

EBSRAY PUMPS

INSTALLATION, OPERATION & MAINTENANCE INSTRUCTIONS



V3000



V2000



V3010

CE

V SERIES MODELS V2000, V3000 & V3010 ROTARY SLIDING VANE PUMPS

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IMPORTANT NOTES

1. This Publication is **TYPICAL ONLY** and only relates to the specifications of the minimum equipment required to ensure the optimum performance, maximum life and trouble-free operation of the Ebsray V2000, V3000 & V3010 Pumps.
2. Products with the mandatory European CE mark affixed indicate conformity to the essential health and safety requirements via their applicable EU Directives (e.g. ATEX 94/09/EC, Machinery 98/37/EC etc).
As certain specific products/equipment outlined in this Publication are CE marked (meaning the equipment has been assessed and supplied in conformity to those Directives), **STRICT ADHERENCE** with **ALL** the instructions and recommendations forms an essential part in maintaining the product/equipment's conformity.
Failure to comply with the instructions and recommendations contained in this Publication may void CE conformity.
3. This Publication does **NOT** depict:
 - a) Ancillary required equipment related to the fabrication, installation and operation of the Pump e.g. miscellaneous flanges, fittings etc.
 - b) Required equipment unrelated to the Pumpset e.g. tank fill lines, vapour return lines, emergency shutdown systems etc.
 - c) The materials and method of fabrication of any required sub-systems.
4. It is the responsibility of the designer, fabricator and the installer of each required sub-system to ensure that:
 - a) The Ebsray specifications within this Publication and any other relevant Ebsray documents are **STRICTLY** adhered to.
 - b) Any variation (including use of equipment deemed "Equivalent") or addition to the Ebsray Specifications, as related to the Pumpset and Pumping System in general, meet Ebsray's minimum requirements.
 - c) All design, fabrication and installation of the tank and sub-systems is **STRICTLY** in accordance with all relevant National, State and Local Directives, Standards, Codes and Regulations.
5. Ebsray reserves the right to:
 - a) Withdraw or alter any or all of the Ebsray specifications within this Publication and any other relevant Ebsray documents without notification.
 - b) Determine the validity of any Warranty claims for Ebsray equipment based on the proper application of Ebsray supplied equipment by the way of adherence to the Ebsray specifications within this Publication and any other relevant Ebsray documents.

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Terms used in this publication requiring special attention



DANGER

1. *Non-compliance with requirements under this heading could create circumstances which may lead to serious personal injury or death or substantial property damage.*



WARNING

2. *Non-compliance with requirements under this heading could create circumstances which may lead to personal injury and/or which may cause damage to the Pumpset and/or ancillary equipment.*



CAUTION

3. *Items under this heading draw attention to legal and/or statutory requirements which control the installation and use of this type of equipment. Non-compliance with these requirements may create a dangerous situation and/or result in damage to the Pumpset and ancillary equipment.*

NOTE:

4. *Items under this heading are to draw attention to assembly procedures, techniques and methods of operation, etc. which are important to ensure correct installation and operation of equipment and which, if not followed may result in damage, failure or poor performance of Pumpset and ancillary equipment.*

SECTION 1 – GENERAL

1.1 INTRODUCTION

This publication is intended to assist those involved with the installation, operation and maintenance of Ebsray Model V2000, V3000 & V3010 Rotary Sliding Vane Pumps.



DANGER

Before starting any work, this publication should be completely read/reviewed by all persons involved with the work. If any part of this publication is unclear, obtain clarification before proceeding with any work.



DANGER

If designated for pumping LPG: - As LPG (Propane and Butane) is regarded as a flammable liquid, extreme caution must be taken to ensure total compliance with all relevant Directives, Standards, Codes and Regulations is fully understood and exercised in the installation, operation and maintenance of Ebsray V2000, V3000 and V3010 pumps.

These instructions are intended to assist correct pump installation, operation and maintenance requirements. They are additional to, and do not supersede or override any applicable statutory, legal or regulatory requirements.

The design, materials and workmanship incorporated in the manufacture of Ebsray pumps make them capable of reliable operation over a long working life. Correct installation and operation is essential. Service life is enhanced by periodic inspection and careful maintenance.



CAUTION

Installation and servicing of this equipment should be performed by qualified competent personnel in accordance with relevant Directives, Standards, Codes, Regulations and site restrictions, in conjunction with these instructions.

When the equipment supplied utilises components other than those manufactured by Ebsray e.g. electrical equipment, switches, fittings, valves, etc reference should be made to the original manufacturer's data before installation or servicing is commenced. Failure to observe these details may void the Warranty.



WARNING

The pump/pumpset must be operated within the original selected design parameters of pumped product (Use only LPG of internationally accepted (ISO) quality and specification), speed, flow, pressure, temperature, voltage and current. Should any change be contemplated, please confer with Ebsray in order to verify the suitability of such a change

1.2 TRANSPORTATION, PACKING & STORAGE

Standard domestic packing is suitable for shipment in covered transports. Pump ports must be sealed to exclude ingress of condensation, moisture or foreign material. When received on site the Pumpset must be stored in a dry covered area.

NOTE: *If Pump is not installed and commissioned immediately, special preservative techniques will be required. (Refer to Ebsray). e.g. If the Pump is installed, but not commissioned, low pressure nitrogen can be used to purge, seal and protect the Pump from the effects of condensation and atmospheric corrosion.*



WARNING

NEVER allow water or any corrosive product to enter the pump (e.g. for hydrostatic testing of pipework). Severe internal damage may result and will void the Warranty

1.3 RECEIVING INSPECTION

SHORTAGES and/or DAMAGE: On receipt of equipment, check all items against the dispatch documents and inspect for damage. Any damage or shortage incurred during transit should be noted on the packing note and on both your own and the carrier's copy of the consignment note. A claim should be made immediately on the transport company. Also advise Ebsray or their Appointed Representative. Should a shortage be evident on receipt, notify Ebsray immediately giving full details and packing note number.

1.4 HANDLING

Do not drop Pump! Care should be taken in moving/handling Pump/Pumpsets in order to minimise stress on the internal components. The Pump/Pumpset should be lifted in such a manner as to ensure compliance with the relevant lifting codes. **Severe internal Pump damage may result if correct handling and due care is not taken.**

1.5 WARRANTY

1. All Ebsray manufactured pumps and equipment are warranted as standard for one (1) year against faulty workmanship and/or materials. Refer to Ebsray PUMPS 'Standard Conditions of Sale and Warranty' publication for details.
2. Ancillary equipment supplied by Ebsray but manufactured by others will be in accordance with those manufacturer's written warranty conditions

SECTION 2 – INSTALLATION

CAUTION Installation and removal of this equipment should be performed by suitably qualified competent personnel in accordance with relevant Directives, Standards, Codes, Regulations and site restrictions - in conjunction with these instructions.

DANGER Never loosen or remove fittings, flanges, etc. while under pressure (vapour pressure of LPG may be very high), always isolate components or pipework and depressurise prior to work.

2.1 LOCATION

The pumping unit should be placed as close as practicable to the source of supply keeping within the NPSHr of the pump. Ensure floor area and headroom allotted are sufficient for inspection and maintenance. Allow sufficient space and ventilation for motor cooling requirements. Be sure to allow for crane or hoist access if required.

2.2 FOUNDATIONS

Baseplate units should be accurately installed. When on a concrete foundation, ensure that it has been poured on a solid footing.

2.3 PUMP PIPING CONNECTIONS

NOTE: Never draw piping into place by use of force at the port connections of the pump.

All piping should be supported independently and line up accurately with the pump ports.

2.4 STRAINER PROTECTION

The pump suction should always be protected by an efficient suction strainer of adequate size to accommodate the liquid viscosity conditions without causing excessive suction resistance.

2.5 COUPLING ALIGNMENT

To maximise the life of the pump appropriate alignment of the coupled shafts is a fundamental requirement of any coupling installation.

NOTE: Coupling types must be selected and installed in compliance with the relevant Directives, Standards, Codes, and Regulations dependant on application and location. (e.g. ATEX compliant – if applicable)

Reference should be made to OEM coupling data for specific requirements however angular misalignment and parallel misalignment as shown in Figs 1 & 2 must be corrected.

If pump was supplied by Ebsray as part of a pumpset unit, pump and driver have been accurately aligned at factory. When incorporating these pumps into other equipment, manufacturers should ensure that coupling alignment is properly addressed.

To ensure that alignment has been maintained during transit and installation, alignment **MUST BE CHECKED** upon final installation and prior to startup.

Ensure 'distance between shaft ends' (DBSE) is correct for the type of coupling utilised.

ANGULAR MISALIGNMENT as shown in Fig.1 where shafts are at an angle to one another should be corrected before parallel misalignment.

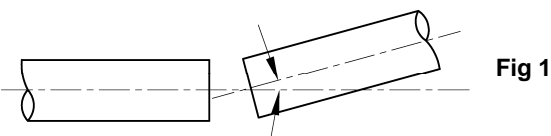


Fig 1

PARALLEL MISALIGNMENT as shown in Fig.2 where shafts are in line angularly and parallel to each other but are offset can now be corrected.

Adjustment by use of shims under the driver (or pump) will effectively correct error in the vertical plane.

Movement of one of the ends horizontally will correct error in the horizontal plane

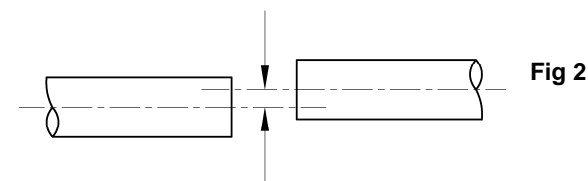


Fig 2

SECTION 3 – OPERATION

3.1 DESCRIPTION

The EBSRAY Models V2000, V3000 & V3010 are positive displacement Sliding Vane Pumps, primarily intended for the transfer of LPG and other low to medium viscosity liquids. All models are of identical internal design and construction however the V3000 is mounted via the top inlet port flange and has bottom discharge. The V3000 also offers an alternate 45° inlet port. The V2000 and V3010 are foot mounted with 90° porting and top discharge. All Models are available with single or double ended drive shafts. Model V3010 is available with an aluminium body – application dependant (not for LPG or Anhydrous Ammonia).

In all models, the Rotor/Shaft assembly rotates within a cam-form Liner and between two replaceable Wearplates. Mechanical Seals, located outside the wearplates, isolate the Drive End and Inspection End Ball Bearings from the pumpage. These grease packed heavy duty Double Row Deep Groove Ball Bearings provide positive radial and axial positioning of the pump rotor. A lip seal is fitted to the Drive End Cover to minimise the ingress of dust/dirt along the shaft.

The pump is protected from excessive pressure rise by an internal pressure relief valve with tamperproof adjustment. The V2000, V3000 and V3010 Pumps are designed to provide trouble-free & safe operation and must be operated in accordance with the following recommendations.

3.2 LUBRICATION

Periodic ball bearing lubrication is required via grease nipples fitted to the bearing housings at approximately every 500 hours of operation. Ebsray recommends the use of a lithium complex NLGI Grade 2 grease with an ISO VG220 viscosity rating.

3.3 PRE-STARTUP CHECKLIST



WARNING

Do not run Pump dry. Do not start Pump against closed Discharge Valve unless external bypass protection is fitted. Severe internal damage to the Pump will result, voiding Warranty.

- ▶ Lubricate as required.
- ▶ Check alignment of couplings.
- ▶ Ensure freedom of rotation of shaft.
- ▶ Check direction of rotation
- ▶ Open inlet and discharge valves



WARNING

To prevent damage to pump or system, disengage coupling before checking direction of rotation.

3.4 OPERATIONAL CHECKS

Inspect pump frequently during the first few hours of operation for such conditions as excessive heating of ball bearings, vibration or unusual noises etc.

3.5 PERIODIC INSPECTION

Periodic Inspection of the Pump, Pump System and Ancillary Equipment is required to maintain safety, conformity, operational functionality and reliability. Ebsray recommends a maximum interval of three months or 500 hours operation between routine periodic maintenance inspections (More frequent inspections may be necessary dependent upon usage, site conditions, operation etc).

If any abnormal condition is discovered, cease operation of pump immediately and take action to rectify the problem.

For safe operation, the following items should be included in the routine periodic inspection:

- a. Inspect the Pump for leaks, vibration, abnormal noises, signs of overheating, discolouration, etc.
- b. Inspect Coupling Assembly for signs of wear, overheating, discolouration, etc.
- c. Check Pump differential pressure

SECTION 4 – MAINTENANCE



CAUTION

Prior to any system disassembly or service, verify that all requirements of statutory Directives, Standards, Codes and Regulations, are met and that specific site requirements etc are satisfied

Some minor maintenance tasks and inspections can be performed with the pump 'in line' so long as complete isolation, depressurising and purging procedures have been completed. However for major maintenance it is recommended that the pump be removed from the installation

4.1 PREPARATION FOR DISASSEMBLY

1. Obtain the appropriate Work Permit if required.
2. Isolate power supply to motor – if fitted.
3. Isolate pump from liquids in suction and discharge lines, depressurise and purge out any toxic, flammable, corrosive or air hardening liquids (if present).

4. Disconnect porting connections.
5. Remove pump from installation.

4.2 DISASSEMBLY

Refer to the Parts Designation drawings in Section 5

4.2.1 Pressure Relief Valve

1. Remove flush plug from valve cover.
2. Using a 6mm allen wrench, turn the adjusting screw clockwise to **reduce** spring tension.
3. Remove valve cover and O-Ring together with spring cap, spring and valve.
4. Remove spring cap from valve cover and remove O-Ring from spring cap.

4.2.2 Pump

1. Remove dust caps from drive end and inspection end bearing housings.
2. Remove lockwashers and locknuts from both inspection end and drive end of shaft.
3. Remove both bearing housings. (To remove bearing housing, screw two of the bearing housing setscrews into the tapped holes provided in the bearing housing. Evenly tighten the setscrews to withdraw the bearing housing.) Take care not to damage the mechanical seal faces.
4. Press out the ball bearings from the bearing housings.
5. Remove the bearing dampening O-Rings from the shaft then carefully remove the mechanical seal components from both the bearing housings and from the rotor/shaft assembly.
6. Remove body covers and wearplates (To remove body cover, screw four of the bearing housing setscrews into the tapped extraction holes provided in the body cover. Evenly tighten the setscrews to withdraw the body cover.)
7. Withdraw the rotor/shaft/vane assembly from the body taking care to support the vanes as the assembly is withdrawn.
8. Remove vanes and pushrods from the rotor (note the orientation of the vanes relative to the direction of rotation)
9. Remove liner from body (note the orientation of the liner relative to the inlet and discharge ports of the body.
10. Remove grease nipples and pressure release plugs from the bearing housings.
11. Remove oil seal from drive end dust cap.

4.3 INSPECTION

NOTE: *Optimum performance is achieved by maintaining the pump within the following guidelines. Adequate performance may still be achieved dependent on application parameters.*

1. Inspect rotor/shaft assembly and liner. If damage or excessive wear is evident, it is recommended to replace both components. Scoring in the seal zones of the liner is detrimental to optimum performance.

NB: The rotor is permanently attached to the shaft.

2. Inspect both mechanical seals. Replace mechanical seal assembly if components are worn or damaged
3. Inspect vane pushrods for wear, damage and straightness. Replace the pushrods if they show signs of physical damage, wear or distortion e.g. mushroomed, rounded or tapered ends, scoring on flanks, bending, etc.
4. Inspect vanes for wear or damage. Replace if damaged or excessive wear is evident. Check for scoring on vane tips.

Recommended Minimum Worn Vane Sizes	Vane Length	Vane Height
V2000	74.62mm	27.00mm
V3000	89.62mm	28.00mm
V3010	89.62mm	28.00mm

5. Inspect pressure relief valve assembly and components for wear or damage. Replace or refurbish as required.
6. It is recommended that all O-Rings and lip seals be replaced at every overhaul.
7. Inspect both ball bearings for wear. It is recommended on major overhauls that ball bearings be replaced.

Ball Bearing Replacement interval should not exceed	
V2000	10,000 operational hours
V3000	5,000 operational hours
V3010	5,000 operational hours

8. Ensure pressure relief ducts in bearing housings are not obstructed.

4.4 SPARE PARTS

1. When ordering spare parts, to ensure a minimum of delay and correct replacement to original specification, ALWAYS quote the pump Serial Number located on the nameplate of the pump.
2. Advise the name, Cat # and quantity required. Refer Section 5 – Parts Designation.
3. Advise complete delivery instructions, transportation, etc.

NOTE: *Substitute or so-called ‘equivalent’ item/spare parts are not recommended for use.*

Compliance, safe operation and pump performance may be severely compromised if incorrect or substitute spare parts – including Fasteners, O-Rings, Ball Bearings, etc – are used.

Only use genuine Ebsray spare parts.

4.5 REASSEMBLY - PRELIMINARY

1. Ensure all parts are clean and deburred before assembly.



CAUTION *At all times when handling and installing mechanical seals, care must be taken to ensure lapped faces and seats are not damaged. Particular attention must be given to carbon seats to prevent marking or chipping.*

2. Lubricate all O-Rings and lapped faces of mechanical seals with a good quality, compatible, detergent-free light oil before assembly.
3. Pack Ball Bearings with a good quality, suitable grease.
4. Ensure correct orientation of components relative to pump rotation/handling .

4.6 REASSEMBLY

(Refer Section 5 – Parts Designation)

Pump Fastener Torque settings:	V2000	V3000/V3010	V3010
Body Material	DI	DI	AL
Body Cover to Body	77Nm	77Nm	77Nm
Valve Cover to Body	44Nm	44Nm	30Nm
Brg Housing to Body Cover	44Nm	44Nm	44Nm
Dust Cap to Brg Housing	2Nm	2Nm	2Nm
Adapter Flange to Body	44Nm	44Nm	30Nm
Suction Flange (CL 300)	Dependent on		Gasket
(DI=Ductile Iron, AL=Aluminium))			

4.6.1 Pump

1. Fit liner to body ensuring correct orientation. (Liner is located using the key which is pinned to the body, the word "OUT" is cast into the liner and this must be towards the discharge port area..

2. Fit one wearplate to one end of the body ensuring body key locates in slot in wearplate. Fit body cover with new O-Ring to secure wearplate.

3. Assemble three lower vanes in the rotor and whilst cradling these to prevent them dropping out, insert the three pushrods into the rotor.

NB: Vanes must be correctly oriented i.e. the rounded ends of the vanes contact the liner and the slots in the face of the vanes **must lead** the direction of rotation.

4. Insert the rotor/shaft/vane/pushrod assembly into the body and then insert the other three vanes ensuring correct orientation.

5. Fit wearplate to other end of body, ensuring body key locates in slot in wearplate.

6. Fit body cover with new O-Ring.

7. Fit rotating components of mechanical seal assemblies to each end of shaft.

NB: Ensure mechanical seal components are clean prior to assembly, lubricate before fitting and ensure that O-Rings locate correctly on shaft and that slots in seal assembly locate over drivepins in shaft.

8. Fit O-Rings to stationary seal faces, lubricate and fit stationary seal faces to bearing housings taking care to ensure that location pins locate in holes provided in bearing housings. Place seal failure O-Rings in bearing housings inside stationary seal faces.

9. Fit O-Rings to bearing housings.

10. Carefully fit bearing housings over shaft and fasten to body covers.

NB: When fitting bearing housings, ensure that seal failure O-Rings are not dislodged. Seal failure O-Rings must remain captive between bearing housing and stationary seal face.

11. Fit bearing dampening O-Ring to each end of shaft and slide along shaft until seated in groove.

12. Fit ball bearings over shaft and into bearing housings.

13. Fit lockwashers and locknuts to shaft.

NB: Do not tighten locknuts at this stage.



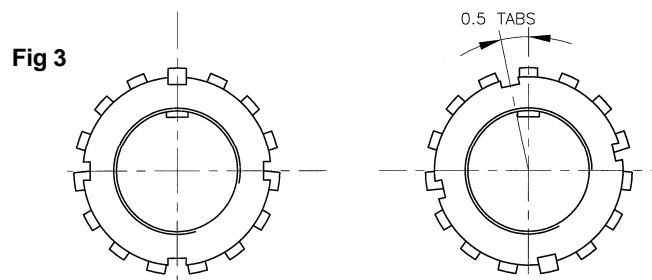
WARNING

Lockwashers must not be reused as bending the tabs more than once may cause fatigue which could result in failure and/or major pump damage. Only reassemble with new lockwashers of the correct thickness (Refer parts list)

TO SET AXIAL CLEARANCES IN PUMP:

14. While rotating shaft by hand using a suitable handle, tighten inspection end locknut until rotor/shaft assembly locks. At this point, the end of the rotor should be hard against the wearplate.

15. Back off the inspection end locknut 0.5 (one half) tab – (see diagram) then, if necessary back it off slightly further (**only as far as required to align a locking tab**). Lock in this position with tab of lockwasher



16. While turning shaft, tighten drive end locknut until an increase in drag is felt (pre-loading), indicating that ball bearings are tightly clamped.

17. Back off drive end locknut just enough to allow free pump rotation while maintaining some pre-loading on drive end ball bearing. Then if necessary back it off slightly further (**only as far as required to align a locking tab**) Lock in this position with tab of lockwasher.

18. Fit dust covers to both ends of pump with new seal in drive end dust cover.

19. Fit grease nipples and pressure release plugs to the bearing housings.

4.6.2 Pressure Relief Valve

1. Screw adjusting screw fully into spring cap and fit O-Rings to spring cap and valve cover.

2. Lubricate bore of valve cover and insert spring cap partially into valve cover.

3. Fit valve, spring and valve cover assembly to body and fasten into position.

4. Use a 6mm allen wrench to adjust pressure relief valve setting.

NOTE: Clockwise movement of the adjusting screw **reduces** spring tension thus reducing differential bypass pressure. Anticlockwise movement of the adjusting screw **increases** spring pressure thus increasing differential bypass pressure.

Never set differential bypass pressure above 1050 kpa (150psi)

5. After adjustment, replace flush plug in valve cover.

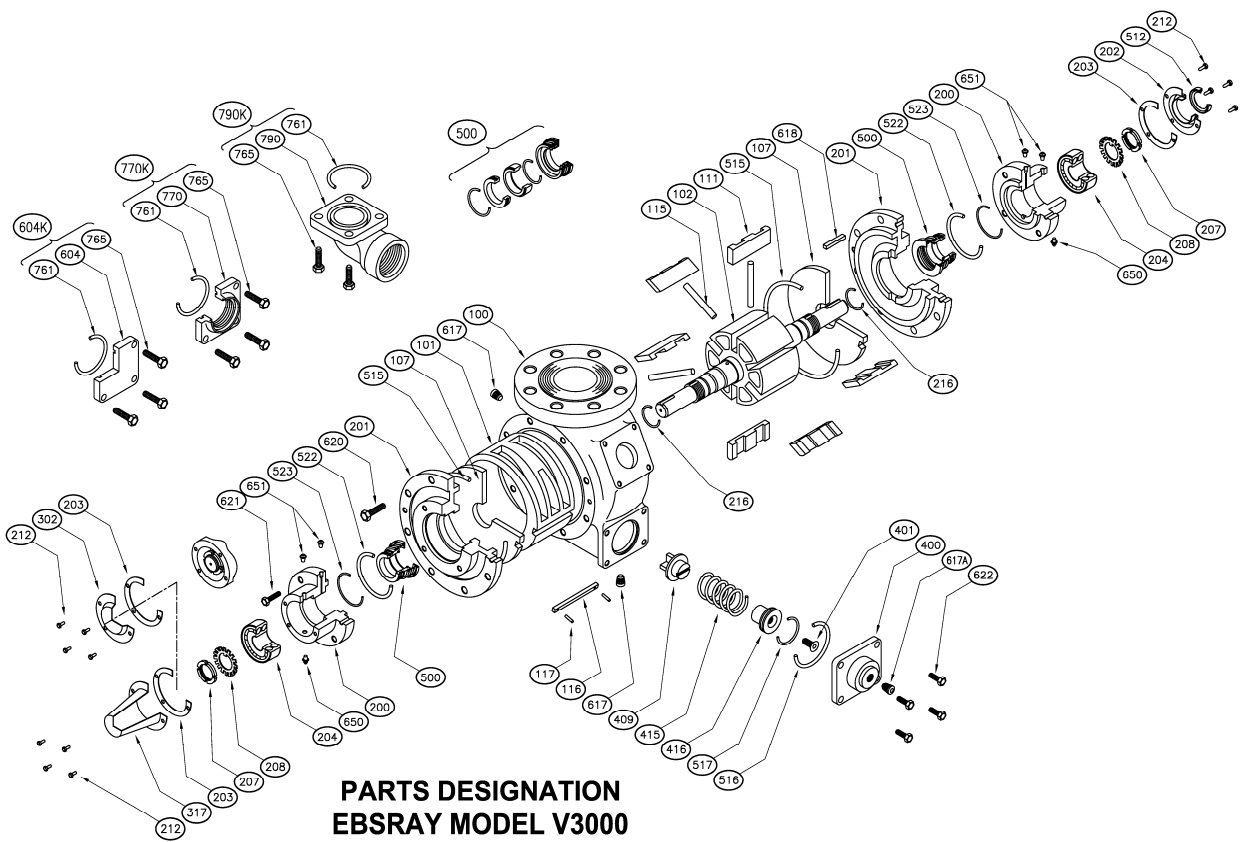
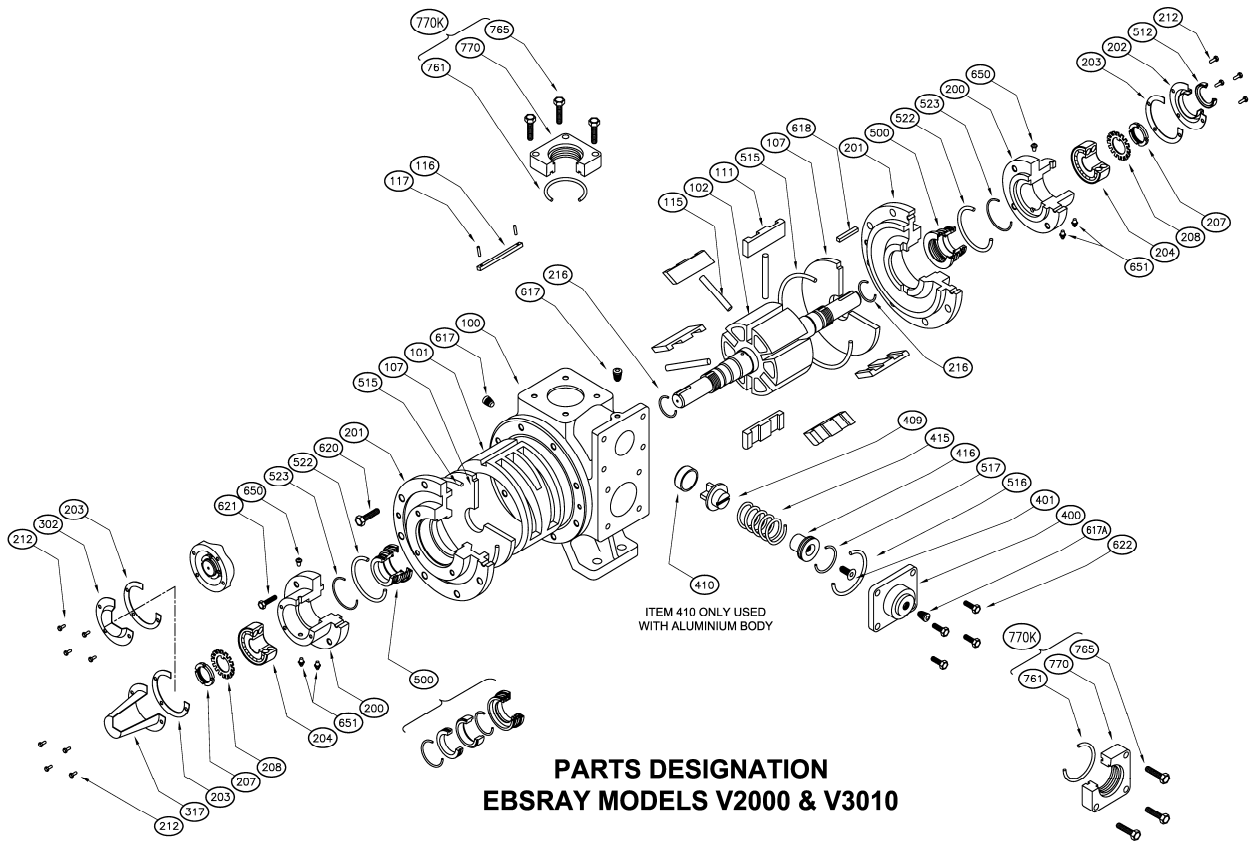
SECTION 5 – PARTS DESIGNATION

MODELS: V2000, V3000 and V3010 Rotary Sliding Vane pump.

Cat#	Description	Qty	Cat#	Description	Qty
100	Body	1	410	Valve Seat (for aluminium body only)	1
101	Liner	1	415	Spring - Bypass Valve	1
102	Rotor/Shaft assembly	1	416	Spring Cap	1
107	Wearplate	2	500	Mechanical Seal Assembly	1
111	Vane	6	512	Oil Seal	1
115	Vane Pushrod	3	515	O-Ring - Body Cover	2
116/117	Body Key Assembly	1	516	O-Ring - Valve Cover	1
200	Bearing Housing	2	517	O-Ring - Spring Cap	1
201	Body Cover	2	522	O-Ring - Bearing Housing	2
202	Dust Cap - Drive End	1	523	O-Ring - Seal Failure	2
203	Gasket – Dust Cap	2	617	Plug	2
204	Double Row Deep Groove Ball Bearing	2	617A	Plug	1
207	Locknut	2	618	Coupling Key	1
208	Lockwasher (1.8mm thickness)	2	620	Bolt - Body Cover	16
212	Setscrew – Dust Cap				
216	O-Ring - Bearing dampening	8	621	Bolt - Bearing Housing	8
302 or 317	Dust Cap - Inspection End or Shaft Cap – Inspection End	1	622	Bolt - Valve Cover	4
400	Valve Cover	1	640	Dowel	2
401	Adjusting Screw - Bypass Valve	1	650	Grease Nipple	2
409	Valve	1	651	Grease Pressure Relief	4
Adaptor Flange Options					
770K	Adaptor Flange Kit (Straight)	1	790K	Adaptor Flange Kit (Elbow)	
	#761 O-Ring - Adaptor Flange	1		#761 O-Ring - Adaptor Flange	1
	#765 Bolt - Adaptor Flange	4		#765 Bolt - Adaptor Flange	4
	#770 Adaptor Flange - 2" NPT or	1		#790 Adaptor Flange - 2" NPT	1
604K	Blanking Flange Kit				
	#761 O-Ring - Adaptor Flange	1			
	#765 Bolt - Adaptor Flange	4			
	#604 Blanking Flange	1			

Adaptor Flange Options

Model	Inlet	Alt Inlet	Discharge	Note
V2000	2-1/2" NPT Adp Flg Kit or 2" NPT Adp Flg Kit	NA	2" NPT Adp Flg Kit or 2-1/2" NPT Adp Flg Kit	V2000 Only
V3000	3" CL 300	2-1/2" NPT Adp Flg Kit or 2" NPT Adp Flg Kit or 2" NPT Elbow Kit	2" NPT Elbow Kit or 2" NPT Adp Flg Kit or 2-1/2" NPT Adp Flg Kit	Interchangeable with V3010
V3010	2-1/2" NPT Adp Flg Kit or 2" NPT Adp Flg Kit or 2" NPT Elbow Kit	NA	2" NPT Adp Flg Kit or 2-1/2" NPT Adp Flg Kit or 2" NPT Elbow Kit	Interchangeable with V3000



SECTION 6 – TROUBLESHOOTING

Symptom	Possible Problem	Possible Cause	Remedy
No Liquid Delivery	Pump not operating	No power to drive shaft	Check driver
		Coupling damaged or disengaged	Repair/replace coupling
	Pump will not turn – locked up	Foreign matter in pump	Clean out pump – check strainer in suction line.
		Vanes/Pushrods broken	Clean pump and replace Vanes/Pushrods
		Ball Bearings seized	Replace Ball Bearings.
	With pump operating	Inlet/Discharge valves closed	Open valves
		No liquid in supply tank	Fill supply tank
		Incorrect direction of rotation	Ensure correct direction of rotation
		Suction filter/strainer blocked or leaking air	Clean filter/strainer and/or eliminate air leaks
		High static discharge pressure	Review system design
Inadequate NPSHa		Increase NPSHa	
Pump vapour locked		Clear vapour to enable pump to prime	
Reduced Output	Pump speed too slow	Incorrect driver speed	Replace/adjust driver
		Faulty driver	Replace/repair as required
	High differential pressure	Restriction in discharge piping or pipe/hose too small.	Remove restriction and/or replace with adequate size pipe/hose
	Restriction in inlet line	Strainer blocked	Clean/clear strainer
		Inlet pipe too small or too long	Modify piping
		Foreign object in suction line	Remove restriction
	Incorrectly set external Bypass Valve or internal Pressure Relief Valve	Valve pressure setting too low	Adjust pressure setting but do NOT exceed system design pressure or driver capability
	Vanes jamming	Foreign matter in pump or damaged vanes	Clean out pump and/or replace vanes
Pump parts worn	End of service life or adverse pumping conditions	Recondition pump	
Excessive Power Consumption	Obstruction is discharge line	Foreign matter in discharge line	Clean or clear out discharge line
		Collapsed or kinked discharge hose	Replace hose or remove kinks
	Operating outside duty point	Pressure, Viscosity, Temperature and/or Speed not as specified	Correct as required
	Rotating parts binding	Foreign matter jamming parts or parts worn	Disassemble, inspect and rectify
	Misalignment between pump and driver	Pump and/or driver moved	Check and realign as required.
Ball Bearings worn	End of service life or adverse pumping conditions	Replace Ball Bearings	
Pump is Noisy	Cavitation	Insufficient NPSH available	Increase NPSHa
		Air leakage in suction line	Remove air leakage
	Pump running dry	No liquid in supply tank	Fill supply tank
		Closed inlet line valve	Open inlet line valve
	Rotating parts binding	Foreign matter jamming parts or parts worn	Disassemble, inspect and rectify
	Ball bearings worn	End of service life or adverse pumping conditions	Replace ball bearings
Pump speed too fast	Incorrect drive speed	Reduce drive speed	

Symptom	Possible Problem	Possible Cause	Remedy
Leakage from Pump	Mechanical Seal leakage	Seals incorrectly installed	Inspect seal assembly, replace if necessary and install correctly
		Excessive dry running of pump	Ensure liquid-state operation of pump
		Seal faces cracked, scratched, pitted or dirty	Inspect and replace seal assembly if required
		O-Rings nicked, cut or twisted	Replace as required
		O-Rings not compatible with pumpage	Replace with O-Rings of a compatible material
		Worn or damaged shaft in seal zone	Replace rotor on shaft assembly
		Misalignment causing excessive shaft distortion	Check and realign as required.
		Excess system pressure	Check and adjust to requirements
	Casing leakage	O-Rings failed	Replace as required
		Fasteners not tight	Tighten to required torque setting
		Thermal expansion of product when locked between valves either side of pump	Remove hydraulic lock potential
		Excessive static pressure	Eliminate excessive static pressure

APPENDIX A – DECLARATION OF CONFORMITY



Publication No 2490-08

EC DECLARATION OF CONFORMITY

Item	Content based upon Annex X of ATEX Directive 94/9/EC
Manufacturer	Ebsray Pumps Pty Ltd
Address	628 Pittwater Road Brookvale NSW 2100 Australia
Manufacturer's Declaration	We, Ebsray Pumps Pty Ltd declare that the following equipment :
Description of Equipment	<p>Ebsray V Series Sliding Vane bareshaft Pump ;</p> <p>Model / Type :</p> <ul style="list-style-type: none"> V15 (all Types) except Liquefied Gases V20 (all Types) V25 (all Types) except Liquefied Gases V2000 (all Types) V3000 (all Types) V3010 (all Types) V30 (all Types) V40 (all Types) V6000 (all Types) <p>The above Models are positive displacement sliding vane Pumps for liquid transfer applications. These Models / Types must only be applied in systems designed for that Model/Type's intended use.</p> <p>The above Models bear the following marking (where applicable) :</p> <p style="text-align: center;"> II 2 G c T4 CE </p>
Declaration of compliance	Is designed and manufactured in compliance with the following applicable Directives :
Applicable Directives evaluated by Manufacturer - not checked by Notified Body	
First applicable Directive	ATEX Directive 94/9/EC - by application of the following Standards :
Individual declaration of compliance	<ul style="list-style-type: none"> EN 1127-1 (2007) EN 13463-1 (2001) EN 13463-5 (2003)
Second applicable Directive	Pressure Equipment Directive (PED) 97/23/EC - but excluded under Article 3.10
Third applicable Directive	<p>Machinery Directive (MD) 98/37/EC – by application of the following Standards :</p> <ul style="list-style-type: none"> EN ISO 12100-1 (2003) EN ISO 12100-2 (2003) EN 809 (1998)
Manufacturer's own warning	Subject to the use for which the product(s) were designed and/or installed in accordance with the relevant Standards and Codes – all in conjunction with the Manufacturer's own Installation and Operating Instructions and recommendations
Final declaration	We, the undersigned, hereby declare that the product(s) specified conform to the listed Directive(s) and Standard(s)
Signatory of person legally responsible	<p>Ebsray Pumps Pty Ltd</p> <p></p> <p>W.A. Ebsary - Managing Director</p>
Place / Date	Brookvale, Australia / 22 April 2008

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