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## **WARRANTY TERMS**

Tirrana Agricultural Series Pumps manufactured by Roto Pumps Ltd. are warranted against effects 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:

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

## **EXCLUSIONS FROM THE WARRANTY**

- w 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.
- w 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.
- w 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](http://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 Range is a Positive Displacement pump manufactured by ROTO 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 handle clean water, brown water, dirty water with sand or silt 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  $240V \pm 5\%$ .
- ◆ 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 °C
Operating Temperature	-10 to 40 °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 °C
Rotor Mk 3	40 to 70 °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

### MAXIMUM DESIGN PUMP PRESSURE

AGAA-01A, 03A, 05A, 07A	600 kPa
AGAA-01B, 03B, 05B, 07B	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.

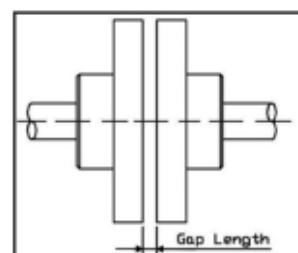
When the pump is supplied with mechanical seal, it may be necessary to ensure proper flushing & quenching arrangement as per the seal manufacturers' recommendations.

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.

### Alignment of pump & drive unit

After bolting down the base frame, unit should be checked for correct alignment of the pump to its prime mover. Set proper distance between the shafts and coupling hubs (refer fig. a. For coupling gap measurement). Gap length in no case should exceed, 0.05 mm.

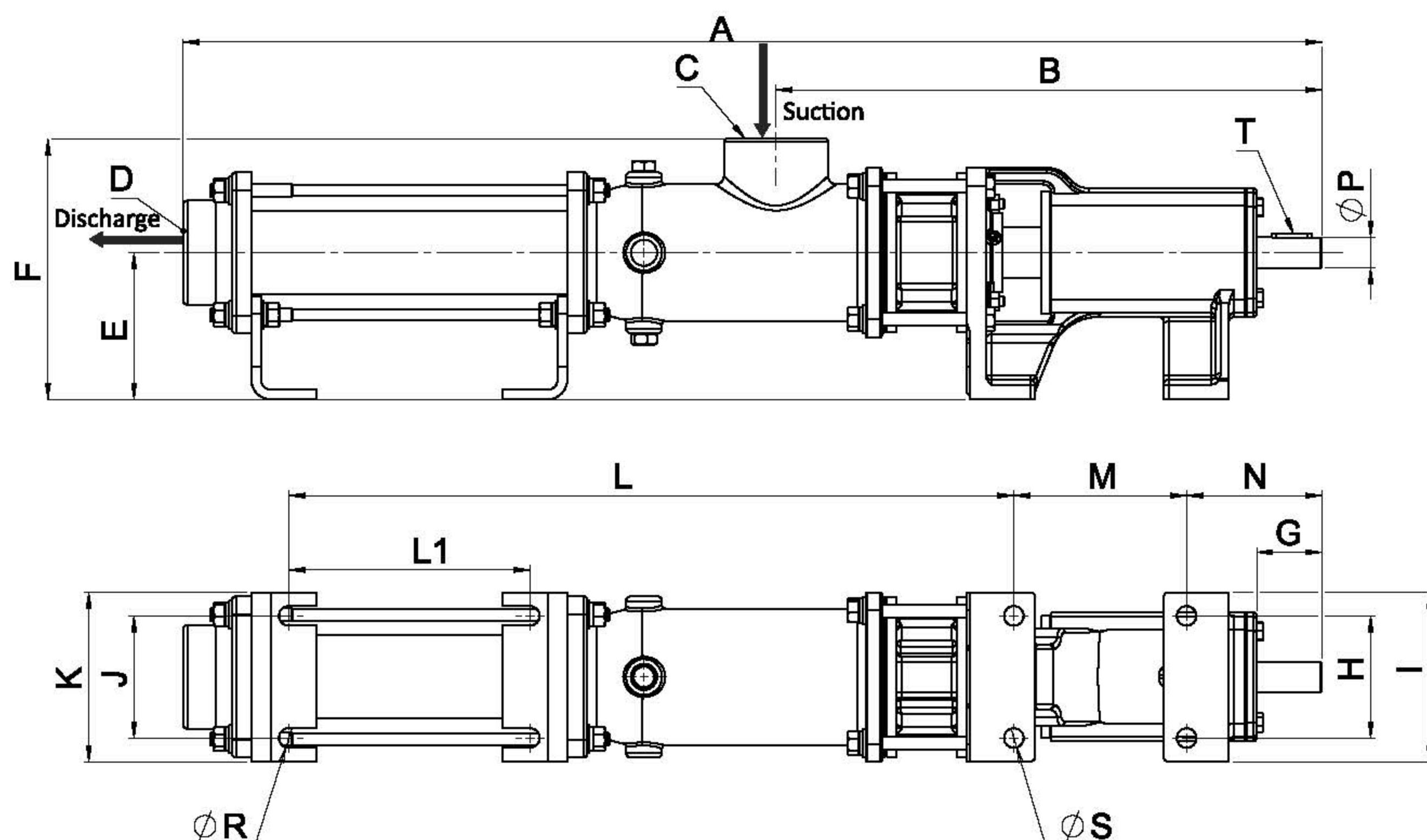


## DIMENSIONS - BARE SHAFT

Pump Model	Dimensions (mm)					
	A	B	C	D	E	F
AGAA-01A	578	312	40	40	80	135
AGAA-01B	764	335	40	40	90	160
AGAA-03A	699	335	40	40	90	160
AGAA-03B	879	335	40	40	90	160
AGAA-05A	708	364	50	50	90	170
AGAA-05B	868	364	50	50	90	170
AGAA-07A	850	364	50	50	90	170
AGAA-07B	1103	419	50	50	112	197

Pump Model	Dimensions (mm)								Weight kg
	L	L1	M	N	K	J	R	S	
AGAA-01A	428	-	106	84	75	104	12	12	12
AGAA-01B	510	-	106	83	75	104	12	12	17
AGAA-03A	445	-	106	83	75	104	12	12	18
AGAA-03B	625	328	106	83	75	104	12	12	19
AGAA-05A	450	-	106	83	75	104	12	12	21
AGAA-05A	610	288	106	83	75	104	12	12	22
AGAA-07A	592	270	106	83	75	104	12	12	25
AGAA-07B	799	421	110	112	85	115	12	12	34

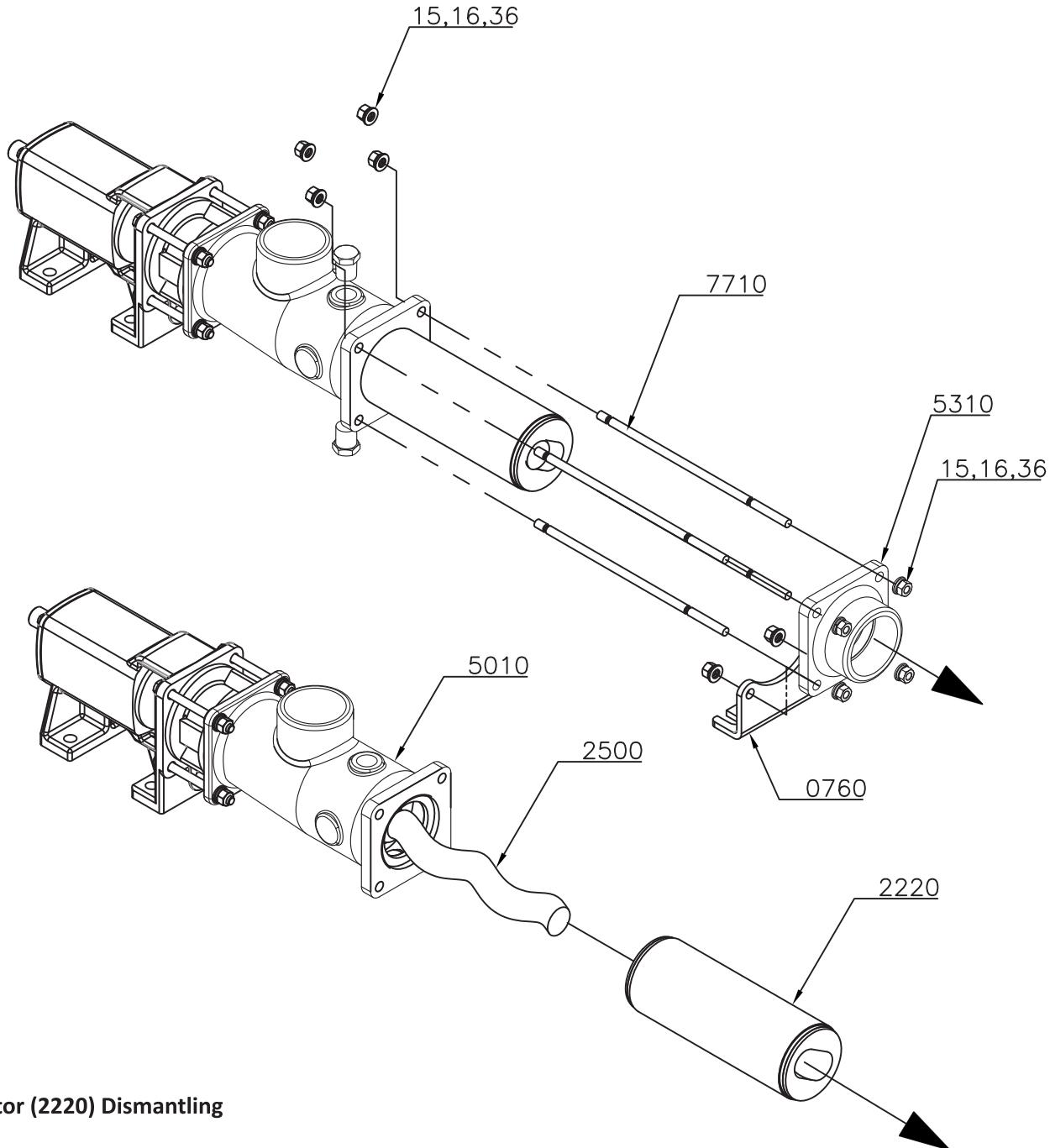
Note - Dimension L1 is applicable only for models with double foot.



## 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).

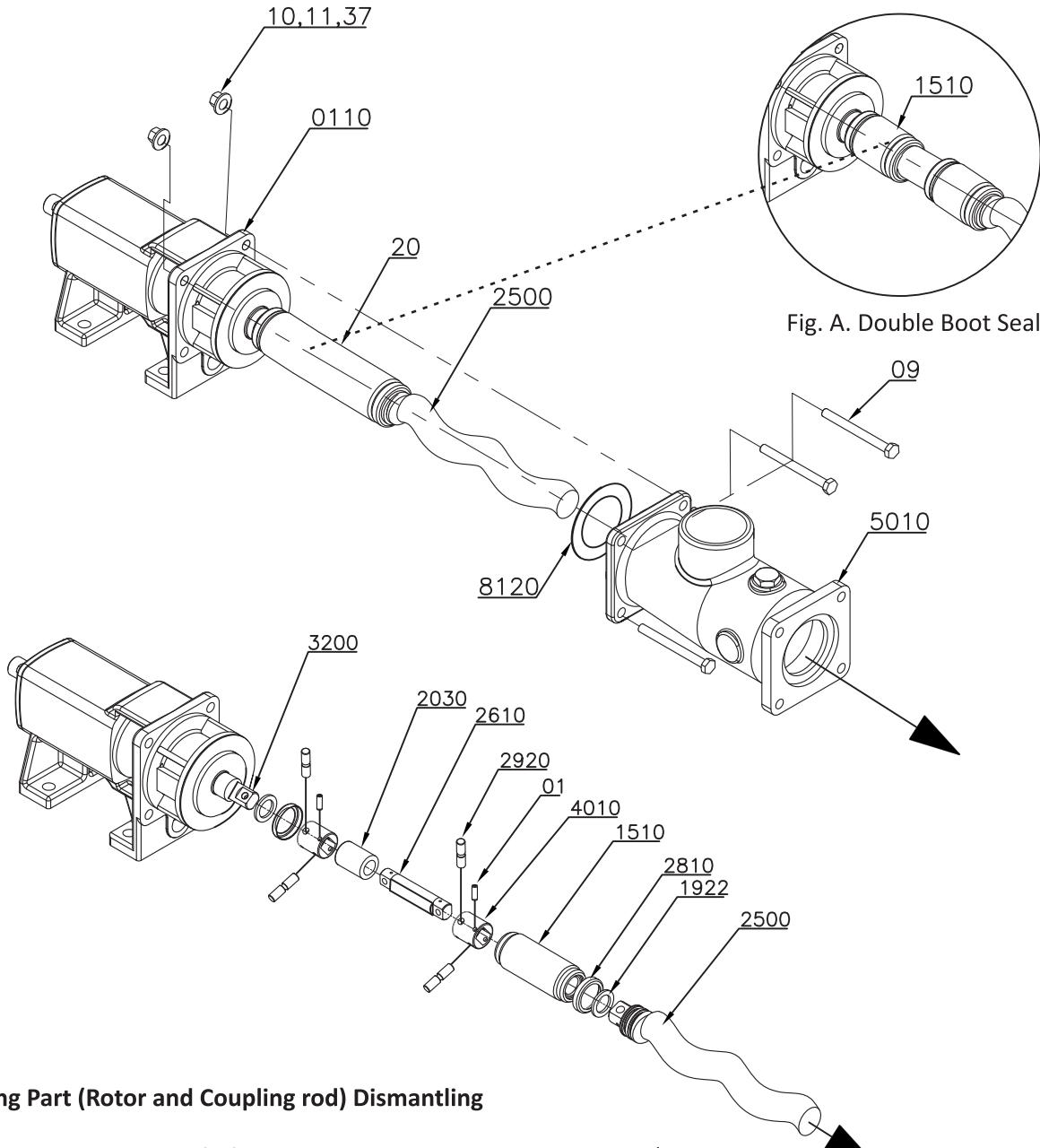


### Stator (2220) Dismantling

- 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).
- 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).

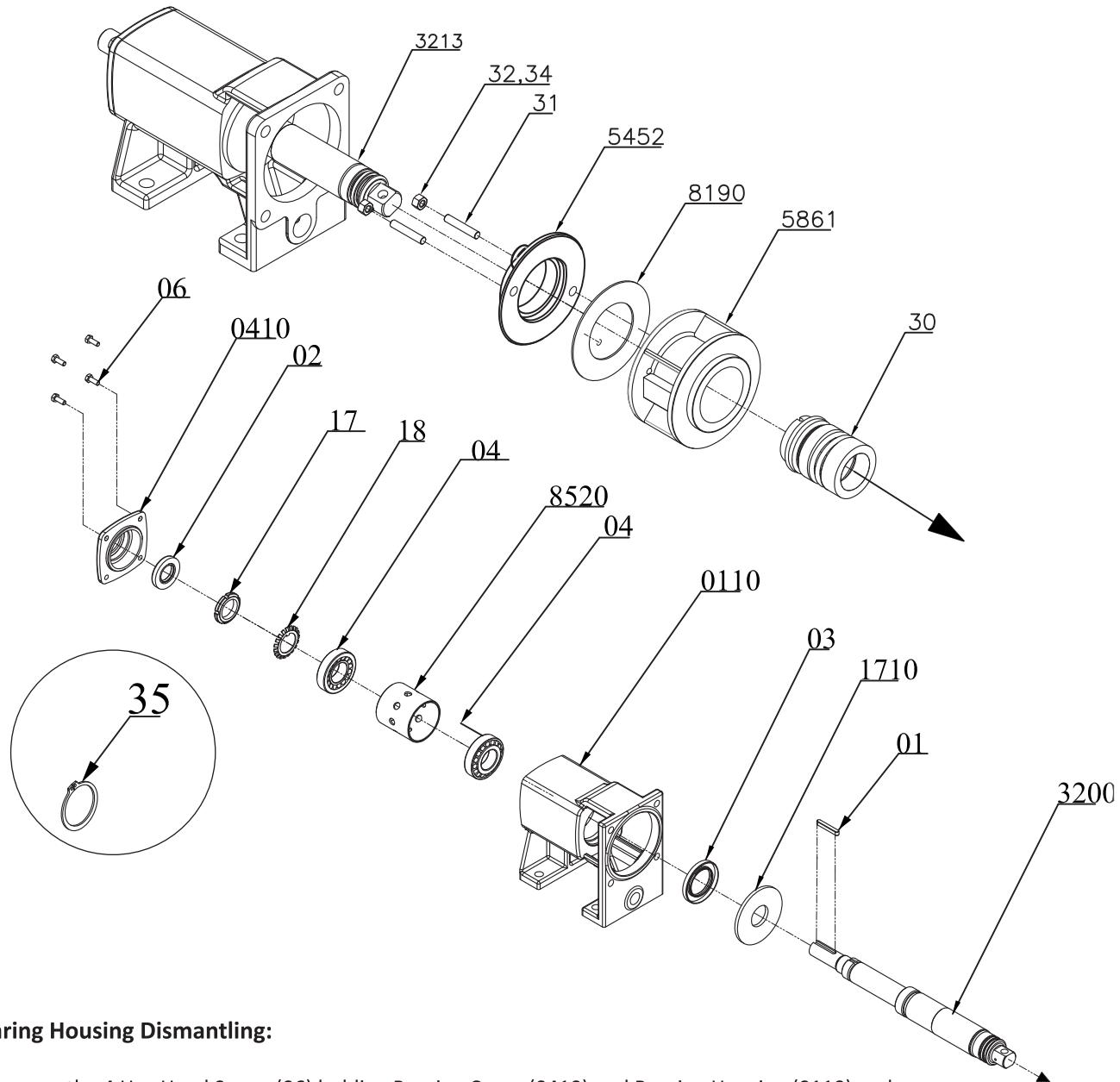


### Rotating Part (Rotor and Coupling rod) Dismantling

- 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).



### Bearing Housing Dismantling:

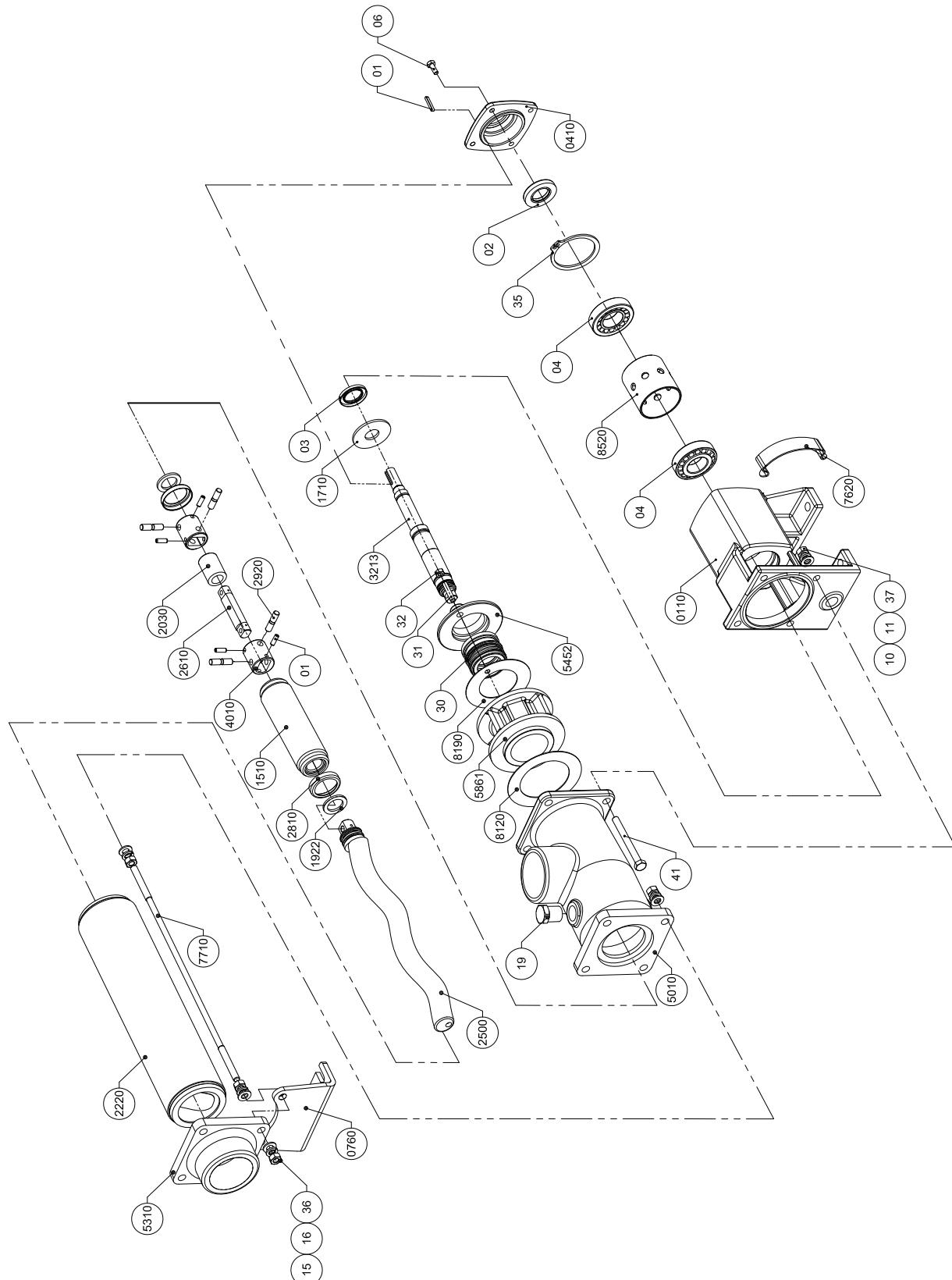
- Remove the 4 Hex Head Screw (06) holding Bearing Cover (0410) and Bearing Housing (0110) and remove the Bearing cover (0410). Take Out Grease Seal (02) & collect the grease.
- Remove Water Thrower (1710) from the shaft (3200) & Grease Seal (03) from the bearing housing (0110).
- Use rubber hammer and strike the Shaft Head (3200) gently (from the UJ side) holding the Bearing housing (0110).
- Pull off Locking washer (18) & unlock the Bearing Locknut (17) or remove the Circlip (35). Use bearing puller to remove Outer Bearing (04) & then take out Bearing spacer external (8520) & next Inner Bearing (04).

REFER NEXT PAGE FOR CORRECTIVE ACTIONS	TROUBLE-SHOOTING CHART																		
	POSSIBLE CAUSES				FAILURE														
	FAIL TO DELIVER LIQUID	PUMP DOES NOT DEVELOP RATED PRESSURE	PUMP LOSES 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
APPLICABLE FOR POSITIVE DISPLACEMENT PUMPS																			
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.

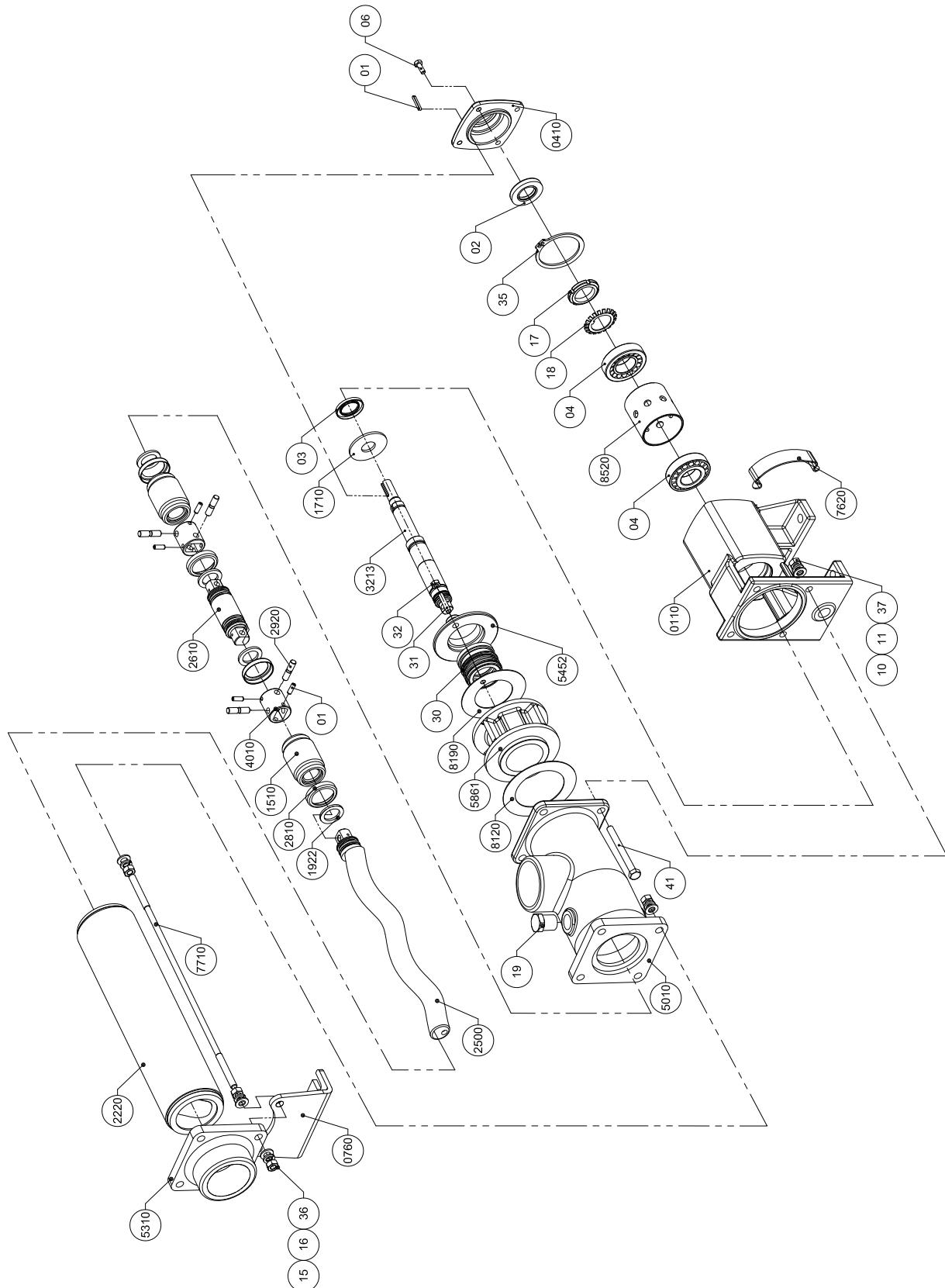
## AGAA EXPLODED VIEW

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



## AGAA EXPLODED VIEW

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





## AGAA SERIES SPARE PART LIST & INTERCHANGEABILITY

PART NO.	DESCRIPTION	QTY.	AGAA 01A	AGAA 01B	AGAA 03A	AGAA 03B	AGAA 05A	AGAA 05B	AGAA 07A	AGAA 07B
0110	BEARING HOUSING	1	RDAA4720110CD				RDAAS510110CD			RDAAS510110CD
0410	BEARING COVER	1	RDAA4720410CD				RDAAS510410CD			RDAAS510410CD
8520	BEARING SPACER (EXTERNAL)	1	RDAA4728520CD				RDAAS518520CD			RDAAS518520CD
0760	FOOT	1	RDAA4720760MS				RDAAS4740760MS			RDAAS510760MS
7710	TIE ROD	4	RDAAS517710AB	RDAAS527710AB	AGAA03A7710AB	AGAA03B7710AB	AGAA05A7710AB	AGAA05B7710AB	RLAA5417710AB	AGAA07B7710AB
5010	PUMP HOUSING	1	GDAAS4915010CD		GDAAS4925010CD				GDAAS515010CD	GDAAS515010CD
5310	END COVER	1		GDAA4915310CD					GDAAS515310CD	GDAAS515310CD
5452	SEAL PLATE	1	RDAA4725452CD				RDAAS515452CD			RDAAS515452CD
5861	MECH. SEAL HOUSING	1	RDAA4725861CD				RDAAS515861CD			RDAAS515861CD
2521	ROTOR	1	AGAA01A2521SC	AGAA01B2521SC	AGAA03A2521SC	AGAA03B2521SC	AGAA05A2521SC	AGAA05B2521SC	AGAA07A2521SC	AGAA07B2521SC
3213	SHAFT	1	RDAA4723213SC				RDAAS513213SC			RDAAS513213SC
2221	BONDED STATOR	1	RDAA4912221A	RDAAS4912221A	AGCA03A2221A	AGCA03B2221A	AGCA05A2221A	AGCA05B2221A	RLAA5412221A	RMAA5412221A
1710	WATER THROWER	1	RDAA4721710A				RDAAS511710A			RDAAS511710A
8120	STUFFING BOX GASKET	1	RDAA4728120				RDAAS518120			RDAAS518120
8190	SEAL PLATE GASKET	1	RDAA4728190				RDAAS518190			RDAAS518190
2610	COUPLING ROD	1	RDAA4722610SC		RDAAS4922610SC			RDAAS512610SC		RDAAS512610SC
1922	B.S.R. RETAINING RING	2 (01,03 Models) 4 (05,07 Models)	RUJC051922RR				RUJD081922RR			RUJD0101922RR
2810	BOOT SEAL RETAINER	2 (01,03 Models) 4 (05,07 Models)	RUJC052810SC				RUJD082810SC			RUJD0102810SC
2030	BOOT SEAL SUPPORT RING	1	RUJC052030RR		RUJC082030RR				NA	
1510	BOOT SEAL	1 (01,03 Models) 2 (05,07 Models)	RUJC051510RR		RUJC081510RR			RUJD081510RR		RUJD0101510RR
2920	U.J. PIN	4	RUJC052920AN				RUJD082920AN			RUJD0102920AN
4010	U.J. HEAD	2	RUJC054010GU				RUJD084010GU			RUJD0104010GU
01A	SPRING PIN	4	RUJC05XX01ASD				RUJD08XX01ASD			RUJD010X01ASD
7620	GLAND GUARD	2	RDAA4727620				RDAAS517620			RDAAS5517620
01	PARALLEL KEY	1					PK01A6x6x25			
02	GREASE SEAL	1	GS0220x35x7				GS0230x52x7			GS0225x47x7
03	GREASE SEAL	1	GS0330x47x7				GS0335x62x7			GS0340x62x7
04	BALL BEARING	2	BBSKF6204				BBSKF6206			TRBSKF30206
06	HEX. HD. SCREW (M6 x 16)	4					HHS06M6x16			
09	HEX. HD. BOLT (M8x90)	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			MS30Ø40XXX
31	STUD (M6 x 25)	2					S31M6X25XX			
32	HEX. NUT (M6)	2					HN32M6XXXX			
34	SPRING WASHER (B6)	2					SW34B6XXXX			
35	EXTERNAL CIRCLIP	1	EC3520x1.2N				EC3530X1.5N			N/A
17	BEARING LOCK NUT (M30x1.5)	1					N/A			BLN17SKFKM6
18	LOCKING WASHER	1					N/A			LW18SKFMB6

