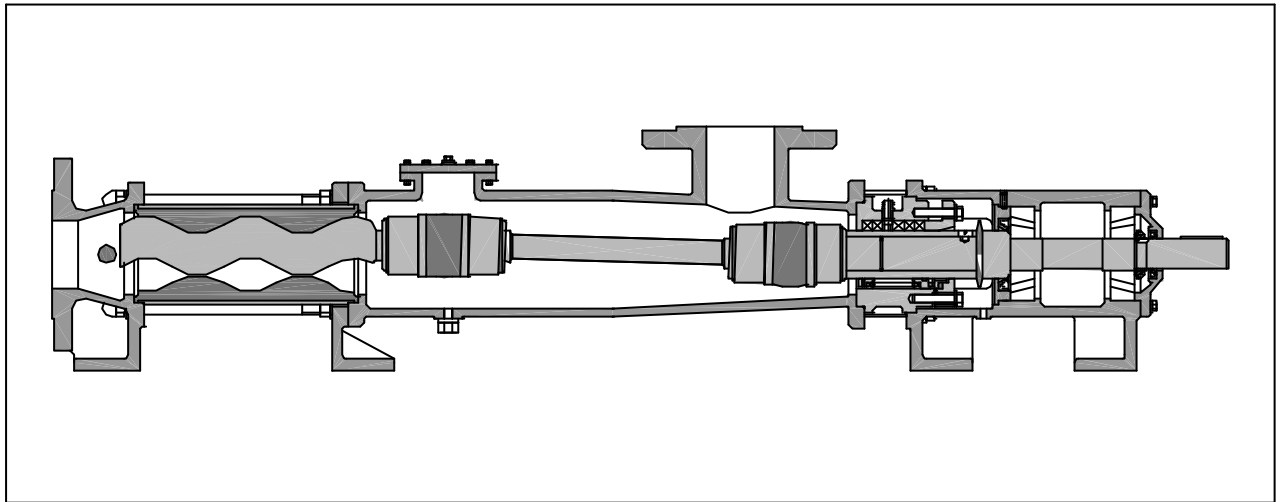


# **ROTOMAC PROGRESSIVE CAVITY PUMPS**

## **INSTALLATION, OPERATION AND MAINTENANCE MANUAL**

**SERIES : SAC**



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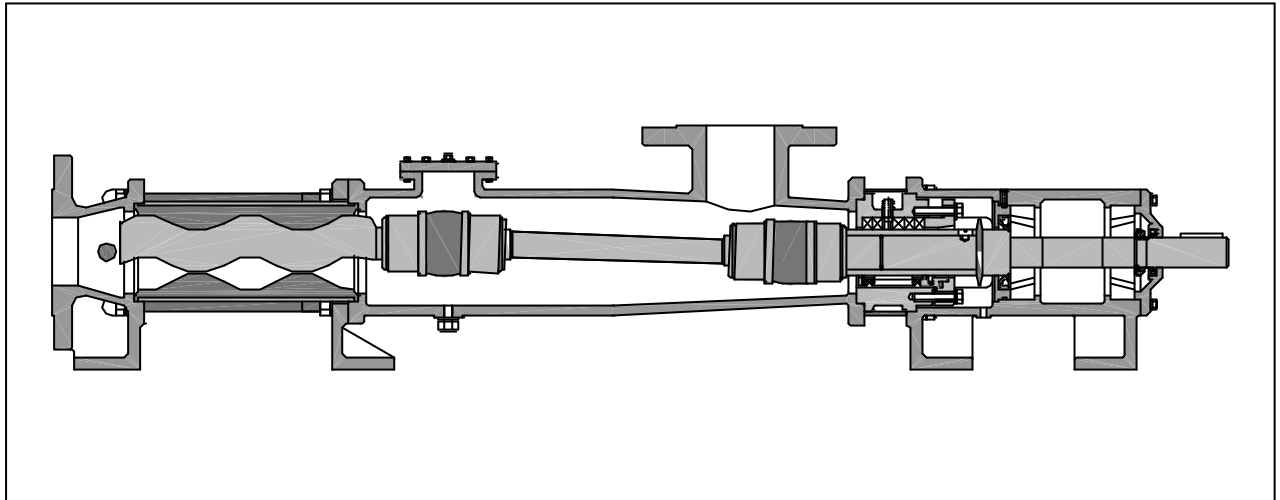
**ROTOMAC PROGRESSIVE CAVITY PUMPS ::#:: THE FINE ART OF PUMPOLOGY**

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# ROTOMAC PROGRESSIVE CAVITY PUMPS

## INSTALLATION, OPERATION AND MAINTENANCE MANUAL

### 'SAC-SERIES' ROTOMAC PUMPS



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**1. SPECIFICATION**

**1.1 BASICS:** Screw Pumps are a special type of Positive Displacement Pumps in which flow through the Pumping elements is truly axial. The liquid is carried between screw threads on one or more rotors and is displaced axially as the screws rotate & mesh. In all other rotary pumps the liquid is forced to travel circumferentially, thus giving the screw pump with its unique axial flow pattern and low internal velocities, a number of advantages in many application where liquid agitation or churning is objectionable. The Single Screw Pump exists only in a limited number of configurations. The rotor thread is eccentric to the axis of rotation and meshes with internal threads of the stator (rotor housing), alternatively the stator is made to wobble along the pump centerline.

**1.2 THEORY:** In screw pumps, it is the intermeshing of the threads & close fit of the surrounding housing which create one or more sets of moving seals between pump inlet & outlet. These sets of seals act as a labyrinth & provide the screw pump with its positive pressure capability. The successive sets of seals form fully enclosed cavities, which move continuously from inlet to outlet. These cavities trap liquid at the inlet & carry it along to the outlet, providing a smooth flow.

**1.3 DESIGN CONCEPTS:** The pressure gradient in the pump element of all types of screw pumps produces various hydraulic reaction forces. The mechanical and hydraulic techniques employed for absorbing these reaction forces are among the fundamental differences in the type of screw pumps produced by various manufacturers. Another fundamental difference lies in the method of engaging or meshing the rotors and maintaining the running clearances between them.

**1.4 SCOPE**

**1.4.1 'SAC' Series 'ROTOMAC' Pumps** are used for handling viscous / non viscous, non-corrosive fluids, abrasive and pulped material in suspension. It is an ideal pump for handling slurry of various pumping medium, edible and industrial oils, etc.

**1.4.2** These type of **'ROTOMAC'** Pumps are constructed in good quality gray cast iron and the rotating parts generally of Nickel Chrome Steel, hardened and hard chrome plated to withstand wear and abrasion. Stainless Steel rotating as well as housing parts are used for normal corrosive fluids and the rotor scroll as well as the shaft under gland are being hard chrome plated for abrasive duties.

**1.5 DUTY CONDITIONS:**

**'SAC' Series 'ROTOMAC' Pumps** should be installed only on specific duties for which the have been supplied. In case pumps are required to be used for other applications, manufacturer's prior recommendation should be sought in the interest of safety, plant efficiency and the pump life.

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**2. IMPORTANT NOTES**

- 2.1 In order to achieve reliable performance and long service life, the pump must be checked and maintained at regular intervals, strictly according to the instructions.
- 2.2 These instructions should be placed at the disposal of operating and maintenance staff and should be carefully followed.
- 2.3 The manufacturer do not take any responsibility for damage occurring due to non-observance of these operating instructions.
- 2.4 Warning Plates on the pump showing correct direction of rotation, warning against Dry Running, must always be observed and kept completely legible.

**3 INSTALLATION AND SAFETY RECOMMENDATIONS**

- 3.1 'SAC' Series 'ROTOMAC' Pumps must be installed with their base plates mounted on a flat surface, grouted and bolted, thus ensuring firm fixing and reduction in noise and vibration. Sufficient space to be left for removal of the stator during the maintenance work.
- 3.2 All pipe works should be independently supported to avoid any load on the pump.
- 3.3 To eliminate vibration, the pump must be checked for proper alignment with the drive unit before and after the pipe fittings. Maximum permitted misalignment tolerances for a standard installation are – Radial Shift: 1 % of the largest external diameter in the pump assembly and the Angular Misalignment:  $\pm 1^{\circ} 30'$
- 3.4 It is recommended that a vacuum gauge be fitted to the pump suction branch and a pressure gauge fitted to the delivery branch to facilitate continuous monitoring of the pump operating conditions.
- 3.5 When motor is being wired and checked for direction of rotation, it must be decoupled from the pump to prevent dry running. Wiring works of all electrical equipments should be carried out by qualified personnel and complied with the relevant national regulations.
- 3.6 Care must be taken to protect all electrical items from oil and water.
- 3.7 Belt Guard must be securely fixed in position to avoid contact with the running drive belts/ coupling. Pump Safety Devices are to be ensured in place before starting the pump.

**4 PRE-OPERATIVE CAUTIONS**

- 4.1 THE 'ROTOMAC' PROGRESSIVE CAVITY PUMPS SHOULD NEVER BE RUN IN A DRY CONDITION, EVEN FOR A FEW REVOLUTIONS AS THIS WILL DAMAGE THE RUBBER STATOR.
- 4.2 AS THE PUMP REQUIRES HIGH STARTING TORQUE, USE OF ONLY DIRECT-ON-LINE STARTER IS RECOMMENDED WITH SQUIRREL CAGE INDUCTION MOTOR.
- 4.1 'ROTOMAC' PROGRESSIVE CAVITY PUMPS SHOULD NEVER BE STARTED AGAINST CLOSED VALVES.

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**5. START-UP AND ROTATION**

5.1 The Pump Housing (17) must be filled with the relevant pumping media before starting. In case of high viscosity media, fill with a liquid. This initial filling is not for priming purpose; but to provide the necessary lubrication to the rubber stator until the pump primes itself.

5.2 When the pump is stopped, sufficient product is trapped in, to provide lubrication for the next starting, but if the pump is lying idle or it has been dismantled for servicing / relocation, the pump must be filled with relevant product and given a few turns by hand before starting.

5.3 **'SAC' Series 'ROTOMAC' Pumps** are normally arranged for counterclockwise rotation (viewing from the driving end) which results in the flange nearer to the driving end, being the suction. Pumps fitted with direction dependent seals should never be run in the opposite direction of the rotation arrow. In case where necessary, it is advisable to contact the Factory, to run the pump in the reverse direction so as to bring the delivery at the driving end.

5.4 Open the valves before starting the pump. Never run the pump against a closed outlet or inlet valve!

5.5 If the pump is having Mechanical Seal shaft sealing arrangement, connect the supply lines for the flushing and quenching fluids before the pump is put into operation.

**6. GENERAL INFORMATION**

6.1 **STUFFING BOX/GLAND PACKING:**  
The packing is provided to arrest the entry of air in the system when the pump is under suction, and leakage of the product when the pump is under pressure. The Gland (06) should be tightened sufficiently with the help of the gland nuts (38) just to prevent the entry of air / leak when the pump is in operation. A slight drip from the gland (06) when the gland is working under pressure does not harm; but ensures lubrication of the packing. The Gland packing are not to be over tightened.

6.2 **SHAFT (15):**  
Shaft is manufactured as on solid piece to carry the Cardan Universal Joint, which ensures a true concentric motion and does not disturb the gland packing / mechanical seal during operation.

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- 7. DISMANTLING:**
- 7.1 Unscrew the 4 domed nuts (29) fitted to the tie rods (24) and remove the end cover (22). After loosening the nuts (29) unscrew the hex. nut (40) and loosen the middle support (21). Unscrew the tie rods (24) from the pump housing (17). Withdraw the middle support (21).
  - 7.2 Hold the pump coupling or the shaft (15) unscrew the Bonded Stator (25). If the stator offers some resistance, pour a little water through the opening to ease out this stiffness.
  - 7.3 Unscrew the 4 Hex. nuts (35) holding the pump housing (17) to the bearing housing (01) and withdraw the pump housing (17).
  - 7.4 Remove the 'O' Ring (64) from the Cardan Joint Assembly (28) stopping the Pin Retainer Sleeve (63). Slip out the Pin Retainer Sleeve (63). Knock out the Cardan Rod Pin (27) and withdraw the Rotor (23).
  - 7.5 Repeat the procedure to remove the Cardan Rod (26) from the Cardan Joint Assembly (28) as explained in 7.4.
  - 7.6 Execute the above said procedure at the other end of the Cardan Joint Assembly (28) and withdraw the Cardan Joint Assembly (28) from the Shaft-Cardan (15).
  - 7.7 Remove the Stuffing Box (05) along with the Gland (06).  
  
**OPTIONAL:** Unscrew the Hex. Head Bolts (37A) holding the Mech. Seal Housing (05A) and the Seal Clamping Plate (06A). Remove the Mech. Seal Housing (05A) along with the 'O' Ring (54). Unscrew the grub screws holding the Mech. Seal (14M) to the Shaft-Cardan (15) / Shaft Sleeve (16) and slide out the Mech. Seal (14M) along with the Seal Clamping Plate (06A).
  - 7.8 Unscrew the Cap Screw (53) holding the Shaft Sleeve (16) and slip out the Shaft Sleeve (16) (Optional) and the Water Thrower (12).
  - 7.9 Unscrew the Grub Screw (33) holding the Grease Seal Housing (04) and remove the same from the Shaft-Cardan (15).
  - 7.10 Remove the pump coupling and the Shaft Key (31) if fitted. Unscrew the Hex. Head Bolts (32) and remove the Bearing Cover (02). Open out the Bearing Lock Nut Washer (11) and unscrew the Bearing Lock Nut (10).
  - 7.11 Place the Bearing Housing (01) along with the Shaft-Cardan (15) driving end facing upward on the hydraulic press. Apply pressure gradually on the Shaft-Cardan (15) driving the same through the rear Taper Roller Bearing (09). The Shaft-Cardan (15) will come out with the front Taper Roller Bearing (09) leaving both the bearing outer ring inside the Bearing Housing (01). Remove the front Taper Roller Bearing from the Shaft-Cardan (15).

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- 7.12 Place an appropriate size of steel plate of sufficient strength across the outer ring of the front Taper Roller Bearing (09) and press out the outer ring from the Bearing Housing (01). Repeat the same procedure to remove the outer ring of the rear Taper Roller Bearing (09) by reversing the Bearing Housing (01) on the hydraulic press.
- 7.13 Clean all the parts removed and apply necessary anticorrosive treatment.
- 8. REASSEMBLING:**
- 8.1 Start mounting the outer rings of the rear & front Taper Roller Bearings (09) facing outward to each other inside the Bearing Housing (01) using a mounting dolly or a clean length of tubing. Let the outer rings sit squarely on their seats provided inside the Bearing Housing (01).
- 8.2 Mount the inner ring with its roller and cage assembly of the front Taper Roller Bearing (09) on to the Shaft-Cardan (15). Let the inner ring sit on the step of the Shaft-Cardan (15), small end of the taper towards the driving end of the shaft. Fill the rollers with suitable grease. Insert the Shaft-Cardan (15) through the Bearing Housing (01) and let the mounted inner ring sit in the outer ring of the front Taper Roller Bearing (09). Place the front end of the Shaft-Cardan (15) on a wooden piece along with the Bearing Housing (01). Grease and mount the inner ring with its roller and cage assembly of the rear Taper Roller Bearing (09) on to the Shaft-Cardan (15) and let the same sit in the outer ring. Place the Bearing Lock Nut Washer (11) in place and screw the Bearing Lock Nut (10) and tighten the inner ring of the rear Taper Roller Bearing (09) as the Shaft-Cardan (15) is rotated. When the shaft is no longer be rotated easily, loosen the nut just enough to allow the shaft to rotate freely again. See that sufficient amount of grease is applied to the bearings.
- 8.3 Place the Bearing Cover (02) fitted with Grease Seal (07) to the Bearing Housing (01) and tighten the same with the Hex. Head Bolts (32).
- 8.4 Slide the Grease Seal Housing (04) fitted with Grease Seal (08) and locate the same in position at the front Taper Roller Bearing (09). Hold the Grease Seal Housing (04) with the Grub Screw (33)
- 8.5 Slide the Water Thrower (12) and place it in front of the Grease Seal Housing (04).
- 8.6 **OPTIONAL:** Place the 'O' Ring (66) in its groove on the Shaft-Cardan (15) and slide the Shaft Sleeve (16) over the shaft to the locking position and tighten the Cap Screw (53).
- 8.7 Slide the Gland (06) and the Stuffing Box (05) fitted with Stud (37).
- 8.8 Place the Pin Retainer Sleeve (63) and the 'O' Ring (64) over the Shaft-Cardan (15). Offer the Cardan Joint Assembly (28) mounted with 'O' Rings (64). Insert the Cardan Rod Pin (27) and slide the Pin Retainer Sleeve (63) and stop the same with the 'O' Ring (64).

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- 8.9 Mount the 'O' Rings (64) for the Pin Retainer Sleeve (63) on to the other end of the Cardan Joint Assembly (28). Insert one end of the Cardan Rod (26) with the Pin Retainer Sleeve (63) and the 'O' Ring (64) to the Cardan Joint Assembly (28). Insert the Cardan Rod Pin (27) and slide the Pin Retainer Sleeve (63) and stop the same with the 'O' Ring (64). Place the Pin Retainer Sleeve (63) and the 'O' Ring (64) over the other end of the Cardan Rod (26) and repeat the procedure as explained in 8.8.
- Mount the 'O' Rings (64) for the Pin Retainer Sleeve (63) on to the other end of the Cardan Joint Assembly (28). Insert the Rotor (23) head with the Pin Retainer Sleeve (63) and the 'O' Ring (64) to the Cardan Joint Assembly (28). Repeat the procedure as explained in 8.9. Place the Pin Retainer Sleeve (63) and the 'O' Ring (64) over the other end of the Cardan Rod
- 8.10 Place the 'O' Ring (55) in the seat of the Pump Housing (17) and offer the same fitted with the Studs (34) over the rotating assembly to the Stuffing Box (05) / Bearing Housing (01). Align the Bearing Housing (01), Stuffing Box (05) and the Pump Housing (17), ensuring the 'O' Ring (55) in the seat of the Pump Housing (17). Tighten the aligned assemblies with the Spring Washer (36) and the Hex. Nuts (35).
- 8.11 Screw the Bonded Stator to the Rotor (23) holding the Shaft end firmly and let the Bonded Stator sit squarely in the seat provided on the face of the Pump Housing (17).
- 8.12 Slide the Middle Support (21) if applicable. Screw the Tie Rods (24) with Hex. Nuts (40) & Sp. Washers (41) to the Pump Housing (17) through the Middle Support (21). Tighten the Middle Support (21) with the Hex. Nuts (40) & Sp. Washers (41) to the Pump Housing (17).
- 8.13 Offer the End Cover to the Bonded Stator (25) and tighten the same with the Domed Nuts (29) and Sp. Washers (30). Screw in the Drain Plug (49) with the Plain Washer (50).
- 8.14 Place the Shaft Key (31) in its groove on the Shaft-Cardan (15) and mount the pulley / coupling.
- 8.15 Recheck that all the fasteners are fully tightened and completeness of the parts as per cross sectional drawing of 'SAC' Series of 'ROTOMAC' Progressive Cavity Pumps.
- 8.16 In cases of Four Stage pumps, Stator Support Rings (20) are provided one each with 'O' Ring (56) at the Pump Housing (17) face and the End Cover (22) to support the Bonded Stator (25) and seal the assembly.

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**9 CARDAN JOINT ASSEMBLY (28):**  
The Cardan Universal Joint connecting the shaft to the rotor, provides freedom of angular movement to the rotor. Two sets of pins and bushes in the assembly, perpendicular to each other maintaining maximum contact between them, provide free angular movement in their own plane. The Cardan Joint Assembly can be removed from the shaft easily and the fitment or removal of Mechanical seals from the shaft made easy without dismantling the bearing housing.

**9.1 Dismantling & Assembling of Cardan Joint Assembly:**  
Slip out both the Boot Seal Retainers (28-07) using a wooden piece and mallet taking care not to damage the rubber surface of the boot seal retainer. Remove the Boot Seal (28-06) carefully from its grooves without using any sharp tools.

**9.2** File or grind the formed head of the Cardan Joint Dowel (28-05) and withdraw the dowel. Knock off the Cardan Joint Bushes (28-03) and remove the Cardan Joint Body (28-01).

**9.3** Withdraw the Cardan Joint Pin (28-04) and remove the other Cardan Joint Body (28-01).

**9.4** The Cardan Joint Block (28-02) and the other parts are now free for inspection and necessary replacement of the parts.

**9.5** Refitting is a simple reversal of this procedure.

**10. MECHANICAL SEAL (14M)(OPTIONAL):**

**10.1** Mechanical Seal (14M) is fitted over the shaft (15) / shaft sleeve (16) encased in the Mech. Seal Housing (05A) and the static seal ring ( lapped face facing forward ) in the recess of the seal clamping plate(06A).

**10.2** Mechanical seal gives a perfect leak-proof joint. The seals are pre-loaded and assembled to give maximum efficiency. Care should be taken not to drop or scratch the lapped faces as this will render them incapable of forming a perfect seal.

**10.3** Single Mechanical Seals work without additional equipments except for operating them with a rinsing or cooling system as required for the pumping medium.

**10.4 RINSING:** In case of rinsing as per API 610, Appendix D, Plan 32, where the media is having solids a clear rinse is fed in near the area of sliding surface which keeps the medium away from the seals. The pressure of the rinse is greater than that of the medium and sufficient in quantity.

**10.5 QUENCHING:** In case of quenching as per API 610, Appendix D, Plan 62, Quenching is commonly used in sealing engineering that applies a non pressurized external fluid to the atmospheric side of a mechanical seal. The quenching is applied when a single mechanical seal will not work or only to a limited extent without auxiliary measures.

**10.6 Fitting & removal of Mechanical Seals:** Remove the bolts holding the seal clamping plate to the mechanical seal housing. Withdraw the seal housing and unscrew the grub screw holding the Mechanical Seal to the shaft. Slide out the seal clamping plate and carefully push out the seal face.

**10.7** Assembling of the seal is reversal of the above said procedure. Care is to be exercised for cleanliness and avoiding of foreign bodies in between the seal faces sliding surfaces. While assembling the seal on the shaft, apply some glycerine to the shaft and the seal housing area of the gaskets.

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10. FAULT FINDING & REMEDYING

Possible Problems													The ROTOMAC pump is a well established product which was thoroughly tested before leaving the factory. If you use the pump in keeping with your Order specification and treat it in accordance with our operating and Maintenance Instructions, it will run satisfactorily for a long period of time.				
The pump is no longer starting	The pump is no longer sucking	The pumped medium is too little	The pressure is too low	The pumped medium is unstable	The pump is running loudly	The pump is stuck	The drive is overload	The rotor life time is too short	The rotor life time is too short	The shaft seal is leaking	Failure to deliver liquid	Pump looses liquid after starting		Vibration	Stuffing box over-heats	Bearing over-heat	Bearing wear rapidly
*								*									In new pumps or stators : the static friction is too great.
*	*	*						*									The pump electrical equipment is not compatible with the electrical supply.
	*							*	*	*							The pressure is too high.
*						*	*										There are foreign bodies in the pump.
*						*	*	*	*								The temperature of the liquid medium is too high, the stator is too ductile.
*						*	*	*									The stator has swollen, the elastomer is not compatible with the medium.
*						*	*	*									The solids content of the medium is too high and leads to blockages.
*						*	*	*	*	*							The liquid medium sediments or hardens when left to stand.
		*	*	*							*	*	*				There is air or vapour in the suction pipe.
	*	*	*	*							*	*					The suction pipe is leaking.
	*	*	*	*							*	*					The shaft seal is leaking.
		*	*								*						The rpm is too low.
	*	*	*								*						With reduced diameter rotor : operating temperature has not been reached.
		*	*	*	*			*	*				*				The suction is too great or pressure too low (cavitation).
		*	*	*	*	*	*	*					*				The pump is running dry.
	*	*	*	*	*						*	*					The stator is worn out, or temperature of liquid is too low.
	*	*	*	*	*			*	*		*	*					The stator material is brittle.
	*	*	*	*	*			*			*	*					The rotor is worn out.
				*								*					The joints are worn out.
				*								*		*	*		The pump and drive are not axially aligned.
				*								*					The elastic element of the coupling is worn out.
				*				*			*	*					The bearings are destroyed.
						*									*		The rpm is too high.
						*											The viscosity is too high.
						*											The specific weight of the medium is too high.
						*		*			*						The stuffing box is incorrectly tightened.
								*			*						The packing is not suited to the liquid medium.
*								*	*		*						Mechanical seal : rotation is incorrect.
								*			*						Mechanical seal : mechanical seal and mating ring have failed.
								*			*						Mechanical seal : elastomers damaged, swollen or brittle.
										*	*	*					NPSH available, too low.
														*	*		Insufficient lubrication of bearings.
												*		*			Excessive tension of the drive belts.

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## 10. FAULT FINDING & REMEDYING

### Remedy

Fill the pump up, then pump through manually using a suitable appliance; if necessary use glycerine as lubricant in the stator.				
Check order information. Examine electrical installation (possibly 2 phase operation).				
Measure the pressure with a manometer and check against order details. Reduce the pressure or change the drive.				
Remove foreign bodies and eliminate possible damage.				
If the liquid medium temperature cannot be lowered, use a reduced diameter rotor.				
Check whether the liquid medium agrees with the order requirements. Possibly change stator material.				
Increase the liquid part of the medium.				
Clean the pump and rinse through after each run.				
Increase the suction liquid level, prevent turbulence and air bubble at the inlet.				
Check seal and tighten pipe connections.				
Stuffing box : tighten or renew. Mechanical seal : renew seals, eliminate solid deposits.				
In the case of adjustable drives : increase the rpm. If necessary change the drive.				
Warm up the pump (stator) to operating temperature first of all.				
Decrease suction resistance, lower the temperature of the liquid medium, install the pump at a lower location.				
Fill up the pump, provide for dry running protection, move the pipes.				
Replace with a new stator or ensure correct liquid temperature.				
Fit a new stator. Check the liquid medium agrees with order details; if necessary change the stator material.				
Change rotor, establish the cause. Wear and tear, corrosion, cavitation; if necessary change to a different material or coating.				
Replace relevant parts, carefully reseal and lubricate.				
Re-align the unit.				
Use a new connection and re-align the pump.				
Replace bearing, lubricate, reseal. At higher temperatures observe the lubricant and the bearing.				
In the case of adjustable drives : lower the rpm.				
Measure the viscosity and compare with order details. If necessary adjust viscosity or change the drive.				
Measure specific weight and compare with order details. If necessary adjust specific weight or change the drive.				
Service stuffing box according to page 3 (6.1), if necessary renew worn shaft.				
Replace fitted packing with another packing type.				
Change electrical connection.				
Replace relevant rings with new ones.				
Replace elastomers. Check whether the liquid medium agrees with order details, if necessary change material.				
Make necessary arrangement to meet the NPSH(r) of the pump.				
Inspect and re-grease the bearings sufficiently.				
Re-adjust the drive belts tension only to requirement without over tightening.				
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**MAINTENANCE AND SERVICE**

Due to a simple assembly design of the Progressive Cavity Pumps, they need a little attention and replacements but as per the Maintenance & Service practice, the following are attended at regular intervals:

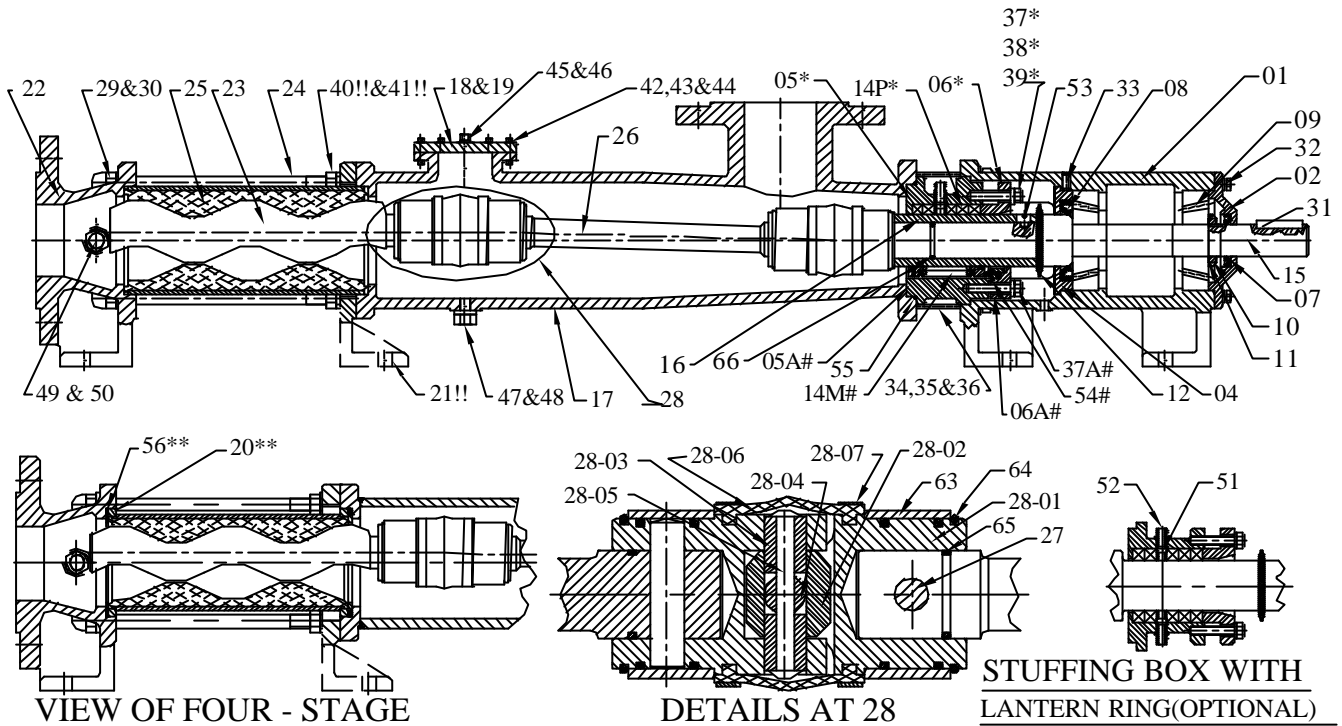
- Cleaning:** The pump should be regularly rinsed or cleaned where sedimentation deposits of medium is likely.
- Temporary Shutdown:** If the pump is stopped temporarily for some time, the pump should be rinsed /cleaned if the medium tends to solidify/ harden and glue up the Mechanical Seal.
- Stator:** When stopped for a long period, the elastomer along the contact line between the rotor and stator may become permanently distorted and this will increase the breakaway torque. It is advised to remove the stator from the pump and the same is stored in air-tight package in a cool/dry place away from light.
- This case applies to Standby Pumps as well and they are to be operated from time to time otherwise the pump may seize when being started up.
- Rotor:** When stored for a long period, support on wooden blocks and cover to protect from damage.
- Drive Belts & Coupling:** Check the drive belts tension. If need be, adjust to proper tension. Excessively worn out belts are to be replaced by matched sets. Check the rubber bushes and coupling bolts for wear & tear and replace if necessary.
- Bearings:** The Shaft of the pump is mounted on heavy duty taper roller bearings which are lubricated for life in the factory. Should the bearings have to be removed, the old grease should be washed out and re-greased.

**Lubricating Grease:**

Operating Temperature Range ° C	Grease (Example)
Minus 30 to + 120	"Shell" Alvania G3
Minus 30 to +180	"Kluber" Petamo GHY 443
Minus 35 to + 260	"Kluber" Barrieta L55/3

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12. CROSS-SECTIONAL ARRANGEMENT OF 'SAC-SERIES' PUMPS

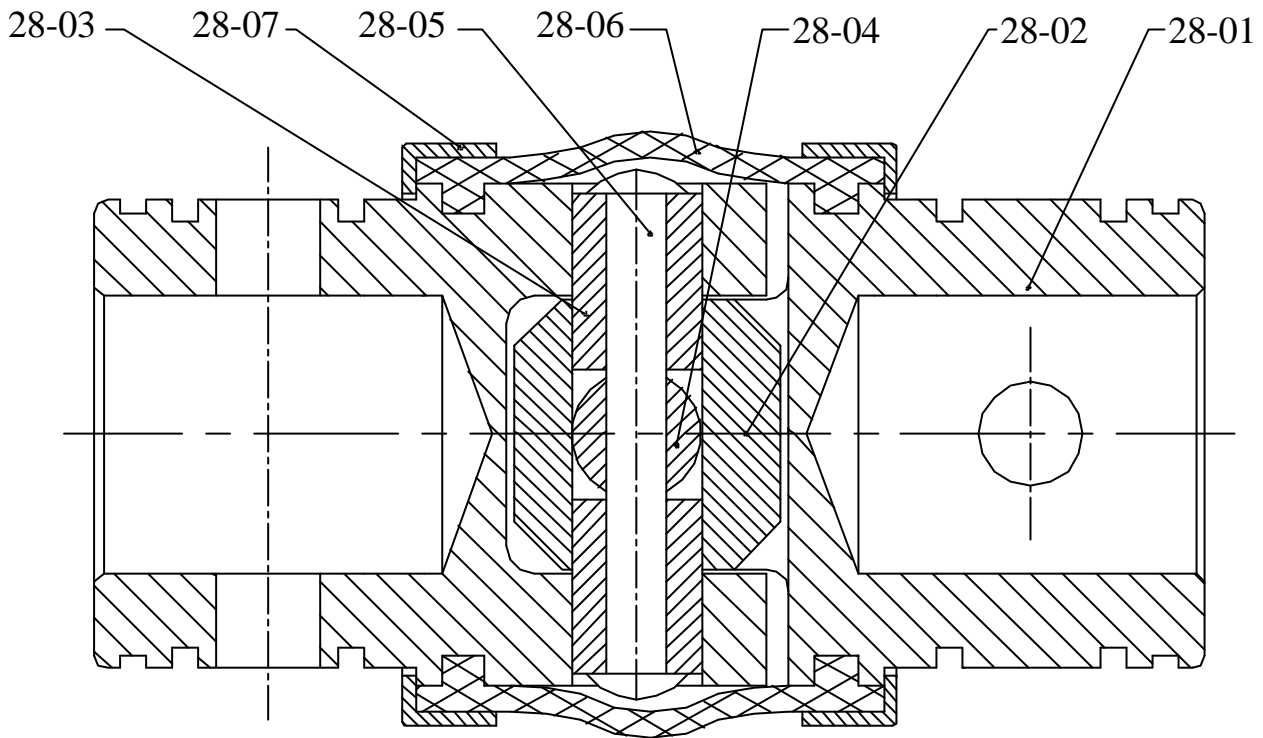


Part No.	DESCRIPTION	No. off	Part No.	DESCRIPTION	No. off	Part No.	DESCRIPTION	No. off
01	BEARING HOUSING	01	23	ROTOR	01	38	HEX. NUT for 37	02
02	BEARING COVER	01	24	TIE ROD	04	39	SPRING WASHER for 38	02
04	GREASE SEAL HOUSING	01	25	BONDED STATOR	01	40	HEX. NUT for 21 !!	04
05	STUFFING BOX *	01	26	CARDAN ROD	01	41	SPRING WASHER for 40 !!	04
05A	MECH. SEAL HOUSING(Opt.) #	01	27	CARDAN ROD PIN	04	42	HEX. HEAD BOLT for 18	@
06	GLAND *	01	28	CARDAN JOINT ASSY.	02	43	HEX. NUT for 42	@
06A	SEAL CLAMPING PLATE(Opt.) #	01	28-01	CARDAN JOINT BODY	04	44	SPRING WASHER for 42	@
07	GREASE SEAL for 02	01	28-02	CARDAN JOINT BLOCK	02	45	FILLING PLUG for 17	01
08	GREASE SEAL for 04	01	28-03	CARDAN JOINT BUSH	04	46	PLAIN WASHER for 45	01
09	TAPER ROLLER BEARING	02	28-04	CARDAN JOINT PIN	02	47	DRAIN PLUG for 17	01
10	BEARING LOCK NUT	01	28-05	CARDAN JOINT DOWEL	02	48	PLAIN WASHER for 47	01
11	BEARING LOCK NUT WASHER	01	28-06	BOOT SEAL	02	49	DRAIN PLUG for 22	01
12	WATER THROWER	01	28-07	BOOT SEAL RETAINER	04	50	PLAIN WASHER for 49	01
14P	PACKING GLAND Set *	01	29	DOMED NUT for 24	04	51	LANTERN RING for 05 (Opt.)	01
14M	MECHANICAL SEAL(Opt.) #	01	30	SPRING WASHER for 29	04	52	NOZZEL for 05/05A (Opt.)	02
15	SHAFT - CARDAN	01	31	SHAFT KEY for 15	01	53	CAP SCREW for 16	01
16	SHAFT SLEEVE for 14M/P(Opt.)	01	32	HEX. HEAD BOLT for 02	04	54	GASKET for 05A #	01
17	PUMP HOUSING	01	33	GRUB SCREW for 01	01	55	'O' RING for 17	01
18	INSPECTION COVER(Opt.)	01	34	STUD for 17	04	56	'O' RING for 20 **	02
19	GASKET for 18(Opt.)	01	35	HEX. NUT for 34	04	63	PIN RETAINER SLEEVE	04
20	STATOR SUPPORT RING **	02	36	SPRING WASHER for 35	04	64	'O' RING for 63	12
21	MIDDLE SUPPORT !!	01	37	STUD for 05 *	02	65	'O' RING for 15 , 23 & 26	04
22	END COVER	01	37A	HEX. HEAD BOLT for 05A #	04	66	'O' RING for 16	01

**NOTE :-** 1. !! FOR PUMP SIZE:- SAC-01564 , 02084 , 03124 , 04162 & ABOVE.  
 2. @ No. off DEPENDS ON PUMP SIZE.  
 3. \*\* FOR PUMP SIZE:- SAC-01564 , 02084 , 03124 , 04164 , 05204 , 06244 , 07284 & 08324 ONLY.  
 4. \* WHEN PUMP SUPPLIED WITH GLAND PACKING.  
 5. # WHEN PUMP SUPPLIED WITH MECHANICAL SEAL.  
 6. WHEN PUMP SUPPLIED WITH SHAFT SLEEVE THEN USE PART No.- 16 , 53 & 66 OTHERWISE NO.

	Date	Name	Signature	Revision :
Approved	01/04/2000	A.G.		Document No. :
Released	06/04/2000	R.P.G.		RIPL : O & MM : 03

13. CROSS-SECTIONAL ARRANGEMENT OF 'CARDAN JOINT'



PART NO.	DESCRIPTION	NO. OFF
28-01	CARDAN JOINT BODY	02
28-02	CARDAN JOINT BLOCK	01
28-03	CARDAN JOINT BUSH	02
28-04	CARDAN JOINT PIN	01
28-05	CARDAN JOINT DOWEL	01
28-06	BOOT SEAL	01
28-07	BOOT SEAL RETAINER	02

Revision :		Date	Name	Signature
Document No. :	Approved	01/04/2000	A.G.	
RIPL : O & MM : 03	Released	06/04/2000	R.P.G.	

Pump Type & Size	Bearing size (SKF No.)	Grease Seal		Gland Packing (Sq.mm)	Bearing		Mech. Seal Size (mm) (DIN 24960)
		Small (mm)	Large (mm)		Lock Nut (SKF)	Locking Washer (SKF)	
01561 01562 01564 02081 02082	30304	14 x 28 x 8	25 x 42 x 10	8	KM 4	MB 4	25
02084 03121 03122	30306	22 x 38 x 8	38 x 62 x 10	10	KM 6	MB 6	38
03124 04161 04162	30307	28 x 45 x 8	45 x 68 x 10	10	KM 7	MB 7	45
04164 05201 05202	30309	32 x 56 x 10	53 x 83 x 10	10	KM 9	MB 9	53
05204 06241 06242 07281	30311	38 x 65 x 10	60 x 100 x 10	12.5	KM 11	MB 11	60
06244 07282 07284 08321 08322 09361	30313	48 x 75 x 12	70 x 110 x 12	12.5	KM 13	MB 13	70
08324 09362 10401 10402	30315	60 x 90 x 12	80 x 120 x 12	16	KM 15	MB 15	80

	Date	Name	Signature	Revision :
Approved	01.04.2000	AG		Document No.
Released	06.04.2000	RPG		RIPL: O&MM: 03

**USE ONLY GENUINE "ROTOMAC" SPARE PARTS FOR REPLACEMENTS**

**RECOMMENDED STOCK OF WEAR PARTS FOR 2 YEARS TROUBLE FREE OPERATION**  
(Under Normal Operating Conditions)

Part No.	Description of Spare Parts	No. off / Pump Large set	No. off / Pump Small set
25	Bonded Stator	2	1
23	Rotor	1	-
28	Cardan Joint Assembly	1	-
26	Cardan Rod	1	-
14M	Mechanical Seal (If applicable)	1	-
14P	Gland Packing Set	2	1
54-56, 64-66	'O' Ring set	2	1

**When sending enquiries for spares, please mention the following clearly:**

Pump Sl. No.	Pump Type	Code
Part No.	Description of Spare Parts	Quantity
Material of Construction (as per Bill of Material)		

**Address to:**

ROTOMAC INDUSTRIES PVT. LTD.  
 D-4A, PANKI INDUSTRIAL AREA, SITE-1,  
 KANPUR – 208 022 (U.P) INDIA  
 Tel: 2691704, 2691705 Fax: +91 (0512) 2691706  
 E-mail: [rotomac@vsnl.net](mailto:rotomac@vsnl.net)  
 Website: [www.rotomacpump.com](http://www.rotomacpump.com)

	Date	Name	Signature	Revision :
Approved	01.04.2000	AG		Document No.
Released	06.04.2000	RPG		RIPL: O&MM: 03