

Installation Operation Maintenance Instructions

Model MP100 Vacuum Pump



Serial Number

Site Location

Installation Date

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Warning

Read the installation and maintenance information before commencing work on this equipment. Your attention is drawn to the health and safety information on page 4. Until the equipment into which the machine has been incorporated and the said equipment declared to be in conformity with the Machinery Directive, they must not be put into service.

Foreword

The MP series rotary vacuum pump has been developed based on many years of experience in the compressor and vacuum pump industry. Using modern design techniques and production methods coupled with rigorous testing and high quality standards ensure this series of machines have a long, efficient and reliable service life.

These operating instructions have been written for all personnel who have responsibility to the machine, it contains all the necessary information required for the machine to have a long trouble free service life. This manual must be stored near the machine and read before attempting any work on it.

Ensure that all operation and maintenance is only performed by competent and trained personnel and any repairs use only original parts from the manufacturer.

General

The normal routine of running the machine is very simple. If it is carried out strictly at all times, many years of trouble free service can be expected.

We emphasise two points of paramount importance-

1. Filtration of incoming air of gas
2. Lubrication

If possible provide a logbook so that the operator can enter daily readings. After several months a record will show whether the machine is performing as it did originally. If readings are to be taken the following are all that is required. Inlet and outlet air temperatures, suction conditions and oil drip rate.

A typical layout for the log book is shown in the table below.

Machine Log Book				
Date	Inlet Air Temp.	Discharge Air Temp.	Suction Conditions	Oil Drip Rate.

Operating Principle

Rotary sliding vane compressors and vacuum pumps are multi-cell machines, which work on the displacement principle. They provide a constant, low-pulsation supply of air or gas.

The machines have a cylindrical bored housing. The rotor, which is also cylindrical, is fitted eccentrically in the cylinder so that a crescent-shaped working chamber is formed. Movable rotor vanes are fitted in the longitudinal grooves in the rotor; centrifugal force and the force of the air or gas presses the blades against the cylinder-housing wall when the rotor turns.

The vanes divide the crescent-shaped working chamber into cells of different sizes. As the rotor turns, the cell volume on the intake side increases, and the cell draws air in at low pressure, at which point is open to the intake delivery line. As the rotor continues to turn, the cell is closed (see fig 1) and the volume of the cell decreases. This causes the enclosed air or gas to be compressed (see fig 2) and forced out through discharge delivery line under atmospheric pressure.

The machine can only be run in one direction, which is indicated by an arrow on the cylinder. The direction of rotation must not be reversed.



Read the installation and operating instructions carefully.

Rotating machinery and pressurised components, which may contain toxic, flammable or otherwise hazardous media are potentially dangerous equipment if not operated and maintained correctly. It is imperative that all users of such equipment fully educate themselves to the potential dangers and satisfy themselves that the personnel responsible for installing, testing, commissioning, operating and maintaining the plant are competent to do so. Instruction manuals are provided for guidance but must assume some basic level of competence by users. If there are any doubts or ambiguities concerning correct procedures, ask Utile Engineering. **DO NOT TAKE RISKS.**

Certain machinery can generate high levels of noise which can be harmful if exposed to it for lengthy periods of time. Various codes of practice are in existence and users must ensure that adequate precautions are taken to prevent a health hazard to employees or third party.

Equipment with internal pressures above or below ambient pressures can create a hazard. Before attempting to investigate problems, service or maintain equipment, it must be safely depressurised or pressurised to ambient conditions. Also since the gaseous medium may be flammable, toxic, corrosive or otherwise hazardous it may be necessary to purge the installation with an inert gas, such as nitrogen. Special precautions are necessary for certain gases and the user must ensure that adequate procedures are implemented.

Moving parts of machinery must not be touched and all such parts must be adequately guarded. Suitable guards are provided and must be securely retained in position at all times.

Before commencing maintenance, servicing or making other adjustments, the prime mover and other equipment must be isolated electrically or otherwise immobilised to prevent accidental start-up. In this vein, a fully qualified electrician should carry out all electrical work and all electrical equipment should be isolated before it is touched and pneumatic or hydraulic controls depressurised and made safe. Procedures must also exist to ensure that electrical or other inputs cannot be restored accidentally during the maintenance or service period.

Safety trips, emergency stop-buttons and other such devices (if fitted) are to be checked regularly to ensure that they continue to function correctly and will protect the installation and personnel in the event of an emergency.

NO attempt should be made to touch the machine whilst it is rotating. Particular care is needed when checking rotor clearances. Any movement of rotors may trap fingers.

Most machines, certain pipes and ancillaries become hot during operation whilst certain machines with sub-zero inlet temperatures may result in very cold surfaces. If it is possible for personnel to come into contact with such surfaces unknowingly or accidentally they should be guarded.

If severe vibration is observed, the cause of this should be immediately investigated and the situation rectified. Excessive vibration can lead to fatigue and other failures. Similarly, if during operation a significant change is noticed in the level of vibration, noise, temperature or any other parameter, the cause of such changes must be determined, and the cause rectified. Inlet filters must be inspected regularly so that liquid or debris is not allowed to enter the machine, which could cause damage and consequently injury to personnel.

During routine maintenance, coupling alignment should be checked for misalignment. Only approved lubricants must be used and quantities, etc must be checked regularly.

Before restarting after servicing, all nuts, set screws, etc must be checked for tightness, check all joints, for leaks and carry out purging as necessary before introducing the process gas. Also, before start-up, check the machine inlet and outlet isolating valves are open both non-return valves (if fitted) are the correct orientation.

Adjacent pipework and equipment must not impose undue forces and moments on the machinery flanges.

All welding work must be carried out by an approved gas coded welder.

In order to prevent reverse rotation of machines, it is **ESSENTIAL** that a non-return valve be installed in the inlet pipework. Otherwise a hazardous situation can arise during a normal shutdown or if the prime mover power supply is interrupted for a period of time.

The environment around the installation may need to be monitored in order to detect gas leaks etc., and consideration must be given to the installation of gas detecting equipment, and the class of electric equipment. All personnel working in or passing through the area should be adequately warned by signs and trained to exercise appropriate safety precautions. Ensure the correct personal protective equipment is worn at all times.

Technical Specification

The model and machine serial number appear on the machine data plate, other machine data can be found in the following table.

	Units	MP100
Maximum Vacuum	kPa	96.5
Speed – Maximum	R.P.M.	1500
Speed - Minimum	R.P.M.	700
Capacity at 50kPa at Maximum Speed	L/min	4215
Capacity at 50kPa at Minimum Speed	L/min	1620
Absorbed Power at 50kPa at Max. Speed	kW	5.4
Absorbed Power at 50kPa at Min. Speed	kW	2.2
Moment of Inertia	kg m ²	0.068
Noise Level at 1 metre	db (A)	80
Weight	kg	49

Note: Machine must not be used on any other gas than originally specified. Utile Engineering must be consulted if traces of any other gas are introduced into the machine.

Packaging



Top / This Way Up



Fragile

The packaging conforms to the relevant regulations. The symbols used on the packages are shown above. The machines are bolted down on a pallet and therefore should not move during transportation and either cased or shrink wrapped for general protection. The ancillary components are packed suitably within the case. The packaging and contents should be received in good condition. When unpacking do not remove the inlet/outlet protection covers.

The contents should be inspected against the advice note, notify Utile Engineering within 3 days of any items, which are damaged or are missing, followed by a written claim within seven days of the goods being delivered.

Storage

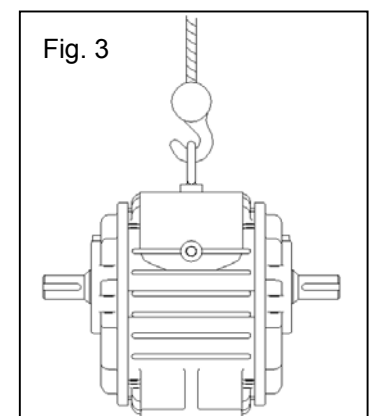
If the machine is not required for immediate installation, the machine should be stored in a clean, dry area protected from the weather. The intake and discharge port covers must remain in position until the machine is installed. We recommend that until the machine is installed the shaft be turned a few revolutions by hand every month to ensure the machine is running free.

The green protective coating on the shaft remains effective for approximately 1 year. If the machine is stored for a longer period of time, the coat must be renewed.

Handling

Skilled personnel working in accordance with safe working practices must carry out the lifting of machines. Before lifting the correct equipment must be available. Cranes, jacks, slings, and lifting beams must be capable of carrying the weight of the machine to be lifted. The lifting eyebolt situated in the top of the cylinder and a crane hook must be used when lifting or moving the machine (see fig 3). Do not use the machine ports or the shaft extension for lifting or moving the machine.

For weights see above in Technical Specification.



Installation

Before commencing installation, a site specific risk assessment, method statement and hazard identification list must be completed and adhered to. All work must be carried out in a safe area. Utile Engineering trained personnel or those trained to an equivalent standard should carry out installation, any claims for damage due to faulty installation will be void. The machine is delivered ready to be connected, with only the removal of the intake and discharge protection covers. All warning labels and instructions must be observed and retained with the machine. It is essential equipment is installed, earthed and guarded in accordance with current legislation. If the user is installing their own switches and safety devices these must be suitable for the correct working area. Before installation, ensure there is no damage to the machine and that it turns freely by hand.

Typical tools required for installation include: -

Set of spanners Pipe Wrenches Set of screwdrivers Hacksaw
Hammer / mallet Drill (low voltage)

Typical bolt tightening torques are: -

Bolt Tightening Torques			
Size	Torque	Size	Torque
M4	4.00 Nm	M10	40.00 Nm
M5	6.00 Nm	M12	70.00 Nm
M6	10.00 Nm	M16	100.00 Nm
M8	18.00 Nm	M20	150.00 Nm

Location

The machine should be installed in a clean, dry, well-ventilated area. Allow adequate space and facilities for service, inspection and future expansion. A minimum of 0.75m of working space around the machine is recommended. Adequate space around the motor and machine, particularly any fan inlets, is also necessary to facilitate cooling airflow. Where several machines are installed in close proximity, care must be taken to ensure there is no recirculation of exhausted warm air.

Foundation

Simple slab type foundations, designed for static loadings only are satisfactory. The foundations should raise the machine to a reasonable height above the floor for convenient service and inspection. The use of anti-vibration mounts between the base and foundation are recommended, these absorb the vibrations generated by the rotating parts of the machine and insulate it against any vibration in the surrounding environment. Ensure that the anti-vibration mounts are evenly loaded. Foundation bolts should fix the base.

Electrical Supply and Connection

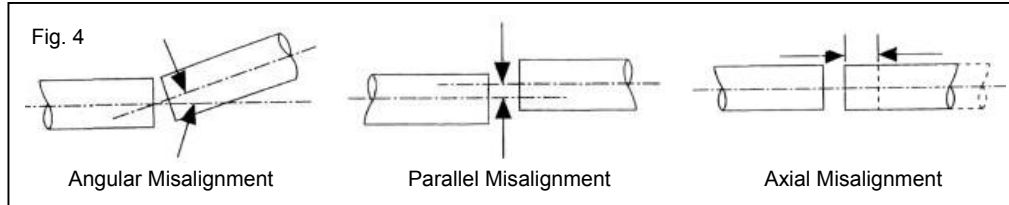
The voltage rating of the supply must be compatible with the motor and the fittings. All electrical installation must be carried out by a qualified electrician and in accordance with current regulations and within the framework of the Electricity of Work Regulation 1990. Ensure all electrical connections, plugs, sockets etc are secure before switching the supply on.

Earthing

It is important that the motor enclosure is soundly earthed by metallic earth continuity conductor, or by separate earth bonding, but in all cases the installation must be made and tested and approved for this feature by a qualified installer before the supply is applied to the motor.

Fitting Pulleys and Couplings

These should be bored to our standard limits (details supplied upon request) and fitted to the shaft with a screwing motion. On no account should they be driven on. Tapping of fitments onto the machine shaft with a hammer or mallet, causes bearing damage. This results in an increase in bearing noise and a significant reduction in bearing life. Attention should be paid to the guarding of all moving parts.



Drive Alignment

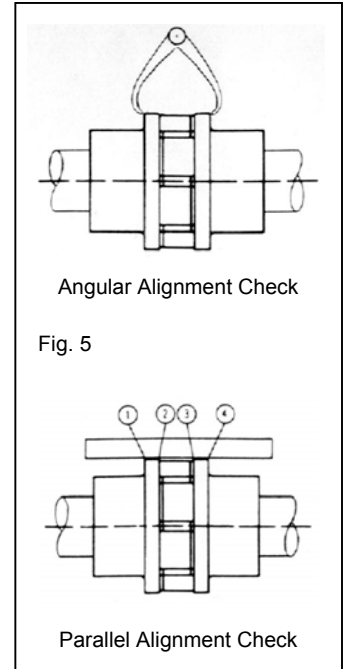
The rotor shaft must always be horizontal. There are three basis modes of misalignment, these are angular, parallel and axial (shown in fig. 4).

Flexible Coupling

1. Remove any dirt, oil, etc. from all mating surfaces. Place bush in hub and match half holes on both shafts.
2. Place setscrews loosely in threaded holes. Mount assembly in desired position on shafts.
3. Tighten setscrews. Place disc/flexible coupling in position, and bring the shafts together obtaining the manufacturers assembled length for the coupling given in their instructions.
4. To check for angular alignment: (see fig. 5)
Rotate the coupling through 90° and measure the distance between the faces. Repeat adjusting the shafts until four identical measurements are obtained.

To check for parallel alignment: (see fig. 5)

Place a straight edge across the coupling. The hubs will be in correct alignment when the straight edge contacts the 4 points squarely.



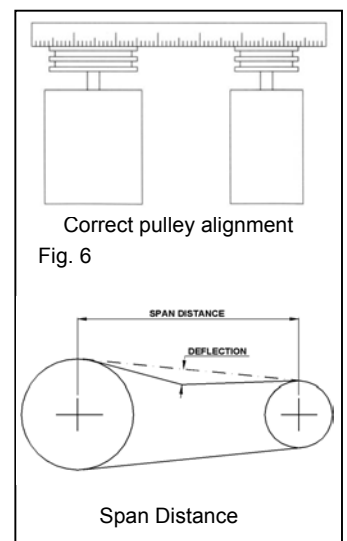
Drive Belts

1. Remove any dirt, oil, etc. from all mating surfaces. Place bush in hub and match half holes on both shafts.
2. Mount assembly in desired position on shafts ensuring both shafts are parallel and in correct alignment, use a straight edge, a correctly aligned drive will contact both pulleys squarely (see fig. 6).
3. Fit driving belts. Measure span of belts between tangent points of the two pulleys. A deflection of 1.5mm is obtained for every 100mm of the measured span.

Compare the deflection force required with the table. If the force required is according to the table then the tension is suitable. Too little force indicates under-tension and visa-versa.

Belt Section	Force Required to deflect belt 1.5mm per 100mm span (kgf)
SPZ	0.5 to 0.8
SPA	1.0 to 1.5
SPB	2.0 to 3.1
SPC	4.1 to 6.1

4. The belts should be tensioned towards the high side, to allow for the tension drop after the belts have been run-in. Belt tension should be checked daily in the first week after installation/renewal.



Note:

Excessive tension on the pulleys will damage the bearings and lead to probable shaft rupture.

Belts, which become charged electrostatically, must not be used in hazardous atmospheres.

Pipework

- The connecting pipework must be completely clean, dry and free from internal rust or scale.
- When fitting the intake and discharge pipework it is essential that adequate supports be provided and that it is properly aligned to prevent excessive strain being placed upon the machine, flexible pipe should be placed in the pipeline to remove this strain.
- During installation care must be taken to ensure that no foreign matter enters the machine or serious damage may result.
- An intake filter should be fitted into the intake side to prevent any particles from entering the machine.
- Use P.T.F.E. tape only as a jointing medium since surplus from jointing compounds will damage the blades if drawn into the machine.
- When the machine is delivering into or exhausting from a receiver, or working with a system having a large storage capacity, it is essential to fit a non-return valve in the pipework, preferably on the discharge side to prevent the machine from running in reverse on shutdown.
- Arrange both the intake and discharge pipework so that any condensate flows away from the machine.
- If user is installing their own protective switches and other devices these must be suitable for operation in the zone classified.
- All pipework and fittings must comply with IGE/UP/2 or the national standard for the country of installation.
- Vacuum pumps are normally supplied with exhaust silencers.

Pre Start-up Checks

Before starting the machine for the first time after installation, maintenance or after a long downtime, make the following checks: -

- ✓ Ensure all the anchor bolts for the machine, base and motor are securely fastened.
- ✓ Check that the machine is free running by turning the shaft by hand through a few revolutions.
- ✓ Flick start the motor to check that the direction of rotation agrees with the arrow on top of the machine cylinder. Note this should be completed with the coupling/drive belts removed.
- ✓ Recheck coupling/drive alignment and retension (see page 7).
- ✓ Ensure all equipment is installed and earthed in accordance with current legislation.
- ✓ Check all piping connections. If the system is to be pressure tested, all gauges and pressure switches must be isolated or removed. Maximum purge or pressure test is 1.50 times the working pressure.
- ✓ Check all protective devices ensuring they are working correctly.
- ✓ Ensure personnel are adequately protected from accidental contact with all dangerous equipment.
- ✓ Fill the oil reservoir with Shell Rimula 15W/40 oil or equivalent, prime the oil lines to the machine.
- ✓ Instruct the operating personnel that the machine is operational.

Protective Devices

All pressure and temperature switches must be set and tested at the desired set point by simulating the set point in actual operation.

With the machine running at the duty pressure after warming up, adjust the discharge temperature switch downwards to actuate and stop the machine. Reset the switch at the cut out temperature plus 10°C - 15°C in order to avoid false tripping from small and reasonable increases above normal levels.

Adjust the high pressure cut out switch in the same manner and reset at working pressure plus 10%.

After the first 50 running hours, remove the cone shaped mesh strainer from the inlet, clean and replace.

If a large amount of debris has been collected run for a further 50 hour period repeating the process until the filter remains clean.

Start-up

Proceed as follows: -

- i. When starting vacuum pumps the intake valve can be closed to reduce the starting power and then slowly opened as the machine reaches operating speed.
- ii. Start the drive motor and bring the machine up to operating speed.
- iii. Check and adjust the lubricator drip rate to that indicated in the lubrication section.
- iv. Check all protective devices and controls making sure they are working correctly.

Operating Notes

- Daily, check the oil drip rate through the indicator. Fill the oil tank.
- After the initial running in period, check the belt tension. Belt squeal denotes a loose belt that requires tightening.
- Inspect the filter fitted to the inlet, regularly clean and renew the element when necessary. Excessive discharge temperature for normal operation as indicated by the rise in temperature shown in the log book indicates inadequate cooling, faulty lubrication or a dirty intake filter. The machine should be stopped and inspected.
- Check the machine internally for wear every 10,000 running hours. (see Inspection and Service)
- The blade depth should be checked after the initial 2,000 running hours and thereafter every 5,000 running hours for wear and renew if the rubbing tips have worn to a depth of 67mm. (see Check Blade Wear). Condensate if allowed to enter the machine can cause severe blade wear.
- If adjustment of the oil drip rate is required (see lubrication).

Stopping Procedure

Proceed as follows: -

- i. When stopping vacuum pumps the intake valve should be slowly closed.
- ii. Trip out or Stop the drive motor.

Lubrication

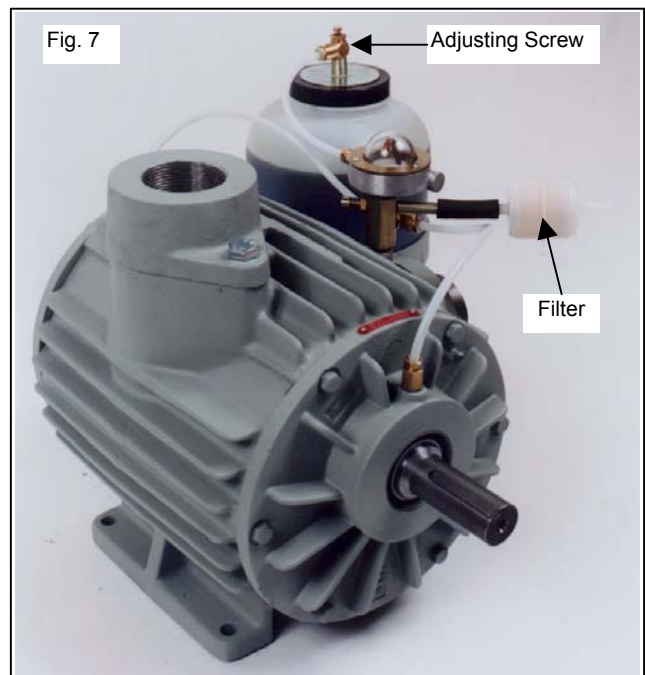
Prime all oil pipes prior to initial start and every time machine is dismantled for service. Oil is fed into the bearing housings and is then allowed to flow into the cylinder and lubricates the blades.

The recommended grade of oil is **Shell Rimula 15W/40** the typical physical characteristics are: -

SAE Viscosity Grade	15W/40
Kinematic Viscosity	100.1
@ 40°C cSt	14.5
100°C cSt (IP71)	
Viscosity Index (IP226)	135
Pour Point °C (IP15)	-27
Density @ 15°C kg/l (IP365)	0.890
Flash Point (PMCC) °C (IP34)	226
Sulphated Ash % wt (IP163)	1.1
Total Base Number mg KOH/g (IP276)	8.0

The recommended lubricator minimum oil drip rate is for MP100 – 10 drops/min.

Fig 7 shows how the lubrication system works. The vacuum on the underside of the lubricator controls the rate of oil flow. The amount of vacuum and hence air drawn in through the filter is factory set.



To increase the oil flow, screw out the adjusting screw on the oil bottle lid and screw in to decrease the amount.

Increased oil flow and difficulty in controlling the drip rate indicates a dirty filter.

Maintenance

Fully trained and competent staff must carry out any maintenance work. Utile Engineering offers contract maintenance services if required contact our service department.

When carrying out any maintenance and inspections always follow the health and safety guidelines on page 4. A regular correct maintenance plan is essential to good operational reliability and a long service life for your machine. As operating conditions vary, no exact timings can be specified for wear checks, repairs and inspections, however the following plan can be used as a guide until time scales to better suit the machines environment are found.

The machine, ancillaries and surrounding area should be kept as clean as possible.

Ensure all items are properly held and supported during all aspects of maintenance as not to pose a problem for health and safety. Observe all lifting points and apply care when handling the equipment.

Ensure all machines and associated pipework have cooled down sufficiently before touching and attempting any maintenance.

Typical tools required for maintenance include: -

Set of spanners	Pipe Wrenches	Circlip Pliers
Set of screwdrivers	Vernier Gauge / Micrometer	Two-leg Pulley drawer
Set of Allen Keys	Hammer / mallet	Feeler Gauges

Typical bolt tightening torques can be seen on page 6.

New gaskets must be fitted every time the machine is dismantled.

Bearings and seals are recommended to be replaced after 15000 operating hours or 2 years whichever is sooner. Blades must be replaced regardless of wear after 20000 operating hours as failure due to fatigue could cause serious damage.

After maintenance the machine and equipment must be treated, as new and all pre-commissioning checks should be made. Install all protective devices and controls properly after completion of work. Ensure all cabling, unions and guards are correct, secure and in place. Dispose of any used oil and cleaning solutions as prescribed by law.

MAINTENANCE PLAN			
DAILY CHECKS		QUARTERLY CHECKS	
TASK	CHECK	TASK	CHECK
Check / Fill lubricator reservoir		Check machine for blade wear.	
Check Belt condition/Tension (Hourly for running in period).		Check control panel for wiring, cleanliness and function of all panel features. (if applicable)	
Drain all vessels, condensate traps, outlet filters manually		Check function of emergency stop button and local motor isolator. (if applicable)	
Clean inlet filters (Daily for 1 st week).		Check motors for excessive vibration and damage.	
		Check function of pressure gauges.	
		Check function of non-return valves	
		Check function of pressure relief valves	
WEEKLY CHECKS		YEARLY CHECKS	
Check lubricator drip rate		Clean lubricator and oil lines	
Check belt condition / tension		Check flanges and joints for leaks.	
Clean inlet filters (After for 1 st week).		Clean internally vessels, condensate traps, filters (including elements).	
Run Standby machine for a few minutes.		Inspect machine internally (at least once a year)	
Complete logbook data			
MONTHLY CHECKS			
Check function and operation of all valves.			
Check differential pressure across filters (clean and replace if necessary).			
Check function and operation of autodrain / condensate lines.			
Clean fins on machine and motors			

Troubleshooting

The following table shows some typical problems and the remedies.

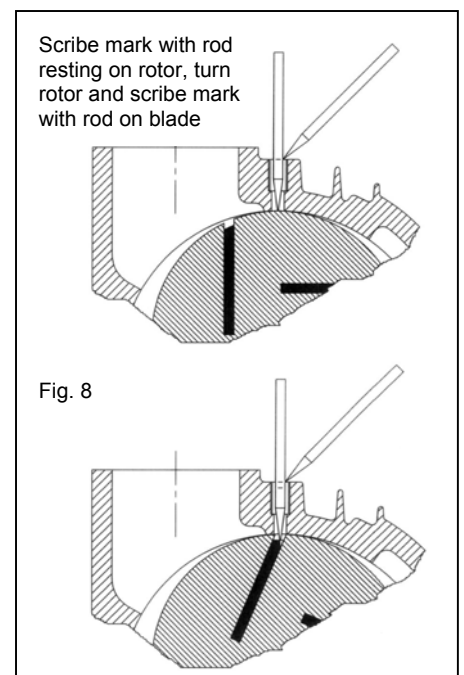
SYMPTONS	CAUSES	REMEDIES
Machine revolves in wrong direction	Incorrect connection of motor terminal	Re-arrange terminal connection
Discharge air temperature excessive	1. Machine operating at higher duty than specified. 2. Blocked intake filter. 3. Insufficient or wrong lubrication. 4. Warped / Sticking blades	1. Check rating. 2. Clean intake filter. 3. Use correct lubrication and feed rates. 4. Replace blades
Excessive blade wear	1. Insufficient lubricant to cylinder. 2. Incorrect lubricant. 3. Dirty inlet air/gas. 4. Excessive operating temperature	1. Inspect & clean oil lines, oil holes. 2. Use correct lubricant. 3. Clean & inspect intake. 4. See remedies for excessive discharge temperature.
Abnormal noise, vibration or periodic knocking	1. Worn bearing. 2. Excessive blade wear. 3. Erratic cylinder wear. 4. Insufficient lubrication 5. Rotor contacting coverplates 6. Drive misalignment 7. Warped rotor blades. 8. Excessive liquid carryover.	1. Replace bearing. 2. Replace blades & check lubrication 3. Rebore, redowel & check lubrication. 4. Increase lubrication rate 5. Check temperature, pressure & internal clearances 6. Realign and retension drive. 7. Replace rotor blades. 8. Drain all points.
Vacuum cannot be built up or only up to a certain extent.	1. Worn blades. 2. Improper belt tension. 3. Sticking relief valve.	1. Replace rotor blades. 2. Adjust belt tension. 3. Clean and replace.
Slipping of belts	1. Improper belt tension. 2. Worn belt.	1. Adjust belt tension. 2. Replace with new ones.
Overheating of electric motor	1. Overloading of motor due to excessive working pressure.	1. Lower working pressure.
Machine does not start	1. Breakdown of electric current 2. Malfunction of motor. 3. Wrong motor connections.	1. Contact power company. 2. Check motor. 3. Check electrical connections.
Shaft partially or totally locked	1. Faulty bearing 2. Foreign particles in machine. 3. Machine seized.	1. Replace bearing. 2. Disassemble machine and remove foreign particles. 3. Repair machine.

Note: If assistance is required in determining and correcting the fault with the machine then contact our service department.

1. Check Blade Wear

When carrying out any maintenance and inspections always follow the health and safety guidelines on page 3. Fully trained and competent staff must carry out any maintenance work.

- 1.1 Carry out the following procedure after the first 2,000 running hours and repeat every 5,000-hour interval. Record all measurements.
- 1.2 With the pump stationary and with the system drained, remove the eyebolt or plug in the top of the machine cylinder and insert into the hole beneath a pointed measuring rod 6mm dia x 150mm long until contact is made with the rotor (see fig. 8). Scribe a mark on the rod. Slowly rotate the shaft by hand until the rod drops onto the tip of the blade, scribe a second mark on the rod. Measure the amount of movement and renew the blades if this exceeds 6mm. Replace the plug or eyebolt.



2. Blade Inspection

When carrying out any maintenance and inspections always follow the health and safety guidelines on page 3. Ensure all electric circuits are isolated and cannot be switched on, and that the pipeline system has been cleared and is pressurised to atmospheric pressure. Fully trained and competent service personnel must carry out any maintenance work.

Inspection commences with the dismantling of the rear end, after removal of the oil tank, oil pipes and shaft guard.

- 2.1 Remove 6 hex head screws (13) the coverplate (3) complete with shaft seal (10) can be withdrawn leaving the ball bearing (9) on the shaft.
- 2.2 Measure and note the thickness of the gasket (11) fitted between the cylinder (1) and coverplate (3).
- 2.3 The blades (8) can now be removed from their slots for inspection.
Check the blades for lamination, chipping or charring on their rubbing edges and for concave wear. For any other wear other than polished surfaces or if the blades depth has reduced to 67mm or below then replace the blades.
When replacing blades a complete set must be replaced. The old blades must be disposed of according to the local government laws. When fitting new blades, make sure they slide freely in their slots and if necessary remove high spots with fine emery cloth. Lightly smear the blade surfaces with oil before reassembly.
- 2.4 Inspect the visible part of the cylinder bore and rotor for any signs of excessive wear or scuffing and for excessive slot wear. If there is any sign of cylinder rubbing completely dismantle the machine. Factory reconditioning is recommended, but if work has to be carried out on site, we advise you most strongly to contact Utile Engineering Service Department for advice.
During inspection, determine if the correct oil is being used. Bearings, cylinder wall, rotor/shaft assembly and blades should show a polished surface with a light film of oil. Hard baked deposits indicate inferior oil, dirt or excessive temperature.

3. Reassembly after Blade Inspection

Reassemble in the reverse order taking note of the following points: -

- 3.1 Ensure the blades are orientated correctly in their slots.
- 3.2 If coverplate gaskets have been replaced, it is essential that they are the same thickness as the originals, otherwise internal clearances will be affected and could cause serious damage. Lightly smear the gasket with oil before replacing.
- 3.3 Replace coverplate, screws and oil tank. Before reconnecting oil pipes ensure they are primed.

4. Cylinder Renewal

With the rear end coverplate (3) already removed as described in 2 for blade inspection, the next stage is to withdraw the rotor complete with the drive end coverplate (2).

- 4.1 Remove any oil pipes connected to the drive end.
- 4.2 Undo 6 screws (13) and slide off the coverplate (2) complete with the rotor.
- 4.3 Measure and note the thickness of the gasket (11) fitted between the cylinder (1) and coverplate (2).
The cylinder can now be replaced or rebored.
- 4.4 When reboring the cylinder the maximum allowable increase in diameter is 0.8mm to give a final bore of 200.80mm. Contact Utile Engineering for appropriate assembly instructions in this case.

5. Removal of Bearings and Seals

With the rear end coverplate (3) already removed as described in 2 for blade inspection.

- 5.1 Using a two-leg pulley drawer the rear end ball bearing (9) can be removed from the shaft.
- 5.2 The oil seal (10) can be pressed out of the coverplate for inspection.

With the drive end coverplate (2) already removed complete with rotor as described in 4 for cylinder renewal.

- 5.3 Using a two-leg pulley drawer the remove the drive end coverplate (2) complete with the shaft seal (10) leaving the ball bearing on the shaft. Note the position of the thrust washer (15) in the coverplate.
- 5.4 Using a two-leg pulley drawer the drive end ball bearing (9) can be removed from the shaft.

- 5.5 The oil seal (10) can be pressed out of the coverplate for inspection.
- 5.6 Inspect the bearings, renew if they show any signs of wear or pitting.
- 5.7 Examine the shaft seals (10) and renew if the wiping lips are worn or damaged.

6. Reassembly Procedure

This section only applies when using original bore size or replacement cylinder. Before commencing reassembly ensure that all components are perfectly clean and oilways are clear. Lightly smear the shaft with oil to assist assembly.

The correct clearances for these machines are: -

	MP100
Drive End Coverplate / Rotor	0.20mm / 0.23mm
Rear End Coverplate / Rotor	0.08mm / 0.10mm
Rotor / Cylinder	0.08mm / 0.10mm

Starting at the rear end

- 6.1 If spacing rings (5) have been replaced, grind replacements to the exact width of the originals and locate against the rotor side face with the flanged side nearest to the rotor.
- 6.2 Press ball bearing (9) onto the shaft.
- 6.3 Replace oil seal (10) in coverplate ensuring that the tension spring faces away from the bearing.
- 6.4 Fit any shims (16) into the coverplate (3) and press coverplate onto the rotor/shaft. Set clearance.
- 6.5 If coverplate gaskets (11) have been replaced, it is essential that they are the same thickness as the originals, otherwise internal clearances will be affected and could cause serious damage. Lightly smear the gasket with oil before replacing.
- 6.6 Turn cylinder (1) upside down for ease of assembly.
- 6.7 Place rear coverplate assembly onto cylinder (1) via location dowels and bolt with 6 screws (13) and with coverplate gaskets (11) in place.
- 6.8 Check rotor / cylinder clearance.

Reassemble drive end

- 6.9 Refit sliding blades (8) in their slots after lightly smearing with oil and removing any high spots with fine emery cloth. Ensure the blades are orientated correctly in their slots.
- 6.10 Fit spacing ring (5) onto the shaft with the flanged side nearest to the rotor.
- 6.11 Press ball bearing (9) onto the shaft.
- 6.12 Replace oil seal (10) in coverplate ensuring that the tension spring faces away from the bearing.
- 6.13 Fit thrust washer (15) in the correct position in coverplate (2).
- 6.14 Assemble onto cylinder (1) via location dowels ensuring correct thickness of gaskets are used.

Check that the shaft rotates freely by hand before refitting oil pipes and shaft guard. Prime oil pipes before use.

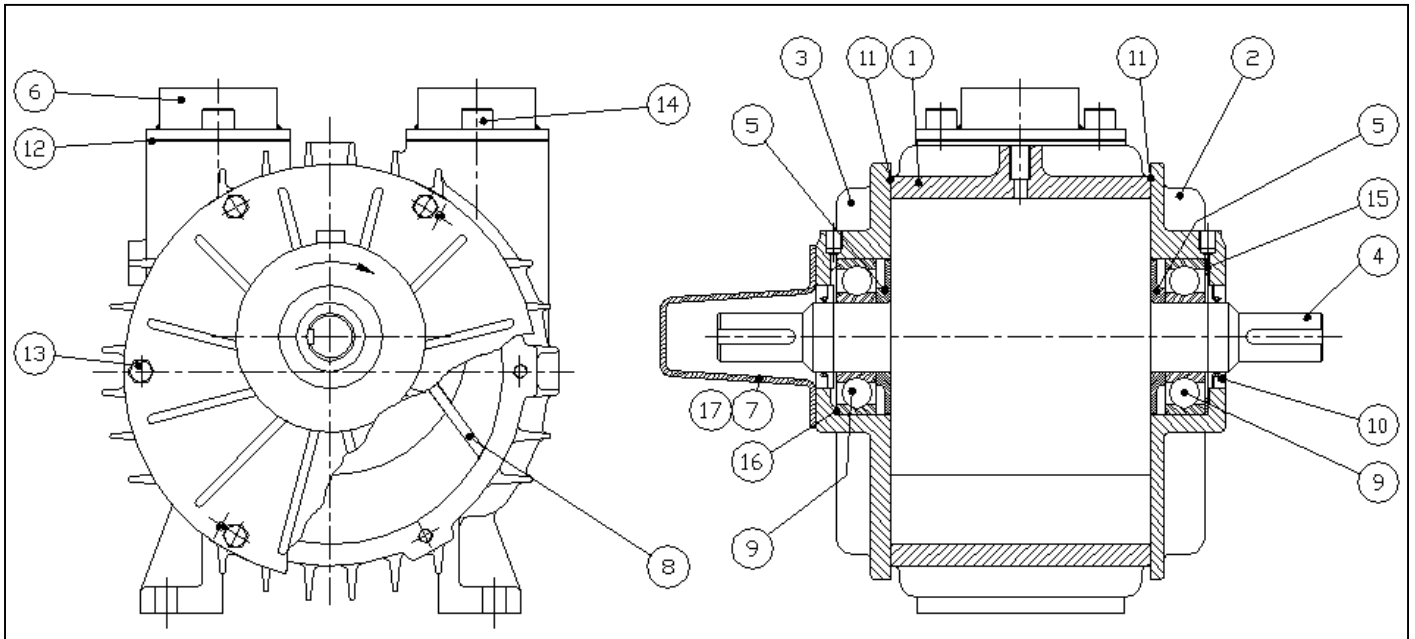
7. Spare Parts

A stock of the main wearing parts at the installation site is important to the constant availability and smooth running of the machine.

We recommend the following parts and quantities to be kept in stock at the installation site.

Description	Part Number	Quantity
	MP100	
Blade	S 13045/3	4
Ball Bearing	H 1028	2
Oil Seal	F 1079	1
Gasket – Coverplate	K 1150	2
Gasket – Flange	S 8605/1	2
Lubricator Filter	L 1021	1

Always quote the machine serial number when ordering spare parts.



ITEM	DESCRIPTION	PART NUMBER	QTY
		MP100	
1	CYLINDER	S 13123	1
2	COVERPLATE - DRIVE END	S 13040/1	1
3	COVERPLATE - REAR END	S 13040/3	1
4	ROTOR & SHAFT ASSEMBLY	S 13124	1
5	SPACING RING	S 13042	2
6	FLANGE	S 13125	2
7	SHAFT GUARD	S 8728	1
8	BLADE	S 13045/3	4
9	BALL BEARING	H 1028	2
10	OIL SEAL	F 1079	2
11	GASKET - COVERPLATE	K 1150	2
12	GASKET - FLANGE	S 8506/1	2
13	HEX HEAD SCREW	G 1083	12
14	SOCKET HEAD CAP SCREW	G 1189	4
15	THRUST WASHER	B 1069	1
16	SHIM	K 1051	TO SUIT
17	HOLLOW SOCKET SET SCREW	G 1098	2

After Sales Service

Contact the address or telephone number shown at the bottom of each page or our local distributor, for any after sales service, maintenance or service problems.

Contract maintenance, service exchange machines or a site visit by a Utile Engineering Service Engineer can also be arranged in the same manner.

Utile Engineering can also provide Training Programs for all your requirements, from maintenance repair to operator and supervisor training. They are structured to give specialist knowledge of our products and procedures including use of authorised spares. The enacting of the Health and Safety at Work Act focused attention on the responsibility of all parties, manufacturers, users and repairers on the repair of equipment. We strongly recommend that repairs should be carried out to the original specification using authorised replacement parts where necessary.



Warranty Claim Conditions

Utile offers a 12-month warranty against faulty parts and workmanship. This does not include components used in the production of packages, where the appropriate manufacturers warranty applies.

- 1. The warranty period commences from the first day that the operator receives the machine.
2. The warranty covers defective parts or workmanship used in the manufacture of the machine.
3. The operator must notify the company promptly of any failure (using the appropriate procedure – indicated below).

Please note: The company is not liable for any claim where: -

- 1. Damages or delay or any other consequential cost associated with the alleged defect, are incurred.
2. Malfunction caused by fair wear and tear, abnormal conditions of use, accident, neglect or misuse of equipment, or improper storage.
3. Deviation from operating specifications or other special terms of sale.
4. Improper operation, maintenance or repair.
5. Damage resulting during shipment or installation by other than company authorised personnel.
6. Freight charges for goods returned to the company's premises.

No allowances will be made for repairs or alterations carried out without the company's written consent or approval.

Claim form

To make a claim complete the form below and send, phone, fax or email us at the address at the bottom of the page.

Warranty Claim Form
Your Details
Name:
Company Name:
Company Address:
Telephone:
Fax:
E-mail:
Machine Details
Serial Number:
Model:
Site Location:
Supplier Name:
Installers Name:
Date Commissioned:
Name of Person responsible for Maintenance:
Operating Hours a Day:
Duty Details
Speed: Gas Flow: Pressure:
Further Information

