



**SDM SERIES
OPERATION
&
MAINTENANCE
MANUAL**

fluidity.
nonstop



**Seal Less Metallic
Magnetically Coupled
Centrifugal Pump**



Read these instructions before putting the pump into service.



Installation and operation should be carried out by qualified personnel only.



Danger of electrocution. Electric supply must be isolated before working on the pumpset.



Electrical work should only be carried out by qualified personnel

IMPORTANT NOTES



Failure to observe the recommended procedures may result in early and severe damage to your pump and may also invalidate the guarantee.



Locate the pump on a firm base close to the liquid source and not more than 1.5 – 2.0 metres above it.



Mount the pump horizontally if possible. If mounted vertically, the unit must be motor downwards.



The bore of the inlet and discharge pipes should be at least as large as the nominal bore of the pump ports.



Use rigid or reinforced inlet pipe that will not deform or collapse under suction conditions.

IMPORTANT NOTES



Align rigid pipes accurately with the pump ports, to ensure that the pump head is not distorted or damaged.



Fit an inlet strainer of approx. 0.2 mm mesh if there is any risk of solid particles entering the pump.



Use of an electrical starter is recommended. A simple switch is often inadequate for starting and stopping electric motors.

APPROPRIATE STARTER WILL: prevent accidental restarts after power-failure; provide a safe, waterproof switch enclosure; protect the motor with a correctly set overload cut-cut (a fuse protects only the wiring); withstand the heavy starting current of the motor, preventing arcing and rapid contact wear.

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GENERAL

AxFlow Aturia SDM pumps are seal less metallic magnetically coupled centrifugal pumps. Details of the pump type and model, serial number and operating data are indicated on the pump nameplate.

The pump must be installed and operated in full compliance with these instructions. The pump may not be operated outside the limits specified on the nameplate and within this manual. The pump should only be operated by skilled trained personnel. The manufacturer will not accept liability if these instructions are not followed.

This manual does not take into account any specific local regulations or bylaws that may be applicable, and it is the responsibility of the installer to ensure compliance with such regulations.

Noise levels

The following table reports the noise level produced by AxFlow Aturia SDM-series 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 AxFlow standard electric motors. For other motors the table values shall be compared to the actual used motors.

MOTOR FRAME SIZE	MOTOR SPEED	
	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

Area of operation

AxFlow Aturia SDM pump sets may be installed within a building or externally. Wherever installed, protect the pump from frost, snow and flooding.

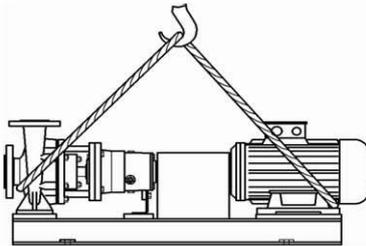
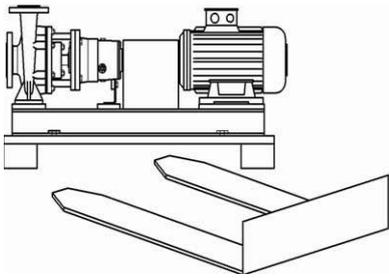
Care must be taken to ensure that cold weather will not cause the pump or pipes to freeze, and installers may wish to consider lagging or trace heating.

If supplied, standard electric motors are only suitable for operation in safe areas, free from the danger of explosive liquids or gases.

Spare parts

Spare parts are available from AxFlow throughout Great Britain. Please quote the pump model and serial number for all spares enquiries.

Transport



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.

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.

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.

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.

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.

Storage

If not to be used immediately, the pumpset should be stored in a dry warm and vibration free environment.

If an electric motor is supplied as the drive, then before putting into service, the motor winding insulation should be tested. If the reading is below 10 Mega ohms, move to a warm dry place for a few hours until the motor insulation value rises.

Do not remove flange covers until the pump is ready to be connected to the pipework.

Drivers

AxFlow Aturia SDM pumps may be driven by an electric motor through a shaft -to-shaft coupling.

There are particular points which can affect the pump:

- Shaft -to-shaft flexible couplings must be properly aligned, as poor alignment will cause high loads on the pump bearings. Couplings must be suitably rated, and provide sufficient flexibility to prevent shock forces and oscillating loads from being transmitted to the pump shaft. This is particularly important for diesel engine drives.
- When designing the drive system and prime mover, take into account that the pump dismantles by removing the rotating element out from the back of the pump casing. Sufficient space should be allowed to facilitate dismantling of the pump.

INSTALLATION



Isolate the supply before commencing work on the pump

Foundations

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

The pump must be mounted horizontally on a level foundation, with the suction / discharge ports horizontal perpendicular to the body.

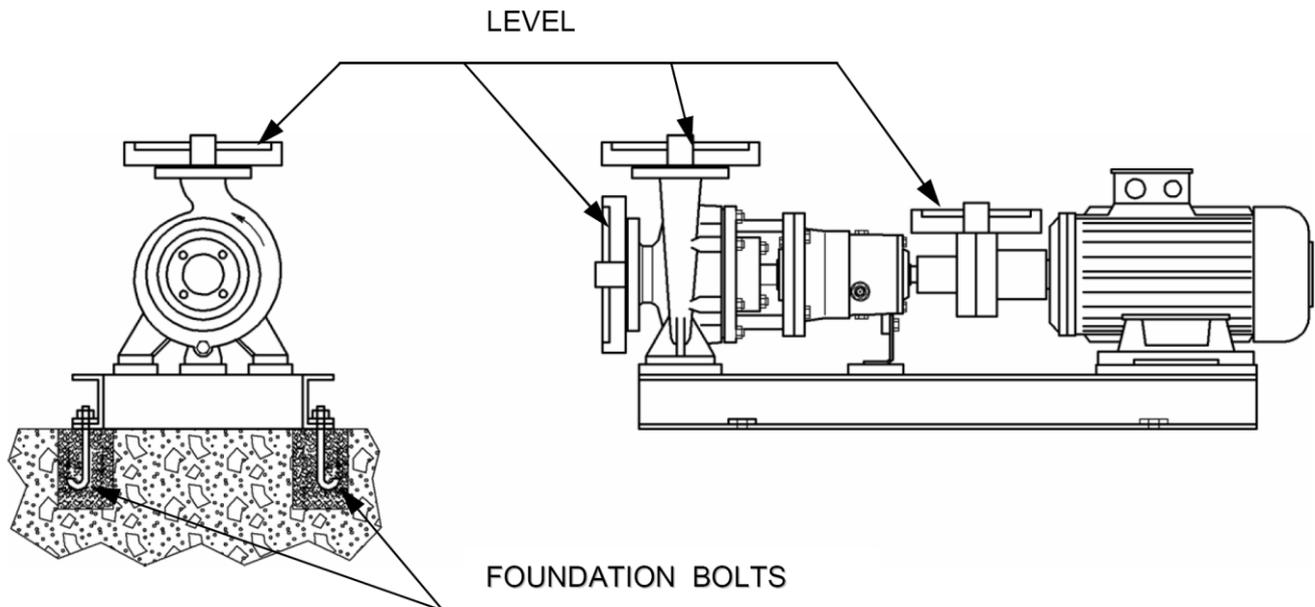
Close-coupled motor-pump unit without baseplate

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.

Motor-pump units on baseplates

Level the baseplate accurately, using shims under the base-plate next to the foundation bolts. The baseplate, if supplied, 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.

Pump and motor alignment



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

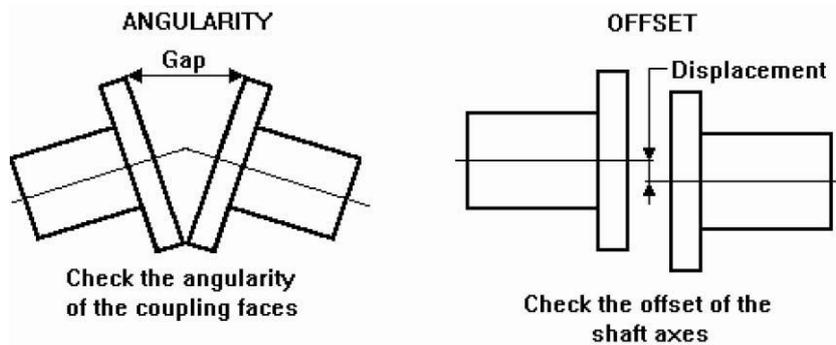
Long-coupled pumps have been pre-aligned with the motor prior to shipment. If pump units receive rough treatment during shipment, they can become misaligned. The flexible coupling is not designed to compensate for misalignment. Improper alignment will cause vibration and premature bearing failure.



**CHECK THE ALIGNMENT
OF PUMP AND MOTOR
PRIOR TO START-UP**

INSTALLATION

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

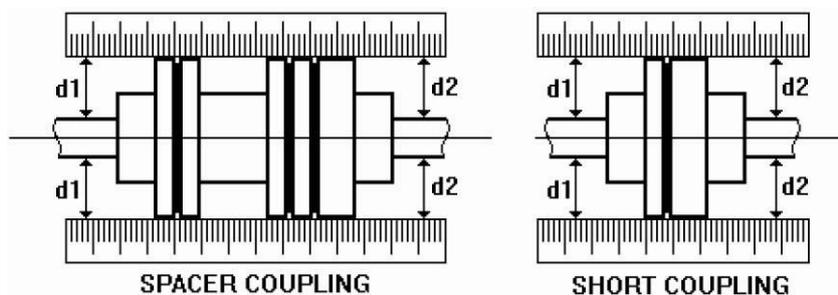


COUPLING TYPE	OFFSET DISPLACEMENT	ANGULARITY GAP
Short flexible coupling (3000 rpm)	0.05 mm	0.04 mm per 100 mm coupling diameter
Flexible spacer coupling (3000 rpm)	0.07 mm per 100 mm spacer length	0.04 mm per 100 mm coupling diameter

Methods of checking alignment

Straight edge

Using a straight edge, check the distance from the shaft at several points on the circumference of the coupling. The distances d_1 and d_2 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.

Dial gauge ("clocking")

There are several methods, using one or two dial gauges. The most accurate is the reverse indicator method, using two gauges, which overcomes errors due to 'sag' of the gauge bars.

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, AxFlow can provide further information about suitable alignment methods, including allowances for **THERMAL EXPANSION IN HIGH TEMPERATURE USE**.

Location and piping

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).

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

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 Table overleaf.

These moments must not be exceeded, otherwise the pump may distort internally, or the pump and motor may become misaligned.

Pipework must be fully and independently supported as close as practicable to the pump.

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

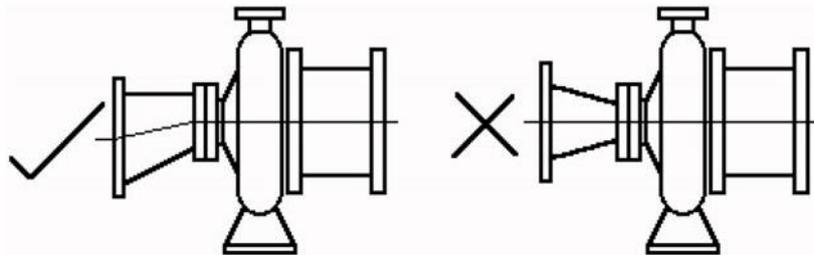
The suction line should be as short and straight as possible, with a minimum number of bends. Bends should be large radius type: avoid sharp elbows. Bends and fittings should be no closer than 20 pipe diameters to the pump suction, to allow undisturbed flow to the pump impeller. Liquid velocity in the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

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.

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

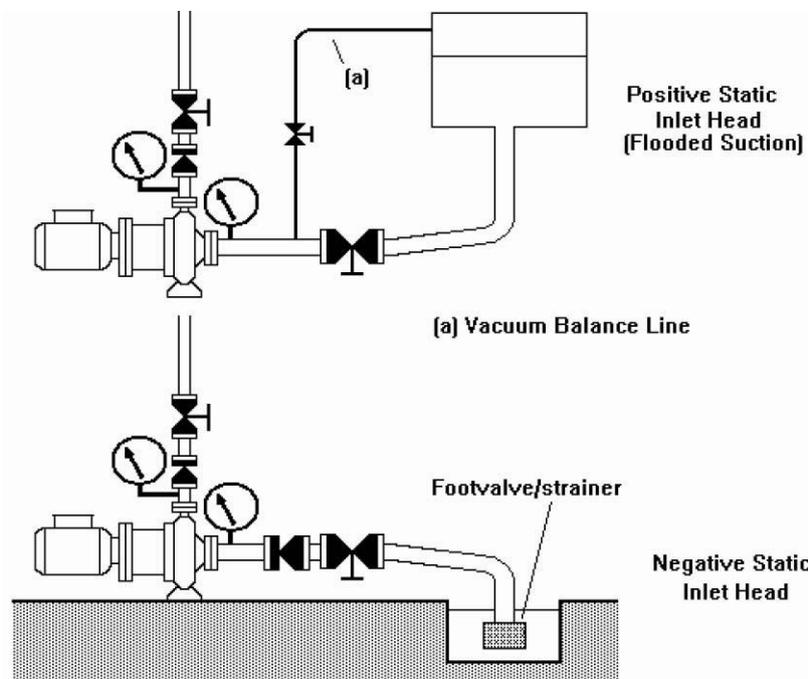


ATTENTION !



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.



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

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.

INSTALLATION

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.

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

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 170°C or saturated steam with a maximum pressure of 7 bar (100psi).

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. If possible a TEMPORARY START-UP STRAINER with a 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 ingestion of solids during normal operation, once the pump has been successfully commissioned, a PERMANENT INLET STRAINER should be fitted in the inlet line.



**AVOID PUMPING LIQUIDS
CONTAINING
SUSPENDED SOLIDS**

Standard AxFlow 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.

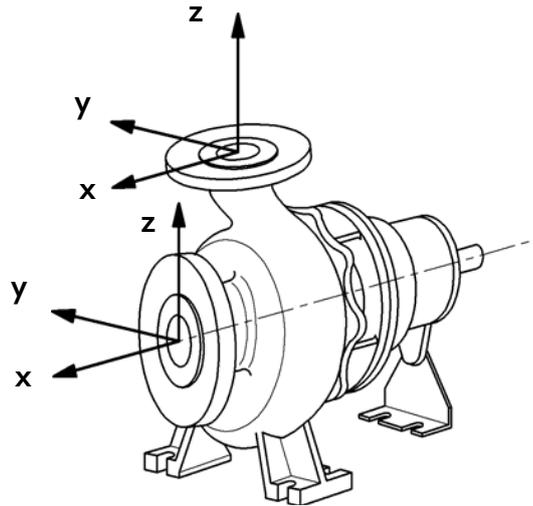
The strainer must be inspected regularly and cleaned when necessary.



**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.**

Admissible external forces and torques on pump flanges

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



TYPE	FLANGE	TORQUES, (daN)				MOMENTS, (daN.m)			
		F _x	F _y	F _z	ΣF	M _x	M _y	M _z	ΣM
SDM 2 x 8	Suction	310	385	250	555	140	70	110	190
	Delivery	235	285	190	415	100	48	80	140
SDM 2.5 x 10	Suction	70	55	42	100	35	18	25	45
	Delivery	310	385	250	555	140	70	110	190
SDM 3 x 12	Suction	70	55	42	100	35	18	25	45
	Delivery	65	50	40	95	30	15	20	40
SDM 4 x 14	Suction	90	75	60	135	50	25	40	70
	Delivery	70	55	42	100	35	18	25	45

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:

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.

Low inlet pressure

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.

'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 above.

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.



Isolate the supply before commencing work on the pump

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.

Connecting the electric motor

1. Isolate the electric supply cable from the power supply.
2. Bring the cable end into the terminal box through a suitable cable gland.
3. Follow the motor manufacturer's instructions for electrical connection. These will normally be found inside the terminal box, either on a separate instruction sheet or attached to the inside of the terminal box cover.

Check that the terminal links are correctly positioned for the supply voltage.

Ensure that the earth connection is properly and securely made.

Before replacing the terminal box lid, check that the sealing surfaces and the gasket or o-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.

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 only the wiring
- d. withstand the heavy starting current of the motor, preventing arcing and rapid contact wear.

Check direction of rotation

WARNING! "DO NOT RUN THE PUMP DRY"

Long-coupled pumps only

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

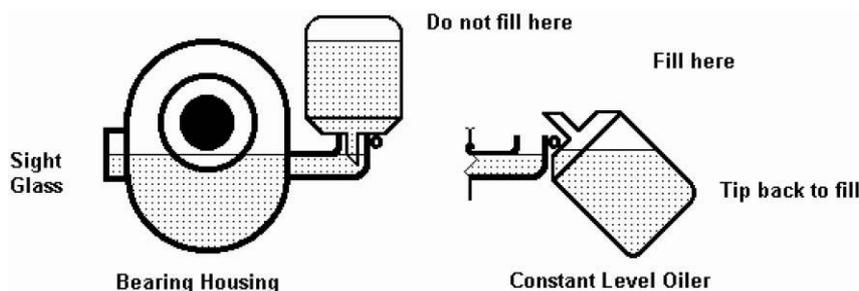
Use ISO VG-46 viscosity oil for bearing temperature from 0° to 70°C.

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

OIL QUANTITY : BEARING BRACKET SIZE 24 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.



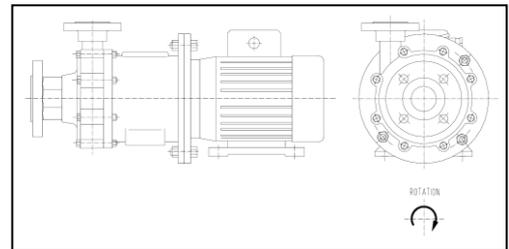
If there is a toothed spacer coupling between the pump and the motor, check whether it needs to be filled with oil. Follow the coupling manufacturer's instructions as required.

Direction of rotation

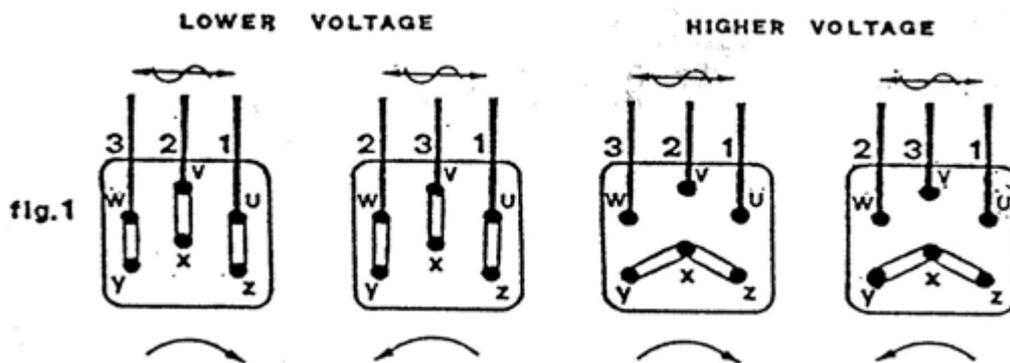
AxFlow Aturia SDM series pumps rotate anti-clockwise when viewed from in front of the pump inlet nozzle.

To confirm the direction of rotation (refer to the rotational arrow on the pump casing) use the following procedure:

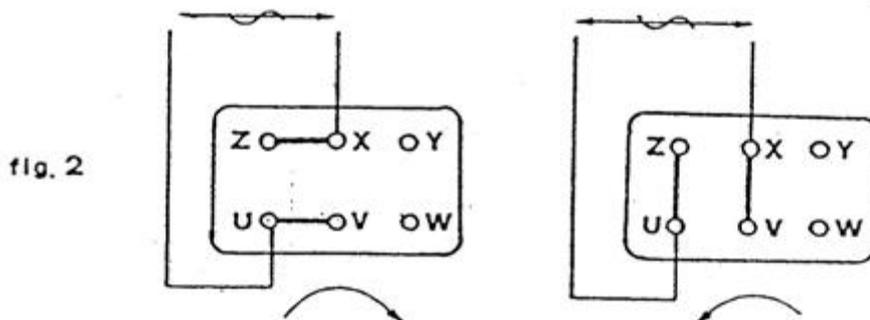
- Open the suction and discharge valves, allowing the pump to fill with liquid.
- Remove the coupling guard of a long-coupled pump, or the motor fan cover of a close-coupled pump.
- 'Bump' the motor by pressing the motor start and stop buttons in quick succession. If the direction of rotation is incorrect,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



To alter the direction of rotation of a three-phase motor changes any two connections.



For a single-phase motor, reverse the polarity of the start winding in relation to the main winding.



IF IN DOUBT OR DIFFICULTY, OBTAIN THE ASSISTENCE OF A QUALIFIED ELECTRICIAN

OPERATION

Supervision

When correctly installed and operated, this AxFlow pump will give many years of trouble free service. In operation, the pump should be free from vibration and run smoothly. Any changes to smoothness of operation should be investigated immediately. The pump should be visually checked periodically.

Priming the pump



**DO NOT RUN THE
PUMP DRY!**

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).

1. Open the discharge valve to 1/2 open.
2. 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 pump

3. If the pressure gauge does not hold steady after repeating step 2 several times, shut the pump down, open the discharge vent (if permissible) and check that all vapour or air is purged from the system.
4. 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.
5. If the pump starts to vibrate, rattle or run noisily, the flow rate has become excessive. Close the discharge valve IMMEDIATELY until the pump runs smoothly again. 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. Your pump supplier will advise on a suitable orifice size if necessary.

Pump operation

Operators should make frequent visual inspections to check that the pump is running smoothly without noise or vibration, and that 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.

Care must be taken to make sure that the sleeve bearings in the pump are replaced in sufficient 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

Be sure to maintain properly the ball bearings supporting the outer magnet in the external bearing housing (or the motor bearings in the case of close-coupled pumps).



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

Follow the motor manufacturer's recommendations and keep the motor bearings maintained.



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.

AxFlow Aturia SDM-series 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.

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.

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

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.

MAINTENANCE

In general, AxFlow Aturia SDM-series pumps do not require routine maintenance, and therefore do not need to be dismantled frequently. If the recommended procedures are observed, the pump should give lengthy and trouble-free service. Worn graphite vanes and stator components may ultimately need to be replaced. Follow carefully the instructions for dismantling and re-assembling the pump, or return to AxFlow for overhaul.



Isolate the supply before commencing work on the pump

Supply isolation

For pumps driven by electric motor, always isolate the supply before working on the pump. Affix a notice on the electrical isolator to inform others that the work is being carried out on the installation. If possible lock closed the supply isolator.

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 AxFlow Aturia pump is capable of running for very long periods with minimal attention. Please see previous PUMP OPERATION section.

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 O-rings	After 2500 hours of operation, check for premature wear. Thereafter, check every 5000 hours or once a year, whichever is shorter.
Motor bearings	Unless otherwise specifically stated in the pump instructions, motor bearings are grease-filled and sealed for life. We recommend regular checks on motor bearing condition, and replacement when necessary.	Check motor manufacturer manuals or require it if not provided.

DISASSEMBLY**Strong magnet essential precautions**

MAGNETS CAN PRODUCE STRONG MECHANICAL FORCES!



THERE IS A DANGER OF INJURY WHEN TWO MAGNETS ARE BROUGHT TOGETHER BY HAND!



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.



IF MAGNETIC PARTICLES GET INTO THE EYES, GET MEDICAL HELP IMMEDIATELY!



HEART PACEMAKERS CAN BE DAMAGED!



TOOLS OR OTHER IRON OBJECTS CAN BE ATTRACTED SUDDENLY!



CARDS WITH MAGNETICALLY STORED INFORMATION, I.E. CREDIT CARDS, ETC., CAN BE DAMAGED!



WATCHES CAN BE DAMAGED!

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:

1. if the pump stands idle for an extended period, it is not damaged by precipitation or encrustation of solids.
2. 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 down carefully after heating in order to prevent ice forming inside the pump casing.

NOTICE !!

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.

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**



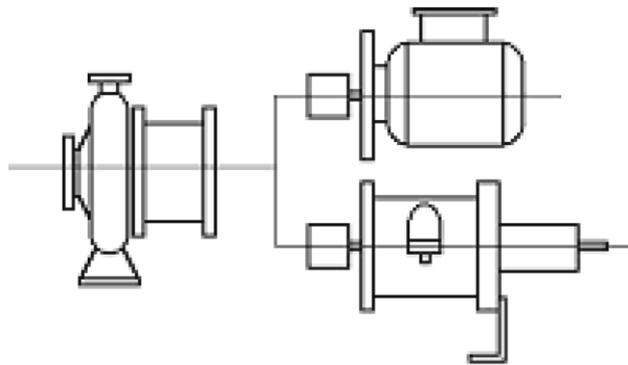
DO NOT USE FORCE!

The pump should be taken apart with the help of the labelled 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.

1. Check that the pump has been fully drained and flushed out, before you start work on it.
2. Isolate the motor from its electrical supply.
3. Isolate the pump from the rest of the hydraulic system. Isolate and disconnect any jacketing or other auxiliary pipework from the pump.
4. Discharge the oil from the bearing housing. (long coupled units only).
Replace the oil chamber plugs.

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.
6. Dismantling the magnetic drive

**SAFETY NOTE!**

See STRONG MAGNET ESSENTIAL PRECAUTIONS

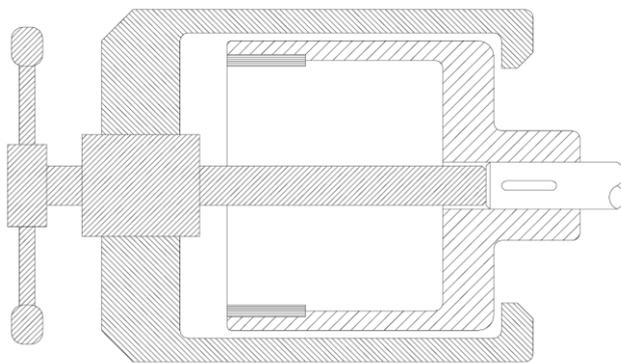
Take care not to trap your fingers as the two halves of the magnetic coupling are separated

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.

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**DO NOT STRIKE THE MAGNET!**

The magnetic elements are brittle and easily damaged.

**DO NOT ALLOW THE MAGNET TO
FALL ON THE FLOOR!****Disassembly of external bearing housing**

See Overleaf

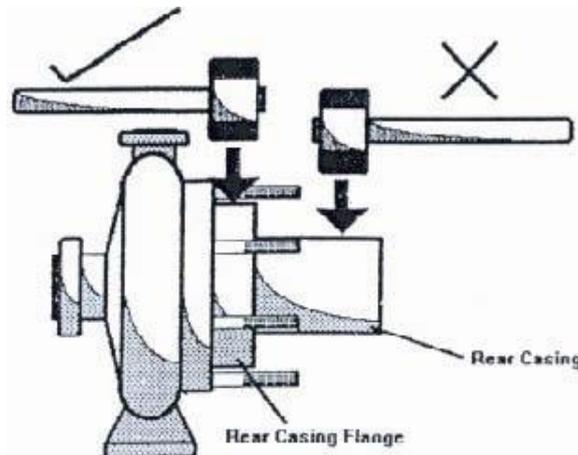
Removing the internal pump assembly

Remove the nuts securing the bracket 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 flange of the rear casing on alternate sides with a soft-headed 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.



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.

Undo bolts and remove bearing covers. Using a bench press, press out shaft together with outer bearing. Press out the inner bearing. Inspect bearings for wear and replace if necessary. Remove any burrs from shaft keyway.

Re-assembly

Using a bench press, insert inner bearing into pedestal housing. Assemble outer bearing and shaft. 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.

REASSEMBLY

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.

Reassembling the pump



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

NOTE! SEE PRECAUTIONS WHEN WORKING WITH STRONG MAGNETS

CAUTION!

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)

Pumping dense and/or viscous liquids

- The flow rate vs. total head curves quoted are based on the performance tests conducted with water at ambient room temperature.
- If liquids of higher density or viscosity are pumped, the power taken by the electric motor will be correspondingly increased and the performance of the pump will be correspondingly reduced.
- AxFlow Aturia SDM-series centrifugal pumps will perform satisfactorily with liquids of specific gravity up to 1.9 and viscosity up to 50 cps.

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

Reassembly of the complete pump

A hydrostatic pressure test may now be carried out with water, to test for leaks. The standard pump is suitable for use at system pressures up to 16 bar. Test pressure must be performed at 24 bar.

Replacing the external magnet and motor or bearing housing

Long-coupled units

Rebuild the external bearing housing if necessary: see DISASSEMBLY AND RE-ASSEMBLY OF THE EXTERNAL BEARING HOUSING (LONG-COUPLED UNITS ONLY) section.

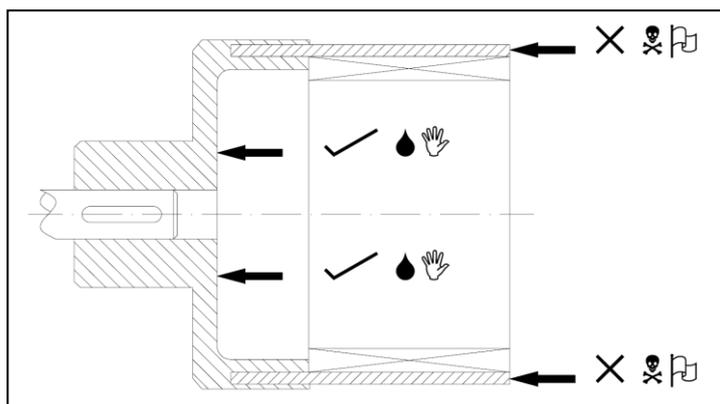
Fit the external magnet on to the external bearing shaft or the motor shaft. First, clean the bore of the drive magnet hole and the surface of the shaft with fine emery paper, and lightly oil both surfaces.

SAFETY NOTE - See STRONG MAGNET ESSENTIAL PRECAUTIONS section.

Fit the shaft key into the keyway. Push the magnet onto 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.



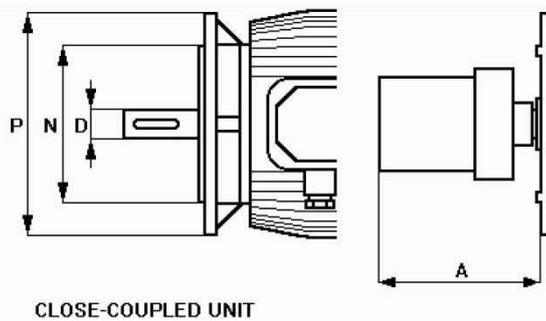
DO NOT STRIKE THE MAGNET! The magnet elements are brittle and are easily damaged.



REASSEMBLY

LOCATION OF EXTERNAL MAGNET ON MOTOR OR PEDESTAL SHAFT

CLOSE COUPLED UNITS						
Pump SDM Model	Motor Frame Size	Dimensions			A mm	External Magnet Type
		P	N	D		
SDM 2 x 8	71	160	110	14	110.5	Standard
SDM 2.5 x 10	80	200	130	19	114.5	Standard
SDM 3 x 12	90	200	130	24	134	Standard
SDM 4 x 14	90	200	130	24	142	Standard



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.

FOR LONG COUPLED PUMPS ONLY: Fill the bearing housing with oil to the middle of the sight-glass.

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

SAFETY NOTE - See PRECAUTIONS

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:

SDM-series pumps : M10 x 150mm

Take care to avoid damaging the brittle magnetic elements inside the external magnet.

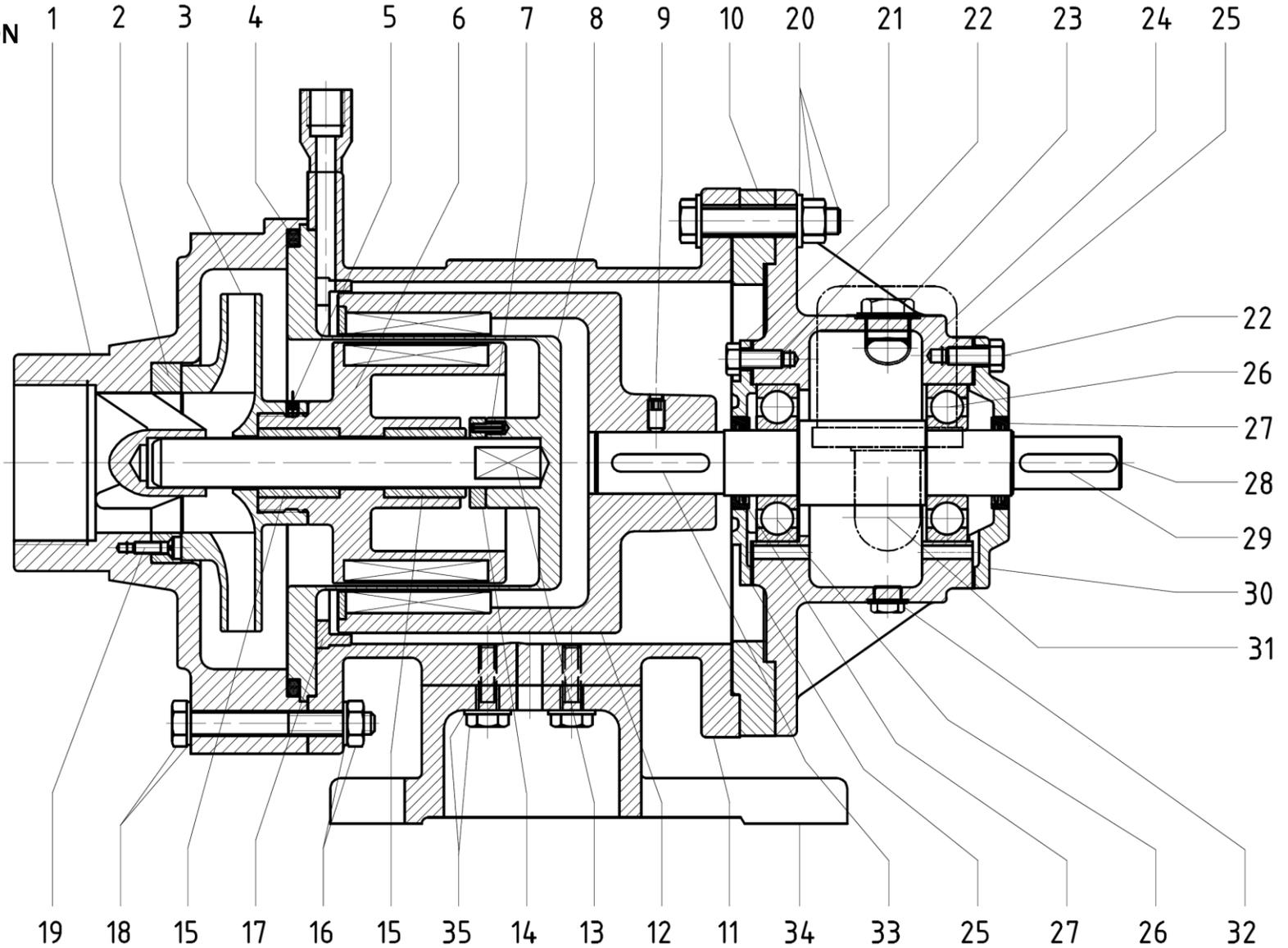
When the pump is fully assembled, turn it over by hand to check for free rotation. The pump should turn over evenly, with no noise or extra resistance at any point.

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 METHODS OF CHECKING ALIGNMENT instructions).

TYPICAL CROSS-SECTION

TYPICAL CROSS-SECTION



TYPICAL CROSS-SECTION

PART No.	DESCRIPTION	COUPLING TYPE
1	Pump Head	Close & Long Coupled
2	Thrust Bearings	Close & Long Coupled
3	Impeller	Close & Long Coupled
4	O-Ring	Close & Long Coupled
5	Screw	Close & Long Coupled
6	Internal Magnet	Close & Long Coupled
7	Pin	Close & Long Coupled
8	Rear Casing	Close & Long Coupled
9	Screw	Close & Long Coupled
10	Adaptor Flange	Close & Long Coupled
11	Bracket with Thermocouple Connection	Close & Long Coupled
12	External Magnet	Close & Long Coupled
13	Shaft	Close & Long Coupled
14	Thrust Bearings	Close & Long Coupled
15	Bearing	Close & Long Coupled
16	Nut / Washer	Close & Long Coupled
17	Rub Ring	Close & Long Coupled
18	Screw / Washer	Close & Long Coupled

PART No.	DESCRIPTION	COUPLING TYPE
19	Screw	Close & Long Coupled
20	Bolt	Long Coupled Only
21	Bearing Cover	Long Coupled Only
22	Screw	Long Coupled Only
23 ¹⁾	Plug	Long Coupled Only
24	External Magnet Bracket	Long Coupled Only
25	Gasket	Long Coupled Only
26 ²⁾	Rear Ball Bearing	Long Coupled Only
27	Labyrinth Seal Ring	Long Coupled Only
28	Bracket Shaft	Long Coupled Only
29	Key	Long Coupled Only
30	Bearing Cover	Long Coupled Only
31	Constant Level Oil	Long Coupled Only
32 ¹⁾	Drain Plug	Long Coupled Only
33	Key	Long Coupled Only
34 ³⁾	Pedestal	Close & Long Coupled
35 ³⁾	Screw / Washer	Close & Long Coupled

1) Oil lubricated only

2) Std: greased for life
Option: oil lubricated

3) On request for Close Coupled version

TROUBLESHOOTING

Provided your AxFlow Aturia SDM-Series 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 AxFlow Aturia SDM-Series 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. Your pump supplier will do his best to assist you further if necessary.

PROBLEM	PROBABLE CAUSE	SOLUTION
INSUFFICIENT FLOW OR PRESSURE	Actual total discharge head exceeds rated head of pump	<ul style="list-style-type: none"> • 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.
	Pump rotating in reverse	<ul style="list-style-type: none"> • Check direction of rotation. Refer to INSTALLATION section.
	Air or vapour trapped in inlet pipework	<ul style="list-style-type: none"> • Check for trapped air or vapour. Refer to INSTALLATION section.
	Liquid contains entrained air or vapour	<ul style="list-style-type: none"> • 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.
	Low inlet pressure, giving rise to cavitation and loss of efficiency	<ul style="list-style-type: none"> • 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.
	Wear on the impeller collar and / or wear ring	<ul style="list-style-type: none"> • Check condition of impeller collar and wear ring. Replace if excessively worn.

TROUBLESHOOTING

PROBLEM	PROBABLE CAUSE	SOLUTION
INSUFFICIENT FLOW OR PRESSURE	Liquid temperature too close to boiling	<ul style="list-style-type: none"> Reduce liquid temperature.
	Insufficient Nett Positive Suction Head	<ul style="list-style-type: none"> Increase NPSH available to the figure on the contract. Check diameter of the suction pipe. Remove any obstruction from the suction pipe. Check temperature of the pumped liquid.
NO FLOW	Actual total discharge head exceeds rated head of pump	<ul style="list-style-type: none"> Increase speed of rotation if possible. Reduce total head of system. Increase discharge pipework size. Check that discharge valve is fully open. Replace pump: seek advice from your pump supplier.
	Pump rotating in reverse	<ul style="list-style-type: none"> Check direction of rotation. Refer to INSTALLATION section.
	Air or vapour trapped in inlet pipework	<ul style="list-style-type: none"> Check for trapped air or vapour. Refer to INSTALLATION section.
	Liquid contains entrained air or vapour	<ul style="list-style-type: none"> 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.
	Low inlet pressure, giving rise to cavitation and loss of efficiency	<ul style="list-style-type: none"> 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.
	Wear on the impeller collar and / or wear ring	<ul style="list-style-type: none"> Check condition of impeller collar and wear ring. Replace if excessively worn.
	Liquid temperature too close to boiling	<ul style="list-style-type: none"> Reduce liquid temperature.

TROUBLESHOOTING

PROBLEM	PROBABLE CAUSE	SOLUTION
NO FLOW	Pump has lost its prime	<ul style="list-style-type: none"> • Check inlet line for air leaks. • Check for loss of liquid supply. • Re-prime pump. Refer to OPERATION section.
		<ul style="list-style-type: none"> • Check for blockage in the inlet pipework. • Check if any inlet strainers / filters are blocked. • Check for closed valves in the inlet pipework.
	Blocked inlet line	<ul style="list-style-type: none"> • 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 impeller: inspect pump internally if it does not rotate freely. • Reduce motor power (check first with you pump supplier). • Use a soft start system for pump starting.
	Insufficient depth of immersion of the suction pipe end under the level of the liquid	<ul style="list-style-type: none"> • Increase the depth of immersion of the suction pipe
NO FLOW	Magnetic drive de-coupled	<ul style="list-style-type: none"> • Reduce discharge head: partly open discharge valve. • Reduce liquid density. • Check for free rotation of pump: inspect pump internally if it does not rotate freely. • Discharge control valve closing too quickly. • Excessive internal wear. • Reduce motor power (check first with your pump supplier). • Soft-start motor.
	Motor has stopped	<ul style="list-style-type: none"> • Check power supply. • Check motor condition.

TROUBLESHOOTING

PROBLEM	PROBABLE CAUSE	SOLUTION
EXCESSIVE FLOW	Actual total discharge head is below rated head of pump	<ul style="list-style-type: none"> • Reduce speed of rotation if possible. • Fit smaller diameter impeller. • Partly close discharge valve to restrict flow. • Fit orifice plate in discharge line to restrict flow.
MOTOR OVERHEATS AND / OR CUTS OUT	Actual total discharge head is below rated head of pump	<ul style="list-style-type: none"> • Reduce speed of rotation if possible. • Fit smaller diameter impeller. • Partly close discharge valve to restrict flow. • Fit orifice plate in discharge line to restrict flow.
	Excessive liquid density or viscosity	<ul style="list-style-type: none"> • Reduce flow rate by reducing pump speed if possible.
	Pump has or is about to seize	<ul style="list-style-type: none"> • Check pump for free rotation. • Check pump internally for obstructions.
	Motor and pump misaligned	<ul style="list-style-type: none"> • Refer to INSTALLATION section.
	Motor bearings are failing	<ul style="list-style-type: none"> • Replace motor bearings. • Investigate cause of overload/failure.
	Undersized motor	<ul style="list-style-type: none"> • Fit a larger motor: check first with you pump supplier.
	Incorrectly set motor overload cut out	<ul style="list-style-type: none"> • Check motor overload setting
	Electronic dry running protector has tripped	<ul style="list-style-type: none"> • Check for loss of flow. • Check for loss of liquid supply.

PROBLEM	PROBABLE CAUSE	SOLUTION
PUMP RUNS NOISILY AND / OR VIBRATES	<p>Low inlet pressure, with cavitation, loss of efficiency and loss of liquid film in the pump bearings.</p> <p>STOP THE PUMP IMMEDIATELY!</p> <p>(Mechanical damage may be occurring)</p>	<ul style="list-style-type: none"> • 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.
		<ul style="list-style-type: none"> • Check carbon cartridges and replace if worn. • Reduce liquid temperature
	Worn, eroded, fouled or damaged internal parts	<ul style="list-style-type: none"> • Check pump internally for wear, damage or obstruction.
	Motor and pump misaligned	<ul style="list-style-type: none"> • Refer to INSTALLATION section.
	Coupling worn	<ul style="list-style-type: none"> • Replace coupling. • Check alignment of motor and pump.
	Worn external pump bearings	<ul style="list-style-type: none"> • Check bearings and replace if necessary
	Worn motor bearings	<ul style="list-style-type: none"> • Check bearings and replace if necessary
	Pump feet, motor feet or baseplate not firmly secured	<ul style="list-style-type: none"> • Check for 'soft-foot'. Refer to PUMP FOUNDATION section.
	Misaligned or badly secured pipework	<ul style="list-style-type: none"> • Check pipework alignment and support. Refer to LOCATION AND PIPING section.
Pump starting while rotating in reverse	<ul style="list-style-type: none"> • Stop pump immediately and allow discharge line to drain completely before re-starting. 	

PROBLEM	PROBABLE CAUSE	SOLUTION
OVERHEATED (EXTERNAL) PUMP BEARINGS (Long-coupled units only)	Low inlet pressure, with cavitation, loss of efficiency and loss of liquid film in the pump bearings. STOP THE PUMP IMMEDIATELY! (Mechanical damage may be occurring)	<ul style="list-style-type: none"> • 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.
		<ul style="list-style-type: none"> • Check carbon cartridges and replace if worn. • Reduce liquid temperature.
	Worn, eroded, fouled or damaged internal parts	<ul style="list-style-type: none"> • Check pump internally for wear, damage or obstruction.
	Motor and pump misaligned	<ul style="list-style-type: none"> • Refer to INSTALLATION section.
	Coupling worn	<ul style="list-style-type: none"> • Replace coupling. • Check alignment of motor and pump.
	Worn external pump bearings	<ul style="list-style-type: none"> • Check bearings and replace if necessary
	Worn motor bearings	<ul style="list-style-type: none"> • Check bearings and replace if necessary
	Pump feet, motor feet or baseplate not firmly secured	<ul style="list-style-type: none"> • Check for 'soft-foot'. Refer to PUMP FOUNDATION section.
	Misaligned or badly secured pipework	<ul style="list-style-type: none"> • Check pipework alignment and support. Refer to LOCATION AND PIPING section.
	Lack of oil in bearing housing	<ul style="list-style-type: none"> • Check oil level: refill oil if necessary. • Replace bearings if necessary.
	Incorrect oil in bearing housing	<ul style="list-style-type: none"> • Drain and replace oil if necessary. • Replace bearings if necessary.
Excessive temperature of pumped liquid	<ul style="list-style-type: none"> • Refill bearing housing with correct oil for working temperature of the pump. 	



NOTES



"fluidity.nonstop" is our promise and our commitment to a level of service and a quality of product, performance and expertise the like of which has not been seen before. We are Europe's leading source of pumps and pump expertise for the process industry and we intend to maintain that position by working fluidly, and ceaselessly, to bring you the best.

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