



Serial No: _____

Type Series Ajax ISO: _____

Contents:		Page
0	General	3
0.1	Handling	3
1	Installation	3
1.1	Foundation	3
1.2	Mounting	3
1.3	Aligning Pump / Motor	3
1.4	Connecting the Piping	4
1.4.1	Auxiliary Connections	4
1.4.2	Vacuum Balance	4
1.5	Coupling Guard	4
1.6	Final Check	4
2	Startup / Commissioning Shut-down	4
2.1	Preparation	4
2.1.1	Lubricant	4
2.1.2	Shaft Seal	4
2.1.3	Priming the Pump and Associated Checks	4
2.1.4	Checking the Direction of Rotation	4
2.2	Startup	5
2.3	Shut-down	5
3	Maintenance and Lubrication	5
3.1	Supervision of Operation	5
3.2	Lubrication	5
3.2.1	Grease	5
4	Dismantling and Reassembly	6
4.1	General	6
4.2	Dismantling	6
4.2.1	Mechanical Seal	6
4.3	Bearings.....	6
4.3.1	Greased for Life Bearings	6
4.4	Reassembly	6
4.4.1	Pump.....	6
4.4.2	Shaft Seal	7
4.4.3	Mechanical Seal	7
4.5	Spare Parts	7
4.5.1	Ordering Spare Parts	7
4.5.2	Parts List and Material Identification	8
4.5.3	Recommended List of Spare Parts for 2 years Continuous Operation	9
4.5.4	Recommended Torques	9
5	Trouble shooting	10-11

0 General

Centrifugal pumps will give trouble-free, satisfactory service if they are properly installed and maintained.

Follow the instructions in this manual carefully. Do not run the pumps under operating instruction which differ from those specified by us.

This manual does not take into account any on site safety regulations which may apply. The nameplate attached to the pump indicates the type series/size, identification number, impeller dimension and serial number. Please always indicate this data in case of inquiries, supplement orders and especially when ordering spare parts.



For the standard pump arrangement operating conditions should never exceed the recommended working pressure and 95°C.

Ensure that operation is in accordance with the instructions contained in this manual (contract documentation). It is essential that the electrical connection values are as specified and that the instructions on installation and maintenance are followed.

Operation of this unit beyond the above conditions may result in excess load and subsequent failure. Failure to heed these warnings can result in personal injury and damage to equipment.

N.B.

This manual does not cover all details or eventualities which might occur during installation, operation or maintenance. The pumpset must only be handled by skilled, trained personnel. For any information and instructions not contained in this manual, please contact KSB Australia. The manufacturer accepts no liability for the pumpset if the instructions in this manual are not complied with.

0.1 Handling

When handling the complete pumpset, attach ropes to the pump and motor as shown (not through the motor eyebolt) or onto the lifting lugs supplied.

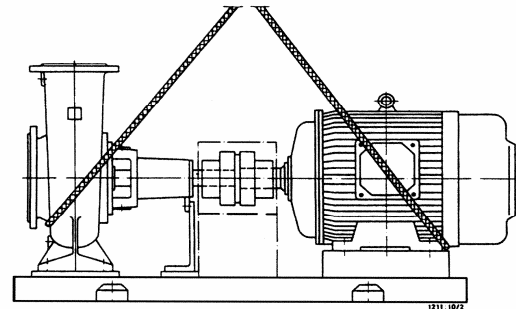


Fig. 1. Pump and motor and common baseplate.

1 Installation

1.1 Foundation

Make sure the concrete foundation has set before mounting the pumpset. The surface of the foundation must be completely horizontal and perfectly flat.

1.2 Mounting

Position the pumpset on the foundation and align using a precision spirit level (on the pump discharge nozzle).

Always fit shims to left and right of the anchor bolts near the bolts, between the baseplate/foundation frame and the foundation. If the shims are more than 800mm apart, position extra shims equal distant between them. All shims must be perfectly flush.

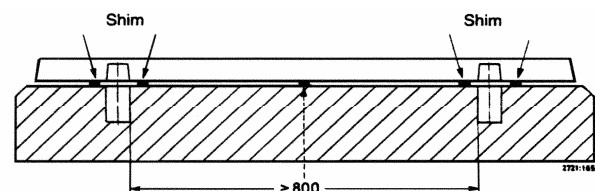


Fig. 2. Fitting shims

Uniformly tighten up securing means.

Baseplates have to be grouted with non-shrinking mortar up to the upper edge of the frame after having been fixed in position.

1.3 Aligning Pump/Motor

The coupling must be checked and the pumpset realigned even if the pump and motor are supplied ready mounted on a common baseplate.

The pump is only recommended for direct drive via a flexible spacer coupling. Spacer couplings enable the utilisation of the back pull out feature.

Where belt drives are necessary a separate jack (intermediate) shaft with bearings to carry the belt loads may be required.

All drive systems, where supplied by KSB Australia, are appropriately protected by suitable guards.

1.4 Connecting the Piping

Never use the pump as an anchorage point for the piping.

Suction lift lines should be run with a rising slope towards the pump, positive suction lines with a downward slope towards the pump to avoid the formation of air locks.

The pipes should be supported very near the pump and connected without transmitting any stresses and strains to it. The pump must not bear the weight of the piping.

The nominal diameters of short pipelines should at least correspond to those of the pump connections. In case of long pipelines, the most economical nominal diameter is to be determined for the application.

Adaptors to larger nominal diameters should be designed with an extension angle of approx. 8° to avoid increased pressure losses.

The installation of non-return devices and suction and discharge valves is recommended according to the type of plant and pump.

Before commissioning a new installation, thoroughly check, flush and blow through all vessels, piping and connections.

Welding beads, scale and other impurities frequently only become dislodged after a certain period of time. It is necessary to fit a strainer in the suction line to prevent these entering the pump. The total cross-section of the holes in the strainer should be three times the cross-section of the piping in order to avoid excessive pressure loss across the strainer due to clogging.

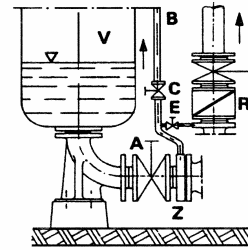
1.4.1 Auxiliary Connections

The size and locations of all auxiliary connections for sealing, flushing, and leakage liquid are shown in the general arrangement drawing or piping diagram.

1.4.2 Vacuum Balance

If the pump has to pump from a vessel under vacuum it is advisable to fit a vacuum balance line. This line should have a minimum diameter of 25mm and be arranged to lead into the vessel above the maximum advisable level.

An additional pipeline that can be shut off – a pump discharge nozzle vacuum balance line – facilitates the venting of the pump prior to start up.



- A Main isolating valve
- B Vacuum balance line
- C Isolating valve
- E Vacuum-tight isolating valve
- R Non-return flap valve
- V Vacuum vessel
- Z Intermediate flange

Fig. 3 Suction line and vacuum balance line

1.5 Coupling Guard

Safety regulations specify that the pump must be fitted with a coupling guard.

1.6 Final Check

Recheck alignment as described in 1.3. It must be possible to rotate the coupling easily by hand. Check the integrity of all connections.

2 Start Up/Commissioning, Shut-down

2.1 Preparation

2.1.1 Lubricant

Pump bearings are greased for life, reducing maintenance.

2.1.2 Shaft Seal

For information on shaft seal please refer to 4.2.1 and 4.4.2.

2.1.3 Priming and Pump and Associated Checks

Vent and prime the pump and suction line before start up. The isolating valve in the suction line must be completely open.

Fully open the auxiliary lines (sealing, flushing liquid) and check they are functioning properly. Open the isolating valve in the vacuum line (if fitted) and close the vacuum-tight isolating valve E (fig. 3).

2.1.4 Checking the Direction of Rotation

The direction of rotation of the driver must match the arrow on the pump. Check this by switching the pump on and immediately switching it off again. Fit the coupling guard.

2.2 Startup

Start the set up against a closed discharge valve only. Once the pump has reached full speed slowly open the valve and set to the duty point.

2.3 Shut-down

Close the discharge gate valve. The discharge gate valve can remain open if the discharge line is fitted with a non-return device and pressure is maintained in the discharge pipe.

Switch off the motor, making sure the pumpset runs down smoothly and evenly to a stand-still.

If the pumpset is to remain out of service for long periods, close the shut-off valve in the suction line and close all auxiliary connections.

On pumps supplied with product under vacuum, there must be sealant supply to the shaft seal even at stand-still.

If there is a danger of freezer and/or if the pumps is to be out of service for a long period, then drain the pump or otherwise protect it against freezing.

3 Maintenance and Lubrication

3.1 Supervision of Operation

The pump must run quietly and evenly at all times. The pump must never run dry.

The bearing temperature may be 50°C above room temperature, but must not exceed 90°C (measured at the outside of the bearing housing). Do not run the pump for more than three minutes against a closed discharge valve.

Pumps with mechanical seals experience minor or invisible (vapour) leakage. The seal is maintenance free. Standby pumps should be started up and run for ten minutes once a week to keep them operational. Also check the integrity of the auxiliary connections. Flexible parts of the coupling which show signs of wear should be replaced in good time.

3.2 Lubrication


3.2.1 Grease

Once in service the bearings should not require lubrication as to the bearings fitted are Sealed for Life and do not require to be lubricated at regular intervals.

When newly installed in a pump the bearings sometimes will run hot until they have properly seated and the excess lubricant has been expelled.

4 Dismantling and Reassembly

4.1 General

 Before dismantling, make sure the pump is disconnected from the power supply and cannot be switched on accidentally.


The suction and discharge isolating valves must be closed.

The pump casing must have cooled down to ambient temperature.

The pump casing must be empty and not under pressure.

4.2 Dismantling

- 1 Detach all auxiliary supply lines.
- 2 Remove coupling guard.
- 3 For coupling without spacer.
 - 3.1 Dismantling of complete pump.
 - 3.1.2 Remove discharge and suction branch from pipeline.
 - 3.1.3 Loosen pump from baseplate.
 - 3.2 During dismantling the volute casing can remain on the baseplate and in the pipeline.
 - 3.2.1 Uncouple pump from motor.
 - 3.2.2 Confirm power supply disconnected.
 - 3.2.3 Disconnect power cables from motor.
 - 3.2.4 Loosen motor from baseplate.
 - 3.2.5 Remove supporting foot 183 from the baseplate and loosen nuts on backcover.

 3.2.6 Pull out bearing housing with backcover and complete rotor (assembled unit).

With larger pumps, suspend or support bearing housing to prevent the rotating assembly from falling over.

- 4 For coupling with spacer. During dismantling the volute casing can remain on the baseplate and in the pipeline.

- 4.1 Remove spacer of the coupling.
- 4.2 Remove supporting foot 183 from the baseplate and loosen nuts on the discharge cover.
- 4.3 Pull out bearing housing with backcover and complete rotor (assembled unit).

If the pump has been in operation for a long time some parts may be difficult to move. In this case use a brand name penetrating oil or suitable pull off device.

Under no circumstances use force.

4.2.1 Mechanical Seal

To replace the mechanical seal it is necessary to dismantle the pump.

After removing the impeller 230 draw the mechanical seal 433 from the shaft by hand. Remove the stationary seat from the backcover (or seal plate if fitted).

4.3 Bearings

4.3.1 Greased for Life Bearings

Module	BEARING (drive end)	
1	6306ZZ	Ø72XØ30X19
2	6308ZZ	Ø90XØ40X23
3	6310ZZ	Ø110XØ50X27
4	6313ZZ	Ø140xØ65x33

Module	BEARING (Impeller end)	
1	6307ZZ	Ø80XØ35X21
2	6309ZZ	Ø100XØ45X25
3	6311ZZ	Ø120XØ55X29
4	6313ZZ	Ø140xØ65x33

4.4 Reassembly

4.4.1 Pump

Reassemble in accordance with standard engineering practice.

Coat the fittings and screw connections with graphite or similar before reassembly.

Check O-ring for wear and replace if necessary. All gaskets must be renewed; make sure the new ones are the same thickness as the old ones.

If the sealing area between impeller seal ring and casing wear ring is worn, replace the casing wear rings 502 where fitted.

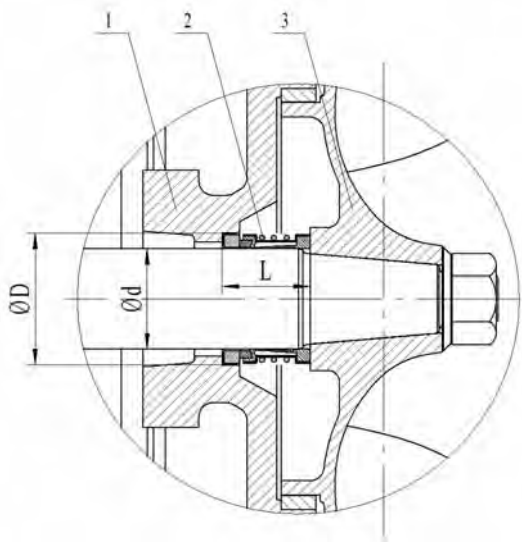
Gap clearances on diameter: [mm]

ID Casing wear ring	min	max
105	0.3	0.3054
115	0.35	0.404
132	0.35	0.413
160	0.4	0.463
186	0.45	0.522
235	0.5	0.572

Reassemble the pump in reverse order to dismantling. Make sure you reassemble in the right sequence.

Refer to section 2 for startup/recommissioning, shutdown.

4.4.2 Shaft Seal



Module	ØD	Ød	L
1	48	32	42.5
2	61	43	45
3	73	53	47.5
4	80	60	52.5

4.4.3 Mechanical Seal

Reassemble in reverse order to dismantling.

When fitting a mechanical seal bear the following points in mind:

Maximum care and maximum cleanliness are mandatory. Do not remove the guard on the seal faces until just before fitting. The seal faces, o-rings and rubber seals must not be damaged.

Clean or carefully remove any deposits from the shaft and stationary ring seat in the bearing housing. The shaft 210 may be lubricated with liquid detergent to reduce friction when mounting the seal. Do not use grease.

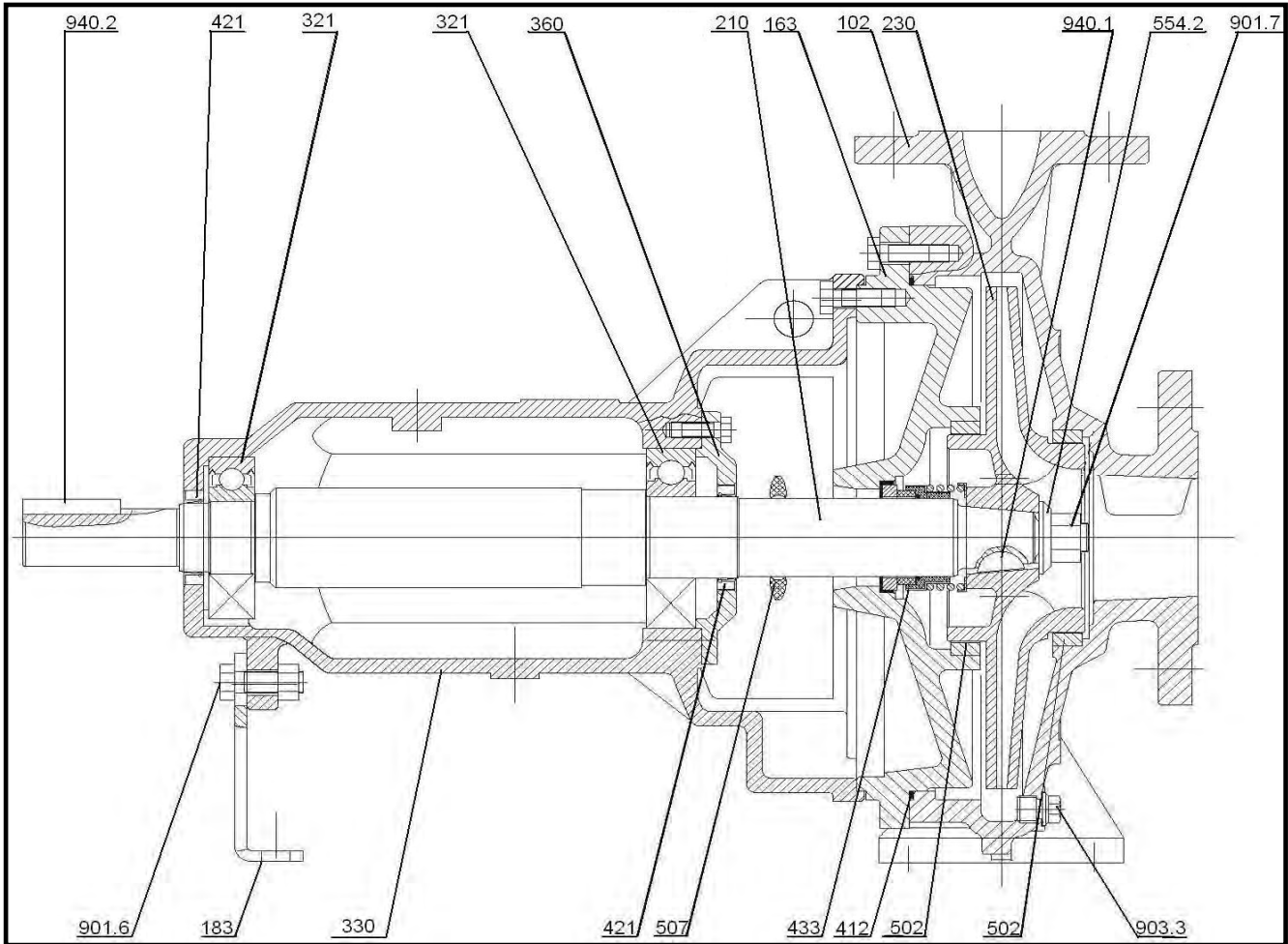
Push the stationary seal with rubber boot seal into the backcover or seal plate, applying pressure evenly to all sides.

4.5 Spare Parts

4.5.1 Ordering Spare Parts

When ordering spare parts please always indicate the following information which may be taken from the nameplate of the pump.
e.g.

Pump Type: Ajax ISO Pump
 Pump Size: ISO125-100-200
 ID No: 120434N
 Ser. No: 1234567
 Impeller Dia: 228

4.5.2 Parts List and Material Identification


ITEM	DESCRIPTION	MATERIAL IDENTIFICATION		
		04 CI / BRZ	23 CI / SS	12 SS / SS
102	Casing	CI	CI	316 SS
163	Discharge Cover	CI	CI	316 SS
183	Support foot	CI	CI	CI
210	Shaft	420 SS	420 SS	316 SS
230	Impeller	BRZ	316SS	316 SS
321	Bearing - Drive End	ST	ST	ST
330	Bearing Bracket	CI	CI	CI
360	Bearing Cover	CI	CI	CI
412	O-Ring - Casing	nitrile	nitrile	nitrile
421	Bearing Lip Seal	nitrile	nitrile	nitrile
433	Mechanical Seal	standard ceramic / carbon / 316 SS / nitrile		
502	Casing Wear Rings	316SS	316SS	316SS
507	Thrower	nitrile	nitrile	nitrile
554.2	Impeller Washer	316SS	316SS	316SS
901.6	Setscrew, Foot	carbon steel	carbon steel	carbon steel
901.7	Impeller Nut	302SS	302SS	302SS
903.3	Plug, Drain	carbon steel	carbon steel	316SS
940.1	Key, Impeller	304SS	304SS	304SS
940.2	Key, Coupling	carbon steel	carbon steel	carbon steel
970	Nameplate	SS	SS	SS

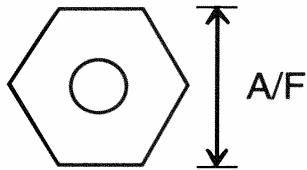
4.5.3 Recommended List of Spare Parts for 2 Years Continuous Operation

Part No.	Part Description	Number of pumps (including standby pumps)						
		2	3	4	5	6 & 7	8 & 9	10 & more
		Quantity of spare parts						
210	Shaft	1	1	2	2	2	3	30%
230	Impeller	1	1	1	2	2	3	30%
321	Deep groove ball bearing	2	2	2	4	6	8	100%
330	Bearing bracket	-	-	-	-	-	1	2 off
502	Casing wear ring	2	2	2	3	3	4	50%
412	O-Ring	4	6	8	8	9	12	150%
433	Mechanical seal	2	3	4	5	6	7	90%

4.5.4 Recommended Torques

For casing and impeller nut.

ACROSS FLAT	mm	17	19	24	30	36	46
	lb-ft	12	20	32	50	65	80
TORQUE	N-m	16	27	43	68	88	108



5 Trouble-shooting

Pump delivers insufficient liquid.	Motor overloaded.	Excessively high pump discharge pressure.	Bearing overheated.	Pump leaks.	Excessive shaft seal leakage.	Rough pump running.	Excessive temperature rise inside the pump.	Cause	Remedy ¹⁾
•								The pump generates an excessively high differential pressure	Reset duty point
•								Excessively high back pressure	Check plant for dirt Fit larger impeller(s) ²⁾ Increase speed (applies to turbine driven or I.C. engine driven pumps)
•						•	•	The pump and/or piping are incompletely vented or primed	Vent or prime the pump and piping completely
•								Suction line or impeller(s) are clogged	Remove deposits in the pump and/or piping
•								Formation of airpockets in the piping	Alter piping layout If necessary, fit a vent valve
•						•	•	NPSH available is too low (on positive suction head installations)	Check liquid level Mount pump at lower level Open isolating valve in suction line fully Check suction line strainers Make sure that the permissible rate of pressure decrease is not exceeded
•								Ingress of air on shaft seal	Sealing liquid passage is clogged; clean it out. If necessary, arrange a sealing liquid supply from an outside source, or increase sealing liquid pressure Fit a new shaft seal
•								Reverse rotation	Change over two phases of the power supply cable
•								Rotational speed is too low ²⁾	Increase speed
•						•		Excessive wear of the pump internals	Replace worn components with new ones
	•					•		Pump back pressure is lower than specified in the purchase order	Adjust duty point accurately in case of persistent overloading, trim the impeller(s) if necessary ²⁾
	•							Specific gravity or viscosity of the fluid pumped is higher than that specified in the purchase order ²⁾	²⁾
	•				•			Gland cover too tight or tightened askew	Correct
	•	•						Excessive rotational speed	Reduce speed ²⁾
				•				Defective gasket	Renew gasket between volute casing and discharge cover
					•			Worn shaft seal	Renew shaft seal Check flushing liquid or sealing liquid pressure

1) The pump should be made pressureless before attempting to remedy faults in parts under pressure.

2) Please refer to KSB Ajax Australia Pty Ltd

Pump delivers insufficient liquid.	Motor overloaded.	Excessively high pump discharge pressure.	Bearing overheated.	Pump leaks.	Excessive shaft seal leakage.	Rough pump running.	Excessive temperature rise inside the pump.	Cause	Remedy ¹⁾
●					●			Grooving, score marks or roughness on shaft protecting sleeve	Renew shaft sleeve/shaft protecting sleeve
					●			The pump runs noisily	Correct the suction conditions Align pump Rebalance motor Increase suction pressure at pump suction nozzle
			●		●	●		Pumpset misaligned	Rectify
			●		●	●		The pump is distorted or resonance vibrations in the piping	Check piping connections and pump fixing bolts, reduce gap between pipe supports, if necessary Support piping using anti-vibration material
			●					Excessive axial thrust ²⁾	Clean out balance holes in the impeller Fit new casing wear rings
			●			●		Too much, too little or unsuitable lubricant quality	Reduce quantity of or top up lubricant, or change lubricant quality
			●					The specified coupling gap has not been maintained	Restore correct coupling gap in accordance with the data on the installation plan
●	●							The motor is running on two phases only	Replace the defective fuse Check electrical connections
						●		The rotor is out of balance	Clean the rotor Rebalance the rotor dynamically
						●		Defective bearings	Fit new bearings
						●	●	Insufficient rate of flow	Increase the minimum rate of flow
					●			Faults in the circulation liquid supply	Increase the cross-section of the circulation liquid line

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