SDM INSTALLATION, OPERATION, AND MAINTENANCE MANUAL

To obtain the best performance from your ROTOS pump, please read these instructions carefully. Failure to observe the recommended procedures may result in damage to your ROTOS pump, and may also invalidate the supplier's guarantee.

REMARKS ON THE USE OF THE PUMP PERFORMANCES CURVES

CENTRIFUGAL MAGNETIC DRIVE PUMPS

1. **Pump performances are guaranteed by ROTOS with manufacturing clearances according to UNI 9902 Cl.II Appendix A specification. If the pumps are to be subjected to any other specification requiring closer tolerances, this must be pointed out when a quotation is requested. In such cases, the manufacturer ROTOS will select the required pump model and will state the guaranteed tolerances.**

2. **Performances are valid for homogeneous liquids with specific gravity of 1 Kg/dmc.**
   If the liquid has a specific gravity different from 1, the actual power consumption will be the one shown in the curve multiplied by the specific gravity.
   For liquids having S.G. higher than 1,9 ask the manufacturer ROTOS.

3. **Performances are valid for homogeneous liquids with viscosity of 1 cps.**
   If the liquid has a viscosity different from 1, the Q/H curve will be altered, also efficiency decreases. For liquids having a viscosity lower than 0.5 cps, or, higher than 150 cps ask the manufacturer ROTOS.

4. **The NPSH values given in the curves are the lowest required values. As a rule the NPSH value available on the plant should be, at least, 0.6 m higher of the NPSH value required by the pump and stated on the performances curves.**

5. **The given efficiency is achieved by pump-prototypes; efficiency might result lower with cast steel, stainless steel and special alloy constructions and standard production in series.**
   Reduce as follows : pumps with discharge nozzle up to 25 mm 3 % points
   pumps with discharge nozzle over 25 mm 2 % points

6. **MAXIMUM ADVISED TEMPERATURES ARE:**

Metallic Pumps: 150°C - 160°C for pumps equipped with standard magnets.

(first value is referred to a continuous service. Second value is referred to an intermittent service)

7. **If, for any technical reason, hydraulic required power is higher than the maximum allowed motor power, the selected pump is not suitable for the application; please contact the manufacturer ROTOS. mkt_surf@gruppoaturia.it**

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SDM INSTALLATION, OPERATION, AND MAINTENANCE MANUAL

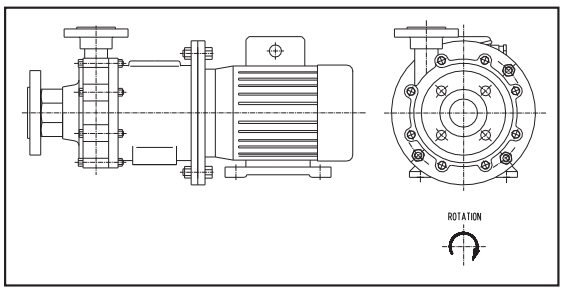
THIS INSTRUCTION MANUAL is intended to guide those responsible for the installation, operation and maintenance of ROTOS PTM

Please read it carefully, before you install and operate your ROTOS pump.

ROTOS SDM – SERIES PUMP PRESENTATION

B. Discharge Nozzle

A. Suction nozzle



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SDM INSTALLATION, OPERATION, AND MAINTENANCE MANUAL

W A R N I N G

WORKING WITH STRONG MAGNETS ESSENTIAL PRECAUTIONS

1	**Magnets can produce strong mechanical forces.**
2	**There is a danger of injury when two magnets are brought together by hand.**
3	**Magnets are brittle and are easily damaged. Breakage can occur when a magnet is placed near another magnet or iron object without mechanical guidance and special care.**
4	**If magnetic particles get into the eyes, get medical help immediately.**
5	**Heart pacemakers can be damaged.**
6	**Tools or other iron objects can be attracted suddenly.**
7	**Credit cards etc with magnetically stored information can be damaged.**
8	**Watches can be damaged.**

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SDM INSTALLATION, OPERATION, AND MAINTENANCE MANUAL

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18. PART LIST

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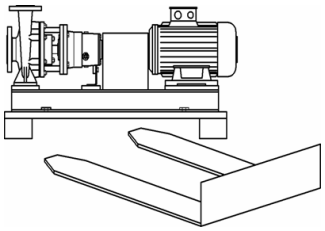
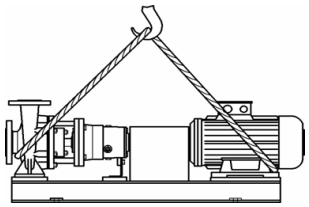
SDM INSTALLATION, OPERATION, AND MAINTENANCE MANUAL

1. WHEN RECEIVING YOUR ROTOS PUMP





1 Check the nameplate on the pump against the receiving and purchase order documents to be sure that the correct size of pump and materials of construction have been supplied. If a motor has been supplied, check that the power, speed, and voltage are correct.

1.1 Prior to unpacking, check for physical damage to the packing and the pump unit and notify the forwarding agent **IMMEDIATELY** if any damage is found.

1.1.1 Check that the port covers are intact. If not, check whether foreign objects may have found their way into the pump casing through the ports. Remove the port covers only when you are ready to connect the pipes to the pump.

1.1.2 When shipped, the pumps are suitable for short-term storage only. If long-term storage is necessary before the pump will be put into operation, we suggest that you contact your pump supplier for long-term storage recommendations.

1.1.3 Check for free rotation of the pump. If the pump is close-coupled to the motor, remove the fan cover from the motor and rotate the fan by hand. To check long-coupled pumps for free rotation, remove the coupling guard and rotate the pump and motor shafts at the flexible coupling.

2. PUMP FOUNDATION

The foundation should be substantial in order to reduce vibrations, and rigid enough to prevent flexing which can result in mis-alignment. Foundation bolts of the correct size should be located by reference to certified drawings if the baseplate is supplied with the pump.

2.1 The pump must be mounted horizontally on a level foundation, with the discharge port vertically upwards.

2.2 Close-coupled motor-pump units without baseplates

Level the pump base accurately, using shims under the pump feet. The pump must sit firmly and evenly on its foundation. It must not be distorted by bolting to an uneven surface.

2.3 Motor-pump units on baseplates

Level the baseplate accurately, using shims under the base-plate next to the foundation bolts. The baseplate must sit firmly and evenly on its foundation: it must not be distorted by bolting to an uneven surface, which will throw the pump and motor out of alignment.

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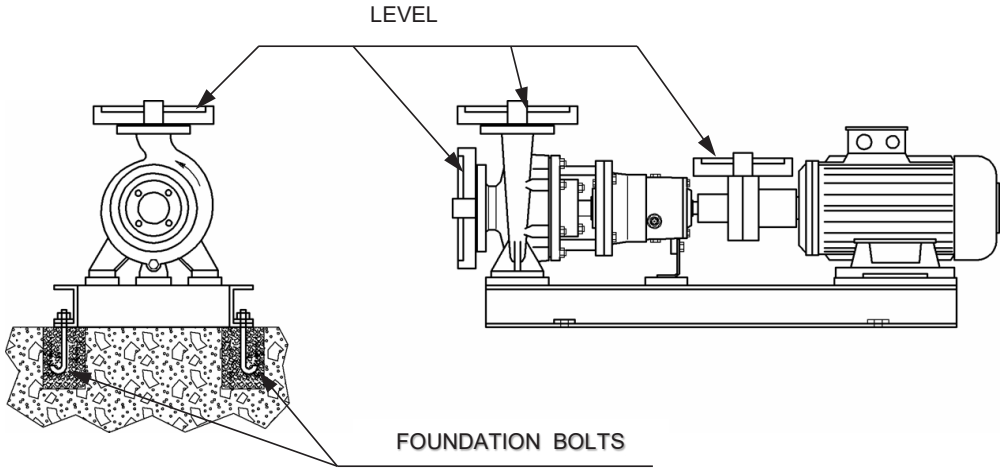
3. PUMP AND MOTOR ALIGNMENT

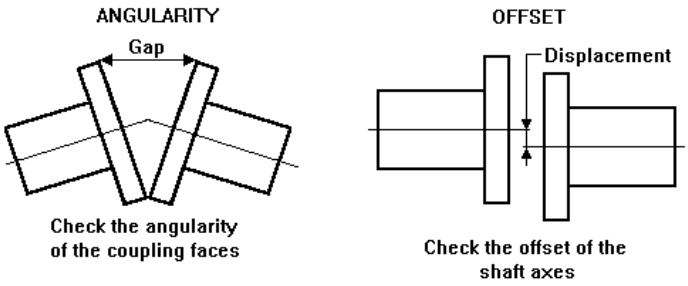
3.1 Close-coupled pumps have been aligned prior to shipment and if they turn freely by hand, no further adjustments are necessary.

3.2 Long-coupled pumps have been pre-aligned with the motor prior to shipment. If pump units receive rough treatment during shipment, they can become mis-aligned. The flexible coupling is not designed to compensate for mis-alignment. Improper alignment will cause vibration and premature bearing failure.



3.2.1 CHECK THE ALIGNMENT OF PUMP AND MOTOR BEFORE START-UP.

A final alignment check should be made after the baseplate has been grouted and set, and the foundation bolts have been tightened.



Couplings should be aligned within the following limits:

COUPLING TYPE	OFFSET	ANGULARITY
	Displacement	Gap
Short flexible coupling (3000 rpm)	0.05mm	0.04mm per 100mm coupling diameter.
Flexible spacer coupling (3000 rpm)	0.07mm per 100mm spacer length.	0.04mm per 100mm coupling diameter.

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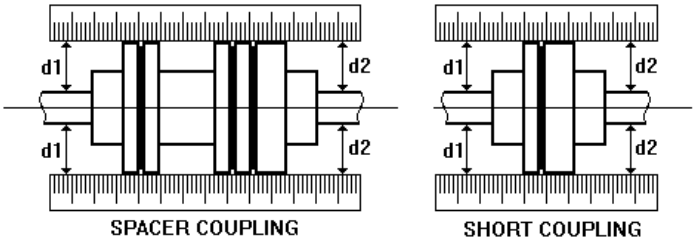
3.2.2 Methods of checking alignment

a. **Straight edge**

Using a straight edge, check the distance from the shaft at several points on the circumference of the coupling. The distances d1 and d2 should each remain constant.



IMPORTANT NOTE:The straight edge method checks static coupling alignment, not shaft alignment. It relies for its accuracy on the accurate alignment of each coupling half on its shaft. The straight edge method is a useful preliminary check, but should not be seen as an effective final alignment method.

b. **Dial gauge** ("clocking")
There are several methods, using one or two dial gauges. The lost accurate is the reverse indicator method, using two gauges, which overcomes errors due to `sag' of the gauge bars.

c. **Optical methods**
Several proprietary systems are available, such as the `OPTALIGN' system (INA Linear Systems). Mechanical errors are eliminated by optical alignment techniques. On request, your pump supplier can provide further information about suitable alignment methods, including allowances for

THERMAL EXPANSION IN HIGH TEMPERATURE USE.

4. LOCATION AND PIPING

4.1 The correct pipework sizes should be selected according to the allowable limits of liquid velocity and pressure drop at the required flow rate. Check the NPSH required by the pump at its specified duty point, and ensure that the minimum NPSH available exceeds that required.

This is particularly important for liquids near their boiling temperature (or bubble point).

4.2 Check that the pipework is **THOROUGHLY CLEAN** before the pump is installed.

4.3 Pipework connections must be accurately aligned with the pump ports, so that they can be connected to the pump without forcing. Maximum allowable bending moments are set out in the Tables on pages 4/5. These moments must not be exceeded, otherwise the pump may distort internally, or the pump and motor may become mis-aligned. Pipework must be fully and independently supported as close as practicable to the pump.

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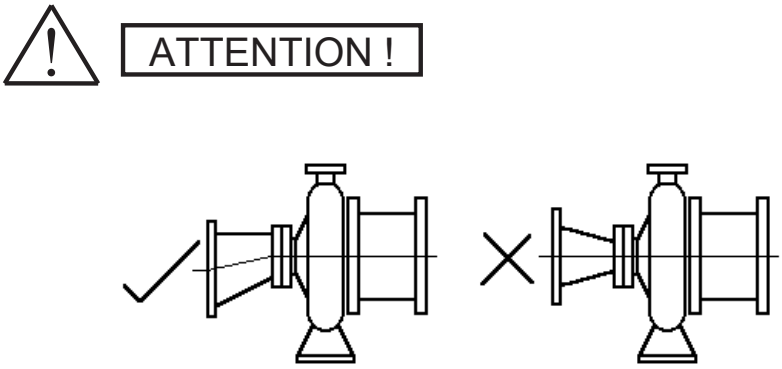
Locate the pump as close as possible to the liquid source.

4.4 The suction line should be as short and straight as possible, with a minimum number of bends. Bends should be radiused: avoid sharp elbows. Bends and fittings should be no closer than 20 pipe diameters to the pump suction, to allow undisturbed flow to the pump impeller.

4.5 Liquid velocity in the suction line should normally be between 0.7 and 2.0m/sec. If the liquid is near its boiling temperature (or bubble point), its velocity may need to reduced to 0.5-1.0m/sec. If the suction line is oversized, the reducer at the pump inlet port should be ECCENTRIC, not concentric.



4.6 Generally, suction piping should be one or two sizes larger than the inlet bore of the pump, to keep liquid velocity low and friction losses to a minimum. This becomes more important as the distance between the pump and the liquid supply increases.

4.7 The suction line should slope so as to avoid air pockets.

Valves on the suction side should be mounted with stems horizontal, or vertically downwards. All joints in the suction line must be tight, to prevent air from entering into the system, with the risk of vapour locking.

If the pump is installed with a negative static inlet head (lower diagram), the foot valve/ strainer must always be immersed at a sufficient depth to avoid entry of air into the pump. Take suitable precautions to prevent vortexing in the supply vessel

A pressure gauge should be installed in the suction line, as close as possible to the pump.

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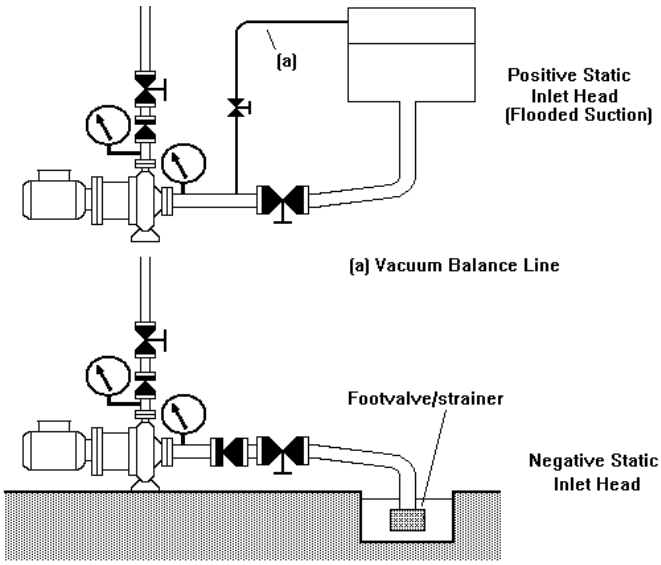

4.8 If the supply vessel is under vacuum, a pressure balancing line should connect the supply vessel and the pump inlet port.

4.9.1 The discharge line should be as short and direct as possible to minimize friction losses. An air vent (if permissible) should be installed at the first high point in the discharge line.

4.10 A check valve and gate valve should be installed as close as possible to the pump discharge nozzle. The check valve is installed to protect the pump from excessive back pressure or reverse flow rotation, and to prevent back flow into the pump during shut down. The discharge (gate) valve is used to regulate the flow. The check valve should be installed between the pump and the discharge valve to allow the pump to be removed from service without emptying the discharge line.

4.11 A pressure gauge should be installed on the discharge side of the pump as close as possible to the discharge nozzle.

4.12 If the pump is fitted with a STEAM HEATING JACKET, the steam must flow into the upper connection and out of the lower connection. The heating fluid may be water with a maximum temperature of 170oC or saturated steam with a maximum pressure of 7 bar (100psi).

4.13 Prior to starting the pump it is important to flush the piping to make sure that the system is free of solids such as pipe scale, welding beads, and dirt. TEMPORARY START-UP STRAINER (40 mesh screen) should be installed in the suction line. BE VERY CAREFUL not to allow the temporary strainer to become plugged, causing low inlet pressure with cavitation or dry running. A pressure gauge should be installed on either side of the temporary strainer to measure the pressure drop across it. If there is any risk of solids particles during normal operation, once the pump has been successfully commissioned, a PERMANENT INLET STRAINER should be fitted in the inlet line.

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AVOID PUMPING LIQUIDS CONTAINING SUSPENDED SOLIDS

Standard Rotos pumps are designed to handle clean liquids. Unless specifically agreed prior to purchase of the pump from your supplier, suspended solid matter must be kept out of the pump by a suitable inlet strainer. The strainer mesh size should be less than 0.5mm, with an open surface area at least 2.5 x nominal cross-sectional area of pump inlet bore.

The strainer must be inspected regularly and cleaned when necessary.

DO NOT PUMP LIQUIDS CONTAINING IRON OXIDES OR FERROMAGNETIC PARTICLES, HOWEVER SMALL. THESE MAY ADHERE TO THE INTERNAL MAGNET AND CAN EVENTUALLY BUILD UP INTO DAMAGING DEPOSITS.

4.12 Protecting the pump against DRY RUNNING

The pump must **NOT** be allowed to run dry. Dry running will result in loss of liquid film to the bearings, causing over-heating and eventual bearing failure, leading to seizure of the pump.

Avoid the following conditions:

a. **Loss of liquid supply**. Ensure that an adequate supply of liquid is available at the pump inlet at all times. Pressure and/or flow sensors should be installed if necessary, to monitor the hydraulic conditions in the inlet pipework.
b. **Low inlet pressure** due to restriction or blockage of the inlet pipework, causing liquid vaporization and cavitation in the pump, with the risk of loss of liquid film in the bearings.
c. **`Dead-heading'** If the pump is permitted to run against a closed discharge for more than a short time (depending on the liquid, the duty, and the pump model and power), the liquid in the pump casing will heat up and evaporate with consequences as in b. above.

4.13 Electronic dry-running protection

A rapid and reliable method of stopping a centrifugal pump, in the event of loss of liquid supply or interruption of flow, is to monitor the power output of the motor. The `EL-FI' device monitors both current and phase angle, providing pump protection without pipework sensors or attachments. It is easily fitted in the power supply to the motor, in place of a normal starter. Details of power monitors are available on request from your pump supplier.

ADMISSIBLE EXTERNAL FORCES AND TORQUES ON PUMP FLANGES AND PORTS

WHEN TIGHTENING FLANGE BOLTS or THREADED PIPING, EXTREME CARE MUST BE USED IN ORDER NOT TO STRESS COMPONENTS OF THE PUMP LIKE FLANGES AND THREADS

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5. ELECTRICAL CONNECTION

The electrical connection to the motor should be carried out by a properly qualified electrician, using cable, cable glands and connection procedures suitable for the electrical load and for the location of the installation.

All regulations governing electrical installations in **HAZARDOUS AREAS** must be strictly followed. It is the responsibility of the pump user to ensure that a safe electrical installation is made and maintained.

5.1 Connecting the electric motor

5.1.1 Insulate the electric supply cable from the power supply.

5.1.2 Bring the cable end into the terminal box through a suitable cable gland.

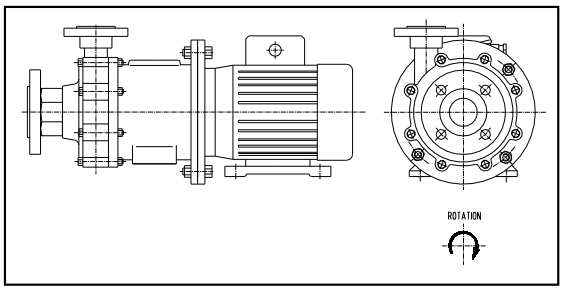
5.1.3 Follow the motor manufacturer's instructions for electrical connection. These will normally be found inside the terminal box. Check that the terminal links are correctly positioned for the supply voltage. Ensure that the earth connection is properly and securely made.

5.1.4 Before replacing the terminal box lid, check that the sealing surfaces and the gasket or 0-ring seal are clean and in good condition. With flameproof electric motors, the opposing metal surfaces of the terminal box seal should be lightly greased to keep out condensation and prevent corrosion.

5.2 A proper electrical starter must be used. A starter will:

a. prevent accidental restarts after power failure
b. provide a safe, waterproof switch enclosure (IP55 `hose-protected' specification)
c. protect the motor with a correctly set thermal overload cut-out a fuse protects wiring only.
d. withstand the heavy starting current of the motor, preventing arcing and rapid contact wear.

b) Start the pump briefly to check the direction of running. The motor should rotate in the direction shown, viewed from in front of pump.



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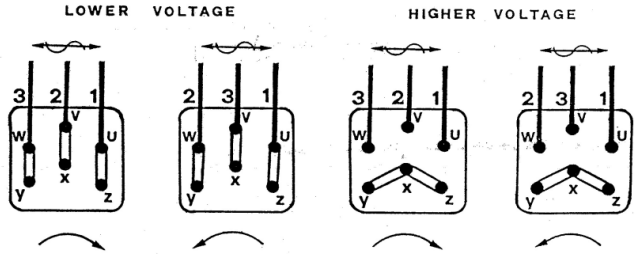
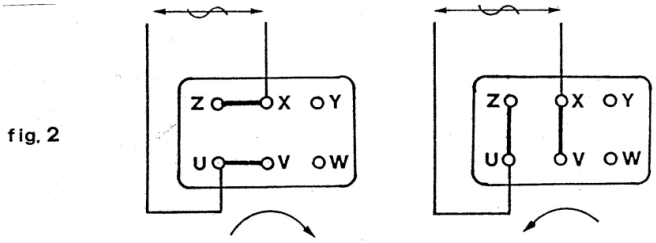
TO ALTER THE DIRECTION OF ROTATION OF A THREE-PHASE MOTOR CHANGE ANY TWO CONNECTIONS.

fig. 1



FOR A SINGLE PHASE MOTOR, REVERSE THE POLARITY OF THE START WINDING IN RELATION TO THE MAIN WINDING

fig. 2



NOISE LEVELS

The following table reports the noise level produced by PTM pumps running with in their operating limits and installed according to the instructions given in this manual (average values measured in free field at 1 meter from the pump set and elaborated according to ISO standard R1680 – curve A).

The values are referred to groups with Aturia standard electric motors. For other motors the table values shall be compared to the actual used motors.

MOTOR SIZE	NOISE LEVEL - dB (A)	
	2 POLES	4 POLES
63	65	61
71	67	62
80	71	64
90	73	66
100	77	68
112	79	69
132	80	69
160	81	69

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6. ROTATION CHECK AND PREPARATION FOR START-UP

WARNING! **"DO NOT RUN THE PUMP DRY"**

6.1 For Long-coupled pumps only

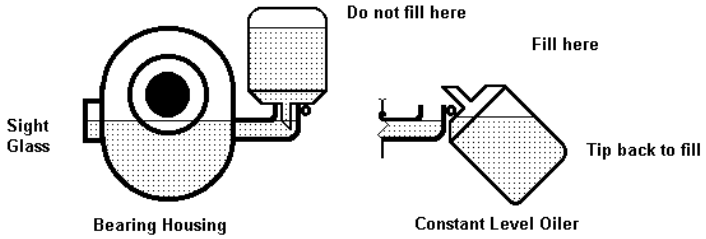
Prior to starting the pump the bearing housing should be filled with one of the following oils:

Use ISO VG-46 viscosity oil for bearing temperature from 0° to 70°c
Use ISO VG-68 viscosity oil for bearing temperature 70° to 90°C.

OIL QUANTITY: BEARING BRACKET SIZE 24 ca. 0.4 lt.

Fill to the middle of the sight glass, using the following procedure:

i) pour oil into the bearing housing, through the filler cap on top of it, until oil is just visible at the bottom of the sight glass.
ii) tip back the transparent bulb of the constant level oiler (if mounted), and fill it with oil.
iii) allow the bulb to return to its normal position. Wait for the oil to flow into the bearing housing.
iv) repeat the operation until oil no longer flows out of the bulb.



If there is a toothed spacer coupling between the pump and the motor, check whether it needs to be filled with oil. Follow the coupling manufacturer's instructions as required.

6.2 DIRECTION OF ROTATION

To confirm the direction of rotation use the following procedure:

a. Open the suction and discharge valves, allowing the pump to fill with liquid.
b. Remove the coupling guard of a long-coupled pump, or the motor fan cover of a close-coupled pump.
c. `Bump' the motor by pressing the motor start and stop buttons in quick succession. If the direction of rotation is incorrect, reverse any two of the three-phase power (see above).
d. After confirming correct rotation, replace the coupling guard or motor fan cover.

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7. PRIMING THE PUMP

WARNING! **"DO NOT RUN THE PUMP DRY"**

7.1 Check that the liquid supply is at the correct temperature, with any necessary heating/cooling in operation. Open the suction and discharge valves, allowing the pump to fill with liquid.

NOTE: If the direction of rotation has not been checked, this must be done before proceeding (see above).

7.2 Open the discharge valve to 1/4 open.

7.3 Start the motor and immediately check the discharge pressure gauge. The pressure should rise quickly and hold steady. If the pressure rises and then falls back, there is air or vapour in the system.

STOP THE PUMP IMMEDIATELY
Wait a few seconds before restarting the pump

7.4 If the pressure gauge does not hold steady after repeating step 7.3 several times, shut the pump down, open the discharge vent (if permissible) and check that all vapour or air is purged from the system.

7.5 Once the pump is fully primed and a steady discharge pressure is established, slowly open the discharge valve until the desired operating point is reached. Check that the electric motor current does not exceed the rated full load current shown on the motor plate.

7.6 If the pump starts to vibrate, rattle or run noisily, the flow rate has become excessive. STOP THE PUMP IMMEDIATELY. Vibration and noise are an indication of cavitation, which can cause rapid and severe damage if permitted to continue. If the flow rate needs to be permanently restricted, a permanent orifice in the discharge line is more secure than an adjustable valve. ROTOS technical department will advise on a suitable orifice size if necessary.

8. PUMP OPERATION

8.1 Operators should make frequent visual inspections to check that the pump is running smoothly without noise or vibration, and the discharge pressure is holding steady, without fluctuation, at the correct figure. Over-heating of the pump or motor bearings is cause for alarm. The bearing housing should not be more than 50°C above ambient temperature, nor should it exceed 80°C (too hot to touch) in any event. If the bearings over-heat, shut the pump down immediately, investigate the cause, and take corrective action.

8.2 Care must be taken to make sure that the sleeve bearings in the pump are replaced in time to prevent mechanical rubbing between the inner magnet and the rear casing of the pump. This condition can be detected by an increase in power consumption and loss of pump performance. In addition the pump may vibrate or operate noisily.

IF LEFT UNATTENDED, THE RUBBING WILL EVENTUALLY BREAK THE REAR CASING CAUSING LEAKAGE OF THE LIQUID INTO THE ENVIRONMENT.

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Be sure to maintain properly the ball bearings supporting the outer magnet in the external bearing housing. Motor bearings in the case of close-coupled pumps. Follow the motor manufacturer's recommendations and keep the motor bearings maintained.

BEARING FAILURE WILL RESULT IN THE OUTER MAGNET MECHANICALLY RUBBING ON THE OUTSIDE OF THE REAR CASING, WHICH IF LEFT UNATTENDED WILL CAUSE THE REAR CASING TO FAIL, WITH LIQUID LEAKAGE INTO THE ENVIRONMENT.

ATTENTION!:
Never throttle the pump by closing a valve in the suction line.
Throttling the suction line can cause serious damage to the pump.

NEVER RESTRICT THE INLET PIPE IN A CENTRIFUGAL PUMP
Restriction of the inlet is liable to cause the pump to cavitate leading to loss of efficiency and rapid wear.

ATTENTION!:
Do not allow the pump to run against a closed discharge valve for more than a few seconds. This will cause rapid heating of the liquid in the pump casing, with vaporization and dry running of the bearings, risking serious damage to the pump.

8.3.1 Rotos pumps are dynamically balanced during manufacture and are tested prior to dispatch to ensure that they run smoothly and without vibration. Replacement impellers are also balanced prior to dispatch.

8.4 Vibration monitoring in service can detect poor hydraulic conditions, bearing wear, internal erosion or chemical attack before it seriously damages the pump. Vibration may be monitored on the internal pump bearings and/or the external bearing housing and/or the motor bearings. Your supplier will advise you on vibration monitoring on request.

8.5 If a temperature sensor is fitted to the pump, check regularly to ensure that it is working properly.

8.6 **IMPORTANT SAFETY NOTE:** When the pump is stopped, unless a non-return valve is fitted in the discharge line, liquid will drain back through the pump, causing it to rotate in reverse. Do not start the pump while it is turning backwards, as this can result in immediate and severe damage. Allow ample time for complete drainage of the discharge line before the pump is restarted.

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9. MAINTENANCE SCHEDULE

Provided the pumped liquid is clean and free of suspended solids, and the pump is operated within the manufacturer's stated performance limits and is not allowed to run dry, your ROTOS pump is capable of running for very long periods with minimal attention. Please read paragraph 8.1.

Parts to be inspected	Action to be taken	Frequency
External bearing housing (long-coupled units)	Fill with appropriate oil to the middle of the sight glass	Weekly. Change the oil every 5000 hours.
Internal bearing system	Check thrust bearings and sleeve bearings for wear. On reassembly use new gaskets and 0-rings.	After 2500 hours of operation, check for premature wear. Check every 5000 hours or once a year, whichever is shorter
Motor bearings	Check Instruction	Check Instruction Manual

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10. DECOMMISSIONING THE PUMP

Before the pump is decommissioned, it should be flushed out with clean water or another suitable liquid.

Thorough flushing out will help to ensure that:

a. if the pump stands idle for an extended period, it is not damaged by precipitation or encrustation of solids.
b. the pump does not contain dangerous amounts of corrosive, toxic or otherwise hazardous liquids when dismantled.

If there is any risk of FREEZING in cold weather, the pump and pipework should be drained out.

VERY IMPORTANT

It is the pump user's responsibility to ensure that the pump is in a safe condition before it is opened or worked on. If the pump is removed and stored, or returned to its supplier or to a third party for repair or overhaul, it must be clearly LABELLED, stating what substances or residues it may contain, warning the recipient of any possible hazard to health. Pumps sent to ROTOS for repair without any indication will not be accepted and resent to the Customer.

11. DISASSEMBLING THE PUMP

These operations should be carried out only by skilled personnel. Damage caused by careless or improper disassembly or reassembly is excluded from the supplier's guarantee.

WORK IN A CLEAN AREA!
DO NOT ALLOW MAGNETIC MATERIALS TO CLING TO THE PUMP MAGNETS.
DO NOT USE FORCE!

The pump should be taken apart with the help of the labeled sectional drawing(s) supplied with it.

If necessary the internal assembly of the pump can be removed from the pump casing without disturbing the pipework. If a spacer coupling is fitted between pump and motor, the pump can be dismantled without disturbing the motor.

11.1 Check that the pump has been fully drained and flushed out, before you start work on it.

11.2 Insulate the motor from its electrical supply.

11.3 Insulate the pump from the rest of the hydraulic system. Isolate and disconnect any jacketing or other auxiliary pipework from the pump.

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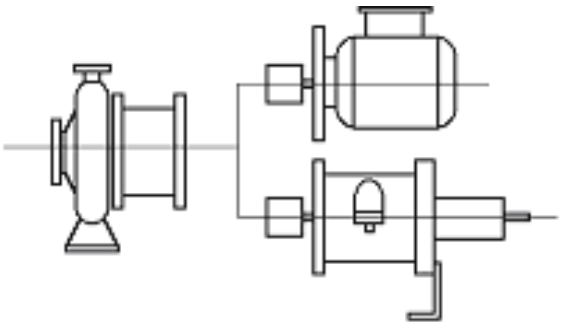
11.4 Discharge the oil from the bearing housing. **(long coupled units only).**
Replace the oil chamber plugs.

11.5 Remove the spacer element of the coupling, or if no spacer is present, remove the motor.
With close-coupled pumps, the motor and external magnet assembly must be removed carefully, without damaging the magnet. See 11.8 below.

11.6 Dismantling the magnetic drive



SAFETY NOTE WHEN WORKING WITH MAGNETS: **See PRECAUTIONS on page 3**

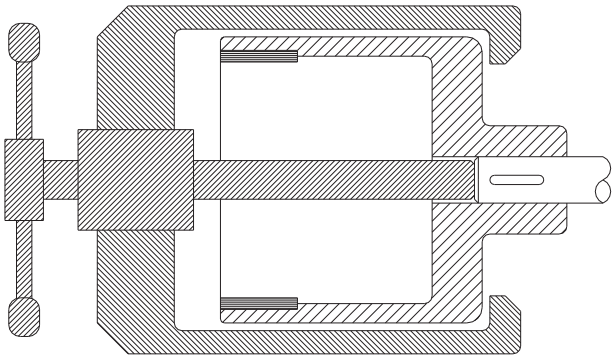
Take care not to trap your fingers as the two halves of the magnetic coupling are separated

Remove the bolts securing the bearing housing to the bracket and carefully withdraw the external bearing housing with the external magnet attached.
Withdraw the external bearing housing and external magnet slowly and progressively, taking care to avoid damaging the brittle magnetic elements inside the external magnet.

11.8 Removing the external magnet from the motor shaft or the external bearing shaft

First loosen the grub screws securing the external magnet. Then use a puller to extract the magnet slowly and progressively from the shaft. If a suitable puller is not available, use **wooden** levers.

MAGNET PULLER:



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DO NOT STRIKE THE MAGNET! The magnetic elements are brittle and are easily damaged.

DO NOT ALLOW THE MAGNET TO FALL ON THE FLOOR!

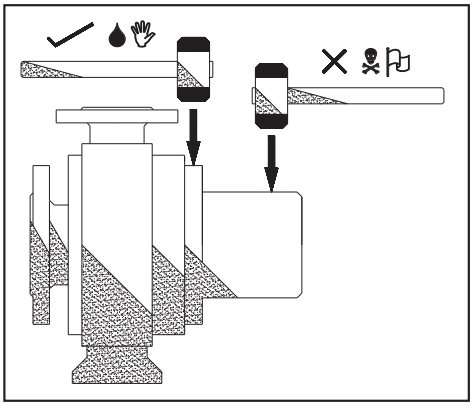
11.9 Disassembly of external bearing housing

See 11.15, page 22.

11.10 Removing the internal pump assembly

Remove the nuts securing the bracket 6581.2 to the pump head. Carefully withdraw the internal pump assembly from the pump head. If the internal pump assembly does not move easily, DO NOT LEVER, but gently tap the "can" of the rear casing on alternate sides with a softheaded mallet, to free the internal assembly.

DO NOT STRIKE THE 'CAN' OF THE REAR CASING!
This thin walled component must not be distorted or damaged



11.15 Disassembly and re-assembly of the EXTERNAL BEARING HOUSING (long-coupled units only)

Drain oil from the pedestal housing. Loosen the grub screw and remove the external magnet from the shaft using a suitable extractor tool.

SEE SECTION DRAWING N° ODM0020

Undo bolts and remove bearing covers (items 3261.1/2). Using a bench press, press out shaft (2130) together with outer bearing (3011.2). Press out the inner bearing (3011.1). Inspect bearings for wear and replace if necessary. Remove any burrs from shaft keyway.

Re-assembly

Using a bench press, insert inner bearing (3011.1) into pedestal housing. Assemble outer bearing (3011.2) and shaft (2130). Press shaft and bearing assembly into pedestal housing. Locate bearing covers onto pedestal housing, ensuring the oil ways are at the bottom. Replace and tighten bolts.

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12. INSPECTION PRIOR TO REASSEMBLY

Clean all the parts carefully. Ball bearings should be washed in a clean solvent and allowed to dry, then oiled. Check all pump parts and replace worn ones.

13. REASSEMBLING THE PUMP

WORK IN A CLEAN AREA!
DO NOT ALLOW MAGNETIC MATERIALS TO CLING TO THE PUMP MAGNETS.

SEE **PAGE 16 FOR PRECAUTIONS WHEN WORKING WITH STRONG MAGNETS.**

IF LUBRICANTS OR THREADLOCKING COMPOUNDS (e.g. `LOCTITE') ARE USED ON ANY INTERNAL THREAD OR OTHER WETTED SURFACE IN THE PUMP, THEY MUST BE COMPATIBLE WITH THE PUMPED LIQUID. (If in doubt consult the manufacturer of the compound)

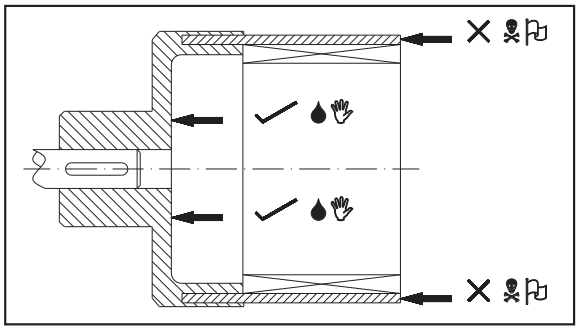
13.5 REPLACING THE EXTERNAL MAGNET AND MOTOR OR BEARING HOUSING

13.5.1 Long-coupled units

Rebuild the external bearing housing if necessary: see 11.15.

13.5.2 Fit the external magnet on to the external bearing shaft or the motor shaft. First, clean the bore of the drive magnet hole and the surface of the shaft with fine emery paper, and lightly oil both surfaces.

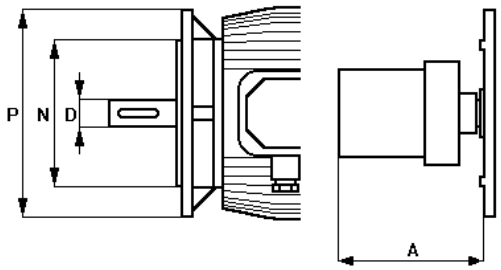
Fit the shaft key into the keyway. Push the magnet on to the shaft: it should be a smooth interference fit. If necessary, use a light hydraulic press to push the magnet into position, pressing on the inside base of the magnet hub. See Table below for correct positioning of the magnet on the shaft. – DO NOT STRIKE THE MAGNET! The magnetic elements are brittle and are easily damaged.



LOCATION OF EXTERNAL MAGNET ON MOTOR OR PEDESTAL SHAFT

LMDP0103B 04-06

CLOSE COUPLED UNITS						
External magnet type	Motor frame size	Dimensions			A	SDM PUMPS
		P	N	D	mm	
Standard	71	160	110	14	110,5	2x8
Standard	80	200	130	19	114,5	2,5x10
Standard	90	200	130	24	134	3x12
Standard	90	200	130	24	142	4x14



CLOSE-COUPLED UNIT

Insert key into shaft keyway and locate the outer magnet on the shaft in accordance with dimension A shown above, and tighten the grub-screw. Fill the bearing housing with oil to the middle of the sight-glass.

13.5.3 Refitting the external magnet (with its bearing housing or motor) to the pump

Check the magnetic elements of the external magnet, and remove any loose metal particles attached to them. The magnet must be clean internally.

Fit the external magnet with its attached bearing housing or motor, into the pump bracket, using three JACKING BOLTS to bring the two magnets together progressively in a controlled manner. JACKING BOLT sizes are: **M10 x 150mm**

Take care to avoid damaging the brittle magnetic elements inside the external magnet.
When the pump is fully assembled, turn it over by hand to check for free rotation.
The pump should turn over evenly, with no noise or extra resistance at any point.

13.6 Refitting the coupling (long-coupled units only)

Fit the two coupling halves to their shafts, checking that they run concentrically. Fit the spacer (if present). Check the coupling carefully for correct ALIGNMENT (see section 3).

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14. PUMP OPERATING PROBLEMS: CAUSES AND REMEDIES

Provided your ROTOS pump is correctly installed and is operated within its designed performance envelope, it is capable of running for very long periods with minimal attention. Regular inspection, and preventive maintenance when necessary, will help to prevent breakdowns.There are many possible reasons why a pump may not run properly. If your ROTOS pump does not run satisfactorily, be prepared to look critically at the system as well as at the pump itself. This section lists some possible pumping problems and indicates how they may be overcome. ROTOS will do his best to assist you further if necessary.

14.1	**INSUFFICIENT FLOW**	
	Causes	**Remedies**
14.1.1	Actual total discharge head exceeds rated head of pump.	Increase speed of rotation if possible. Fit larger diameter impeller. Reduce total head of system. Increase discharge pipework size. Check that discharge valve is fully open. Replace pump: seek advice from your pump supplier.
14.1.2	Pump rotating in reverse.	Check direction of rotation. Refer to section 6.2 of this manual.
14.1.3	Air or vapour trapped in inlet pipework.	Check for trapped air or vapour. Refer to section 4.4 of this manual.
14.1.4	Liquid contains entrained air or vapour. Liquid is foaming.	Check for vortexing in the inlet line. Fit baffles in supply tank to prevent vortexing. Fit a settling tank in the inlet line to allow entrained gas to separate from the liquid.
14.1.5	Low inlet pressure, giving rise to cavitation and loss of efficiency.	Decrease suction lift (negative head). Increase static suction (positive head). Check for inlet obstructions or restrictions. Reduce liquid temperature. Increase inlet pipework bore. Decrease length of inlet pipework. Open inlet valve fully. Check for excessive liquid viscosity: increase liquid temperature if necessary.
14.1.6	Wear of impeller collar and/or wear ring.	Check condition of impeller collar and wear ring. Replace if excessively worn. Refer to section 12.1 of this manual.
14.1.7	Liquid temperature too close to boiling.	Reduce liquid temperature.
14.2	**NO FLOW**	
	Causes	**Remedies**
14.2.1	See 14.1.1 to 14.1.7	As in 14.1.1 to 14.1.7
14.2.2	Pump has lost its prime.	Reprime pump. Refer to section 7 of this manual. Check inlet line for air leaks.Check for loss of liquid supply.
14.2.3	Blocked inlet line.	Check for blocked pipework or strainers, and closed valves.
14.2.4	Magnetic drive de-coupled.	Reduce flow rate: partly close discharge valve. Reduce liquid density. Reduce rated head of pump (check first with your supplier). Check for free rotation of pump: inspect pump internally if it does not rotate freely. Reduce motor power (check first with your pump supplier). Soft-start motor.
14.2.5	Motor has stopped.	Check power supply.Check motor condition.

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14.3	**EXCESSIVE FLOW**	
	Causes	**Remedies**
	Actual total discharge head is below rated head of pump.	Reduce speed of rotation if possible. Fit smaller diameter impeller.Partly close discharge valve to restrict flow.
14.4	**MOTOR OVERHEATS AND/OR CUTS OUT**	
	Causes	**Remedies**
14.4.1	See 14.3.	As in 14.3.
14.4.2	Excessive liquid density.	Reduce flow rate by partly closing discharge valve.
14.4.3	Pump has seized or is about to seize.	Check pump for free rotation. Check pump internally for obstructions.
14.4.4	Motor and pump miss-aligned.	Refer to section 3 of this manual.
14.4.5	Motor bearings are failing.	Replace motor bearings.Investigate cause of overload/failure.
14.4.6	Undersized motor.	Fit a larger motor: check first with your pump supplier.
14.4.7	Incorrectly set motor overload cutout.	Check motor overload cutout setting.
14.4.8	Electronic dry-running protector has tripped.	Check for loss of flow or loss of liquid supply.
14.5	**PUMP RUNS NOISILY AND/OR VIBRATES**	
	Causes	**Remedies**
14.5.1	Low inlet pressure, with cavitation, loss of efficiency, and loss of liquid film in pump bearings (and mechanical damage if allowed to continue).	Refer to sections 14.1.5 and 14.1.7. **STOP THE PUMP IMMEDIATELY**
14.5.2	Worn, eroded, fouled or damaged impeller or internal bearings.	Check pump internally for wear, damage or obstruction.
14.5.3	Motor and pump mis-aligned.	Refer to section 3 of this manual.
14.5.4	Worn coupling.	Replace coupling. Check alignment of motor and pump.
14.5.5	Worn external pump bearings or motor bearings.	Check bearings and replace if necessary.
14.5.6	Pump feet or motor feet or baseplate not firmly secured.	Check for 'soft-foot'. Refer to section 2 of this manual.
14.5.7	Mis-aligned or badly secured pipework.	Check pipework alignment and support. Refer to section 4 of this manual.
14.5.8	Pump started while rotating in reverse.	Stop pump immediately and allow discharge line to drain completely before re-starting.
14.6	**OVERHEATED (EXTERNAL) PUMP BEARINGS (Long-coupled units only)**	
	Causes	**Remedies**
14.6.1	See 14.5.1 to 14.5.7.	As in 14.5.1 to 14.5.7.
14.6.2	Lack of oil, or incorrect oil in bearing housing.	Check oil level: refill, or drain and replace oil if necessary. Replace bearings if necessary.
146.3	Excessive temperature of pumped liquid.	Refill bearing housing with the correct oil for the working temperature of the pump.

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SDM INSTALLATION, OPERATION, AND MAINTENANCE MANUAL

MAINTENANCE OF ROTOS "SDM" SERIES PUMPS

IN GENERAL, ROTOS "SDM" SERIES PUMPS REQUIRE NO ROUTINE MAINTENANCE, AND DO NOT NEED TO BE DISMANTLED FREQUENTLY.

It is advisable though, to make periodic checks on the state of the impeller and shaft support bearings, and to check that the pump remains in good condition internally.

DISMANTLING THE PUMP

THE PUMP CAN BE DISMANTLED EITHER BY DISCONNECTING THE PIPEWORK AND REMOVING THE PUMP BODY, OR BY LEAVING THE PUMP BODY AND PIPEWORK IN POSITION AND WITHDRAWING MOTOR AND INTERNAL ASSEMBLY FROM THE BACK. (BACK PULL OUT SYSTEM).

NOTE THE CORRECT POSITIONS OF THESE PARTS:

a) drain the pump or isolate it from the rest of the liquid system;
b) remove the bolts securing the end cover and pump body to the motor adaptor;
c) carefully separate end cover, pump body and internal assembly;
d) carefully slide the impeller/magnet assembly off the shaft;
e) examine the shaft and bushes for wear, checking for minimal play.

RE-ASSEMBLY THE PUMP

FOLLOW THE ABOVE PROCEDURE IN REVERSE ORDER. IF THE PUMP HAS BEEN DISMANTLED LEAVING PUMP HEAD AND PIPEWORK IN PLACE, TAKE PARTICULAR CARE WHEN RE-ASSEMBLING NOT TO DISTORT OR DAMAGE THE PUMP.

PUMPING DENSE AND/OR VISCOUS LIQUIDS

THE FLOW RATES AND DISCHARGE HEADS QUOTED FOR ROTOS "SDM" SERIES CENTRIFUGAL PUMPS APPLY TO WATER PUMPED AT ROOM TEMPERATURE. IF LIQUIDS OF HIGHER TEMPERATURE OR VISCOSITY OR DENSITY ARE TO BE PUMPED, THE PERFORMANCE OF THE PUMP WILL BE CORRESPONDINGLY REDUCED.

ROTOS PCM series pumps will perform satisfactorily with liquids up to 50cps visc. and 1.9 S.G.

THESE VALUES ARE PURELY INDICATIVE. CONTACT YOUR AREA TECHNICAL DEPARTMENT FOR ADVICE ON PARTICULAR APPLICATIONS

SPARE PARTS FOR ROTOS SDM SERIES PUMPS

A FULL RANGE OF SPARE PARTS FOR ROTOS SDM SERIES PUMPS IS AVAILABLE FROM OUR STOCK. PLEASE QUOTE PUMP MODEL, SERIAL NUMBER AND DESCRIPTION OR PART NUMBERS. SEE DATA SHEET AND SECTIONAL DRAWING FOR PUMP MODEL CONCERNED

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