HMD KONTRO Sealless Pumps — Sundyne CORPORATION

MAINTENANCE INSTRUCTIONS FOR PUMP RANGE GS Frame 1

Separate Mounted

Close Coupled

Centreline Mounted

Standard Models

Quality Assured to ISO 9001 and BS5750 since 1985 for the Design, Manufacture and Repair of SEALLESS Pumps and Drives

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Issue. 1.4

Ref. GS1MI1202

European Union Machinery Directive
(CE Mark System)

(where applicable)

This document incorporates information relevant to the Machinery Directive 98/37/EC. It should be read prior to the use of any of our equipment. Individual maintenance manuals which also conform to the EU Directive should be read when dealing with specific models.

Disclaimer

HMD / Kontro SEALLESS Pumps manufactures sealless pumps to exacting International Quality Management System Standards (ISO 9001) as certified and audited by Lloyd's Register Quality Assurance Limited. Genuine parts and accessories have been specifically designed and tested for use with these products to ensure continued product quality and performance. As HMD / Kontro SEALLESS Pumps can not test all parts and accessories sourced from other vendors, incorrect design and/or fabrication of such parts and accessories may adversely affect the performance and safety features of these products. Failure to properly select, install or use authorised HMD / Kontro parts and accessories is considered misuse and damage or failure caused by misuse is not covered by HMD / Kontro's warranty. Additionally, modification of HMD / Kontro products or removal of original components may impair the safety of these products and their effective operation.

Pumps which are supplied for use in potentially explosive atmospheres (Certified EExd or EExde) are subject to third party test and certification. Use of components sourced from other vendors or re-engineered / re-manufactured will invalidate the third party certification and may result in product failure leading to damage to property and loss of life.

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Safety

The following safety precautions are to be taken in addition to safety procedures laid down by your company and do not supersede, change or absolve you from your statutory duties under government legislation. Our recommendations are based on our proven experience.

⚠ A pump that is not installed, operated or maintained in accordance with HMD/Kontro's recommendations may present a hazard.

⚠ Attention must be given to the safe handling of all items. This applies to both installation and maintenance. Safe lifting practices must be observed to ensure that personal injury or damage to pump components does not occur.

Note that lifting eyes fitted to individual pieces such as pump and motor are designed to lift only this part and not the complete assembly.

⚠ HMD / Kontro pumps contain high power magnets which may, in some circumstances, affect the operation of certain types of medical implants such as pacemakers. Extreme caution should be taken by wearers of these implants when in proximity to an HMD / Kontro Sealless Pump. The assembled pump presents no known problems, however certain internal components need to be treated with caution.

Before disassembling a pump all relevant and appropriate safety precautions must be taken.

SEEK ADVICE FROM YOUR SAFETY REPRESENTATIVE OR THE MANUFACTURER IF YOU HAVE ANY DOUBTS.

Should the pumps have been used to pump toxic or hazardous products ensure compliance with COSHH and/or applicable Health and Safety legislation.

Always isolate the pump electrically before dismantling. Ensure that the electrical switch gear cannot be operated during any work being carried out on the pump.

After the pump has come to a complete stop, isolate the pump by shutting off all valves controlling flow to and from the pump, and any other measures required.

All pumps returned to HMD / Kontro for factory servicing must have a decontamination certificate and the appropriate Health and Safety data sheets.

Care should be taken in assembling magnetic components due to their attraction with ferrous materials. Particular care should be exercised in assembling the inner and outer magnet ring due to the axial pull of the components. Where supplied jacking bolts should be used to prevent fingers from becoming trapped in the assembly.

Always wear adequate protective clothing and eye protection when dismantling pumps, during all process involving the use of power tools such as cleaning, grinding etc. and at all times during the assembly and disassembly of bearing components.

Introduction

This document details the maintenance procedures to be followed in servicing
GS Frame 1 Pumps, as detailed below:-

The GS range is a magnetically driven centrifugal pump family with end suction and top discharge nozzles. The GS range is available in, but not limited to the following standards (where applicable) :-

GSA	ANSI pumps to ANSI B73.1
GSI	ISO pumps to ISO BS/EN22858
GSP	API Pumps to API 610
GSX/H	HMD Specification

The GSA and GSI pumps are foot mounted designs whilst the GSP, GSX and GSH pumps are centreline mounted designs.

For HMD / Kontro guidance and recommendations covering pump foundation and
commissioning, refer to the separate Installation & Operating Instructions.

For further assistance call your nearest HMD/Kontro representative stating the pump serial number, or contact HMD or Kontro direct on :

HMD/KONTRO SEAL/LESS PUMPS
Telephone: 01323 452000 (UK) +44 (1323) 452000 (Int)
Facsimile: 01323 503369 (UK) +44 (1323) 503369 (Int)
email: pumps@hmdpumps.com

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This document must be read in conjunction with the Sectional Arrangement Drawing, Parts List, Installation Drawing and the Installation and Operating manual all contained in the Data Package supplied.

This symbol within the following sections signifies a helpful hint that will assist the user in maintaining the HMD/Kontro pump.

Instructions relevant to GSP/GSX/GSH pumps only are shown in italics.

Section 1 : Tools Required for Maintenance

	GSA / GSP / GSX / GSH	GSI
Spanners / Wrenches	7/16” A/F	10mm A/F
	1/2" A/F	13mm A/F
	3/4" A/F	19mm A/F
Socket Spanner / Wrench	9/16” A/F	
	1 1/2" A/F	38mm A/F
Hexagonal Key	3/16”	5mm
	1/4"	6mm
	7/32”	8mm
	5/16”	
	3/8”	
Torque Wrench	0-70 ft lbs	0-100 Nm
Soft Mallet	Yes	Yes
Bearing Press	Yes	Yes
Oven Suitable for 350°C (662°F)	Yes	Yes

Metal Blocks (75mm [3”] diameter x 25mm [1”] thick [Fig 27 & 29])
Puller or Pry Bar
Levers
Extension Arm
Dial Test Indicator

Note: A/F means across flats

Section 2 : Equivalent Terms

To assist in global understanding the following equivalent terminology is used:

Common Terminology	Also Known As	Common Terminology	Also Known As
Bearing Assembly	Power Frame	Separate Mounted	Long Coupled
Gasket	Joint	Support Gasket	Alignment Pad
Shroud	Containment Shell	Shroud Temperature Probe	Thermometer / RTD
Bush	Radial Bearing or Journal Bearing	Spanner	Wrench
Neck Ring	Wear Ring		

Section 3 : Units

Both Metric and equivalent US units are shown in this manual where appropriate. Conversion factors between units are :-

°C	to	°F	=	multiply by 1.8 & add 32
mm	to	inches	=	divide by 25.4
Nm	to	ftlbs	=	divide by 1.356
mls	to	US. floz	=	divide by 29.6

Section 4 : Engineering Data

Clearances & Endfloats

GS Pump :-

Component	**Diametral Clearance Max/Min**		**Wear Limits Recommended for Replacement**	
	(mm)	(inch)	(mm)	(inch)
Front Neck Ring (3”, 80mm, 65mm Suction)	0.70/0.50	0.027/0.020	1.16	0.046
Front Neck Ring (1.5”, 50mm Suction)	0.70/0.50	0.027/0.020	1.16	0.046
Back Neck Ring	0.70/0.60	0.027/0.023	1.16	0.046
Bump Ring/OMR	0.94/0.69	0.037/0.027	1.16	0.046
OMR/Shroud	2.11/1.43	0.083/0.056		
IMR/Shroud	1.89/1.03	0.074/0.040		
Sleeve/Bush	0.17/0.13	0.006/0.005	0.20	0.008
End Float	1.75/0.34	0.069/0.013	2.5	0.098

Table 1

The above table is for guidance only. Contact HMD/Kontro if different.

Bolt Torques

Ref.	**Component**	**Torque**	
		Nm	ftlbs
61.S42	Front Cap Retention Screws	16	12
61.S43	Back Cap Retention Screws	16	12
61.S51	Labyrinth Retention Screws	16	12
62.S41	Outer Magnet Ring Retention Screws	25	18
43.S49	Bearing Housing Retention Screws	16	12
45.S42	Motor Adaptor Retention Screws	16	12
20.S41	Shroud Retention Screws	12	9
02.03	Impeller Lock Nut	36	26
02.36	Inner Magnet Ring Retention Nut	110	80
20.S41	Bush Holder Retention Screws	16	12
41.N11	Casing Retention Nuts	85	63
41.50	Casing Drain Plug	30	22

Table 2

SECTION 5
DISASSEMBLY OF THE GS Frame 1 Pump

Refer to the Sectional/Parts List Drawing supplied with the separate data package. Component references indicated on sectional and parts list are contained in parentheses ( ) in this document.

5.01 Removal of Instrumentation

If a shroud temperature probe is installed, ensure that it is removed prior to disassembly to avoid damage when the Casing is withdrawn. - **Fig. 1**

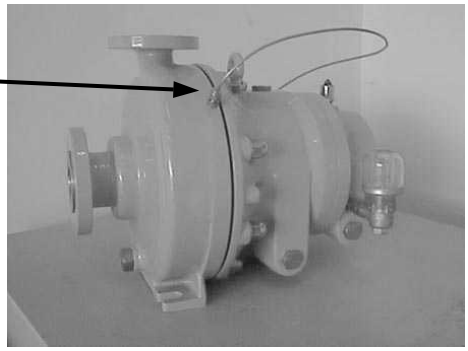


Fig. 1

5.02 Remove the Casing Retention Nuts (41.N11) and the Casing Retention Washers (41.W11). - **Fig. 2**

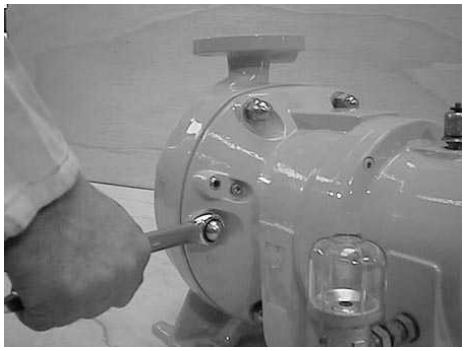


Fig. 2

5.03 Remove the Casing Assembly (41.41) (complete with external filter if fitted). If required use the jacking screws (43.S51) provided.

If Casing is to remain installed in pipework, unbolt mounting bolts and withdraw to clear the casing.

5.04 *GSP/X/H only. Remove Impeller Nut (02.03) and Impeller Washer (02.04) and remove Impeller (06.06) complete with front Thrust Washer (02.07) locking of impeller may be required. Remove front Thrust Washer (02.07) from back of Impeller.*

5.05 Remove the three Bush Holder Retention Screws (20.S41) located behind the Impeller (06.06). - **Fig. 3**

NOTE: Some impellers have flats to allow access to Bush Holder retention screws.

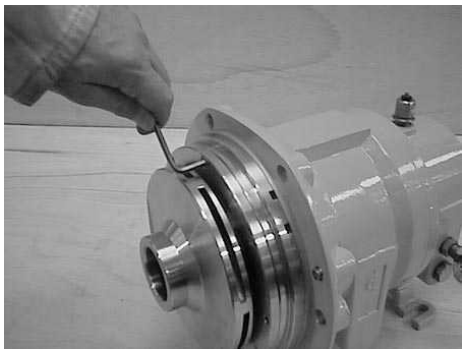


Fig. 3

5.06 Slide out the internal rotating assembly from the Shroud (20.20). Some physical effort is required to overcome the attraction of the Inner and Outer Magnet Rings (37.37 and 51.51). - **Fig. 4**

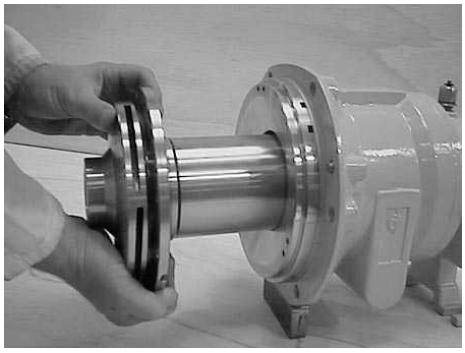


Fig. 4

5.07 Straighten the Inner Magnet Ring (IMR) Tab Washer (02.05) and remove IMR Nut (02.36) - **Fig. 5**

Note: It is a left hand thread, and should be undone in the clockwise direction. Remove the Inner Magnet Ring. Care must be taken to ensure that the Back Thrust Washer (08.08) does not drop out.

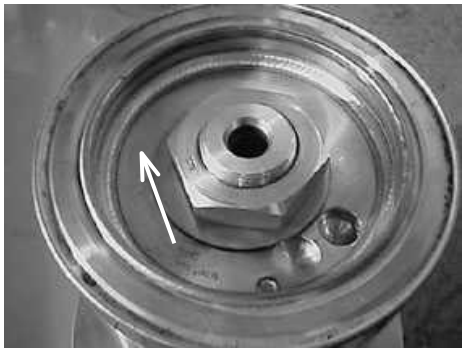


Fig. 5

Do not hold or clamp IMR as this will cause permanent damage.

5.08 Remove Back Thrust Washer (08.08) and its support gasket (08.39) from inside the Inner Magnet Ring (37.37). - **Fig. 6**

Fig. 6

Removal of back thrust washer can be assisted by using a compressed air line and blowing around the edge of the washer to lift off from seat. Removal by force will cause damage to IMR (37.37) location.

5.09 Slide Shaft Assembly from Bush Holder (09.09). - **Fig. 7**

Fig. 7

5.10 Remove the rear Sleeve (02.86) and two 'O' Rings (02.OR1) from their grooves on the Shaft. - **Fig. 8**

Fig. 8

Rear sleeve is best removed using a twisting action.

5.11 Remove the Sleeve Spacer (02.69) and remove the Front Sleeve as 5.10 (02.86), and remove the two 'O' Rings (02.OR1) from their grooves. Remove Front Thrust Washer (02.07) from its location behind the Impeller (06.06).- **Fig. 9**

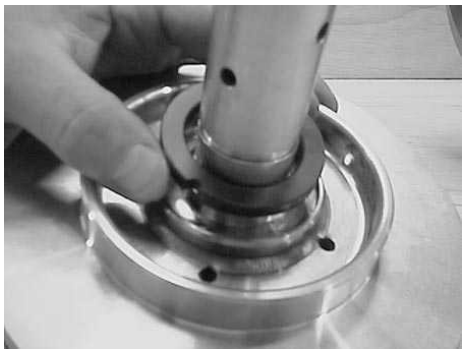


Fig 9

Removal of Front Thrust Washer can be assisted by using a compressed air line and blowing around the edge of the washer to lift off from seat. Removal by force will cause damage to Impeller (06.06) location.

Fig. 9A shows the disassembled Impeller Shaft assembly

Note: Sleeve Spacer not fitted on GSP/X/H.

Fig. 9A

If INsight or thermal ribbon RTD sensors are installed, refer to the Insight or RTD instruction manuals before removing the shroud. Failure to do so will damage the sensor.

5.12 Remove the two Shroud Retention Screws (20.S42). - **Fig. 10**

5.13 Remove Shroud (20.20) from the Coupling Housing (43.43)

Fig. 10

Separate Mounted Pumps - For Close Coupled See Pages 9-10

Drain oil from Bearing Assembly by removing drain plug (61.50). **Fig. 11**

5.14 Remove the five Bearing Housing Retention Screws (43.S49). **Fig. 11**

GSP/X/H only. Remove the Bearing Retention Nuts and Washers (43.N13 and 43.W14).

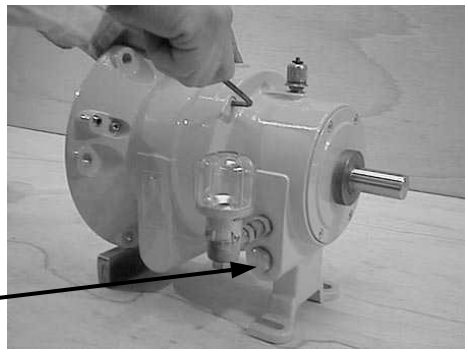


Fig. 11

5.15 Remove the Bearing Assembly (61.61) complete with the Outer Magnet Ring (OMR) (51.51) from the Coupling Housing (43.43) - **Fig. 12**

Note: Jacking Screws (61.S52) are provided if required.

GSP/X/H only. The Bump Ring (51.44) is fitted onto the OMR.

Fig. 12

5.16 Hold Drive Shaft (62.62) vertically in vice using soft jaws with OMR facing upwards. Remove the outer magnet ring retention screw (62.S41) - **Fig. 13**

Hold Drive Shaft (62.62) vertically in vice using soft jaws with OMR facing upwards. Remove the outer magnet ring retention screw (62.S41) - **Fig. 13**

Using levers gently loosen from location and remove outer magnet ring (51.51). Care must be taken not to damage machined surfaces.

GSP/X/H only. Release tab washer and remove screw (62.S11 and 62.W11).

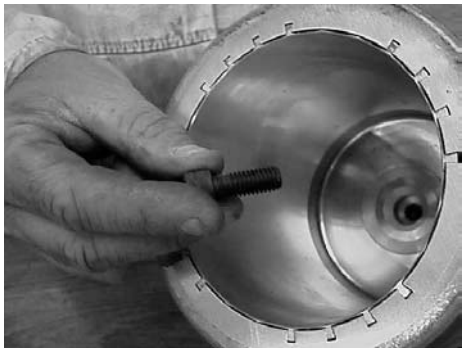


Fig 13

5.17 Remove the four Front Cap Retention Screws (61.S42) and remove the Front Cap (61.67). - **Fig. 14**

Note Jacking holes are provided

5.18 Remove Front Oil Thrower (61.75).

5.19 Remove from vice and remove the Drive Shaft key. (62.K31)

Fig. 14

5.20 Remove the Back Cap Retention Screws (61.S43) and Back Cap (61.68).

Note Jacking Screws (61.S54) are provided (if required). If necessary, press the Outer Labyrinth Seal (61.70B) from the Back Cap

5.21 Remove the Labyrinth Seal Retention Screw (61.S51) and remove the Inner Labyrinth Seal (61.70A). - **Fig. 15**

5.22 *GSP/X/H only. Straighten Drive Shaft Washer (62.63) and remove nut and washer.*

5.23 Using a soft mallet, gently strike the Key Way end of the Drive Shaft (62.62) until it comes out of the Bearing Assembly (61.61).

5.24 Press Ball Race (62.BB1) from Drive Shaft (62.62). - **Fig. 16**
Remove Ball Race (62.BB1) from Bearing Housing (61.61).

5.25 Clean all the dismantled components and examine for wear or damage, any component found to be worn or damaged should be replaced with genuine spares purchased from HMD/Kontro Sealless Pumps or their authorised representatives. Replace all joints.

Fig. 15

Fig. 16

Close Coupled Pumps

5.26 Remove the Motor Adaptor Retention Screws (43.S42) from the Coupling Housing and remove the Electric Motor complete with the Outer Magnet Ring (51.51) and Motor Adaptor Assembly (45.45). - **Fig. 17**

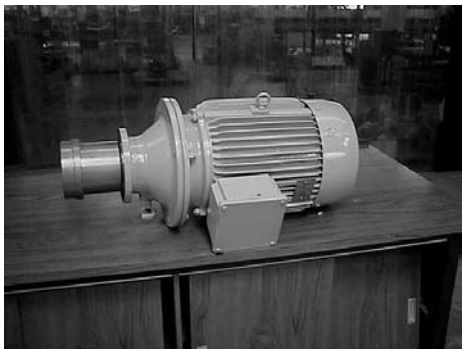


Fig. 17

5.27 Remove the Outer Magnet Ring retention screw (62.S41) - **Fig. 18**

Fig. 18

5.28 Using levers gently loosen from location and remove Outer Magnet Ring (51.51). Care must be taken not to damage machined surfaces. **Fig. 19**

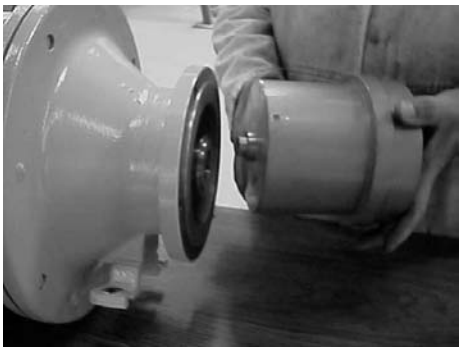


Fig. 19

5.29 Remove the Motor retention fasteners (45.S42) and separate the Motor Adaptor (45.45) from the motor. - **Fig. 20**

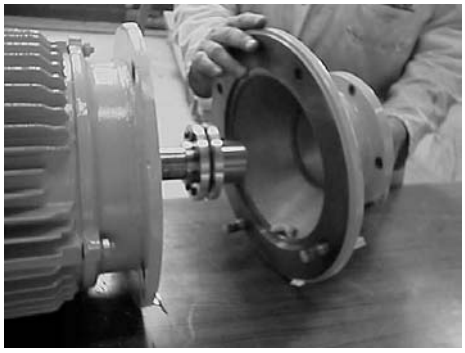


Fig. 20

5.30 Progressively loosen all the bolts on the Shrink Disc Coupling. (52.82) to avoid distortion. - **Fig. 21**

Fig. 21

5.31 Slide the Shrink Disc Coupling (52.82) off the Drive Adaptor (52.52) towards the motor. - **Fig. 22**

Fig. 22

5.32 Slide the Drive Adaptor (52.52) from the motor shaft and remove the Shrink Disc Coupling (52.82). - **Fig. 23**

If Drive Adaptor is tight on shaft, gently lever off.

Fig. 23

5.33 Photograph showing the Close Coupled drive components disassembled. **- Fig. 24**

5.34 Clean all the dismantled components and examine for wear or damage, any component found to be worn or damaged should be replaced with genuine spares purchased from HMD / Kontro Sealless Pumps or their authorised representatives.

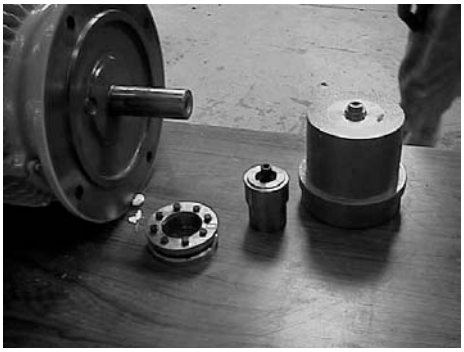


Fig. 24

Section 6
Recommended Procedure for Replacement of Bushes and Thrust Pads

Please ensure that you conform to safe working practices.

Guard against the combustion of product residue on the component.
Wear eye protection to guard against the fracturing of Carbon and Silicon Carbide Bushes and Thrust Pads.
Wear suitable protective clothing and gloves while handling hot components.

6.01 It is strongly recommended that all Bushes and Thrust Pads are replaced before the pump is reassembled, if damaged or beyond wear limits given on page 3.

Removal

6.02 If Bushes are pinned, remove the pins prior to heating the Bush Holder. Remove existing Thrust Pad (09.13) and Bushes (09.10 & 09.10A) by heating the Bush Holder (09.09) in an oven at 350°C (662oF) for approximately 30 minutes. At this point the Bushes and Thrust Pad must be immediately removed.

Fitting

Clean mating bores and faces thoroughly prior to fitting of replacement parts. Use a non mechanical cleaning method. Note: Metal blocks will be required, refer to Section 1 (Page 2) Tool Requirements.

6.03 For new Bushes (09.10 & 09.10A) and the Back Thrust Pad (09.13) place them into an oven and hold within 50°C (122OF) of the bush holder temperature and maintain for approximately 30 minutes, prior to fitting into the Bush Holder. This is not required for Carbon Bushes. Metal blocks should also be preheated to prevent cracking of the Bush and Thrust Pad.

6.04 Stand the clean Bush Holder (09.09) vertical with the Flange uppermost in an oven and heat to 300°C (572oF). - **Fig. 25**

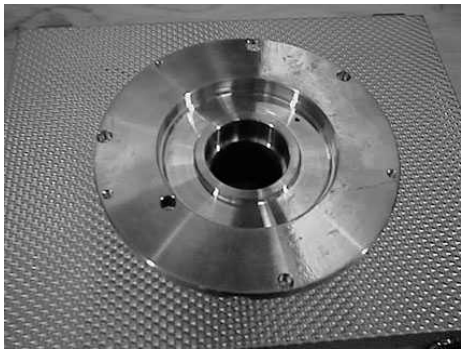


Fig. 25

6.05 Take the first Bush (09.10) and insert into Bush Holder (09.09). Ensure that the flow grooves are correctly positioned. - **Fig. 26 & 26A**

Fig. 26

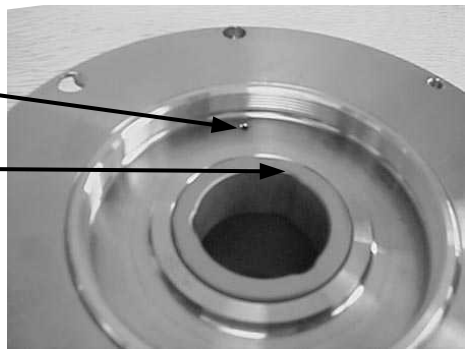


Fig. 26A

6.06 Allow the Bush Holder (09.09) to cool to approximately 100°C (212oF). Replace the Bush Holder (09.09) in oven with the flange downwards. To ensure that the front Bush does not fall out, it should be held in place by resting on a metal block as shown. - **Fig. 27**

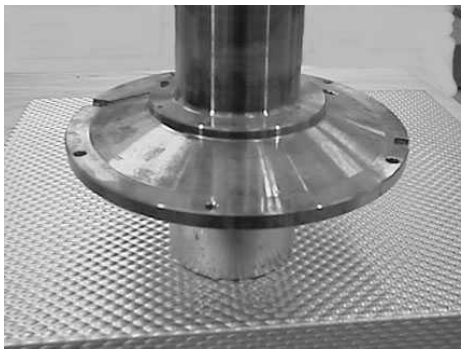


Fig. 27

6.07 Heat the Bush Holder (09.09) to 300°C (572oF) remove from oven with the block holding in Front Bush, now insert the Back Bush (09.10A) ensuring that it is fully seated and the flow grooves are aligned with the Front Bush flow grooves. Insert the Thrust Pad (09.13) ensuring that it is fully seated and that the flow grooves face outwards. - **Fig. 28**

Note: Bush Holder must still rest on the metal block as shown in **Fig. 27**

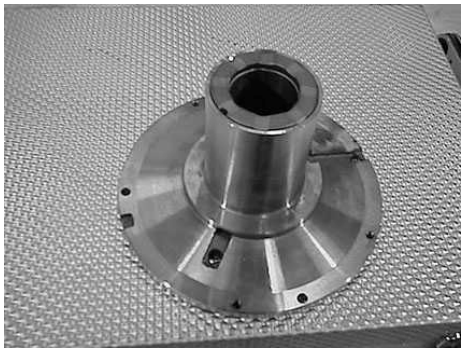


Fig. 28

6.08 Allow the Bush Holder to cool in the vertical position as shown in **Fig. 29**. Do not attempt to accelerate the cooling process. Metal block on top must be approx 1kg (2.2lb). When cool, visually inspect for correct Bush and Thrust pad seating and for any signs of damage.

6.09 If Bushes are carbon, using existing cross holes in Bush Holder, drill through Bushes with a 5.6mm (7/32") diameter drill, and fit new pins (09.49).

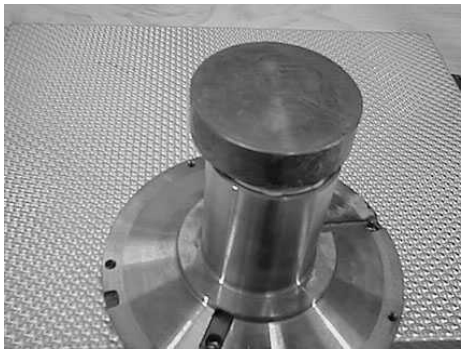


Fig. 29

Section 7
Neck Ring and Impeller Wear Ring Replacement

Removal

7.01 Neck Rings (41.01 & 09.01A) are retained by an interference fit and can be removed from their locations by using a suitable puller or pry bar. - **Fig. 30**

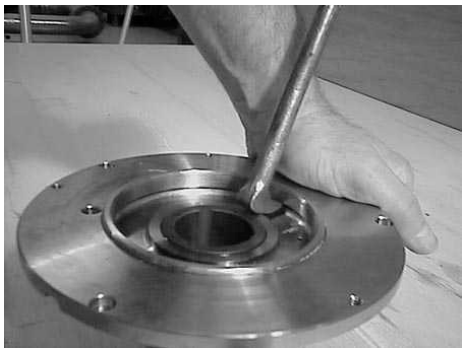


Fig. 30

Note that if Neck Rings are pinned, the pins should be removed first, prior to removing the Neck Rings.

7.02 *GSP only. Impeller Wear Rings (06.84 and 06.84A) are retained by an interference fit and also by three pins (06.49, 06.49A). These rings must be removed by machining.*

Fitting

7.03 Neck Rings (41.01 & 09.01A) should be fitted using a soft drift until they seat against their shoulder. - **Fig. 31**

Fig. 31

Note that the leading edge of the Neck Ring has a chamfer.

Note that the Neck Rings are pinned (where necessary) by milling a 3mm (0.118”) diameter hole by 13mm (0.5”) deep in three equi-spaced locations at the interface diameter of the Neck Rings and holder. Fit new Pins (41.49 & 09.49A) and check for distortion of the Neck Ring bores after pinning and remachine as necessary to dimensions shown in **Table 3**.

7.04 Impeller Wear Rings (06.84 & 06.84A) are fitted by heating them to approximately 1500C (2720F) and locating onto the Impeller (06.06) hubs. Once the Rings are cool, drill three holes in each Ring as 7.03. Fit new Pins (06.49 & 06.49A), and machine the Wear Rings to the finished sizes shown in **Table 4**.

Neck Ring Location Bore

Pump Size **GSA/IX/H**	Casing Inch mm	Bush Holder Inch mm
1.5x1x6 (H) / 50x32x160 (H)	3.190 / 3.189 81.035 / 81.000	4.805 / 4.803 122.040 / 122.000
3x1.5x6 (H) / 65x50x160 (H)	4.017 / 4.016 102.035 / 102.000	4.805 / 4.803 122.040 / 122.000
3x2x6 (H) / 80x65x160 (H)	4.017 / 4.016 102.035 / 102.000	4.805 / 4.803 122.040 / 122.000
1.5x1x8(H) / 50x32x200 (H)	4.017 / 4.016 81.035 / 81.000	4.805 / 4.803 122.040 / 122.000
3x1.5x8 (H) / 65x40x200 (H)	3.190 / 3.189 102.035 / 102.000	4.805 / 4.803 122.040 / 122.000
80x50x200 (H)	102.035 / 102.000	122.040 / 122.000

Pump Size **GSP**	Casing Inch mm	Bush Holder Inch mm
1.5x1x6 (H)	3.584 / 3.583 91.035 / 91.000	4.805 / 4.803 122.040 / 122.000
3x1.5x6 (H)	4.411 / 4.409 112.035 / 112.000	4.805 / 4.803 122.040 / 122.000
3x2x6 (H)	4.411 / 4.409 112.035 / 112.000	4.805 / 4.803 122.040 / 122.000
1.5x1x8 (H)	3.584 / 3.583 91.035 / 91.000	4.805 / 4.803 122.040 / 122.000
3x1.5x8 (H)	4.411 / 4.409 112.035 / 112.000	4.805 / 4.803 122.040 / 122.000

Table 3

Finished Machined Impeller Wear Ring Outer Diameter

Pump Size GSP	Wear Ring Inch mm	Wear Ring Inch mm
1.5x1x6 (H)	3.559 / 3.557 90.435 / 90.300	4.779 / 4.778 121.440 / 121.300
3x1.5x6 (H)	4.385 / 4.384 111.435 / 111.300	4.779 / 4.778 121.440 / 121.300
3x2x6 (H)	4.385 / 4.384 111.435 / 111.300	4.779 / 4.778 121.440 / 121.300
1.5x1x8 (H)	3.559 / 3.557 90.435 / 90.300	4.779 / 4.778 121.440 / 121.300
3x1.5x8 (H)	4.385 / 4.384 111.435 / 111.300	4.779 / 4.778 121.440 / 121.300

Table 4

SECTION 8
ASSEMBLY INSTRUCTIONS

Ensure all the Pump Components have been cleaned and are in an "as new" condition before assembly. The assembly should be carried out in a clean, dry area.

Separate Mounted Pumps

8.01 Install the Front Ball Race (62.BB1) to the drive shaft by either pressing or pre-heating the race. Ensure it is seated against the location shoulder on the shaft (62.62). - **Fig. 32**

Fig. 32

8.02 Insert the Drive Shaft (62.62) into the Bearing Housing (61.61) and gently tap or press the Outer Ball Race of Bearing until it is seated against the location shoulder in the Bearing Housing (61.61). - **Fig. 33**

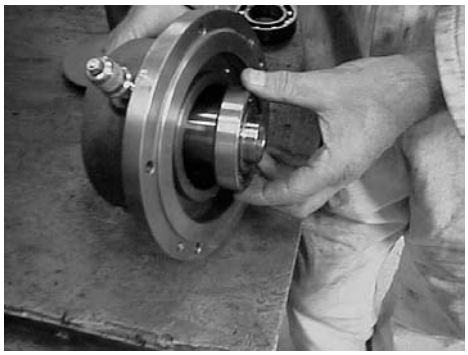


Fig. 33

8.03 Place the Rear Ball Race (62.BB1) on to the Drive Shaft (62.62) and into the Bearing Housing (61.61). - **Fig. 34**

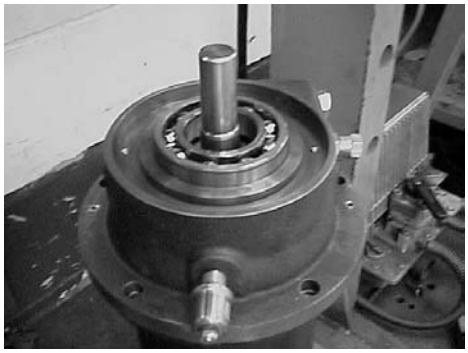


Fig. 34

8.04 Drive Shaft and Rear Race Assembly can be located on Bearing Housing shoulder by use of a press. - **Fig. 35**

GSP/X/H only. To lock nut, fit Drive Shaft Washer (62.64) and Drive Shaft Nut (62.63) to the Drive Shaft (62.62) and tighten to 50 Nm (37 ftlbs), turning Tab Washer over on to one flat of the nut.

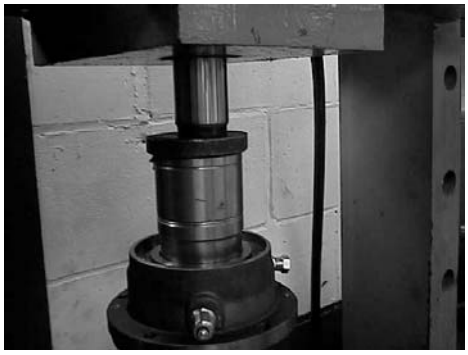


Fig. 35

8.05 Install the Front Oil Thrower (61.75) onto the Drive Shaft. - **Fig. 36**

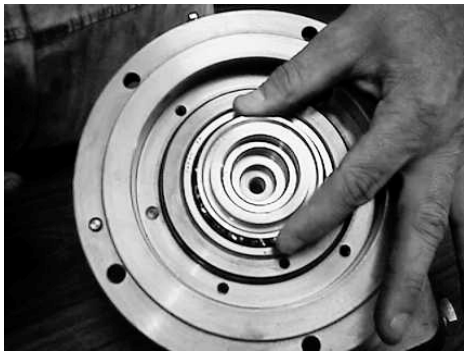


Fig. 36

8.06 Install the new 'O' Ring (61.OR1) and Front Cap (61.67) and retain with the Retention Screws (61.S42). Torque screws to 16 Nm (12 ft lbs). - **Fig. 37**

Fig. 37

8.07 Install the new rear O-ring (62.OR2) to the bore of the inner Labyrinth Seal (61.70A) and slide on to the Drive Shaft (62.62) up to the shoulder. Align retention hole with flat on Drive Shaft, tighten the Labyrinth Retention Screw on the Drive Shaft.

Torque to 16 Nm (12 ft lbs).(61.S51). **Fig. 38**

Fig. 38

8.08 Press Outer Labyrinth Seal (61.70B) into the Back Cap (61.68) ensuring the hole in the seal is in-line with the slot on the inside of the Back Cap. - **Fig. 39**

Fig. 39

8.09 Install the new 'O' Ring (61.OR1) and Back Cap (61.68) and retain with the Retention Screws (61.S43). Torque to 16 Nm (12 ft lbs). - **Fig. 40**

8.10 Re-install key (62.K31) into Drive Shaft

Fig. 40

8.11 Install the Outer Magnet Ring (OMR) (51.51) Rotate clockwise on cam viewed on front, and tighten the Outer Magnet Ring Retention Screw (62.S41) to a torque of 25 Nm (18ftlbs) after applying thread lock to screw. - **Fig. 41**

GSP/X/H only. Turn Tab Washer into hole in Outer Magnet Ring (OMR) and tighten the OMR Retention Screw to a torque of 25 Nm (18 ftlbs)(62.W11 and 62.S11) turn Tab Washer onto one flat of Nut.

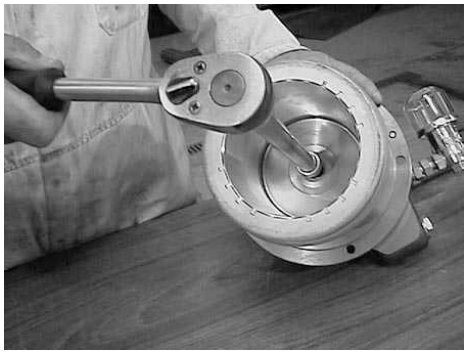


Fig. 41

8.12 If required insert a new Bump Ring (43.44) to the Coupling Housing (43.43) by gently tapping into place using a soft drift. - **Fig. 42**

8.13 Fit the Bearing Housing (61.61) to the Coupling Housing (43.43) using the retention screws (43.S49). Torque to 16 Nm (12 ft lbs).

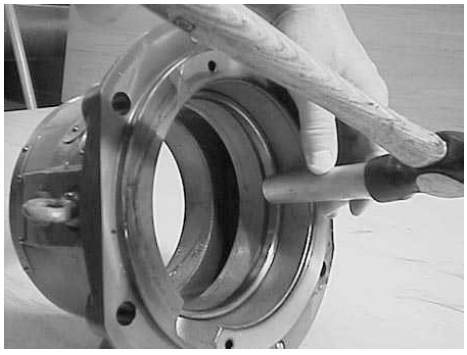


Fig. 42

Close Coupled

8.14 Install Shrink Disc Coupling (52.82) and Drive Flange Adaptor (52.52) over Motor Shaft with bolts towards motor, ensure that Adaptor is fully seated against Motor Shaft end. Torque bolts progressively in a sequential order around the circumference. - **Table 5**

The required torque value for the Shrink Disc coupling, are shown in chart below or as indicated on the coupling. - **Fig. 43**

Do not tighten bolts diagonally

Motor Frame Size	**Torque**	
	Nm	Ft lbs
143T, 145T, 90S, 90L	4	3
182T, 184T, 213T, 215T, 254T, 256T, 100L, 112M, 132S, 132M, 160L, 160M, 180L, 180M	12	9

Table 5

Fig. 43

8.15 Fit Motor Adaptor (45.45) to Motor Face/Flange and bolt to correct torque. - **Fig. 44**

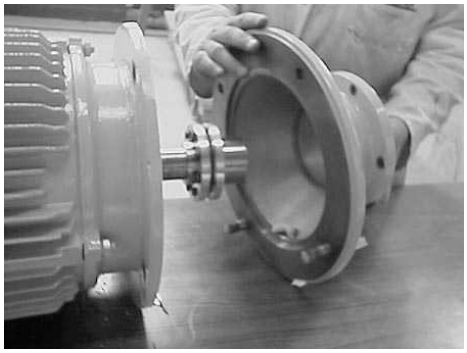


Fig. 44

8.16 Install the Outer Magnet Ring (51.51) to the drive flange adaptor (52.52) and tighten the Outer Magnet Ring retention screw (62.S41) to a torque of 25Nm (18 ftlbs) after applying thread lock to screw. The Outer Magnet Ring should be rotated clockwise on the cam viewed from front prior to tightening the screw.

8.17 Fit Coupling Housing to the Motor Adaptor and retain with the retention fasteners (45.S42). Torque to 12 Nm (9 ft lbs). If new Bump Ring (43.44) is required refer to 8.12.

All Pumps

Check concentricity and squareness of OMR to the face of the Motor or Bearing Housing prior to fitting Coupling Housing. **Fig. 45a & 45b**

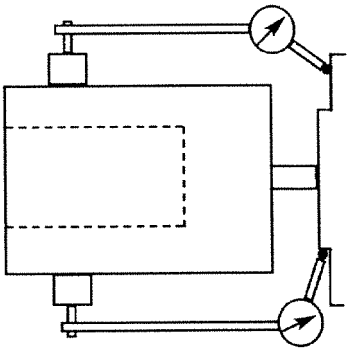


Fig. 45a

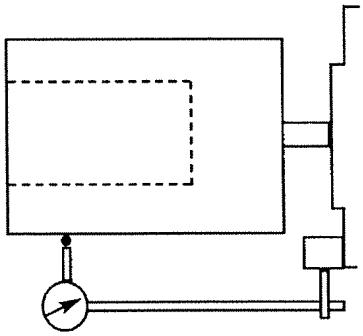


Fig. 45b

8.18 Check that the Outer Magnet Ring (51.51) is rotating concentric within the Coupling Housing (43.43). Maximum face run-out is 0.25mm (0.010”) and maximum run-out is 0.50mm (0.020”) diametral, measured in the Shroud location bore. - **Fig. 45**

8.19 If instrumentation is to be fitted refer to the appropriate manual

Fig. 45

8.20 Install the Shroud (20.20) into the Coupling Housing (43.43) using the two Shroud Retention Screws (20.S42). Torque screws to 16 Nm (12 ft lbs). **Fig. 46**

Fig. 46

8.21 Install Front Thrust Washer (02.07) to the Impeller (06.06), ensure that the Thrust Washer is located on Thrust Washer Drive Pin (02.49C) and moves freely by hand. - **Fig. 47**

Fig. 47

8.22 Install two new 'O' Rings (02.OR1) into the grooves in the Impeller end of the Pump Shaft (02.02). - **Fig. 48**

Fig. 48

8.23 Install in a twisting motion the Front Pump Shaft Sleeve (02.86) onto the Pump Shaft until it seats.

8.24 Install the Pump Shaft Spacer Sleeve (02.69) onto the Shaft until it seats. *(Not applicable to GSP/X/H).*

8.25 Install two new 'O' Rings (02.0R1) into the two remaining grooves on the pump Shaft (02.02). - **Fig. 49**

8.26 Install remaining shaft sleeve as 8.24

GSP/X/H only. Install key (02.K41) and Impeller (06.06) onto Pump Shaft and install Impeller Washer (02.04) and locking nut (02.03). Torque to 36 Nm (26 ft lbs).

Fig. 49

8.27 Install the Support Gasket (08.39), then back Thrust Washer (08.08) into the Inner Magnet Ring (37.37), ensuring correct pin location. Back Thrust Washer should move freely by hand. - **Fig. 50**

Fig. 50

8.28 With Inner Magnet Ring (37.37) on a clean surface, place Bush Holder Assembly (09.09) carefully inside Inner Magnet Ring (37.37). - **Fig. 51**

Fig. 51

8.29 Install Shaft Assembly into Bush Holder (09.09) taking care not to damage Bushes and Sleeves. Turn Shaft clockwise to locate cam in IMR drive flange. - **Fig. 52**

8.30 Carefully turn over total Assembly, keeping parts together, and stand on Impeller nose.

Fig. 52

8.31 Install Tab Washer (02.05) and bend tab into hole in Inner Magnet Ring, install nut (02.36) Torque, to 110Nm (80 ft.lb). Nut is left-handed and should be tightened counter-clockwise. - **Fig. 53**

8.32 Check that the Shaft Assembly rotates freely within the Bush Holder then bend new Coupling Tab Washer (02.05) into contact with one of the flats on the Coupling Nut (02.36).

Fig. 53

8.33 Hold on outside of Impeller and Impeller eye and slide the Assembly into the Shroud (20.20). Care must be taken as there will be strong magnetic attraction between the Inner and Outer Magnet Rings. Hold on outside of Impeller and Impeller eye. - **Fig. 54**

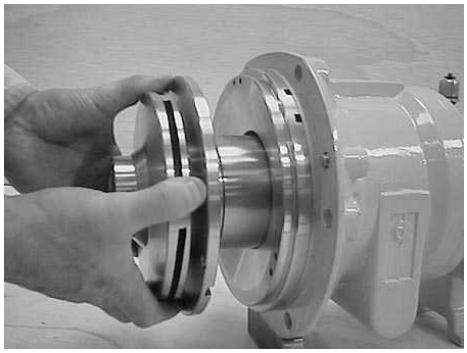


Fig. 54

8.34 Secure the Bush Holder (09.09) to the Shroud (20.20) using the three Retention Screws (20.S41). Torque to 16 Nm (12 ft lbs) Note: Align holes prior to fitting screws.

8.35 Check the axial movement of the Impeller Assembly using a “Dial Test Indicator”, it should be between 0.34 and 1.75mm (0.013” and 0.069”). - **Fig. 55**

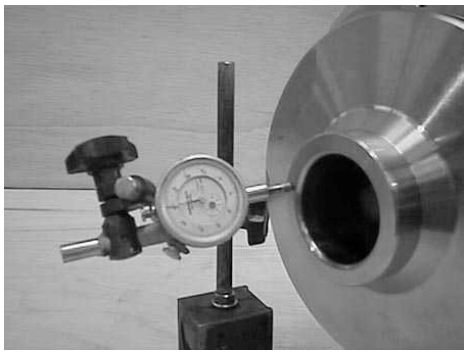


Fig. 55

8.36 Install a new Casing Gasket (20.17). - **Fig. 56**

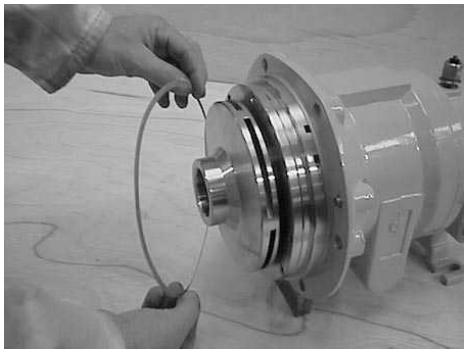


Fig. 56

8.37 Fit the Casing (41.41) to the Coupling Housing (43.43) and secure using the Casing Retention Nuts (41.N11) and Casing Retention Washers (41.W11). - **Fig. 57**
Torque to 85 Nm (63 ft lbs)

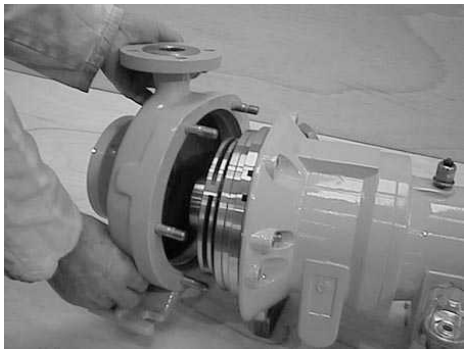
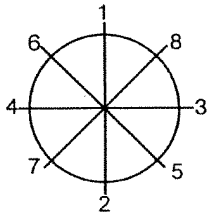


Fig. 57

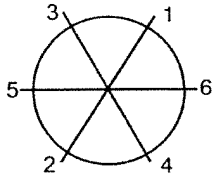
In order to ensure that the Casing Gasket is evenly compressed, and to ensure the Coupling Housing is bolted squarely with the Casing, the following procedure must be followed:-

1 After assembly, and before replacing the Nuts, ensure the Casing Studs are lightly lubricated.
2 Ensure the Casing Nuts are clean.
3 Following the patterns shown tighten the Casing Nuts thus:-

1st pass	30% of recommended torque
2nd pass	60% of recommended torque
3rd pass	Full recommended torque



All GS Pumps except GSI



GSI

8.38 Fit Casing Drain Plug (41.50), always use a new gasket (41.17A). Torque to 30 Nm (22 ft lbs).

8.39 Ensure either the temperature monitoring (41.TC) device or plug (41.50B) is fitted.

8.40 Ensure all unused connections are plugged.

8.41 Fit the Adaptor (61.CL2) to the Constant Level Oiler (61.CL1) via the tapered thread. Fit the Union (61.CL3) and Washer to the Adaptor and then the whole assembly to the Bearing Housing (61.61). Ensure the bottle is vertical. Do not fill oil bottle at this stage. Where sealed for life grease bearings are fitted, do not fit the constant level oiler and associated fittings, fit a plug instead.

Section 9
Oil Lubricated Bearing Assemblies
Separate Mounted Only

9.01 Filling Procedure

This details the filling procedure for oil lubricated bearing assemblies.

Do not fill using the coupling housing vent plug shown in **Fig. 58**, as this will place oil in the coupling housing and may lead to pump failure.

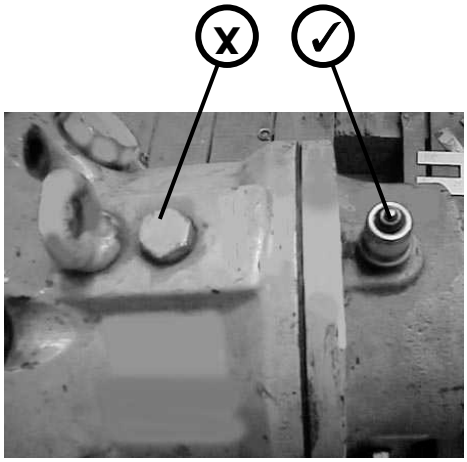


Fig. 58

Fill the oil lubricated bearing assembly using a recommended grade of oil, stated in section 9.02, by removing the filter/breather (61.VP1), and pouring approximately three quarters of the volume of oil, stated in section 9.03, into the housing.

The remaining volume to ensure the correct oil level, should be filled using the oil bottle as follows:-

Fill the oil bottle and place in the constant level oiler (61.CL1) allow the bottle to empty which may take 15 minutes or so, and then refill and repeat the procedure. If the oil bottle does not empty or stops at the same level for 30 minutes or so, the correct oil level in the bearing housing has been reached.

Do not try to take short cuts by topping up via the breather or constant level oiler without the bottle fitted, as this may result in overfilling, resulting in oil entering the coupling housing, or hot running bearings.

GSP/X/H only. Bearing housings are fitted with a window nut. The correct oil level is half way up the window.

9.02 Recommended Oil Grades

Typical Physical Characteristics			Acceptance Method
ISO Oil Type		HM	-
ISO Viscosity grade		68	-
Viscosity, Kinetis at	0°C	1040 (max)	ASTM D445 or IP71
	40°C	64 – 68	
	100°C	8.6 (max)	
Viscosity Index		98 – 102	ASTM D2270 or IP226
Density at 15°C, Kg/m		878 – 888	ASTM D4052 or IP365
Flash Point °C (Pensky-Martens Closed Cup/coc)		220 – 255	ASTM D92 or IP36
Pour Point °C		-5 to –30	ASTM D97 or IP15
Foaming Characteristics ml, after 10 minutes			
Sequence 1 @ 24°C			ASTM D892 or IP146
	Tendency / Stability	Trace / Nil	
Sequence 2 @ 93.5°C			
	Tendency / Stability	20 / Nil	
Sequence 3 @ 24°C (after sequence 2)			
	Tendency / Stability	Trace / Nil	

For equipment operating in ambient temperatures below -40°C (-40°F) consult HMD / Kontro for advice. For pumps operating in process temperatures above 260°C (500°F) a synthetic oil is recommended, consult HMD / Kontro for advice.

9.03 Oil Capacities (Power Frame Housing)

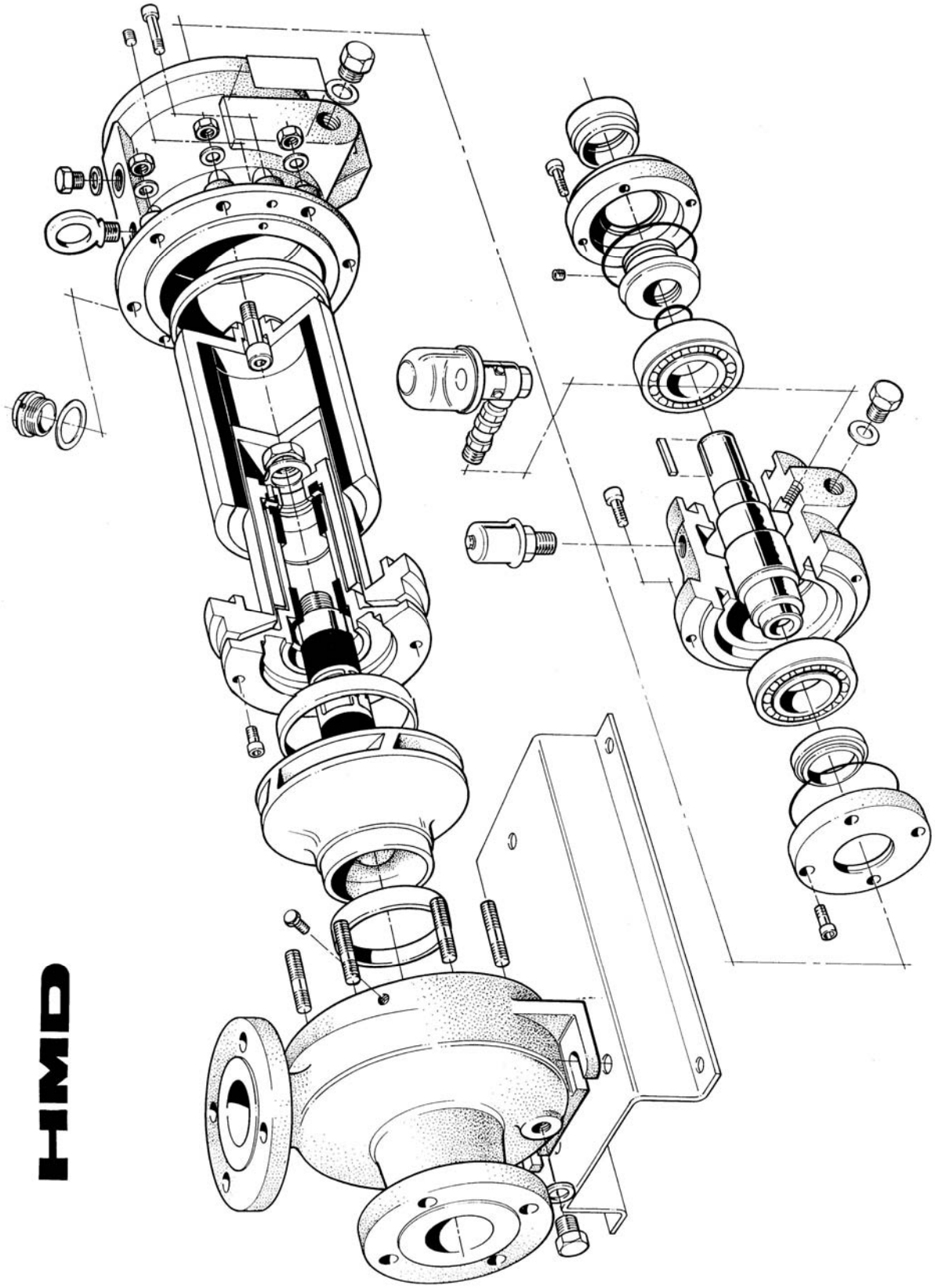
Quantities are in ml and US fl.ozs and are approximate.

To determine how much oil is required for your particular pump, refer to the model number on either the order acknowledgement or the nameplate fitted to the pump. With that information refer to the tables below for the correct amount of oil needed.

If you have any doubts or questions please do not hesitate to contact HMD / Kontro or your local representative.

Size	**GSA**		**GSP/X/H**	
	mls	Usfl.oz	mls	Usfl.oz
1.5x1x6 (H)	100	3.3	375	12.4
3x1.5x6 (H)	100	3.3	375	12.4
3x2x6 (H)	100	3.3	375	12.4
1.5x1x8 (H)	100	3.3	375	12.4
3x1.5x8 (H)	100	3.3	375	12.4

Size	**GSI**	
	mls	Usfl.oz
50-32-160 (H)	125	4.1
65-50-160 (H)	125	4.1
80-65-160 (H)	125	4.1
50-32-200 (H)	125	4.1
65-40-200 (H)	125	4.1
80-50-200 (H)	125	4.1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