the unlikely event of damage during transport. Please report any damage to your supplier.

Depending on the actual model, the pugmill may have been shipped with the nozzle removed. If this is the case locate the nozzle and the six, stainless steel, fastening bolts and fit to the end barrel flange using a 17mm spanner. ***A closed cell foam gasket (supplied) must be placed between the two flanges*** – failure to do so will result in poorly de-aired clay. A liberal smear of grease on the bolt threads will aid later removal.

The on/off switch contactor has been removed for shipping. This must be fitted using the bolt supplied. Tighten with a 16mm (5/8") spanner to the hole provided on the rear of the gearbox.

Important notes

- ❖ The pugmill should be placed on a **sturdy** table or bench approximately 50cm (20") high.
- ❖ The vacuum pump may be located up to 7m. (20 ft) away from the pugmill.
- ❖ Check the electrical requirements for the particular unit on the motor specification plate. Ensure all extension leads, adaptors used are adequately rated.
- ❖ **It is of critical importance the rotation of the augers be checked before using the pugmill.** The primary auger ***must turn anti-clockwise*** when viewed from the nozzle end. If this is not the case the phase connection at the motor must be changed by the electrician.

UN-PACKING THE VACUUM PUMP

Similarly disassemble the crate containing the vacuum pump. Check that the oil level is to the indicated level on the sight glass (see figure 2).

As mentioned above the vacuum pump may be located up to 7m (20ft) away from the pugmill. It is advised not to locate the vacuum pump directly underneath the pugmill due to the chances of it becoming encrusted with dropped clay/water.

SETTING-UP THE VACUUM PUMP

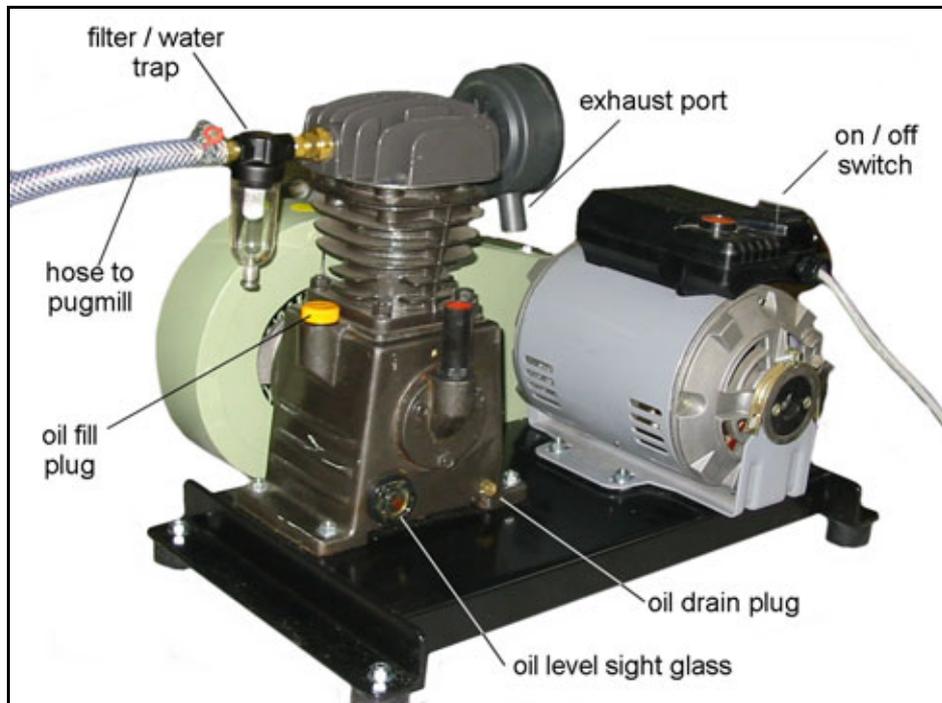
Locate the following parts:

- ❖ vacuum hose, with two hose clamps
- ❖ vacuum pump filter / water trap
- ❖ vacuum gauge
- ❖ clear plastic, vacuum chamber cover with gasket

Important: It is recommended to smear a light film of grease onto the brass threads before attaching components. This aids sealing and future disassembly.

Setting up the vacuum pump continued.

1. Screw the vacuum gauge onto the brass fitting attached to the rear of the pugmill's vacuum chamber. To tighten use a 14mm (9/16") spanner on the square brass section adjacent to the thread –do not over tighten. A layer of Teflon tape (plumber's thread tape) on the thread may make it easier to align the gauge to face the operator.
2. Screw the filter / water trap onto the brass fitting onto the inlet manifold of the vacuum pump. The clear bowl should be facing downward. See Fig 2.
3. Connect the vacuum hose using the hose clamps supplied to both the filter (on the vacuum pump) and the fitting adjacent to the vacuum gauge on the pugmill.
4. Fit one of the vacuum chamber gaskets onto the posts of clear plastic cover. Place the cover on the vacuum chamber. See Fig 1.



**Figure 3: Components of the vacuum pump
(Note some models will have a twin cylinder vacuum pump)**

OPERATION

DEAIRING CLAY

The Venco Industrial Series units are fitted with an innovative feed system that allows safe and effortless feeding of clay into the twin mixing augers. This unique design, completely shields the user from the rotating blades without the need for a restrictive safety grille or which is commonly used in traditional lever/pressing systems. The vacuum pump should be left operating at all times while processing clay.

Once sufficient clay has been fed into the pugmill the vacuum gauge will start to rise. For satisfactory de-airing, the vacuum gauge should read 90kPa or more. 95-98kPa is ideal. *(note: these reading are for sea-level and will be reduced at altitude)*

Leave the vacuum pump running continuously while pugging. The pugmill may be turned on and off as required. (If the vacuum pump is turned off during pugging, the clay within the barrel may absorb air)



Figure 2: Loading clay

Put lumps of clay onto the ledge in the feed hopper. Pull the lever forward and **hold down for a couple of seconds** to allow the clay to fall off. Lift the handle and repeat the process.

Any resistance that may be encountered is most likely due to over loading with too much clay or lifting the handle before clay has time to fall into the mixing augers underneath.

Notes on successful de-airing.

❖ Air is drawn from the clay through the de-air slot within the vacuum chamber. It is normal for some of the clay to be sucked up through this slot and into the vacuum chamber during operation. This clay need only be removed if the chamber becomes full or if the slot becomes completely blocked.

To successfully de-air clay, there need only be a small hole from the vacuum chamber into the pugmill barrel.

❖ The Venco Industrial series pugmills are equipped with an innovative system which automatically clears an aperture from the vacuum chamber into the pugmill barrel. A short rubber finger is fitted to a bracket that is flicked by the auger on each rotation, creating a vacuum path to the shredded clay.

Hint: The de-airing slot can be cleared *swiftly* by quickly flicking the vacuum dump tap on and off while processing.

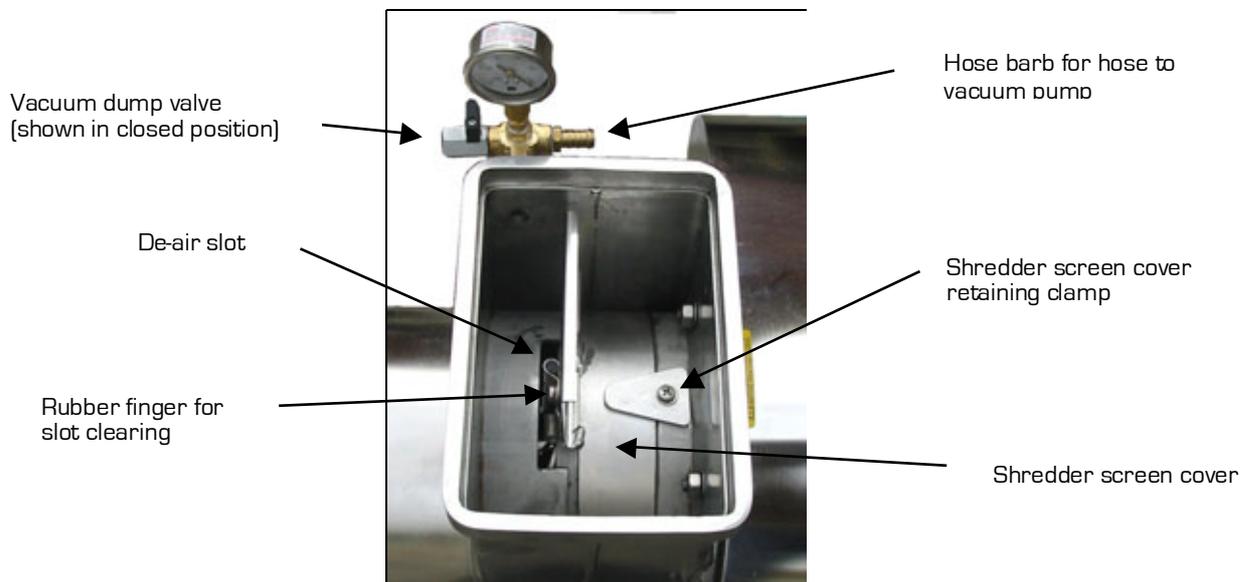
- ❖ Some fine porcelain type clays are difficult to de-air. To improve de-airing, slow the rate of flow by adjusting the auger speed (on models with a variable speed drive) or by blanking off the top of the shredding screen, adjacent to the de-airing slot. This may be accomplished by applying a layer of plastic adhesive tape to the top layer of the screen.

This technique may also be used to reduce the clay flow through the slot into the vacuum chamber, if this becomes a problem with soft clays. Install with the blanked area immediately beneath the de-airing slot. Do not blank off more than 75mm (3") of screen height. See the maintenance section for information on removing the shredding screen.

- ❖ It is important to check the vacuum pump oil level and condition daily. See the maintenance section for more information.

Hints

- ❖ The pugmill and vacuum pump motors are fitted with overload protection. If either unit trips off, wait for the motor to cool and then press the red off/reset button located on the contactor enclosure.
- ❖ When the pugmill is not in use, seal the hopper and nozzle with a plastic bag. This may be made airtight by using an elastic band or some adhesive tape. This will prevent the clay hardening within the unit.
- ❖ Clean out all of the clay if the pugmill is not to be used for over a month. See maintenance section.



**Figure 3: Components of the Vacuum Chamber
(lid and gasket removed)**

MIXING / BLENDING BOTH HARD AND SOFT SCRAP

The Venco Industrial Series units are very efficient at mixing, blending and re-claiming both hard and wet scrap clay. Limit the size of dry clay lumps to about 5cm (2") diameter to prevent overloading the unit.

Note: When blending dry scraps it is important to remove the internal shredding screen. Failure to do so will result in rapid clogging of the screen and slow mixing. The vacuum pump should **NOT BE USED** when the shredder screen has been removed i.e. for mixing/blending.

Both hard and wet scraps may be loaded simultaneously. The desired moisture content may be achieved by adjusting the proportions of ingredients and fine-tuning with water or dry clay.

The blended mixture may need to be re-processed a number of times before a homogeneous mix is achieved. Cut pugs of clay in lengths of approximately 10cm (4") as they exit the nozzle. Continue re-feeding this along with more scrap until the desired mixture and consistency has been reached for the complete batch. If dry scrap is being blended it may require three or four passes through the unit to achieve a smooth uniform body.

Water can also be added to the mixture in the hopper – it is best added with the feed bucket in the closed position. With practise, dry powder clay may also be added to the mix. If attempting this, it is advised to add the powder in small amounts.

Only after you are satisfied with the consistency of the body (and there is no dry scrap within the mix) should the screen be fitted and the vacuum pump turned on. The complete batch may then be de-aired and stored for use.

USING THE OPTIONAL DROP CHUTE FEEDER

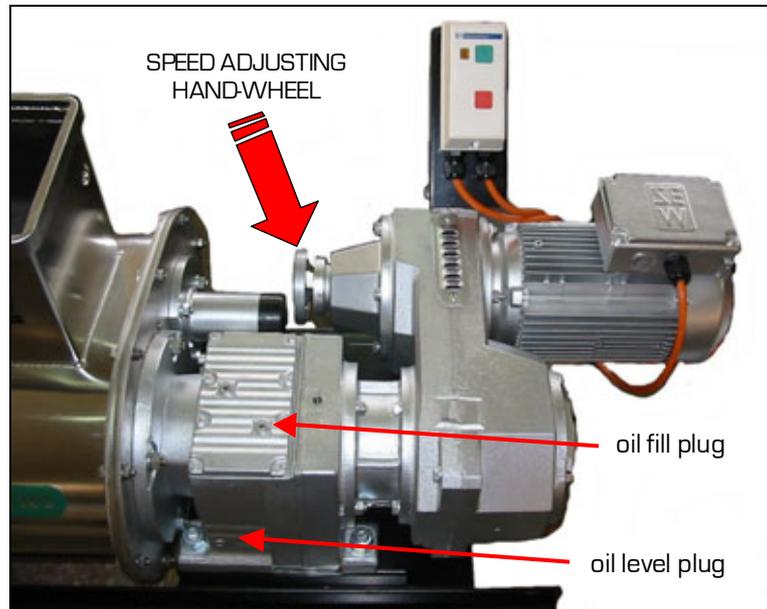
The Venco Industrial series is available with a simple drop chute that replaces the standard rotating bucket feeder. The drop chute may be advantageous when conveyor feeding or if feeding with pelletised clay. This system allows for automatic feeding of clay directly into the mixing chamber, without the need for manual loading.

The chute is approximately 66cm (26") tall to prevent the operators' hands ever coming in contact with the augers. Nevertheless, ***under no circumstances should clay be pushed down the chute with your hands if the chute becomes clogged.***

Cut clay into blocks no larger than about 10cm cubed (4") to prevent overfeeding or clogging the chute.

USING THE OPTIONAL MECHANICAL VARIABLE SPEED DRIVE

The Venco Industrial Series is available with an optional mechanical variable speed drive. Turning the hand-wheel adjacent to the motor varies the auger speed. The hand-wheel should only be adjusted while the motor is operating. The auger speed is infinitely variable between 7- 28RPM.



**Figure 4 :Location of the Speed Adjusting hand-wheel.
(note location of the oil fill plug)**

This drive system is far superior to the more common electronic variable speed drives available as it creates a torque boost that is inversely proportional to the speed reduction chosen. I.e. if the auger speed is halved the available torque is doubled. This feature creates exceptional pushing power for extruding even very stiff clay. The other advantage of this system is that the motor always turns at a constant speed, at which it was designed, hence operating more efficiently and with stable cooling from the motor driven cooling fan.

Important:

- ❖ The speed adjusting hand-wheel should **only** be rotated while the pugmill is in operation.
- ❖ The nominal auger speed is approximately 17-18 RPM.
- ❖ If stiff/low moisture content clay is being processed it is advisable to reduce the auger speed.

USING THE EXPANSION CHAMBER

The Expansion chamber further increases the flexibility of the Venco Industrial pugmill. The expansion chamber allows extruding sections of increased width than the nominal barrel diameter and for increased flow homogeneity and superior flow while extruding larger cross sections.

The expansion chamber is fitted in place of the nozzle at the end of the pugmill using the bolted flange connection. It is important to use a gasket between the expansion chamber and the barrel.

Due to the countless extrusion sections that may be created, the Expansion chamber module comes without dies. Simple plate dies may be fabricated from steel or plastic. Depending on the shape of the extrusion, the plate dies should be made from at least 6mm steel (1/4") or 25mm plexiglass (1") to prevent breakage. If plate dies are to be constructed, a period of trial and error will be required to achieve the desired extrusion. In general, the entry to the die aperture should be heavily radiused to aid even/smooth clay flow. As the die cross-section increases in size and approaches the expansion chamber walls, more significant differential flow will be encountered – this may or may not be a problem.

It should be noted simple plate dies may be OK for some applications, but are far from ideal for serious production of extrusions. A better solution, which will result in more uniform clay flow and significantly less load on the pugmill, will require the fabrication of a tapered nozzle style die.

Hints

- ❖ A gasket **MUST** be used between the expansion chamber and the barrel. Failure to fit a gasket will result in poorly de-aired clay.
- ❖ Apply a liberal coating of grease on the bolts prior to fitting the expansion chamber. This will aid later removal.
- ❖ Altering the auger speed may be necessary when extruding some shapes.

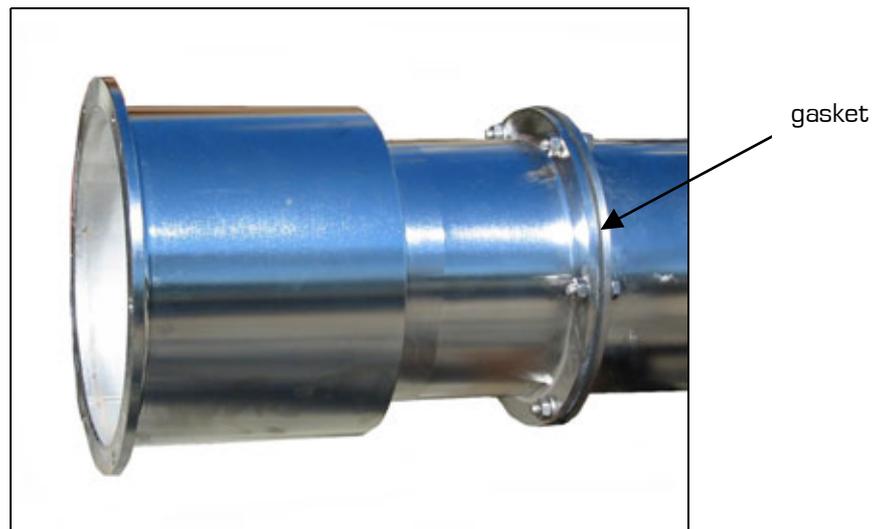


Figure 5: The Expansion chamber fitted to the barrel.

*(note - a gasket **MUST** be used between the expansion chamber and the barrel)*

MAINTENANCE

PUGMILL MAINTENANCE

Venco pugmills are designed to be extremely robust and should reward you with many years of trouble free operation. To ensure this, please follow these few simple procedures.



CAUTION: Before performing any maintenance turn-off the pugmill and un-plug the power supply cable.

Removing the Shredder Screen

The shredder screen will in time become blocked with grog or impurities within the clay and result in reduced production rates. If this is suspected the screen will need to be removed and cleaned.

To gain access to the screen, first remove the screen cover by undoing the single retaining screw, *see figure 3*. Bolt the extractor tool (provided) via the two **M10** bolts, to the holes on the upper surface of the screen. Lever the screen out using a piece of timber as shown in figure 7.

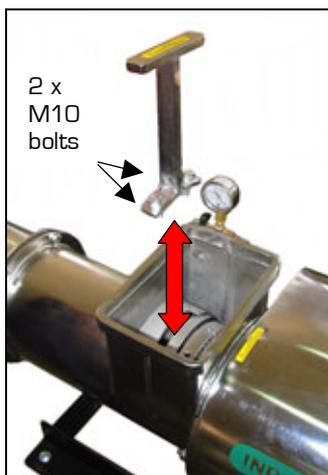


Figure 6: Screen Extractor

Figure 7: Levering the screen out

Figure 8: screen

Hint: An optional coarse shedding screen is available for use with coarse terracotta or clay containing large amounts of grog.

Replacing the shredder screen

It is important to note the orientation of the mesh face on the screen before replacing. The mesh side of the screen should face the motor end of the pugmill, *see figure 8*.

Clean the screen slot in the barrel thoroughly before replacing the screen. It is recommended to liberally grease the slot and outside perimeter of the screen to aid with removal at a later time.

Finish by replacing the screen cover and secure with the latch that was previously removed.

Removing the barrel

1. Turn the pugmill on and run out all clay from the mixing chamber.
2. Once empty turn-off the pugmill and un-plug the power cord from the power outlet.
3. Remove the screen as described in the above section.
4. Remove the screen slot infill pin;
 - a. Locate the infill pin on the underside of the pugmill barrel, directly under the shredder screen. See figure 9.
 - b. Extract the pin by firstly rotating the handle a quarter-turn to unhook from the retaining peg. Remove the pin by moving the handles back and forth while applying a firm downward pressure. See figure 10
5. If necessary remove the vacuum hose from the connection on the vacuum chamber.
6. Remove the nozzle (or expansion chamber) by removing the 6 bolts securing the mounting flange.
7. Remove the next 6 bolts that secure the main barrel section to the mixing chamber. **(Note:** Two bolts are located inside the vacuum chamber). Firmly grasp the barrel section and draw off the auger. If resistance is encountered, due to hard clay etc, rotate the barrel section back-and-forth while withdrawing.

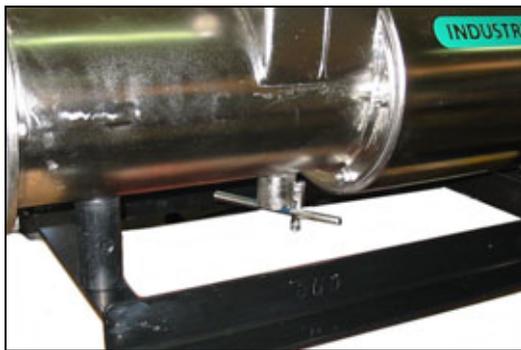
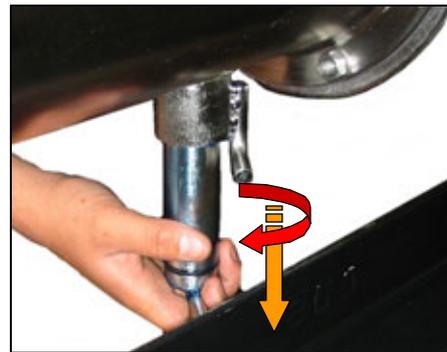


Figure 9 : Screen slot infill pin



**Figure 10: Removing the Infill pin.
(twist and push down)**

Replacing the barrel.

Fitting the barrel is simply the reverse of the removal procedure. Before re-fitting the barrel ensure that all clay is cleaned from around the flanges and that the flanges are perfectly clean. Ensure a gasket is fitted between the flanges of the barrel and the mixing chamber.

Hints:

Apply a thin smear of multi-purpose grease or petroleum jelly onto the infill pin and O-rings before assembly. This will aid future removal.

Check the O-rings for damage before re-installing the infill pin. Replace them if they are damaged.

After the barrel has been re-fitted, insert the shredder screen. Inspect the condition of the O-rings on the infill pin and replace if any damage is present. Thoroughly clean the bore where the pin slides in and coat with a layer of grease. Insert and lock the pin.

Removing the Mixing chamber.

Ensure the power supply is disconnected before proceeding.

On occasion the mixing chamber may need to be removed to clean out dried clay or if a new body is being used.

To remove the mixing chamber, first remove the nozzle and barrel as described above. There are ten (10) bolts around the mixing chamber flange that need to be removed using a 13mm (1/2") spanner. Only remove these OUTER 10 bolts, then draw the mixing chamber off the augers.

Replacement is the reversal of the above procedure.

Checking/changing gearbox oil

The pugmill gearbox is filled with high quality, industrial, gear oil. Under normal operating conditions this oil will need changing after 10,000 hours of operation.

The gearbox holds 1.1 litres of gear oil. Refill with gear oil with a viscosity class of ISO VG220 (shell Omala 220, BP Energol GR-XP 220, Texaco Meropa 220, Mobilgear 630).

To refill the gearbox, firstly drain out the old oil by removing the hex-key drain plug – located on the rear face of the gearbox (lowest plug). After the oil has drained re-fit the plug and then remove the oil level plug and oil fill plug (see figure 4). Pour the oil into the fill plug until the level reaches the oil level plug. Once complete re-fit all plugs and clean any spilt oil.

Vacuum pump maintenance

It is important to check the vacuum pump oil level **daily** in an industrial situation. As the pump operates some oil is carried past the piston rings and exhausted. This is normal and beneficial in keeping the plate valves lubricated and free from corrosion.

Exhausted oil may be collected and re-used. To do this, connect a short flexible hose to the exhaust port and place the other end into a container.

The vacuum pump has a sight glass to check the oil level. Ensure the oil level is up to the mark on the sight glass, top-up if required. The vacuum pump should be topped up with SAE30, SAE40 or multigrade 20/40 automotive engine oil. **DO NOT** use friction-modified oils.

The vacuum pump filter/water trap should be checked occasionally. Clean and drain, by unscrewing the clear plastic bowl. Apply a thin layer of grease or petroleum jelly to the thread on the bowl to aid sealing and future disassembly.

Hint: Some clays shed water during the de-airing process. This can be carried back to the vacuum pump as vapour. This mixes with the sump oil, turning it cloudy white. If this happens, drain the oil into a glass jar and replace with new oil. The old oil can be re-used after it separates from the water (the oil will float on top of the water).

Symptom	Problem Description	Remedial Action
VACUUM PUMP		
milky / cloudy oil	water mixed with oil	drain oil from vacuum pump and replace with fresh oil. Contaminated oil will eventually separate and oil may be drained off and reused.
motor stops running	overload trip	check oil level in vacuum pump, wait for motor to cool before restarting if problem persists see your supplier
low/fluttering vacuum	vacuum leak or vacuum pump problem	clay feed into pug too slow -increase feed rate. for more details see below.
PUGMILL		
motor stops running	overload trip	overloading the pugmill, wait for motor to cool before restarting
excess effort needed to operate feed bucket	clay blocking mechanism or clay pressed against hopper	feeding too fast before clay has time to fall into augers. Turn off pugmill and use scraper to scrape built-up from hopper walls. If adding water it is best to add while the bucket is in the closed position to minimise sticky surface on hopper parts.
excess clay being pushed into vacuum chamber	bridging of vacuum slot	clay too soft - change consistency or try blanking shredder screen as described in manual flow rate too high - reduce feed rate. If using dies -aperture maybe too small, increase size. flick vacuum dump tap open/close quickly to suck clay away.
reduced clay output	blocked shredder screen	disassemble barrel and remove and clean shredder screen Note: dry turnings will quickly block the screen -wet and ball before using
no output even when motor is running	coring of clay within barrel	feed with drier clay and leave running until clay starts feeding again. Coring is caused by too much water being added to drier clay in one step. Add a little at a time.
air in clay (de-air models only)	loss of vacuum note: gauge should read more than 90KPa	*vacuum pump must be operated continuously while pugging * Remove plastic vacuum chamber lid and place finger over brass inlet within vacuum chamber while pump is operating. If this restores vacuum reading on gauge then the problem lies with the vacuum chamber lid gasket or with the barrel gasket - see note (a). * Check all fittings for tension, remove and grease threaded connections * Check plastic vacuum chamber lid for distortion -order new lid * If after checking the above, it is possible that the vac. pump needs servicing please contact your dealer for advice. See note (b)
Notes:		
(a)	check condition of black gasket under vacuum chamber lid and barrel-vacuum chamber- replace if worn or damaged. the vacuum chamber must be placed over the vacuum chamber slot (remove rubber plug first).	
(b)	A simple method of isolating and testing the vacuum pump alone is to fit the vacuum gauge directly to the inlet of the pump. This may be done by using additional fittings or a short piece of rubber hose (and two hose clamps). The gauge must be read in a vertical position.	

Other ceramics equipment available from Venco:



No.6 Cone drive potters wheel. High quality budget priced wheel with integrated seat.



No.3 Cone drive potters wheel.



No.5 Cone drive potters wheel with hand operated speed lock



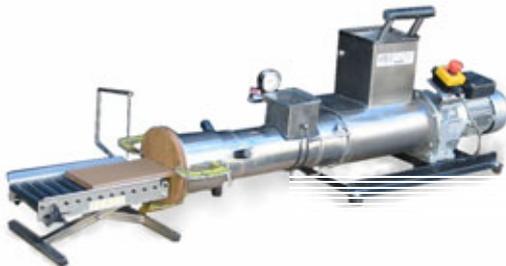
No.7 High torque, electronically controlled potters wheel



75mm, 87mm and 100mm (3 1/2, 4") single auger de-airing pugmill



Stainless steel, hand operated clay extruder. 75mm (3") barrel. Available with a range of dies.



SUPER-twin .All stainless steel, modular pugmill with various optional attachments for de-airing, extruding, mixing and recycling.

VENCO – world renowned for quality and reliability