



D-Range Industrial Progressing Cavity Pumps

Installation and Operating Instructions









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1. SAFETY



Before installing and using the PC pump, carefully read the instructions provided below. This manual contains fundamental instructions that must be followed during installation, operation and maintenance. This manual must be consulted by all qualified personnel who will follow the pumps operation and installation. In addition, this manual must always be available at the location where the pump is used.

Failure to respect the safety rules may cause physical and material damage, failure of the installation or the pump's principal functions; compromised maintenance operations; mechanical or electrical damage; injury to people as well as environmental pollution. Failure to observe safety rules can void the warranty.



This is the safety alert symbol, take special note of literature in this manual highlighted with this symbol. This symbol warns about hazards that may cause serious personal injury, death or property damage if ignored.

2. GENERAL INFORMATION

This manual covers operation and important recommendations for the correct operation of the pump. It is necessary to respect these recommendations in order to maximize the pumps reliability, longevity, as well as to avoid the risk of accident resulting from improper use. The pump must never be used outside the limitations described in the technical specifications. It is necessary to respect the instructions regarding product nature; density; viscosity; temperature; flow rate; pressure; speed; direction of rotation; power of motor as well as all other instructions contained in this manual or in the documentation attached to the contract.

The manufacturer declines all responsibility in the case of accident or damage caused by negligence, Improper use of the pump or the failure to observe the instructions provided in this manual or use under conditions other than those stated in the name plate data.

3. INSTALLATION RECOMMENDATIONS

At the pumping system design stage, consideration must be given for the provision of dedicated gauges, filling or flushing connections, non-return, isolating or pressure relief valves. Due to the nature of a positive displacement pump, it is recommended a pressure relief valve is installed on the outlet side of the pump to prevent any danger and or damage in the event the flow out of the pump becomes blocked.

3.1 IMPORTANT

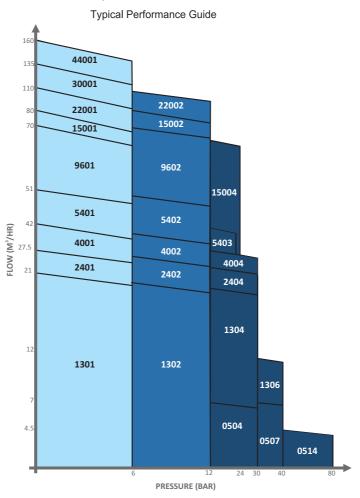
- For ease of maintenance, the correct dismantling space must be provided (refer to the pump dimension sheet).
- All bolts and nuts securing flanges and base mounting fixtures must be checked for tightness before operation.
- All pipework should be independently supported.
- To eliminate vibration, the pump must be correctly aligned with the drive unit, all guards must be securely fixed in position, and mounted on a suitable baseplate.
- When commissioning the plant, all joints in the system must be thoroughly checked for leaks.
- Suction pipework must be clean to prevent trap material from damaging the pump. As an added precaution a temporary strainer may be fitted.



NEVER RUN THE PUMP WITH A CLOSED INLET OR OUTLET VALVE.

4. DUTY CONDITIONS

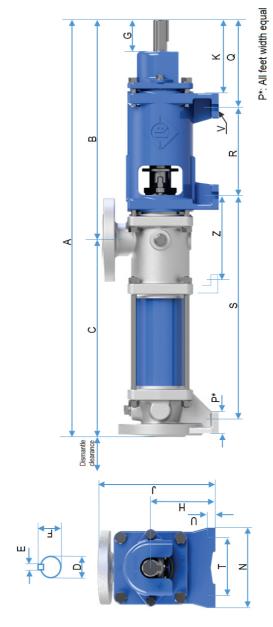
Pumps should be installed only in applications for which they were approved by Franklin Electric, having taken into account material compatibility, flow rates, temperature; solids handling; pressure; rotational speed and the environment. The performance capabilities of the Orbit D-range pump range is shown on the chart below (based on water at 20°C).





Should any changes in the duty conditions be envisaged following pump selection / installation, Franklin Electric's recommendations should be sought in the interest of efficiency, safety and suitability.

5. PUMP DIMENSIONS



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Pump Model	Α	Dismantle Clearance	В	С	D	Е	F	G	Н	J
D0504	1721	780	455	1266	38	10	41	55	110	230
D0507	1830	950	603	1227	48	14	51.5	87	160	320
D0514	2579	1030	603	1976	48	14	51.5	87	160	320
D1301	1226	780	455	771	38	10	41	55	110	230
D1302	1466	780	455	1011	38	10	41	55	110	230
D1304	2200	950	603	1597	48	14	51.5	87	160	320
D1306	2259	950	603	1956	48	14	51.5	87	160	320
D2401	1605	950	603	1002	48	14	51.5	87	160	320
D2402	1980	950	603	1377	48	14	51.5	87	160	320
D2404	2195	950	603	1592	48	14	51.5	87	160	320
D4001	1605	950	603	1002	48	14	51.5	87	160	320
D4002	1987	950	603	1384	48	14	51.5	87	160	320
D4004	2436	1030	603	1833	48	14	51.5	87	160	320
D5401	1670	950	603	1067	48	14	51.5	87	160	320
D5402	2117	950	603	1514	48	14	51.5	87	160	320
D9601	1669	950	603	1066.5	48	14	51.5	87	160	320
D9602	2367	1030	603	1764	48	14	51.5	87	160	320
D15001	1834	950	619	1215	48	14	51.5	87	160	320

Pump Model	N	Р	Q	R	S	Т	U	FLANGE	MASS (kg)
D0504	145	40	209	200	1312	105	13	BS4504/40	92
D0507	200	45	265	210	1355	130	14	BS4504/40	146
D0514	200	43	263	210	2106	130	14	BS4504/40	177
D1301	145	40	209	200	817	105	13	BS4504/40	65
D1302	145	40	209	200	1057	105	13	BS4504/40	78
D1304	200	50	270	210	1720	150	20	BS4504/40	215
D1306	200	50	270	210	1779	150	20	BS4504/40	221
D2401	200	50	270	210	1125	150	20	BS4504/40	152
D2402	200	50	270	210	1500	150	20	BS4504/40	190
D2404	200	50	270	210	1715	150	150 20 B		209
D4001	200	50	270	210	1125	150	20	BS4504/40	150
D4002	200	50	270	210	1507	150	20	BS4504/40	189
D4004	200	65	285	210	1941	150	20	BS4504/16	224
D5401	200	50	270	210	1190	150	20	BS4504/40	156
D5402	200	50	270	210	1637	150	20	BS4504/40	203
D9601	200	50	270	210	1189	150	20	BS4504/16	170
D9602	200	50	270	210	1887	150	20	BS4504/16	248
D15001	200	65	285	210	1339	150	20	BS4504/16	225



6. PUMPS SUPPLIED FOR FOOD APPLICATIONS

For pumps intended for food/hygienic applications, it is imperative that the correct material selection is applied. It is important that a clean in place treatment is executed on the pump at the following times (in addition to the standard CIP plan during normal pump operation):

- 1. When the pump is first commissioned for use.
- 2. When any spare components are fitted/replaced.



Hypalon stators should <u>not</u> be used in applications where product is destined for human consumption. Hygienic applications do require stainless steel pump components. Contact Franklin Electric for more information regarding use of food grade grease for specialized applications.

7. MOTOR WIRING ARRANGEMENT

This PD pump requires a high starting torque to overcome the rotor stator friction fit. To achieve this the motor must be started direct on line (DOL) to realize maximum starting torque. Star-delta starting is not recommended. Higher power motors, requiring starting currents in excess of supply capability need to be powered using variable frequency drives (VFD).



Star-Delta and reduced voltage (soft starters) are not recommended for PD pumps.

Consideration must be given to applications using electronic variable frequency drives, these systems:

- 1. Must make use of VFDs with full torque rating at start-up (as opposed to a square law drive) or
- Use a larger motor than required according to selection (to offer greater starting torque at standstill) when operating direct online.

For applications where the motor will not be operating at full frequency, derating the motor must be accounted for to cope with torque demands within the required RPM range.

Test the motor rotation direction to ensure it is correct as required for pump operation.

Failure to follow this guidance may result in the pump not starting, not being capable of producing the required duties or lead to motor failure.

8. STARTING

Pumps must be filled with liquid / product before startup. This initial filling is not for priming purposes but to provide the necessary lubrication for the stator until the pump primes itself.

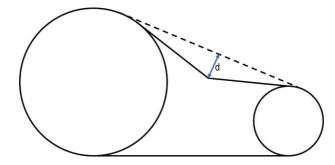
When the pump is stopped, sufficient liquid is normally trapped within rotor stator set to provide lubrication on following startup. If the pump has been standing for a long period of time, or has just been moved to a new location, or has been dismantled for examination it must be filled with liquid and be given a few turns by hand before starting. The pump is normally somewhat stiff (dependant on the model) to turn by hand on account of the close fit between the rotor and the rubber stator. If on start up, the pump does not operate correctly, the plant must be shut down immediately and the cause of the malfunction established before operations are recommenced.



Never run the pump in a dry condition, even for a few revolutions or the stator will be damaged.

Startup check list:

- 1. With the motor isolated from the pump, ensure that its rotation is the correct direction.
- 2. Are there any obstructions in the pipework or pump?
- 3. Are the pump connections and pipework points tight and leak free?
- 4. Have the inlet and outlet protective plugs been removed?
- 5. Is there lubrication in the drive unit / gearbox?
- 6. Does the product seal require a flushing arrangement?
- 7. Is the gland follower loose (If packed gland version)?
- 8. Is motor voltage correct?
- 9. For V-belt arrangement, is belt tension correct? Rule of thumb is 16mm deflection ("d") per 1m belt length.



- 10. For coupling arrangement, are shafts aligned?
- 11. Are the pipework valves open?
- 12. Are all safety guards in place?
- 13. Is the pump filled with 'product' to provide lubrication between the rotor and stator on start up?
- 14. Start then stop the pump; is the pump rotating in the correct direction?



The pump speed / pressure settings must remain below the pumps maximum limitations. Consult Franklin Electric if you are unsure.

15. If the pump has never been run, it may be necessary to crank the pump through one revolution manually (with water/product present in the gland). This can be achieved by using an adjustable wrench fitted at the drive shaft.

9. GUARDS



In accordance with the Health & Safety Act, all guards must be secured after installation, maintenance or any adjustments have been made to the pump.

10. ROTATION

The D-Range of Industrial pumps is suitable for rotation in either direction, i.e. flow direction out either of the pump flanges. The bearing housing direction plate indicates the resultant flow path dependent on mainshaft rotation direction. Pump flow curves also indicate flow direction.

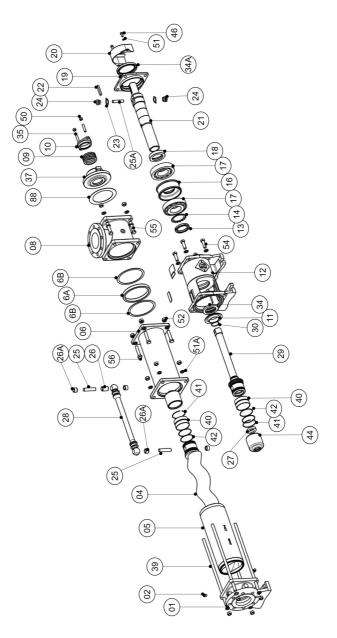
<u>NOTE</u>: It is recommended product flow is directed out the "end cover" (opposite drive end) side of the pump in applications where:

- Pressure above 10 bar is required (dependant on pump capabilities)
- No suction lift is required. For Suction lift applications, delivery must be on gland.

11. DRAWING REFERENCE NUMBERS

ITEM NO.	DESCRIPTION	QTY PER PUMP
1	End cover	1
2	Plug	2
4	Rotor	1
5	Moulded Stator	1
6	Extension Piece	1
6A	Locating Ring - Extension Piece	1
6B	Gasket - Locating Ring	2
7	O ring seal - Extension Piece	1
8	Gland section / Porting Chamber	1
9	Packing ring	1 set
10	Gland follower	1
11	Thrower / Flinger	1
12	Bearing housing	1
13	Bearing locknut	1
14	Bearing lock washer	1
16	Bearing distance piece	1
17	Bearing taper roller	2
18	Shaft bearing collar	1
19	Bearing cover	1
20	Pin cap guard	1
21	Main shaft	1
22	Key	1
23	Washer pin cap	4
24	Pin cap	4
25	Pin coupling rod	2
25A	Drive Pin - Adaptor shaft pin	1
26	Coupling rod bush	2
26A	Yoke bush - Rotor & adaptor shaft	1
27	Seal ring coupling rod	4
28	Coupling rod	1
29	Adaptor shaft	1
30	O ring - Adaptor shaft	1
34	Lip seal	1
34A	Lip seal - Drive end	1
35	Gland stud	2
37	Seal housing / Loose gland	1
39	Tie rod	4
40	Retaining sleeve	2
41	Circlip - Retaining sleeve	2
42	O ring seal - Retaining sleeve	4
44	Sealing Boot	1
46	Pin cap guard Bolt	2
50	Hex nut gland stud	2
51	Spring washer	16
52	Hex nut	16
54	Hex bolt bearing cover	4
55	Hex bolt gland section	4
56	Hex bolt extension piece	4
61	Stator adaptor ring	1
64	O-ring - Stator adaptor ring	2
65	Gasket - Stator adaptor ring	2
85	Subassembly (Bearing housing incl internal comp.)	1
88	Gasket - Loose gland	1

12. EXPLODED VIEW



13. DISMANTLING





Before any maintenance work is carried out on the pump, ensure that the pump is isolated from the electrical supply and that the pump's main isolating valves on the inlet and outlet are closed. Ensure that the system is de-pressurised.



Where hazardous fluids are pumped, the pump must be flushed and drained before the dismantling. Personnel dismantling the pump must wear protective clothing throughout the dismantling procedure.

If the pump has been out of operation for more than one hour, it will assist dismantling if the rotor is given a slight turn, thereby breaking the rotor/stator seal. Where a pump has been out of operation for a longer period of time, dismantling can be facilitated by lubricating the rotor/stator assembly with water through the filling plug holes, and rotating the rotor.

To dismantle the pump, follow the below sequence (reference to Figure 1: Exploded view):

- 1. Remove bolts holding end cover (01) to baseplate/foundation.
- 2. Loosen tie rod nuts and tie rods (39)
- 3. Remove end cover (01).
- 4. Remove stator (05). It may be necessary to rotate mainshaft (21) with suitable spanner while gripping stator (05) to assist with this operation.
- 5. Remove pin cap cover (20).
- 6. Remove pincap (24).
- 7. Remove pin (25A) which will then release the adaptor shaft (29).
- 8. Withdraw rotating assembly comprising of rotor (04), stator (05), adaptor shaft (29), coupling rod (28) or auger.
- 9. To dismantle coupling rod joints, withdraw the rubber protective boots (44) in the direction of the coupling rod (28) or auger. Models D22001-D44001 will also have a boot strap holding the boot (44) to the coupling rod (28) which must be removed.
- 10. Remove yoke circlip (41).
- 11. Remove retaining sleeve (40) by gently tapping on alternate sides with a suitablhe central grrove of the sleeve (40).
- 12. Remove coupling rod pin (25).
- 13. Remove couping rod (28) or auger from rotor (04) and or adaptor shaft (29). Note: See deviation below at this step for model sizes D22001 D44001.



- 14. Loosen 4 hex bolts (55) holding porting chamber (08) to bearing housing (12).
- 15. Loosen gland hex nuts (50).
- 16. Porting chamber (08) and loose gland (37) can now be separated from bearing housing (12).
- 17. Loosen hex bolts (54) and remove bearing cover (19) at drive end.
- 18. Withdraw the mainshaft (21). Bearings (17) and lipseal (34A) will pull-out with mainshaft (21).
- 19. Strip bearing lock nut (13) and bearing lockwasher (14) to remove bearings.

Note: stripping deviation for the rotating parts on pump sizes D22001 – D44001 below:

- 1. Remove boot (44), circlip (41), sleeve (40) and pin (25) as per standard dismantle procedure above at step 12.
- 2. Too separate coupling rod (28) from rotor (04) and main shaft (21), it is necessary to partially lift the yoke bushes (26A). To do this rotate the coupling rod about 15 degrees with respect to the rotor or main shaft yokes.
- 3. The edges of the yoke bushes are then visible through the coupling rod pin hole and, by using a soft metal drift tap the bushes out by a couple of millimetres and remove the coupling rod.
- Remove and replace yoke bushes (26A) if necessary. See 15.2 COUPLING RODS AND UNIVERSAL JOINTS for correct bush installation.

14. RE-ASSEMBLY OF PUMP

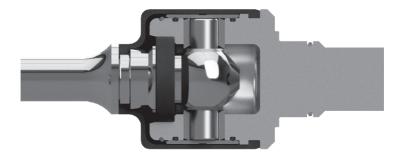
Refer to Figure 1: Exploded view:

- Assemble bearings (17) on mainshaft (21) with bearing spacer (16) in between, and bearing lock washer (14) on open end.
- Fasten bearings (17) on mainshaft (21) with bearing lock nut (13). See 15.3 BEARINGS for bearing settings. Ensure bearings (17) are greased liberally.
- 3. Insert the mainshaft assembly (21) in bearing housing (12).
- 4. Bolt bearing cover (19) to bearing housing (12) with hex bolts (54).
- 5. Install gland side lip seal (34) and drive end lip seal (34A). Lip seal opening must face inwards.
- 6. Install thrower / flinger (11) on mainshaft.
- 7. Place gland follower (10), and then loose gland (37) onto mainshaft (21) from gland end.



- 8. Place gasket (88) in gland section (08) recess, and bolt gland section to bearing housing (12). Flange can be positioned in any orientation.
- 9. Install gland packing (09) into loose gland section (37). Packing must be inserted with each consecutive packing rotated 180°.
- Gland follower (10) can be tightened in place loosely with gland stud (35) and stud nuts (50)..
 Gland follower (10) must be tightened once pump is running, it must be tightened such that the gland continues to drip (a drip a second). See 15.1 GLAND PACKING.
- 11. Fill rotor (04) joint cavity liberally with grease.
- 12. If coupling rod bushes (26) and yoke bushes (26A) have been replaced, ensure the orientation is correct (see 15.2 COUPLING RODS AND UNIVERSAL JOINTS for correct bush installation).

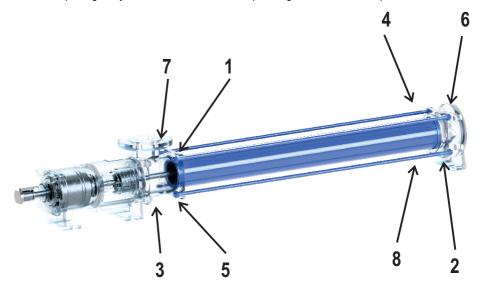
- 13. Fit 2 x retaining sleeve o-rings (42) into rotor (04) o-ring grooves.
- 14. Slide boot (44) onto coupling rod (28).
- Fit seal ring (27) onto coupling rod (28). Grease coupling rod (28) joint ends to ease application of the seal rings (27).
- Place retaining sleeve (40) on coupling rod, in front of boot (44) in preparation for joint assembly.
- 17. Apply thin layer of grease to outer rotor joint (04) to assist with sleeve (40) assembly.
- 18. Thrust coupling rod (28) joint into rotor (04) cavity against the resistance of the seal ring (27).
- 19. Insert Drive pin (25).
- 20. Push sleeve (40) into position. Tap on alternate sides of sleeve (40) with a suitable drift in the central groove to assist if need be.
- 21. Fit circlip (41) in rotor (04) circlip groove.
- 22. Press boot (44) into correct position, ensuring shoulders on either end are located correctly in respective grooves on rotor (04) and coupling rod side (28).



- 23. Repeat join assembly for adaptor shaft (29) joint end.
- 24. Fit adaptor shaft O-ring (30) onto adaptor shaft (29).
- 25. Install adaptor shaft (29) into mainshaft (21).
- 26. Fit one pin cap (24) in mainshaft (21) drive end with lock washer (23). Lock lockwasher (23) by folding wide tab up against pin cap (24) and folding the narrow tab into mainshaft groove see illustration below. Always replace a damaged or missing lock washer (23).



- 27. Install drive pin (25A) into mainshaft (21).
- 28. Fit remaining lockwasher (23) and pincap (24).
- 29. Couple extension piece (06) to porting chamber (08), with gaskets (6B) and locating ring (6A) present.
- 30. Fit stator (05) ensuring it seals up against extension piece (06). Rotate stator (05) while rotor (04) is held stationary to assist with fitment. One can use water, silicone grease or a rubber compatible liquid as a lubricant on rotor to assist with fitment of stator.
- 31. Refit end cover (01) and tie rods (39). Tie rods must be tightened sequentially to ensure an even clamp between the stator and adjacent castings. Tighten rods according to sequence below repeating the cycle 3 times until the correct torque rating is achieved. See torque chart below.



MODEL	TIE ROD TORQUE (NM)
D0504 Mk2	20
D0507 Mk2	40
D0514 Mk2	50
D1301 Mk2	12
D1302 Mk2	12
D1304 Mk2	40
D1306 Mk2	40
D2401 Mk2	15
D2402 Mk2	15
D2404 Mk2	40
D4001 Mk2	25
D4002 Mk2	25
D4004 Mk2	75
D5401 Mk2	30
D5402 Mk2	30
D5403 Mk2	75
D9601 Mk2	75
D9602 Mk2	75
D15001 Mk2	75
D15002 Mk2	75
D15004 Mk2	120
D22001 Mk2	100
D22002 Mk2	100
D30001 Mk2	120
D44001 Mk2	120

15. ROUTINE MAINTENANCE

To ensure optimum pump life the following components should be routinely checked:

- 1. Gland Packing (refer to 15.1 GLAND PACKING).
- Universal Joints Joints should be greased every 500 1,000 running hours but this period could
 be more or less depending on duty conditions. Castrol Spheerol LMM or equivalent grease to be
 used for this purpose.
- Pins Pin wear can be detected by rocking the pump driving pulley or coupling to determine the amount of free play. If the angular deflection is excessive (greater than 5°) the universal joints should be replaced (refer to 13. DISMANTLING).
- 4. **Bearings** Bearings should be cleaned and regreased every 5,000 hours.

15.1 GLAND PACKING

The gland packing supplied as a standard in these pumps is manufactured from a non-asbestos material (PTFE or cotton graphite). The gland will require adjustment during the initial running-in period. Under normal working conditions a slight drip from the gland is essential and assists in lubricating the packing.

It is usual to replace gland packing when re-assembling a pump. Clean the box and shaft thoroughly and examine mainshaft (21) for wear and scoring. Replace shaft if its wear is excessive. Install one ring at a time. Make sure it is clean, and has not picked up any dirt in handling. Joins of successive rings should be staggered and kept at least 90 degrees apart.

After the last ring is installed, take up bolts finger tight. Do not jam the packing into place by excessive gland loading. Start pump, allow packing to leak freely. Excessive leakage during the first hour of operation will result in a better packing operation over a longer period of time. Take up gradually on the gland as the packing seats, until leakage is reduced to a tolerable level, preferably 8-10 drops per minute per inch of shaft diameter. Stopping leakage entirely at this point will cause the packing to burn up. A gland which is too tight can be detected by insufficient leakage and excessive heat in gland area and should be slackened off.

15.2 COUPLING RODS AND UNIVERSAL JOINTS

The universal joints of the coupling rod are designed such that any wear occurring at these points bears on small, inexpensive and easily replaceable bushes.

The universal joints are protected by rubber seal rings to retain the grease inside the joint.

The renewable bushes (26) and yoke bushes (26A) in the coupling rod can be pressed out and replaced. When replacing the bushes it is imperative they are aligned such that the hole elongation lies directed along the length of the coupling rod as per image below. Failure to do this will result in component damage.



15.3 BEARINGS

Bearings are removed from the shaft by following steps in 13. DISMANTLING.

RECOMMENDED PROCEDURE FOR SETTING THE CORRECT RUNNING CLEARANCES IN THE BEARINGS.

- After assembling the bearings (17) and bearing spacer (16) onto the shaft, place the assembly in a vertical position and align the bearing cups and spacer to run concentric with the shaft axis (using straight edge or steel ruler).
- 2. Rotate the bearing cups and spacer by hand and tighten the locknut until resistance is felt in the bearing assembly. At this point all free running clearance is eliminated. (This operation should be carried out with bearings 'dry', i.e. no grease, only a protective coating).
- 3. The locknut should now be loosened to give correct running clearance (see table below).
- 4. The tab of the lock washer should now be bent into a corresponding slot on the locknut.
- 5. Bearing Lubrication The taper roller bearings should be packed with Castrol Spheerol EP2 grease or equivalent and the housing 1/3 filled.

Bearings should be cleaned and re-packed with grease every 5,000 hours.

Model	Bearing	Required Axial Clearance	Anti clockwise clearance locknut rotation for correct clearance
D0504 Mk2	31310	0.06mm-0.08mm	15°
D0507 Mk2	30314	0.1mm-0.12mm	20°
D0514 Mk2	30314	0.1mm-0.12mm	20°
D1301 Mk2	31310	0.06mm-0.08mm	15°
D1302 Mk2	31310	0.06mm-0.08mm	15°
D1304 Mk2	30314	0.1mm-0.12mm	20°
D1306 Mk2	30314	0.1mm-0.12mm	20°
D2401 Mk2	30314	0.1mm-0.12mm	20°
D2402 Mk2	30314	0.1mm-0.12mm	20°
D2404 Mk2	30314	0.1mm-0.12mm	20°
D4001 Mk2	30314	0.1mm-0.12mm	20°
D4002 Mk2	30314	0.1mm-0.12mm	20°
D4004 Mk2	30314	0.1mm-0.12mm	20°
D5401 Mk2	30314	0.1mm-0.12mm	20°
D5402 Mk2	30314	0.1mm-0.12mm	20°
D5403 Mk2	30314	0.1mm-0.12mm	20°
D9601 Mk2	30314	0.1mm-0.12mm	20°
D9602 Mk2	30314	0.1mm-0.12mm	20°
D15001 Mk2	30314	0.1mm-0.12mm	20°
D15002 Mk2	30314	0.1mm-0.12mm	20°
D15004 Mk2	31317	0.1mm-0.12mm	20°
D22001 Mk2	30317	0.1mm-0.12mm	20°
D22002 Mk2	30317	0.1mm-0.12mm	20°
D30001 Mk2	30317	0.1mm-0.12mm	20°
D44001 Mk2	30317	0.1mm-0.12mm	20°

16. MECHANICAL SEALS

Mechanical seals are used in applications where zero leakage from the pump gland section is required. Mechanical seals can be ordered with a new pump assembly or alternatively be fitted at a later stage replacing the existing gland packing. Franklin Electric should be contacted to assist with the selection of a suitable mechanical seal. Part numbers of standard options are listed below.

Model	Mechanical seal size	Component Mechanical seal - Silicon Carbide/Silicon Carbide/Viton Max-12 Bar	Cartridge Mechanical seal - Silicon Carbide/Silicon Carbide/Viton Max-12 Bar	Cartridge Mechanical seal - Silicon Carbide/Silicon CarbideNiton Max-20 Bar	Cartridge Mechanical seal - Tungsten Carbide/Tungsten Carbide/Viton Max-20 Bar
B0042, B0151	30mm	830009174	830009181	830011196	830011203
B0104, B0401, B0402, B0501, B0502, B0801	35mm	830009175	830009182	830011197	830011204
B0901, B0902, B0802, B0601, B0602, B2001, D0504, D1301, D1302	45mm	830009176	830009183	830011198	830011205
B2501, B2502, B3501, D0507, D0514, D1304, D1306, D2401, D2402, D2404, D4001, D4002, D4004, D5401, D5402, D9601, D9602, D15001	65mm	830009177	830009184	830011199	830011206
B3502, B8001, B8002, B5002, B9001, B9601	80mm	830009179	830009186	830011201	830011208



Franklin Electric must be consulted for mechanical seal selection assistance in instances where the seal will be exposed to hazardous products / liquids.

17. PARTS VIEW: D0504-D9602 (EXCLUDING D5403, D15001)

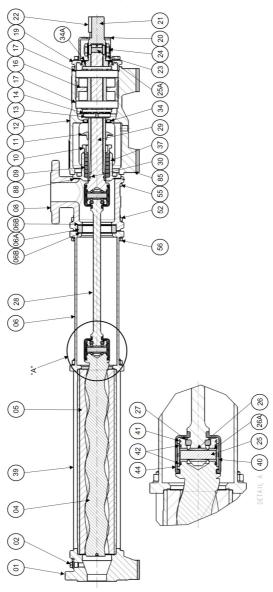


Figure 1

18. PARTS VIEW: D5403, D15001

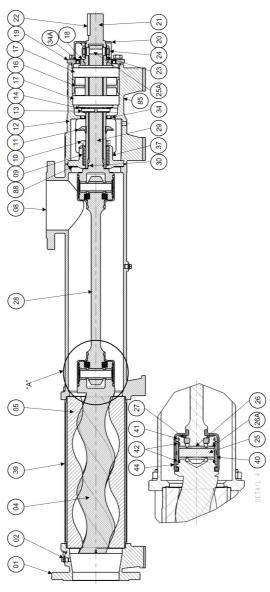


Figure 2

19. INSTALLATION DATA

Complete the installation data documentation for warranty purposes and for future referencing.

PUMP INSTALLATION DATA SHEET	
Customer :	
Date of installation	
Pump size	
Product pumped	
Temperature. °C	
Pump speed. rpm	
Driver speed. rpm	
Pumped capacity. m³/hr	
Pressure at pump. kPa	
Drive. motor/engine/tractor	
Drive power rating	
Relieve valve fitted. Yes/no	
Method of starting. DOL/Star Delta	
Altitude. m	
Suction conditions	
pH	
Viscosity (cP)	
Solids content. %	
Solids detail	
Specific Gravity	
Materials of construction	
Mech. seal or packed gland	
Pump serial no	
Stator serial no	
Length and dia of suct. line. m / mm	
Length and dia of del. line. m / mm	
Suction or delivery on gland	

1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 |

20. TROUBLESHOOTING

Problem/Couse

1 1001	cityOouse	٠.			7	J	٠		٠	٧.	10	•••		10	17	10	10	"	10	10	20	21	~~	20		20	20	21	20	23
	charge	1	2	3			6		8												20					25				29
	capacity			3	4	5	6	7	8		10	11			14		16			19	20	21						27		
	ar discharge			3	4	5	6	7	8								16		18		20									
_	lost after starting			3	4	5	6	7	8	9							16		18											
	stalls when starting			_						9		4.4	12		14	45			18				-00		0.4					29
_	overheats	_		_			_			9		11	40	Ш	14	15		_	40				22 22		24				Ш	20
_	overheats sive power absorbed	-		H			_			9			12 12	Н	14 14				18 18				22		24 24				Н	29 29
	& vibration			3	4	5	6	7	8	9		11	12	13	14	10	16		18					23	24					29
	element wear			3	4	J	U	'	U	3		11			14		10		10				22	23	24					_
	sive gland seal wear		Н	H										13	17	15		17							27		26		28	
	ct loss through gland													13			16	17												
Seizur												11		13	14	15		П							24				П	
No.	Cause								Ti	Ren	ned	v																		
1	Incorrect direction	of r	otat	tion					_	Reverse the motor																				
2	Pump not primed									Expel gas from supply line and pumping chamber and introduce fluid.																				
3	Insufficient NPSH	ava	ilab	le.					_	Expel gas from supply line and pumping chamber and introduce fluid. Increase supply line diameter. Increase suction head. Simplify supply																				
	oumoione in ori								- li	ine	con	figui	ratio	n. F	Redi	uce	spe	ed. I	Dec	reas	se p	rodu	uct t	em	oera	iture) - , hb,	,		
4	Product vapourising	ng ir	ı su	pply	/ lin	e			1	check effect on viscosity and power input. As 3 above.																				
5	Air entering supply line										Remake pipe joints. Adjust or repack gland.																			
6	Gas in supply line									Expel gas from supply line and pumping chamber and introduce fluid. Raise product level. Lower outlet position. Increase submergence of																				
7	Insufficient head above supply vessel outlet							ı	Rais	se pi	rodu	ıct le	evel.	. Lo	wer	outl	et p	osit	ion.	Inc	reas	se si	ubm	erg	enc	e of				
								5	supp	oly li	ne.																			
8	Foot valve strainer is obstructed or blocked								,	Sen	/ice	fittir	ngs.																	
9	Product viscosity above rated figure								ı	Dec	reas	e p	ump	spe	eed	. Inc	reas	se p	rod	uct t	emp	era	ture).						
10	Product viscosity be	elov	v rat	ed 1	figu	re			i	increase pump speed. Decrease product temperature.																				
11	Product temperatur	e a	bove	e ra	ted	figu	re		Cool the product pumping chamber.																					
12	Product temperatur	e b	elow	v rat	ed t	figur	e		Heat the product pumping chamber - check with Franklin Electric.																					
13	Unexpected solids	in p	rodu	uct					(Clea	an th	ie s	yste	m. F	it a	stra	aine	r in t	the	syst	em.									
14	Delivery pressure a	bov	e ra	ited	figu	ıre			_		ck fo	_											e to	pre	vent	pro	ble	n		
					_				1	recu	ırrin	g. S	imp	lify c	deliv	ery	line													
15	Gland over tightene	ed							,	Slac	ken	and	d re-	adju	ust	glan	d.													
16	Gland under tighter	ned							_		ıst g																			
17	Gland flushing inad	lequ	ıate						_		ck tl			flov	vs fi	reely	/ int	o the	e gl	and.	Inc	rea	se fl	OW	rate	١.				
18	Pump speed above	rat	ed f	igur	e				1	Dec	reas	se pi	ump	SDE	eed	1														
19	Pump speed below	rat	ed fi	igur	<u>е</u>				_		ease																			
20	Stator turning								ı	Rep	lace	WO	rn p	arts	. Tig	ghte	n st	ator	bol	ts.										
21	Flexible coupling m	isal	igne	ed					_	_	ck fl										ngs	acc	cord	ingl	у.					
22	Belt drive slipping								-	Re-t	ens	ion 1	to m	anu	ıfac	ture	r's re	ecor	nme	enda	atior	ıs.								
23	Insecure pump driv	er n	nour	ntin	gs				ı	Fit lo	ock '	was	hers	s to	slac	k fa	ster	ners	and	d ret	ight	en.								
24	24 Shaft bearings worn/failed								Ī	Refe	er to	Fra	ınkli	n El	ectr	ic fo	or ac	lvice	e an	d re	plac	cem	ent	parl	s.					
25	25 Discharge blocked or valve closed							_		eve		<u> </u>							ckaç	ge.										
26	26 Product entering packing area							(Che	ck p	ack	ings	oo a	nditi	on a	and	type)												
27	- P- P 3							Fit new parts.																						
28	Shaft wearing the seals									Check for worn shaft and replace.																				
29	Frozen fluid in pum	р							Allow for pump to thaw slowly. Ensure pump is drained in future. Replace damaged parts.																					
L									Rep	lace	daı	mag	ed p	oart	S.															

21. WARRANTY

This document contains Franklin Electric Co., Inc. and all of its subsidiaries (collectively, "Franklin Electric") standard limited warranty, general sales policies and controlling terms and conditions for Submersible Pump (the "Goods"). This document shall not be altered or amended except as provided by Franklin Electric.

Limited Warranty

Franklin Electric warrants that for a period of one (1) year from the date of delivery, the goods purchased will:

- (a) Be free from defects in workmanship and material at the time of shipment;
- (b) Perform consistently with samples previously supplied; and
- (c) Conform to the specifications published or agreed to in writing between the customer and Franklin Electric.

This limited warranty is in lieu of all other warranties, written or oral, statutory, express, or implied, including any warranty of merchantability or fitness for a particular purpose. Customer's sole and exclusive remedy for Franklin Electric's breach of its obligations hereunder, including breach of any express or implied warranty or in a written instrument made of this limited warranty, shall be for the purchase price paid to Franklin Electric for the non-conforming or defective product or for the repair or replacement of non-conforming or defective product, at Franklin Electric's election.

Any Franklin Electric product which Franklin Electric determines to be defective within the warranty period shall be, at Franklin Electric's sole option, repaired or replaced, provided that Franklin Electric's obligation to repair or replace shall be subject to the following conditions:

- (a) Any allegedly defective goods or parts shall have been returned to Franklin Electric at the customer's expense:
- (b) The customer shall establish in writing to the reasonable satisfaction of Franklin Electric that the goods have been properly used and applied for normal purposes;
- (c) No person, whether authorised by the customer or not, shall have tampered with the goods or parts or shall have attempted to rectify the alleged defect in the goods or parts in any way before the inspection thereof by representatives of Franklin Electric; and
- (d) Notwithstanding anything to the contrary contained herein, whether or not Franklin Electric has repaired or replaced alleged defective goods, Franklin Electric shall be entitled at any time to refund the purchase price of any allegedly defective goods to the customer and such refund shall be in full and final settlement of such customer's claim in respect of the allegedly defective goods.

Without limiting the generality of the exclusions of this limited warranty, Franklin Electric does not warrant the adequacy of any specifications provided directly or indirectly by a customer or that Franklin Electric's products will perform in accordance with such specifications.

This limited warranty does not apply to:

- (a) Any goods that have been subject to misuse (including use in a manner inconsistent with the design of the product), abuse, neglect, accident or improper installation or maintenance; and
- (b) Any goods that have been altered or repaired by any person or entity other than Franklin Electric or its authorised representatives;
- (c) Any goods not manufactured by Franklin Electric unless Franklin Electric is entitled to the benefit of the same or similar undertaking, mutatis mutandis from the supplier or manufacturer thereof. In such case, Franklin Electric's liability to the customer for such goods shall be limited to Franklin Electric's benefit from the supplier or manufacturer thereof.

Stated performance figures are based on Franklin Electric's testing experience. Franklin Electric shall not be liable for any loss or damaged incurred or sustained by the customer as a result of the customer's reliance on such figures unless Franklin Electric shall in writing, have:

- (a) Guaranteed such performance figures within specified tolerances; and
- (b) Agreed to pay a penalty or liquidated damages in the event of such performance figures not being achieved, in which event Franklin Electric's liability shall be strictly limited to the amount of such agreed upon penalty or damages.

Notwithstanding anything to the contrary, Franklin Electric shall not be liable, under any circumstances, for:

- (a) Any loss of trade or profit occurring to the customer in the event of the delivery of goods being frustrated or delayed by acts of God or force majeure such as, but not limited to, strikes, riots, lockouts, trade disputes, fire, war, mobilisation, military conscription, confiscation, uprising, trade embargoes, shortage of raw materials, or by any other cause beyond Franklin Electric's control, and
- (b) Loss of profit or any special, incidental or consequential damages whatsoever whether arising from breach of contract, delict, negligence, or from any other cause, even if Franklin Electric shall have been advised of the possibility of such potential loss or damage.

22.	NOTES		

HEAD OFFICE AND FACTORY

PO Box 8136, Edenglen 1613, South Africa 13 Engwena Road, Sebenza, Edenvale 1610 Tel: +27 11 723 6500 Fax: +27 11 609 2417 E-mail: info@franklin-electric.co.za

BRANCHES

DURBAN

Tel: +27 31 700 4160 Fax: +27 31 700 4103

BLOEMFONTEIN

Tel: +27 51 434 1565 Fax: +27 51 435 3819

CAPE TOWN

Tel: +27 21 949 5458 / 5424 / 5448 Fax: +27 21 949 5459

ZAMBIA

PO Box 71253, Ndola, Zambia Tel: +260 21 265 0617 / 9 Fax: +260 21 265 0852 E-mail: info@fele.com

EXPORTS

PO Box 8136, Edenglen 1613, South Africa 13 Engwena Road, Sebenza, Edenvale 1610 Tel: +27 11 723 6500 Fax: +27 11 452 2699 E-mail: info@franklin-electric.co.za

DEPOTS

POLOKWANE

Tel: +27 15 298 8748

PORT ELIZABETH

Tel: +27 41 487 2866 / 2985 / 3058 / 3059 Fax: +27 41 487 2980

BOTSWANA

Private Bag BR 225, Broadhurst, Gaborone Plot 42 Gaborone International Commerce Park Tel: +267 397 4926 Fax: +267 397 4927 E-mail: info@fele.co.bw

Website: www.franklin-electric.com

