CONTENTS

WARRANTY TERMS

Tirrana Agricultural Series Pumps manufactured by Roto Pumps Ltd. are warranted against efects arising from faulty material/workmanship for a period of twelve months from date of commissioning or eighteen months from the date of dispatch by the authorized customer service.

A product moved to an alternate customer site will continue to be subject to the Warranty, provided the deinstallation and reinstallation are conducted by a Roto service engineer. The costs and expenses related to the de-installation and reinstallation shall be the responsibility of the customer.

Roto Pumps will replace faulty parts under warranty, providing always that:

- The equipment was correctly installed and properly used in accordance with Roto Pumps Installations, Operating & Maintenance Manual and accepted Engineering Standards & Codes.
- The claim for goods under warranty arises solely from faulty design, material or workmanship.
- All freight costs to and from the factory or repair agent are to be paid by the purchaser.

EXCLUSIONS FROM THE WARRANTY

- This warranty does not apply to defects resulting from any Customer actions, such as mishandling, improper interfacing, operation outside of design limits, misapplication, improper repair, or unauthorized modification.
- Any part/product repaired, altered or modified in any way whatsoever by persons other than the company or its authorized service representative or the purchased items, assemblies or accessories, which are installed as separate unit.
- In this case the company will make available to the purchaser, upon request a copy of the terms of any warranty given by the manufacturer of such component parts of goods.

The decision of Roto Pumps in relation to any claims or disputes over warranty is final.

The warranty is in lieu of all other expressed, implied, or statutory including implied warranties of fitness.

In case of claim please contact your authorized Roto Dealer or contact Roto Pumps Ltd.

For more info visit us at **www.rotopumps.com.au**

DISCLAIMER

Information in these manual is believed to be reliable. In spite of all the efforts of ROTO PUMPS LTD. to provide sound and all necessary information, the content of this Manual may appear insufficient and is not guaranteed by ROTO PUMPS LTD. as to its completeness or accuracy. However ROTO PUMPS LTD will not accept responsibility for physical injury, damage, loss of user production by failure to observe the instructions for installation, operation and maintenance contained in this complete Manual.

INTRODUCTION

Tirrana-Agricultural Pump Rangeis a Positive Displacement pump manufactured by R·OTO PUMPS LIMITED..

This range is very versatile and provides ideal solution for pumping all types of surface water with maximum efficiency and reliability.These pumps are manufactured to close tolerance and are of rigid construction. However, proper installation, operation & maintenance are equally important to ensure trouble free service.

There are two ranges of Agricultural Pumps- AG & DC series available in two configurations i.e.

- Close-Coupled pump
- Bare-shaft pump

FEATURES

- The hard chrome plated SS rotor ensures long life.
- The unique Split shaft facilitates easy replacement of motor& this ensures use of standard IEC frame motors.
- Cardan universal joint facilitates smoother transmission of angular loads and ensures compact pump.
- Robust bearing housing designed to take axial loads. Facilitates coupling to various drive options.
- Reversible

APPLICATIONS

The Tirrana range of helical rotor pumps is ideal for all types of surface water transfer duties. The pumps can handles clean water, brown water, dirty water with sand or slit or Algae.

These pumps are manufactured to close tolerance and are of rigid construction. However, proper installation, operation & maintenance are equally important to ensure trouble free service.

WARNINGS

- Always keep this instruction manual close to the product's operating location or directly with the Product.
- All the electrical connections must be installed according to the specification given by the motor manufacturer and are always to be verified by an electrical expert only.
- Supply voltage must be within 240V ± 5% .
- Never operate the pump dry even for a few revolutions or the stator will be damaged immediately.
- Never reverse the recommended direction of rotation of pump without consulting ROTO.
- Never run the pump against a closed inlet or outlet valve.
- If there is a risk of danger from any hot or cold machine component, the user must fit protective guards to prevent such components from being touched.

Important Safety Measures

- Always keep this instruction manual close to the product’s operating location or directly with the Product.
- All the electrical connections must be installed according to the specification given by the motor manufacturer and are always to be verified by an electrical expert only.
- Never operate the pump dry even for a few revolutions or the stator will be damaged immediately.
- Never reverse the recommended direction of rotation of pump without consulting ROTO.
- Never run the pump against a closed inlet or outlet valve.
- If there is a risk of danger from any hot or cold machine component, the user must fit protective guards to prevent such components from being touched.

SPECIFICATIONS

ENVIRONMENTAL

Storage Temperature	-10 to 50 ^{o}C
Operating Temperature	-10 to 40 ^{o}C
IP Rating	IP55
Humidity	95% max

WATER QUALITY

pH range	6 to 8.5
Hardness Range	2000 mg/L
Salt Concentration	500 ppm

ROTOR SELECTION - WATER TEMPERATURE

Rotor Standard	10 to 40 ^{o}C
Rotor Mk 3	40 to 70 ^{o}C

MECHANICAL SPECIFICATIONS

BSP Internal Thread Inlet and Outlet

DIRECTION OF ROTATION

Anti - clockwise: When viewed from the motor or bearing housing end.

MATERIALS (Excluding motor)

Pump Housing	Cast iron
Stator	Natural rubber lining
Rotor	Stainless steel Hard chrome plated
Mechanical seal	Carbon/Ceramic/Nitrile
Mechanical seal holder	Stainless steel
End Cover	Cast iron

MOTOR

Voltage 220V to 240V - Single phase, 50Hz

MAXIMUM DESIGN PUMP PRESSURE

AGCA-01A, 03A, 05A, 07A	600 kPa
AGCA-01B, 03B	1200 kPa

RECOMMENDATIONS

ROTO recommend that the operation, maintenance, inspection & mounting work of the equipment should be carried out by qualified personnel only.

Always consult ROTO, in case of any change in the operating parameters like temperature, viscosity, percentage of solids, liquid composition etc. in the interest of safety, plant efficiency and pump life.

INSTALLATION

The pump should be installed in a horizontal position with base plates bolted down on to a concrete surface, thus ensuring firm fixing and thereby reducing noise and vibration.

It is recommended for installing the pump/unit a dry, clean, well-lit and well-ventilated site should be selected.

Pump must be filled with liquid before starting (A threaded plug has been provided on the top of the pump housing for this purpose).When pump is subjected to prolonged stoppage before starting, fill the pump with fluid & give few turns to provide necessary lubrication.

When commissioning the plant, all the joints in the system must be checked thoroughly for leakage. Always use a pressure relief device on delivery line for system safety.

MAINTENANCE

To avoid unexpected failure of the pump, it is important that the pump is periodically dismantled and routine inspection of the pump is carried out.

When the pump is supplied with mechanical seal, it may be necessary to ensure proper flushing & quenching arrangement as per the seal manufactures' recommendations.

Before initial startup and after prolonged shutdown, the mechanical seal need to be lubricated from outside before the pump is started. In this connection, the compatibility of the lubricant with the sealing material is to be considered.

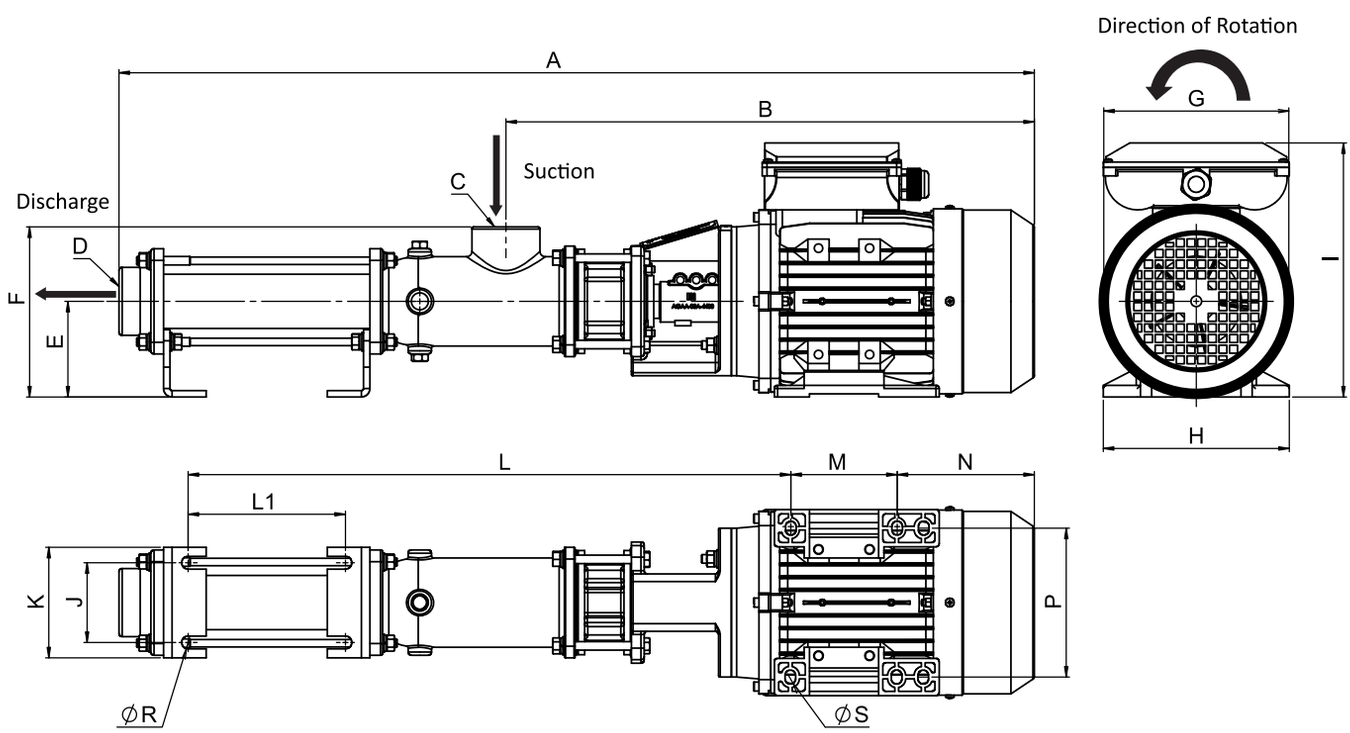
Check for Bearing noise & leakages through the mechanical seal. If any leakages found, seal must be inspected for wear / or cracks, and replaced when found worn out.

DIMENSIONS - CLOSE COUPLED

Pump Model	Power kW	Voltage VAC	Dimensions (mm) A	B	C	D	E	F	G	Weight H
AGCA-01A	0.4	240	855	589	40	40	80	135	160	223
AGCA-01A	0.8	240	855	589	40	40	80	135	160	223
AGCA-01B	0.8	240	1109	680	40	40	90	160	160	223
AGCA-01B	1.1	240	1109	680	40	40	90	160	160	223
AGCA-03A	0.8	240	1044	680	40	40	90	160	175	240
AGCA-03A	1.1	240	1044	680	40	40	90	160	175	240
AGCA-03B	2.2	240	1312	768	40	40	100	170	175	240
AGCA-05A	2.2	240	1141	797	50	50	100	180	198	271
AGCA-07A	4	240	1317	831	50	50	112	192	220	300

Pump Model	Dimensions (mm) L	L1	M	N	P	K	J	R	S	Weight kg
AGCA-01A	440	-	100	100	125	75	104	12	10	22
AGCA-01A	440	-	100	100	125	75	104	12	10	22
AGCA-01B	632	-	125	100	140	75	104	12	10	22
AGCA-01B	632	-	125	100	140	75	104	12	10	22
AGCA-03A	567	-	125	106	140	75	104	12	10	22
AGCA-03A	567	-	125	106	140	75	104	12	10	22
AGCA-03B	761	322	125	106	160	75	104	12	12	24
AGCA-05A	586	-	140	140	160	75	104	12	12	24
AGCA-07A	734	262	140	161	190	85	115	12	12	24

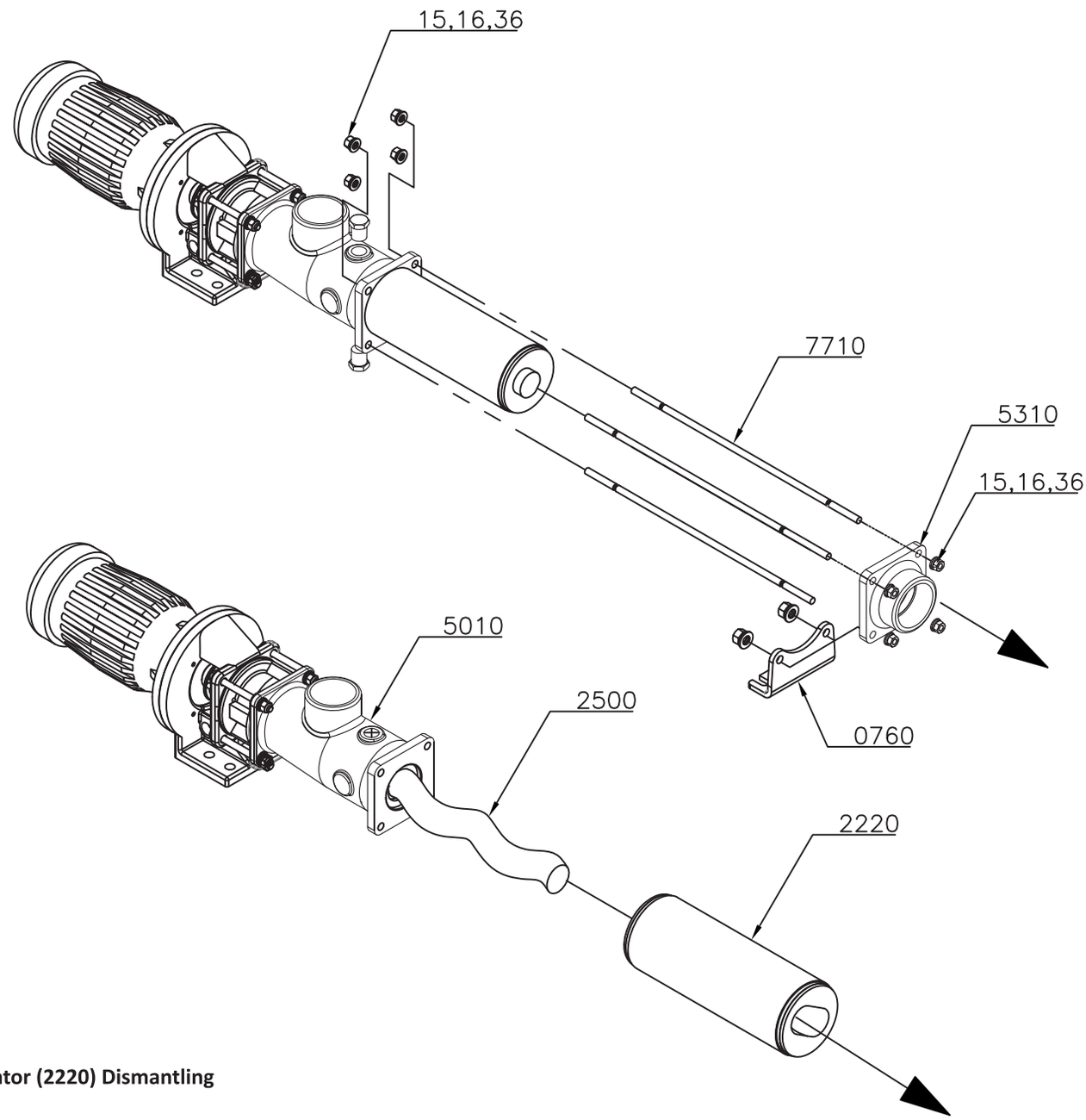
Note - Dimension L1 is applicable only for models with double foot.



PUMP DISMANTLING INSTRUCTIONS

Pressure Branch (5310) Dismantling

- Support pump housing (5010) and Stator(2220) with base.
- Remove Hex Nuts (15) with Spring Washer (16) and Punched Washer (36).
- Remove End Cover (5310), Tie Rods (7710) and Foot (0760).



Stator (2220) Dismantling

- Check if Bonded Stator (2220) offers resistance during removal from the Pump Housing (5010).
- Add lubricant (water/ liquid soap solution) in the Bonded Stator (2220) through opening in Pump Housing (5010).
- Turn the Stator in counter clockwise direction and remove.

Pump Housing (5010) Dismantling

- Remove 4 Hex Head Bolts & Nuts (09, 10) with spring washers (11) and Punched washer (37) holding Pump Housing (5010) and Bearing Housing (0110)/ Pump Lantern (1200).
- Put a protective cover on the Rotor (2500) to avoid rubbing of Rotor (2500) and Coupling Rod (2610).
- Prop up Rotor (2500) with a support.
- Pull off Pump Housing (5010) and Stuffing Box Gasket (8120).

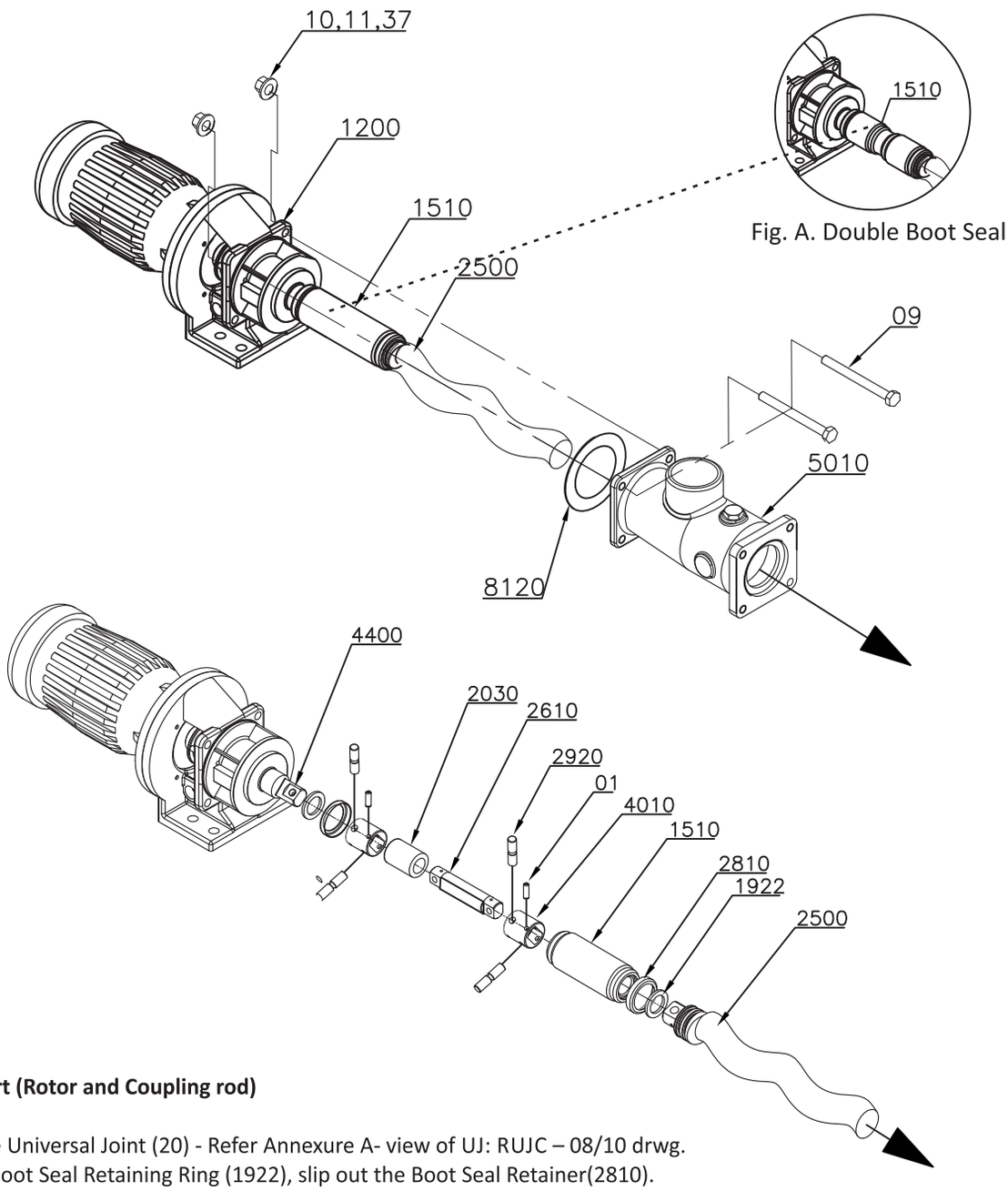


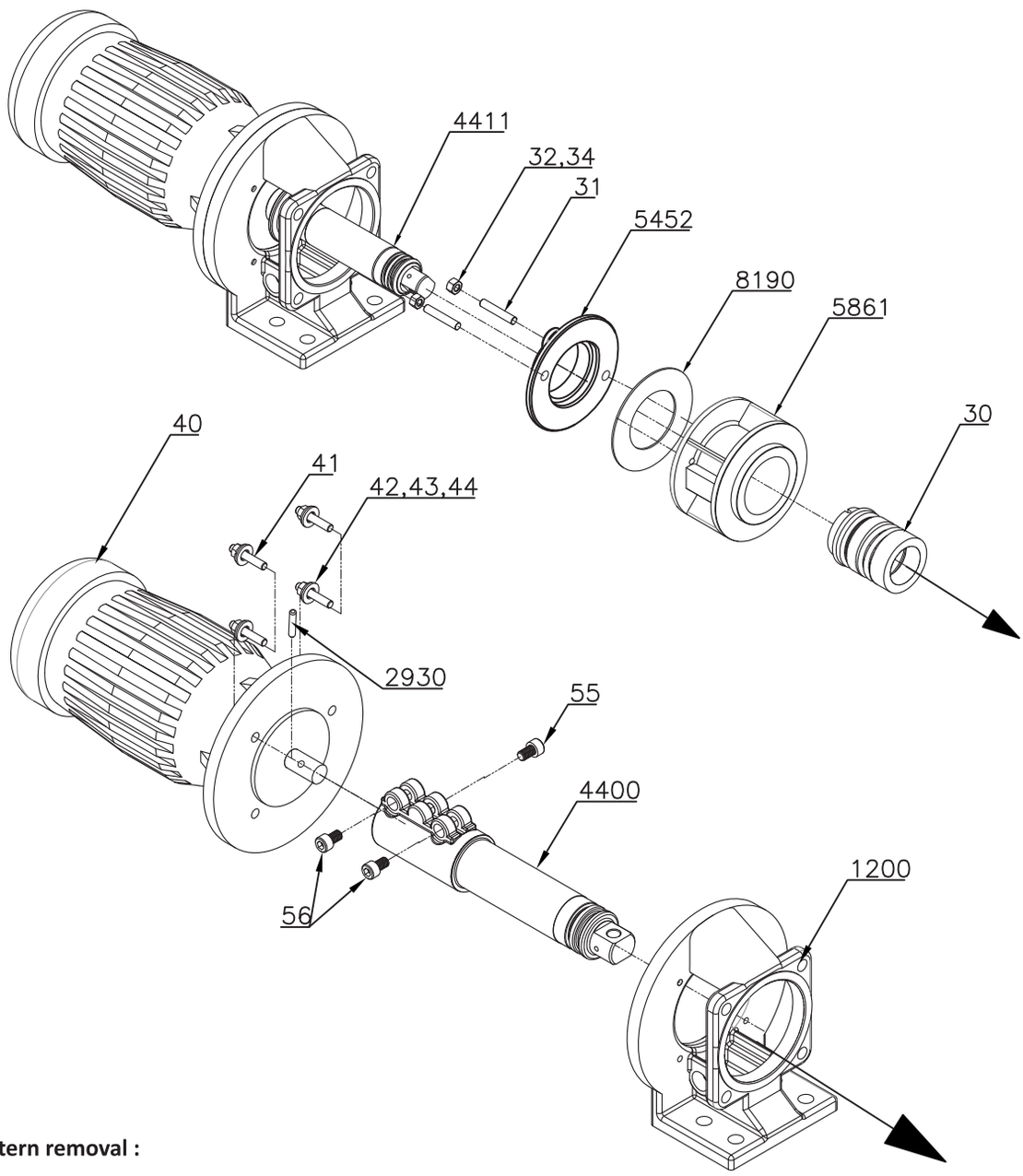
Fig. A. Double Boot Seal

Rotating Part (Rotor and Coupling rod)

- Dismantle Universal Joint (20) - Refer Annexure A- view of UJ: RUJC – 08/10 drwg.
- Remove Boot Seal Retaining Ring (1922), slip out the Boot Seal Retainer(2810).
- Push the Boot Seal (1510) on the drive end side of the Pump and collect the grease from universal joint (20).
- Remove the Spring Pin (01), knock out the UJ Pin (2920) and dismantle the Rotor (2500) from the Coupling Rod (2610) and UJ Head (4010).
- In case of Double Boot Seal in Model no. 5A & 7A follow the same steps.

Mechanical Seal removal:

- Unscrew Hex. Nuts (32)with Spring Washer (34) to remove the seal plate (5452) from mechanical seal housing (5861).
- Slip out the Mechanical seal Housing (5861).
- Loosen the grub screw of the Mechanical Seal Retainer & slip out the Mechanical Seal (30) from the Shaft (4400).
- Slip out seal plate (5452) along with the stationary part of Mechanical Seal.
- Remove the Mechanical Seal Stationary Face from Seal Plate (5452).



Pump Lantern removal :

- Remove the four Hex. Nuts (42), spring washer (43), Punched washer (44) & Hex Head Bolts/ Stud (41).
- Remove the Pump Lantern (1200).
- Slip out the Pin retainer (2850)
- Remove the Dowel pin (2930) and dismantle the stub shaft (4400)

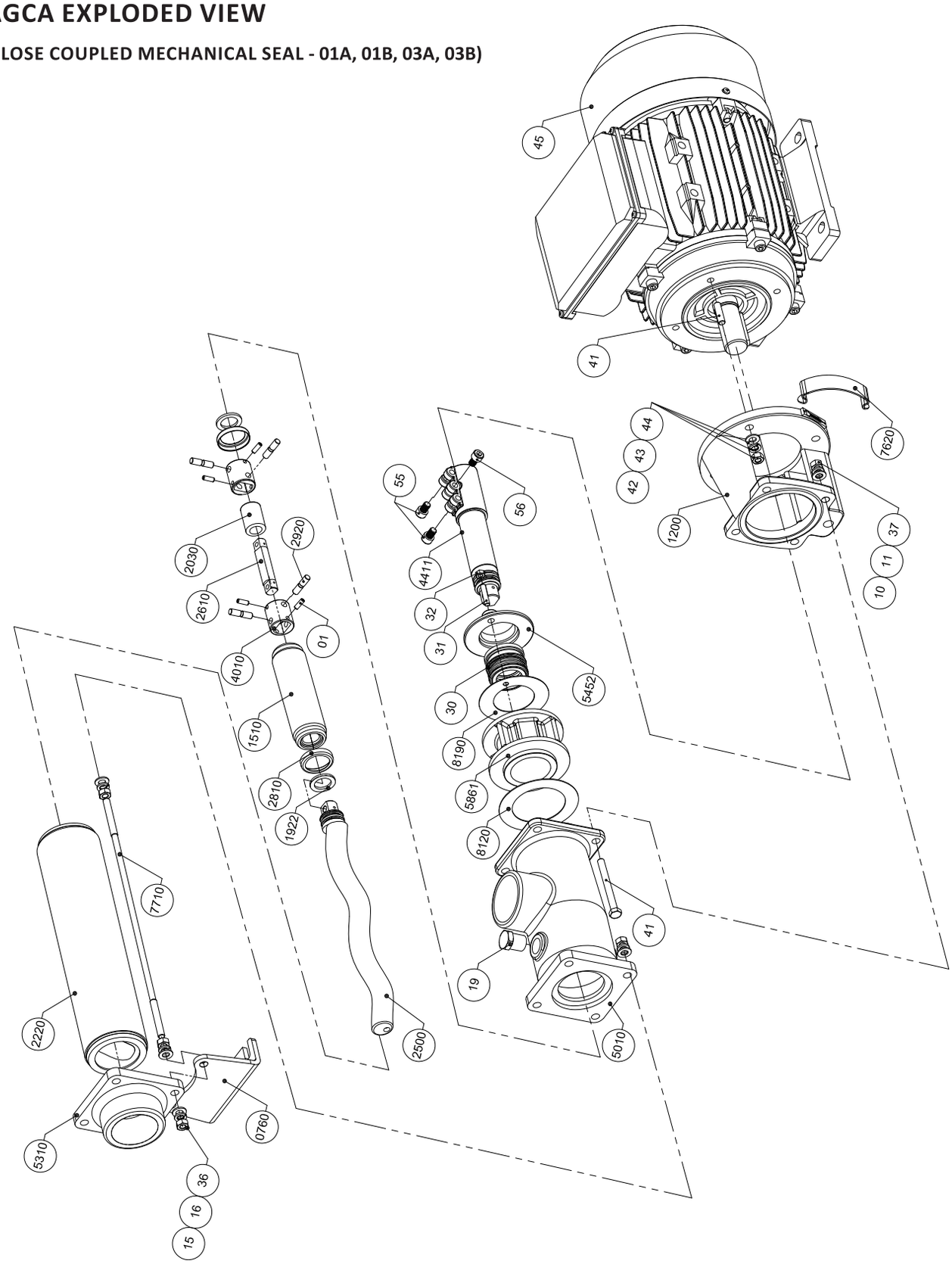
TROUBLE-SHOOTING CHART

REFER NEXT PAGE FOR CORRECTIVE ACTIONS	POSSIBLE CAUSES	FAILURE																			
	APPLICABLE FOR POSITIVE DISPLACEMENT PUMPS	FAIL TO DELIVER LIQUID	PUMP DOES NOT DELIVER RATED CAPACITY	PUMP DOES NOT DEVELOP RATED PRESSURE	PUMP LOOSES LIQUID AFTER STARTING	PUMP OVERLOADS PRIMER	VIBRATION	STUFFING BOX OVERHEATS	BEARING OVERHEATS	BEARING WEAROUT RAPIDLY	MOTOR HEATING UP	SEIZED PUMP	IRREGULAR DELIVERY	PUMP DOES NOT PRIME	NOISY PUMP	GLAND LEAKAGE	EARLY WEAR-OUT OF ROTOR/STATOR OR BOTH	EXCESSIVE POWER ABSORBED BY PUMP	EXCESSIVE GLAND OR SEAL WEAR	PUMP STALLS AT STARTUP	PUMP HAS NO SUCTION
1	WRONG DIRECTION OF ROTATION	•		•										•							•
2	AIR OR VAPOUR POCKET IN SUCTION LINE		•	•			•						•		•						
3	INLET OR SUCTION PIPE INSUFFICIENTLY SUBMERGED	•	•	•										•	•						
4	SUCTION PIPE BLOCKED		•									•					•				•
5	AVAILABLE N.P.S.H. TOO LOW	•	•		•		•						•		•						
6	PUMP NOT UPTO RATED SPEED	•	•	•							•									•	
7	DELIVERY PRESSURE HIGHER THAN RATED	•	•				•		•		•		•		•		•	•		•	
8	AIR LEAK IN SUCTION LINE OR STUFFING BOX		•		•								•	•	•						•
9	VISCOSITY LOWER THAN RATED		•	•																	
10	VISCOSITY GREATER THAN RATED		•		•		•				•		•		•			•		•	
11	GAS OR VAPOUR IN LIQUID			•	•		•						•		•						
12	PUMP SPEED TOO HIGH				•	•	•				•		•		•			•			•
13	PUMP SPEED TOO LOW	•																			
14	SPECIFIC GRAVITY HIGHER THAN RATED	•				•					•										
15	MISALIGNMENT OF COUPLINGS						•		•	•	•				•			•			
16	ELASTIC ELEMENT OF THE COUPLING WORN-OUT														•						
17	WORN OR LOOSE / TIGHT BEARINGS						•		•		•	•			•			•			
18	FOUNDATION NOT RIGID						•								•						
19	DEFECTIVE MECHANICAL SEAL															•			•		
20	WORN MECHANICAL SEAL		•													•				•	•
21	OIL LEVEL TOO LOW/HIGH. LACK OF LUBRICATION.								•	•											
22	WRONG GRADE OF OIL								•												
23	BEARING TOO TIGHT. BEARING BADLY INSTALLED.								•	•											
24	EXCESSIVE THRUST								•	•											
25	TOO MUCH OIL IN THE BEARING								•	•											
26	TOO MUCH GREASE IN THE BEARING								•	•											
27	PIPES EXERT FORCES ON PUMP					•	•	•	•	•		•									
28	RELIEF VALVE SPRING BADLY ADJUSTED		•			•					•	•		•							
29	RELIEF VALVE JAMMED		•	•										•				•			
30	RELIEF VALVE CHATTER		•				•								•						
31	IMPROPER LOCATION OF SAFETY VALVE						•								•						
32	STATOR SWELLING										•				•		•	•		•	
33	EXCESSIVE INTERFERENCE BETWEEN ROTOR AND STATOR										•							•		•	
34	WORN PUMP ELEMENT		•	•								•			•						•
35	STRAINER OBSTRUCTED OR BLOCKED	•	•		•		•						•		•						
36	BELT DRIVE SLIPPING		•				•								•						
37	INCORRECT PUMP / DRIVE MOUNTING ON BASE PLATE						•								•						
38	LOW VOLTAGE																			•	

CORRECTIVE ACTION	
1	Check rotational direction of the pump as per data sheet and name plate. In case of wrong direction, change the drive motor wiring connections.
2	Ensure that the suction lines are full of liquid and the pump is vented. Check the level of the tank/ reservoir and fill, if necessary. Incase of negative suction, open the air vent till air remove then prime the pump. Check all lines, flanges, joints and connections for leakage and repair, if needed.
3	Check liquid level in the reservoir and correct, as required. Clean up / replace Strainer or Filter element. Remove obstructions from the suction line, if any.
4	Clean suction pipeline.
5	Increase suction line diameter. Increase suction head. Reduce Pump Speed. Simplify suction line configuration and reduce length. Reduce pump speed.
6	Correct pump speed as per data sheet.
7	Check pressure head with a pressure gauge. Reduce the pressure head by increasing the diameter of the pipe . Use pressure relief valve on delivery line. Simplify discharge line to reduce pressure.
8	Check flange & valve connections.
9	Check and accommodate as per Pump data / performance sheet.
10	Check and accommodate as per data sheet.
11	Make an arrangement to flooded suction. Avoid inclusion of gas or vapour in liquid.
12	Reduce the pump speed when the conveying fluid media to be pumped is highly viscous - danger of cavitation.
13	Increase the speed of the pump when high suction performances are required and when the conveying fluid media is very thin (less viscous).
14	Check and accommodate as per data sheet.
15	Check whether coupling is worn. Re-align coupling. The coupling needs to be replaced.
16	Relace the elastic element of coupling
17	Replace bearings.
18	Foundation bolt to be tightened properly.
19	Check seal faces and O-rings. If necessary, replace corresponding defective parts (in case of mechanical seal).
20	Replace mechanical seal
21	Ensure oil level as per maintenance schedule in IOM.
22	Ensure oil grade as per maintenance schedule in IOM.
23	Ensure bearing fitment as per instruction given under IOM.
24	Ensure proper bearing as per instruction given in IOM.
25	Ensure oil level as per maintenance schedule in IOM.
26	Ensure grease qty. as per maintenance schedule in IOM.
27	Ensure proper flange connection.
28	Re-adjust spring compression.
29	Clean relief valve & Re-adjust.
30	Check the condition of the valve. If necessary, replace the valve with new one.
31	Use the safety valve after discharge line of the pump.
32	Select a suitable stator material. Else use a rotor with diameter smaller than specified.
33	Provide lubrication (e.g., through soft soap solution) between rotor and stator. Then give one or two rotations to the pump shaft.
34	Dismantle the pump and replace defective parts.
35	Clean / replace the starainer
36	Check and adjust tension of the belt. Else replace.
37	Check & tighten the bolts.
38	Maintain the voltage as per data sheet.

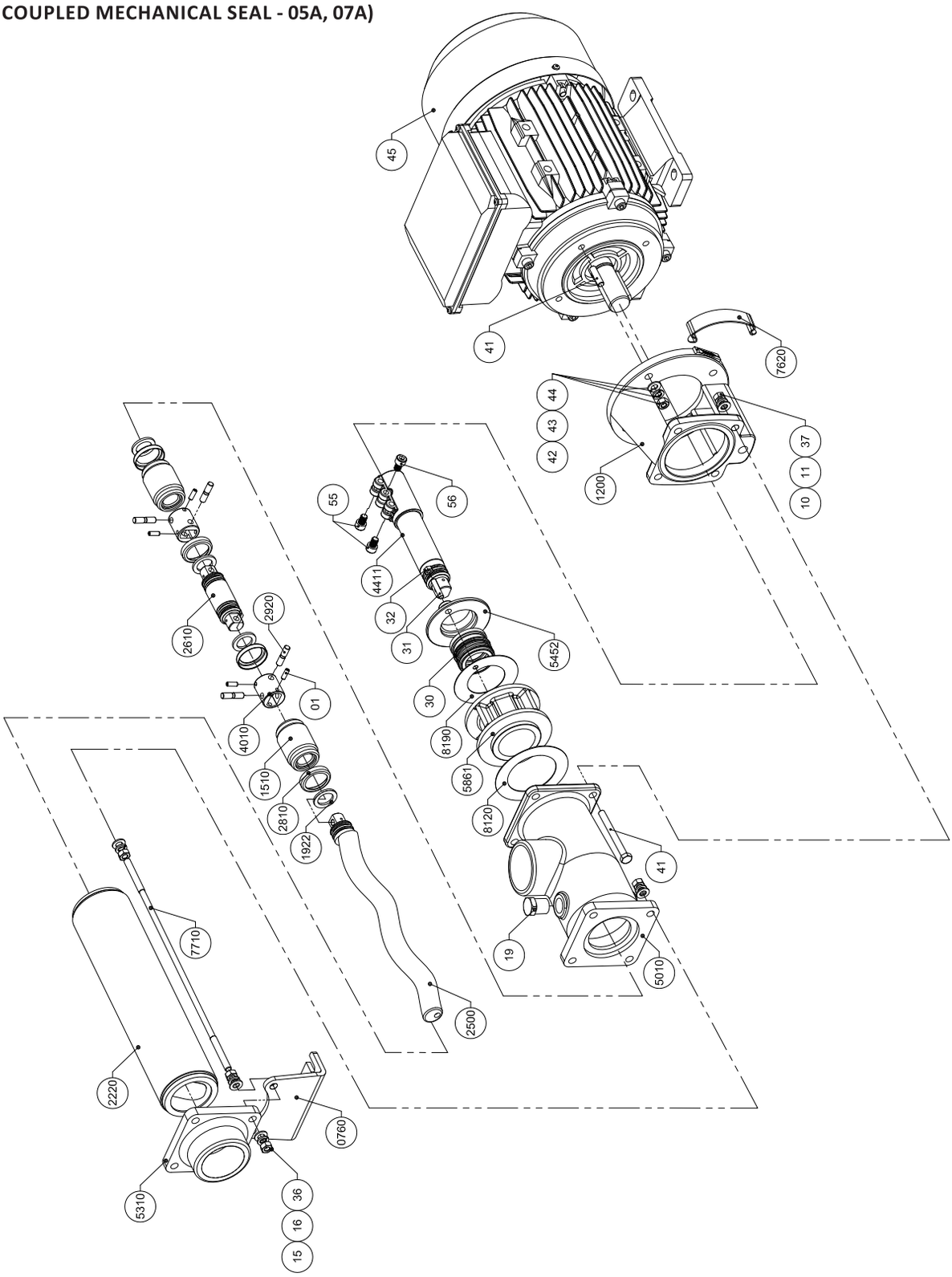
AGCA EXPLODED VIEW

(CLOSE COUPLED MECHANICAL SEAL - 01A, 01B, 03A, 03B)



AGCA EXPLODED VIEW

(CLOSE COUPLED MECHANICAL SEAL - 05A, 07A)



AGCA SERIES SPARE PART LIST & INTERCHANGEABILITY

PART NO.	DESCRIPTION	QTY.	AGCA 01A	AGCA 01B	AGCA 03A	AGCA 03B	AGCA 05A	AGCA 07A
1200	PUMP LANTERN	1	GDCA4721200CD	AGCA01B1200CD		GDCA5311200CD		
0760	FOOT	1	RDAA4720760M	RDAA4740760MS		GDCA4920760MS	GDCA5310760M	RDAA5320760MS
7710	TIE ROD	4	RDAA5317710AB	RDAA5327710AB	AGCA03A7710AB	AGCA03B7710AB	AGCA05A7710AB	RLAA5417710AB
5010	PUMP HOUSING	1	GDAA4915010CD	GDAA4925010CD			GDAA5315010CD	
5310	END COVER	1	GDAA4915310CD	GDAA4915310CD			GDAA5315310CD	
5452	SEAL PLATE	1	RDAA4725452CD	RDAA5315452CD				
5861	MECH. SEAL HOUSING	1	RDAA4725861CD	RDAA5315861CD				
2521	ROTOR	1	AGCA01A2521SC	AGCA01B2521SC	AGCA03A2521SC	AGCA03B2521SC	AGCA05A2521SC	RLAA5412521SC
4400	STUB SHAFT	1	GDCA4724400SC	AGCA03A4400SC		GDCA5314400SC		
2610	COUPLING ROD	1	RDAA4722610SC	RDAA4922610SC			RDAA5312610SC	
2221	BONDED STATOR	1	RDAA4912221A		AGCA03A2221A	AGCA03B2221A	AGCA05A2221A	RLAA5412221A
8120	STUFFING BOX GASKET	1	RDAA4728120	RDAA5318120				
8190	SEAL PLATE GASKET	1	RDAA4728190	RDAA5318190				
1922	B.S.R. RETAINING RING	2 (01,03 Models) 4 (05,07 Models)	RUJC051922RR	RUJC081922RR			RUJD081922RR	
2810	BOOT SEAL RETAINER	2 (01,03 Models) 4 (05,07 Models)	RUJC052810SC	RUJC082810SC			RUJD082810SC	
2030	BOOT SEAL SUPPORT RING	1	RUJC052030RR	RUJC082030RR			N/A	
1510	BOOT SEAL	1 (01,03 Models) 2 (05,07 Models)	RUJC051510RR	RUJC081510RR			RUJD081510RR	
2920	U.J. PIN	4	RUJC052920AN	RUJD082920AN				
4010	U.J. HEAD	2	RUJC054010GU	RUJD084010GU				
7620	GLAND GUARD	2	RDAA4917620			GDCA5317620		
09	HEX. HD. BOLT (M8 x 90)	4	N/A	HHB09M8x90				
10	HEX. NUT (M8)	4	N/A	HN10M8XXXX				
11	SPRING WASHER (B8)	4	N/A	SW11B8XXXX				
37	PUNCHED WASHER (A9)	4	N/A	PW37A9XXXX				
15	HEX. NUT (M8)	10	HN15M8XXXX					
16	SPRING WASHER (B8)	10	SW16B8XXXX					
36	PUNCHED WASHER (A9)	10	PW36A9XXXX					
19	TAPER PLUG	2	TP191/4XXX				TP191/2XXX	
30	MECHANICAL SEAL	1	MS30Ø28XXX	MS30Ø32XXX				
31	STUD	2	S31M6X25XX	S31M8X25XX				
32	HEX. NUT	2	HN32M6XXXX	HN32M8XXXX				
34	SPRING WASHER	2	SW34B6XXXX					
41	STUD	4	S41M6X25XX	S41M8X25XX				
42	HEX. NUT	4	HN42M6XXXX	HN42M8XXXX				
43	SPRING WASHER	4	SW43B6XXXX	SW43B8XXXX				
44	PUNCHED WASHER	4	PW44A7XXXX	PW44A7XXXX				
45	FOOT & FACE MOUNTED MOTOR (240V, 4 POLE)	1	45075KW4P80F	45110KW4P80F		45220KW4P100F		45400KW4P112F
45	FOOT & FACE MOUNTED MOTOR (240V, 6 POLE)	1	45037KW6P80F	45075KW6P80F		N/A		
55	HEX. SOCKET HD. CAP SCREW (M8x20)	2	HSCS55M8x20					
56	HEX. SOCKET HD. GRUB SCREW (M8x14)	1	HSGS56M8x14					