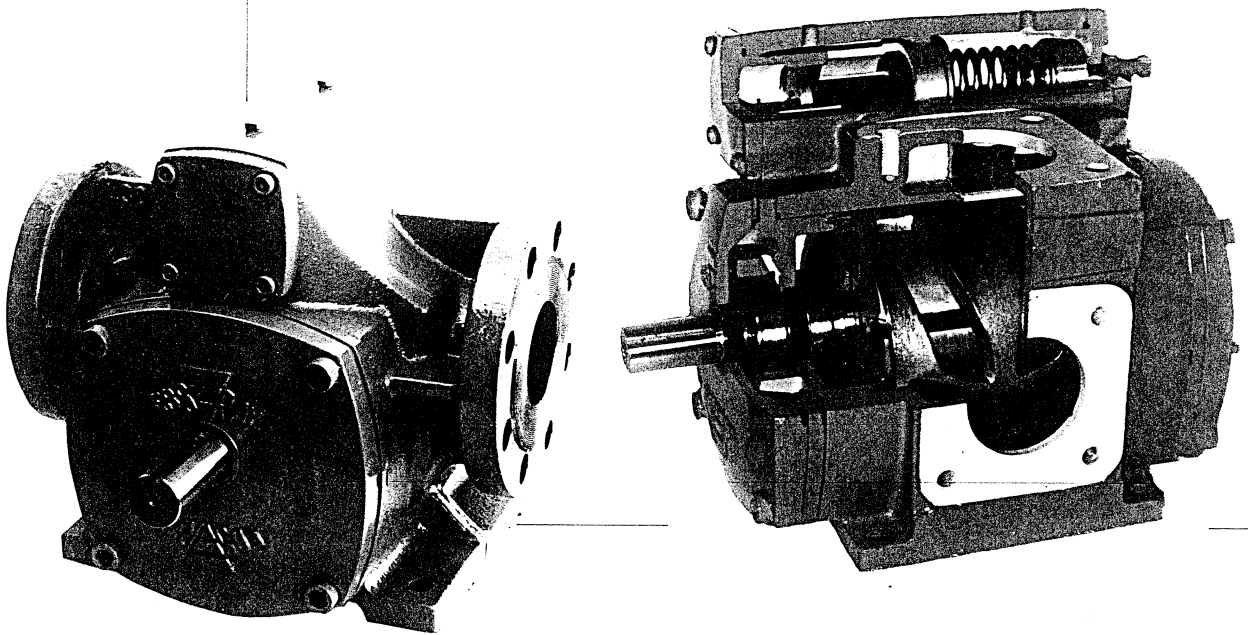


EBSRAY PUMPS

INSTALLATION OPERATION AND MAINTENANCE INSTRUCTIONS



V Series *Models V30 & V35* *Types 23, 24 & 27*

EBS-RAY PUMPS PTY.LIMITED

ACN 000 061 003

Head Office and Works
628 Pittwater Road
Brookvale NSW 2100
Australia.
Telephone: (02) 9905 0234
Fax: (02) 9938 3825

Branch Office Victoria
Phone: (03) 9706 7263
Fax: (03) 9706 7312
Branch Office Queensland
Phone: (07) 3260 7411
Fax: (07) 3260 7422

SECTION I - GENERAL

INTRODUCTION

This publication is intended to assist those involved with the installation, operation and maintenance of EBSRAY Models V30 and V35, Types 23, 24 and 27 Rotary Sliding Vane Pumps. 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 is essential. Service life is enhanced by periodic inspection and careful maintenance.

I-A CAUTION

INSTALLATION AND SERVICING OF THIS EQUIPMENT SHOULD BE PERFORMED BY QUALIFIED COMPETENT PERSONNEL IN ACCORDANCE WITH RELEVANT STATUTORY REGULATIONS OR CODES, IN CONJUNCTION WITH THESE INSTRUCTIONS.

When the equipment supplied utilises components other than manufactured by EBSRAY e.g. couplings, speed reducers, electric motors 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.

I-B WARNING

The pump must be operated within the original selected design parameters of speed, temperature, pressure and viscosity. Should any change be contemplated, please confer with EBSRAY in order to verify the suitability of such a change.

I-C TRANSPORTATION AND PACKING

Standard domestic packing is suitable for shipment in covered transports. Ports must be sealed to exclude ingress of solids. When received on site the pump should be stored in a dry covered area. If storage is required for other than a short period prior to installation, special preservatives and protective wrappings will be required.

I-D INSPECTION ON RECEIPT- SHORTAGES

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 and a claim should be made immediately on the transport company. Should a shortage be evident on receipt, notify EBSRAY immediately giving full details and packing note number.

I-E HANDLING

Care should be used in moving pumps. A sling should be placed under or around a bare shaft pump to minimise stress on the shaft or pump flanges. Baseplate mounted units should be lifted from under the baseplate below both the pump and driver ensuring compliance with the relevant lifting codes.

SECTION II - INSTALLATION

II-A LOCATION

The pumping unit should be placed as close as practicable to the source of supply remembering to keep within the NPSH requirement of the pump. Ensure floor area and headroom allotted is sufficient for inspection and maintenance. Be sure to allow for crane or hoist access if required.

II-B FOUNDATIONS

Baseplate units should be accurately installed. When on a concrete foundation, ensure that it has been poured on a solid footing. NOTE: Position foundation bolts to match baseplate foundation plan.

II-C PUMP PIPING CONNECTIONS

All piping should be supported independently of and line up accurately with the pump ports. NOTE: Pumps with screwed connections should employ a pipe joint close to both the suction and discharge ports to facilitate ease of maintenance.

NEVER DRAW PIPING INTO PLACE BY USE OF FORCE AT THE PORT CONNECTIONS OF THE PUMP.

II-D 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.

II-E ALIGNMENT

Alignment of the pump and driver is of extreme importance for trouble free mechanical operation. Baseplate mounted units are accurately aligned at the factory. To ensure this has been maintained during transit alignment **MUST BE** checked once before startup and again after the unit has been run under actual operating conditions. **NOTE:** The following procedures are typical only and reference should be made to data for specific coupling types.

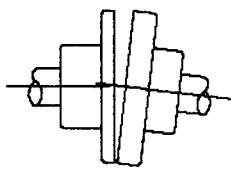


Figure 1

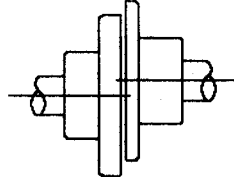


Figure 2

ANGULAR MISALIGNMENT as shown in Fig.1 should be corrected before eccentricity. Refer Fig.3; use feeler gauge reading at 90° intervals, the amount of correction necessary can be easily determined to bring shaft axes in line.

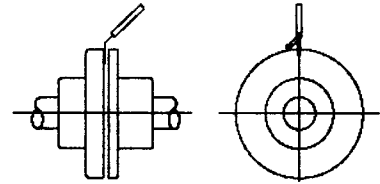


Figure 3

Misalignment due to ECCENTRICITY as shown in Fig.2 can now be corrected. Refer Fig.4; 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. **NOTE:** If both coupling halves are of identical diameter, concentricity may be checked with a straight edge at 90° intervals.

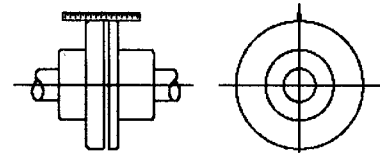


Figure 4

SECTION III - OPERATION

III-A DESCRIPTION

The EBSRAY Models V30 and V35, Types 23, 24 and 27 are positive displacement sliding vane pumps, primarily intended for the transfer of low to medium viscosity liquids. Models V30 and V35 are of similar internal construction, but of different body shapes, resulting in additional porting configurations being available in Model V35 (refer Figs. 5 & 6).

Types 23, 24 and 27 are of identical dimensions but different materials of construction. In both models the rotor/shaft assembly rotates within a cam form liner and between two replaceable wearplates. Two balanced mechanical seals, located outside the wearplates, isolate the drive end and inspection end bearings from the pumpage. These sealed, grease packed ball bearings provide positive axial clearance positioning of the pump rotor. A lip seal is fitted to the drive end cover to minimise ingress of dust/dirt along the shaft. The pump is protected from excessive pressure rise by an integral balanced type bypass valve. The bypass valve is fully adjustable and reversible for change of pump rotation and direction of liquid flow. A blanking plate is fitted to the third port in Model V35.

III-B LUBRICATION

No 'in service' lubrication is required on EBSRAY's Models V30 and V35, Type 23, 24 or 27 pumps.

III-C START-UP CHECKLIST

- Alignment of couplings
- Direction of rotation
- Freeness of shaft
- Do not start pump against closed discharge valve or with suction valve throttled.
- DO NOT RUN PUMP DRY

III-D OPERATIONAL CHECKS

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

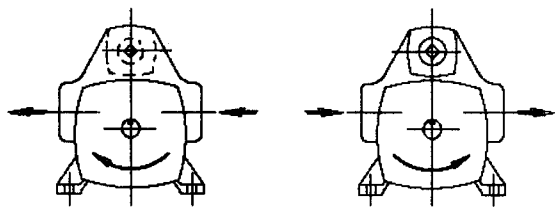


Figure 5. Porting configurations V30

V2

V4

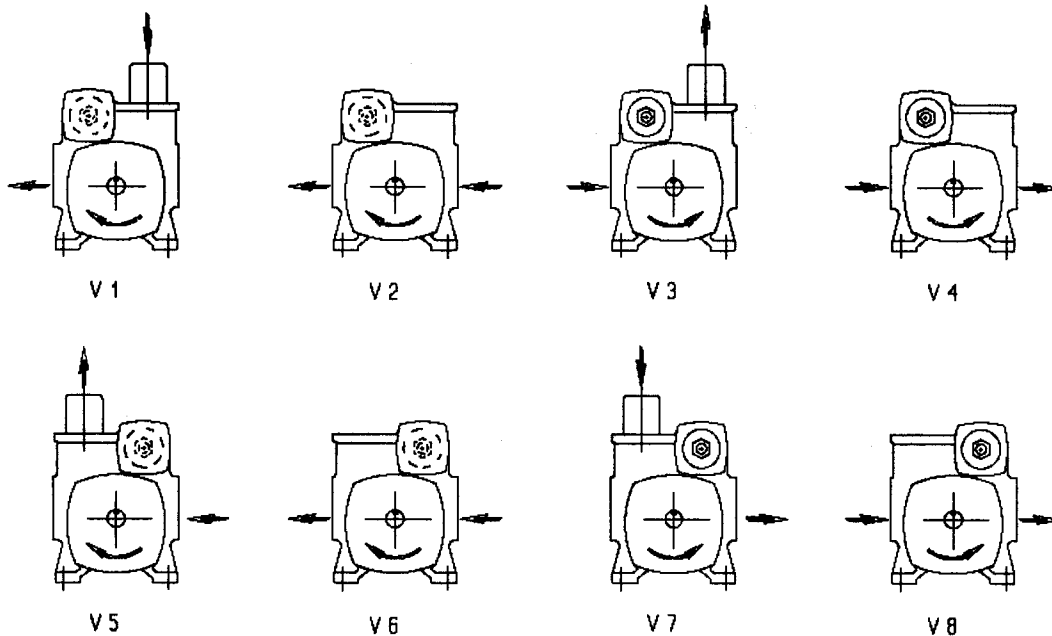


Figure 6. Porting Configurations V35.

SECTION IV - MAINTENANCE

IV-A SPARE PARTS

PRIOR TO ANY DISASSEMBLY OR SERVICE VERIFY THAT ALL REQUIREMENTS OF STATUTORY REGULATIONS OR CODES ARE MET AND THAT SPECIFIC SITE REQUIREMENTS ETC. ARE SATISFIED.

Some inspections and maintenance tasks, 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. The following instructions regarding disassembly/reassembly are relative to major maintenance.

1. When ordering spare parts, to ensure a minimum of delay and correct replacement to original specification, always quote the pump Serial Number which is located on the nameplate of the pump.
2. Advise the name, Cat # and quantity required. Refer to Drg No. AV35-05
3. Advise order number, sales tax exemption (if applicable) and complete delivery instructions, transportation, etc.

IV-B PREPARATION FOR DISASSEMBLY

1. Obtain the appropriate Work Permit if required.

2. Isolate the pump from liquids in suction and discharge lines, depressurise and purge out any toxic, flammable, corrosive or air hardening liquids.
3. Isolate power supply to motor.
4. Note pump and bypass valve orientation relative to direction of pump rotation.
5. Disconnect porting connections.
6. Remove pump from installation.

IV-C DISASSEMBLY

Note: Items required to aid Disassembly/Reassembly

- a) Two 1/2" B.S.W. x 2" setscrews
- b) Two 1/4" B.S.W. x 3" bolts
- c) Four 5/8" B.S.W. x 1" setscrews

CAUTION: TAKE CARE NOT TO DAMAGE COMPONENTS BY PRISING OR LEVERING IN ORDER TO RELEASE FITS.

Section I - Bypass Valve

1. Unlock Locknut, remove Adjusting Screw, Locknut and Spring Washer from Bypass Valve Cover. 2. Remove Bypass Valve Cover and 'O' Ring together with Valve Spring and Retaining Washer with its 'O' Ring.
3. Remove Valve Spring, Retaining Washer and 'O' Rings from Cover.
4. Remove Cartridge and 'O' Ring together with Valve.
5. Remove 'O' Ring and Valve from Cartridge.

Section II - Pump

6. Remove Pump Coupling half from Shaft.
7. Remove Inspection End Bearing Housing Cover.
8. Release Bearing Clamp Bolt.
9. Withdraw Inspection End Bearing Housing complete with Ball Bearing, Seal Seat, spacer and 'O' Ring, by extracting with two 1/2" B.S.W x 2" setscrews in tappings provided.

10. Remove Body 'O' Ring.
11. Remove Seal Seat and 'O' Ring from Housing.
12. Remove Ball Bearing from Housing.
13. Release two Grubscrews on seal sleeve at least 1-1/2 turns.

Note: Grubscrews lock into a location groove in the Shaft and must be backed off to eliminate the possibility of causing severe damage by scoring the Shaft upon withdrawal of Seal Sleeve.

14. Withdraw Rotary Seal Face and Seal Sleeve assembly.
15. Withdraw Inspection End Wearplate complete with location pin, using two 1/4" B.S.W. x 3" bolts in tappings provided.

CAUTION: Do not remove Vanes at this stage as Pushrods will slide out and catch in Liner porting.

16. Remove Drive End Bearing Housing Cover, complete with Lip Seal.
 17. Remove Lip Seal from Drive End Bearing Housing Cover.
 18. Withdraw Pump Drive End Assembly, comprising Bearing Housing complete with Bearing, Mechanical Seal and Rotor/Shaft assemblies, by extracting with two 1/2" B.S.W. x 2" set screws in tappings provided, until fit is released.
 19. Remove Pump Drive End Assembly cradling Vanes in Rotor. Note orientation of Vanes in relation to pump rotation then remove Vanes and Pushrods from Rotor.
 20. Release Bearing Clamp Bolt.
 21. Using a suitable puller withdraw Drive End Bearing Housing and 'O' Ring, complete with Ball Bearing, spacer and Seal Seat from Shaft.
- Note: Mechanical Seal is captive between Wearplate and Bearing Housing and locked to Shaft.
22. Remove Body 'O' Ring.
 23. Remove Seal Seat and 'O' Ring from Housing.
 24. Remove Ball Bearing from Housing.
 25. Release two Grubscrews on Seal Sleeve at least 1-1/2 turns.

Note: Ensure Grubscrews clear Shaft as before. (Refer step 14)

26. Withdraw Rotary Seal Face and Seal Sleeve assembly.

27. Remove Drive End Wearplate complete with location pin.

28. If required remove Liner from Body. Note orientation of suction porting.

29. If required remove Port Blanking Plate and Gasket.

IV-D INSPECTION

1. Inspect Rotor/Shaft assembly and Liner. If damage or excessive wear is evident, it is recommended to replace both components. Note: The Rotor is a shrink fit on the Shaft and is pinned for positive axial location.

2. Inspect Vanes for wear or damage - Refer Table I.

3. Inspect Vane Pushrods for wear,damage and straightness. Replace as required

4. Inspect both Mechanical Seals. Replace worn or damaged components.

5. Inspect both Wearplates and Spacers for damage or excessive wear. Replace as required. Note: Wearplates can be reversed.

6. Inspect Bypass Valve assembly and components for wear or damage. Replace or refurbish as required.

7. It is recommended that all 'O' Rings and the Lip Seal be replaced at every overhaul.

8. Inspect both Ball Bearings for wear. It is recommended on major overhauls that Ball Bearings be replaced.

TABLE I

STANDARD GENERAL CLEARANCES AND SIZES FOR TEMPERATURES 0° - 100°C
(All dimensions are in millimetres)

Clearance	V30	V35
Radial rotor to liner clearance, measured at 12 o'clock position	0.025 - 0.05 mm	0.025 - 0.05 mm
Total axial clearance, liner minus rotor length measured along axis	0.18 - 0.25 mm	0.20 - 0.30 mm
Total vane clearance, liner length minus vane length	0.15 - 0.20 mm	0.18 -0.25 mm
Standard vane height	35.8 - 35.81 mm	35.8 - 35.81 mm
Maximum wear on vane height	4.0 mm	4.0 mm

Notes:

1. Dimensions stated are design parameters.

2. High suction lift capability and optimum performance are achieved when the pump is maintained within these dimensions, however adequate performance may still be achieved with clearances and dimensions outside those stated if application parameters allow.

3. If installing new vanes or liner, check their lengths to comply with the clearances as stated.

IV-E REASSEMBLY - PRELIMINARY

(Refer Drawing No. AV35-05)

1. Ensure all parts are clean and free from sharp edges, burrs etc.

2. Lightly smear all 'O' Rings and lapped faces of Mechanical Seals with a compatible good quality lubricant before assembling.

3. Ensure correct orientation of components:

Bypass valve:

For clockwise pump rotation, Adjusting Screw position is opposite drive end.

For anti-clockwise pump rotation, Adjusting Screw position is at drive end.

4. Lap Bypass Valve (408) into seat of Cartridge (407). Ensure no residue remains on components after lapping.

5. Fit Location Pin (110) to each Wearplate (107) so that an equal length protrudes from both sides.

6. Assemble both Mechanical Seals' Rotary Seal Face (504) to Seal Sleeve (502) as follows:

(a) Fit two 'O' Rings (508, 509) to each Seal Sleeve.

(b) Place a dab of grease on each of the six Springs (505) and fit into the locating holes in the Seal Sleeve.

(c) Position the Rotary Seal Face on the Seal Sleeve, ensuring the ends of the six Springs locate in the mating holes in the Seal Face and the three Drive Pins locate correctly.

(d) Check that the Rotary Seal Face is free to follow axially by spring pressure when fitted to the Shaft, by compressing the Seal Sleeve and Rotary Seal Face by hand.

7. Press fit Lip Seal (513) into Drive End Cover (201) ensuring the sealing lip faces inwards.

8. To facilitate centralising of the rotor between the wearplates, soft paper shims (e.g. tissue paper) 0,10mm thick, may be fitted against the ends of the rotor.

IV-F REASSEMBLY Section I - Pump

1. Place Rotor/Shaft Assembly (102) on workbench and support so that Shaft is vertical with drive end facing upwards.

2. Position Wearplate (107), fitted with Location Pin (110) onto Shaft above Rotor.

3. Apply a medium strength thread locking adhesive to both Seal Grubscrews and position in Seal Sleeve (502).

4. Push Seal Sub-assembly (502,504) over drive end of Shaft, locating so that Grubscrews will

engage the Shaft location groove. Lock Grubscrews onto Shaft.

5. Fit 'O' Ring (510) to Seal Seat (503) and fit this assembly into Drive End Bearing Housing (200).

CAUTION: TAKE CARE NOT TO DAMAGE CARBON SEAT.

6. Carefully position Drive End Bearing Housing with Seal Seat over end of Shaft, so that Location Pin (110) in Wearplate (107) engages locating hole in Bearing Housing.

CAUTION: CARE MUST BE TAKEN NOT TO DAMAGE MECHANICAL SEAL FACES.

7. Fit Spacer (205) to Shaft and locate against shoulder, with chamfer facing downwards (towards Rotor).

8. Ensure Bearing Clamp Bolt Assembly (600) is in position.

9. Fit Bearing (204) into Housing via pressure applied to inner ring of Ballrace until it locates against Spacer.

10. Lock Bearing Clamp Bolt Assembly (600).

11. Fit Liner (101) to Body (100) with bleed hole to pump discharge and thick section to bottom of pump. Refer Fig.7. Leave Liner protruding about 10mm from drive end. With cast "S" towards suction port.

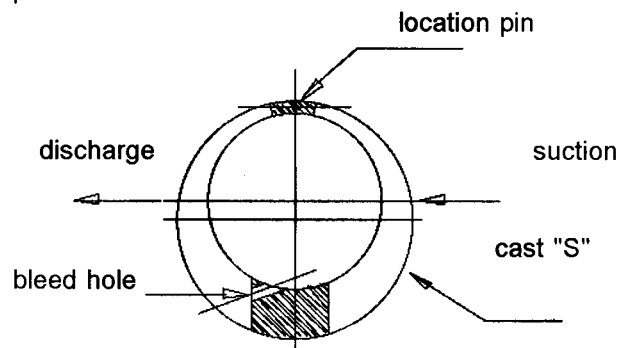


Figure 7

12. Locate Pump Body upside down on work bench and support horizontally in this position. (i.e. with Bypass Valve Body below pump foot.)

13. Fit 'O' Ring (515) to Bearing Housing (200).

14. Fit three Vane Pushrods (115) and six Vanes (111) to Rotor as follows:

Note: THE HYDRAULIC RELIEF SLOTS IN VANE MUST LEAD THE DIRECTION OF ROTATION AND VANE PLATES MUST FACE THE PUSHRODS. (Refer Fig. 8)

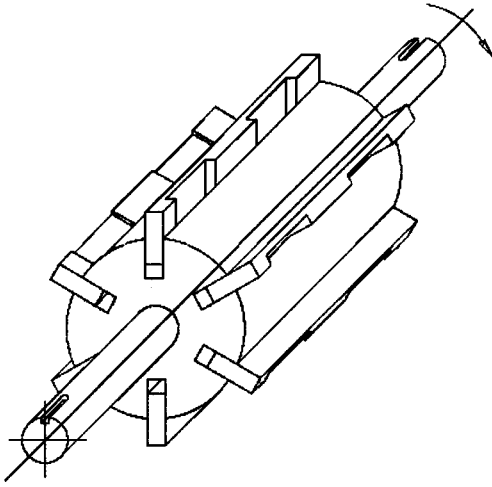


Figure 8

With the Shaft in the horizontal insert three Vanes to top slots of Rotor. Turn Rotor 180 degrees whilst supporting Vanes in the Rotor. Now insert three Pushrods followed by the other three Vanes.

15. Cradling by hand the Vanes in the Rotor, insert the Pump Drive End Assembly into the protruding end of the Liner. Once the Vanes are partially engaged in the Liner bore, rotate Bearing Housing to ensure Location Pin in Wearplate will engage location hole in Liner and push assembly home.

16. Fasten Bearing Housing in position using two 5/8" B.S.W. x 25mm setscrews.

17. Install Inspection End Wearplate so that Location Pin (110) engages location pin hole in Liner, facilitated by using two 1/4" B.S.W. x 75mm bolts in tappings provided. Remove bolts.

18. Apply a medium strength thread locking adhesive to both seal Grubscrews and position in Seal Sleeve (502).

19. Push Seal Sub-assembly (502,504) over Shaft, locating so that Grubscrews will engage the shaft location groove. Lock Grubscrews onto Shaft.

20. Fit 'O' Ring (510) to Seal Seat (503) and fit this assembly into Inspection End Bearing Housing (300). CAUTION: TAKE CARE NOT TO DAMAGE CARBON SEAT.

21. Fit 'O' Ring (515) to Inspection End Bearing Housing.

22. Carefully position Inspection End Bearing Housing with Seal Seat over end of Shaft, so that Location Pin (110) in Wearplate (107) engages

locating hole in Bearing Housing. CAUTION: TAKE CARE NOT TO DAMAGE MECHANICAL SEAL FACES.

23. Fasten Bearing Housing in position using two 5/8" B.S.W. x 25mm setscrews.

24. Fit Spacer (305) to Shaft and locate against shoulder, with chamfer facing inwards (towards Rotor).

25. Ensure Bearing Clamp Bolt Assembly (600) is in position.

26. Fit Bearing (304) into Housing via pressure applied to inner ring of Ballrace until it locates against Spacer. Ensure rotor is centralised.

27. Lock Bearing Clamp Bolt Assembly (600).

28. Rotate Shaft and check pump for binding.

29. Remove the two 5/8" B.S.W. setscrews from Inspection End Bearing Housing (300) and fit Cover (301) to Housing.

30. Remove the two 5/8" B.S.W. setscrews from Drive End Bearing Housing and fit Drive End Cover to Bearing Housing, taking care not to damage Lip Seal (513) on keyway edges.

31. Check pump for freedom of rotation.

32. Turn pump over to locate on base.

33. If required fit Port Blanking Plate (604) with Gasket (605) to Body.

34. Refit pump Coupling Half, lock grub screw with medium strength thread locking adhesive.

Section II-Bypass Valve

Note: Ensure correct orientation with reference to pump rotation.

1. Fit 'O' Ring (516) to Cartridge (407).

2. Position Bypass Valve (408) in Cartridge.

3. Fit Cartridge Assembly into Body (100).

4. Fit Retaining Washer 'O' Ring (517) and Cover 'O' Ring (516) to Cover (400)

5. Lubricate bore and slide Retaining Washer (416) over 'O' Ring (517) onto Cover and check for freedom of movement.

6. Position Spring (415) over Retaining Washer (416).

For increased bypass pressure, rotate Adjusting Screw in clockwise direction (i.e. screw in).

7. Fit Cover Assembly to Body so that end of Spring locates on top of Valve (408).

For decreased bypass pressure, rotate Adjusting Screw anticlockwise (i.e. screw out). Always lock locknut (402) after any adjustment is made and rewire seal if required.

8. Fit Adjusting Screw (401) with Locknut (402) and Spring Washer to Cover.

9. Fit two plugs to top of body (100) (gauge tappings) with an approved thread sealant.

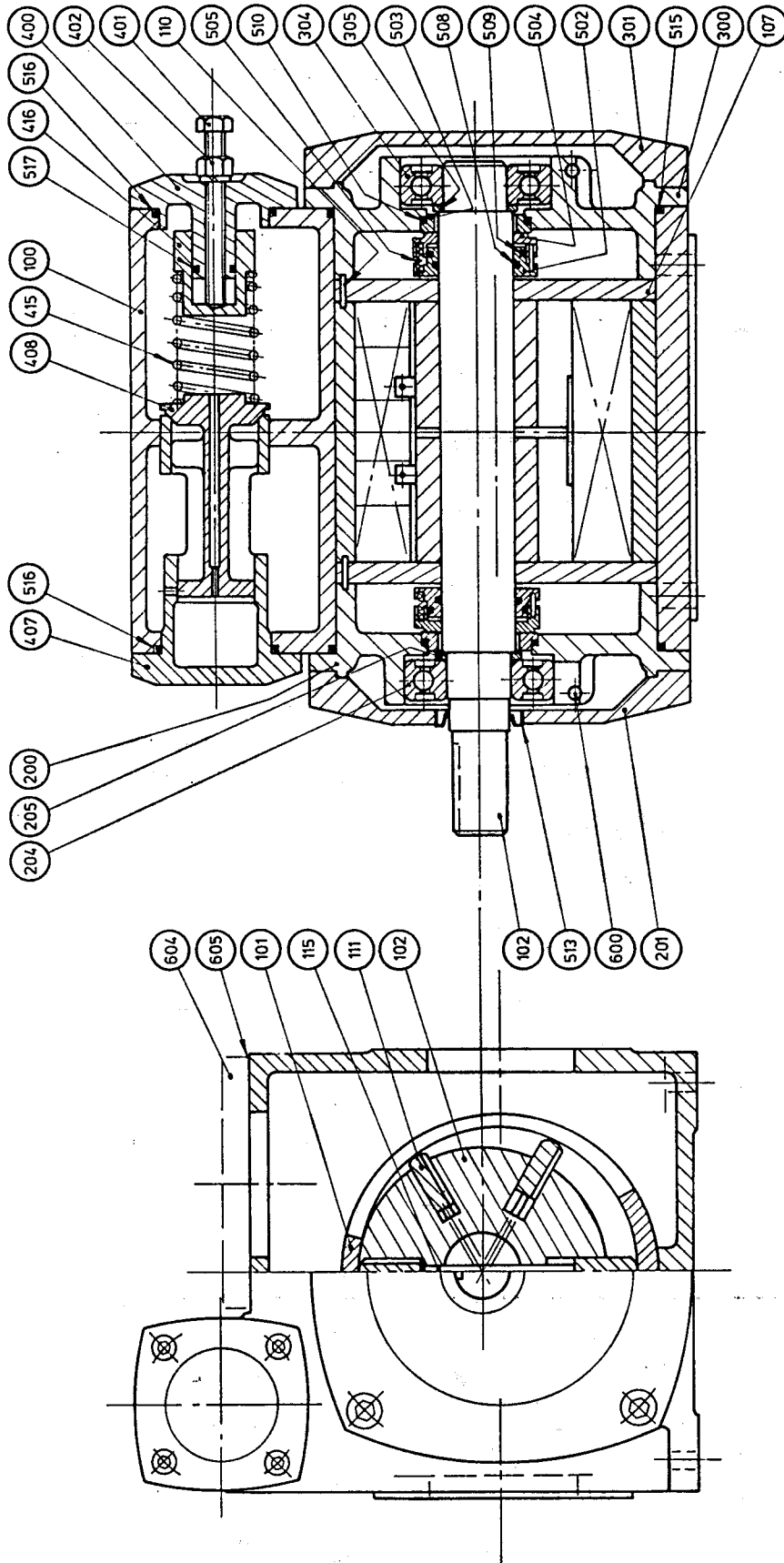
Note: The Bypass Valve will require setting when the pump is recommissioned. - DO NOT EXCEED ORIGINAL SETTING OR SYSTEM DESIGN PRESSURE.

SECTION V - PARTS DESIGNATION

EBSRAY MODELS: V30 and V35 Type 23 or Type 24 Rotary Sliding Vane pumps.

Note: Reference to Dwg AV35-05 enables part identification for both models.

ITEM No.	DESCRIPTION	QUANTITY
100	Body	1
101	Liner	1
102	Rotor/Shaft Assembly	1
107	Wearplate	2
110	Location Pin - Liner/Wearplate	2
111	Vane	6
115	Vane Push Rod	3
200	Drive End Bearing Housing	1
201	Drive End Bearing Housing Cover	1
204	Drive End Bearing	1
205	Spacer-Drive End Bearing	1
300	Inspection End Bearing Housing	1
301	Inspection End Bearing Housing Cover	1
304	Inspection End Bearing	1
305	Spacer - Inspection End Bearing	1
400	Cover - Bypass Valve	1
401	Adjusting Screw - Bypass Valve	1
402	Locknut - Bypass Valve Adjusting Screw	1
407	Cartridge - Bypass Valve	1
408	Balanced Bypass Valve	1
415	Spring - Bypass Valve	1
416	Retaining Washer - Bypass Valve Spring	1
502	Seal Sleeve	2
503	Seal Seat	2
504	Rotary Seal Face	2
505	Spring - Mechanical Seal	2
508	'O' Ring Shaft	2
509	'O' Ring Seal Sleeve	2
510	'O' Ring Seal Seat	2
513	Lip Seal-Drive End Bearing Housing Cover	1
515	'O' Ring Body	2
516	'O' Ring Bypass Valve Cover	2
517	'O' Ring Bypass Valve Retaining Washer	1
600	Bearing Clamp Bolt Assembly	2
604	Port Blanking Plate - V35 only	1
605	Gasket - Port Blanking Plate - V35 only	1



EBSRAY PUMPS PTY LTD
PARTS DESIGNATION - MODEL V35
DRG N° AV35-05
10-2-87 DAH

SECTION VI - TROUBLE SHOOTING

VI-A FAILURE TO DELIVER LIQUID

1. Incorrect direction of rotation.
2. Suction filter/strainer blocked or leaking air.
3. Liquid too viscous.
4. No liquid in tank.
5. High static discharge on pump combined with air in suction pipe.
6. Valves closed or air leaks in suction system.
7. Excess internal clearances.

VI-B LOW OUTPUT

1. Pump speed too low.
2. Cavitation or vaporisation on suction side of pump.
3. Obstruction in suction or discharge pipe.
4. Air leakage in suction pipes or fittings.
5. Bypass valve setting too low - increase pressure by screwing in adjusting screw. DO NOT exceed system design pressure or overload driver.
6. Differential pressure higher than specified duty point.
7. Viscosity of liquid lower than specified duty point.
8. Pump parts worn - have pump reconditioned or replace worn parts.

VI-C EXCESSIVE POWER CONSUMPTION

1. Obstruction in discharge line.
2. Pump operating outside the specified duty point (i.e. high pressure or viscosity)
3. Rotating parts binding - disassemble pump and inspect.
4. Misalignment between pump and driver - check coupling and realign as required.
5. Inherent pipe stresses causing distortion of pump and casing - rectify and realign before reassembling.

6. Bearings worn - inspect and replace as required.

VI-D PUMP IS NOISY

1. Air leakage in suction piping.
2. Cavitation due to insufficient NPSH available i.e. suction conditions extreme - reduce suction losses.
3. Pump running dry - remove blockages in suction line/strainer.
4. Pump and driver misaligned - check coupling and realign as required.
5. Rotating elements binding or broken - disassemble and inspect.
6. Bearings worn - inspect and replace as required.

VI-E LEAKAGE

1. From covers and flanges:
 - a) Set screws not tight - retighten.
 - b) Damaged 'O' ring seals or gaskets - replace.
 - c) Check for thermal expansion of product when locked between valves either side of pump. Remove hydraulic lock potential.
2. From Mechanical Seal: (as evidenced by product leaking from 6 o'clock position drain hole between Bearing Housing and Bearing Housing Cover)
 - a) Mechanical seals incorrectly installed, worn or damaged - replace.
 - b) Misalignment between pump and driver causing excessive shaft distortion - check coupling and realign as required.
 - c) Worn or damaged shaft in seal zone - replace rotor/shaft.
 - d) Excess system pressure -
 - i) check for obstructions in discharge line.
 - ii) check for thermal expansion of product when locked between valves either side of pump. Remove hydraulic lock potential.