

**OPERATION &**  
**MAINTENANCE MANUAL**  
**PYGME PLUNGER PUMP MK II**

ISSUE 9

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**SECTION 1**

**GENERAL DESCRIPTION**

## OPERATION AND MAINTENANCE MANUAL PYGME PLUNGER PUMP MK II

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### 1. GENERAL DESCRIPTION

#### 1.1. Grosvenor Pygme Pump MK II

- 1.1.1. The Pygme Pump MK II is a fixed output single acting positive displacement plunger pump. A wide range of wetted parts materials enable a broad number of applications to be handled. The prime mover is a vertical flange mounted motor driving a worm and wormwheel gear set. This turns an eccentric cam which reciprocates a plunger in and out of the pump head assembly.
- 1.1.2. The pumps are manufactured in a number of plunger diameters between 5/16" to 1-3/8" with stroke lengths of either 5/16", or 1/2" or 1". The pumps are complete with a standard IP 55 electric motor to give a stroke speed of 240 strokes/minute. For hazardous environments, an air motor can be specified. Other motor options are available on request.
- 1.1.3. The standard construction of the pump head is 316L stainless steel with nitrile wetted parts for plunger diameters less than 5/8" and cast iron and nitrile up to 1-3/8". Other materials are available to special order.
- 1.1.4. The standard suction and delivery port connections are available in either 1/4" or 3/8" or 1/2" BSP. Other ports options are available on request.
- 1.1.5. Typical applications are chemical injection, water treatment dosing, sampling or any other application where a positive liquid feed is required. The pump can be supplied complete with packaged tank units or in a variety of standard or custom built assemblies.
- 1.1.6. Various accessories are available including loading valves, relief valves and electrical starters. A calibrated manual stroke adjustment unit is available to give 0-100% pump delivery.

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**SECTION 2**

**TECHNICAL DATA**

## OPERATION AND MAINTENANCE MANUAL PYGME PLUNGER PUMP MK II

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### 2. TECHNICAL DATA

#### 2.1. Pump

Type		Plunger
Size	5/16" x 5/16"	4.5 l/hr @ 70 Bar G
	3/8" x 5/16"	5.5 l/hr @ 70 Bar G
	5/16" x 1/2"	6.75 l/hr @ 70 Bar G
	3/8" x 1/2"	11.5 l/hr @ 70 Bar G
	5/16" x 1"	16 l/hr @ 70 Bar G
	3/8" x 1"	23 l/hr @ 70 Bar G
	1/2" x 1"	43 l/hr @ 70 Bar G
	5/8" x 1"	64 l/hr @ 48 Bar G
	3/4" x 1"	91 l/hr @ 39 Bar G
	7/8" x 1"	127 l/hr @ 30 Bar G
	1" x 1"	164 l/hr @ 21 Bar G
	1-1/8" x 1"	218 l/hr @ 15 Bar G
	1-1/4" x 1"	272 l/hr @ 12 Bar G
	1-3/8" x 1"	318 l/hr @ 8 Bar G
Material - standard		
Pumphead		316L stainless steel
Valves		316L stainless steel
Seals		Nitrile
Suction and Delivery Port Size		
	5/16" x 5/16"	1/4" BSP
	3/8" x 5/16"	1/4" BSP
	5/16" x 1/2"	1/4" BSP
	3/8" x 1/2"	1/4" BSP
	5/16" x 1"	1/4" BSP
	3/8" x 1"	1/4" BSP
	1/2" x 1"	1/4" BSP
	5/8" x 1"	1/4" BSP
	3/4" x 1"	1/2" BSP
	7/8" x 1"	1/2" BSP
	1" x 1"	1/2" BSP
	1-1/8" x 1"	1/2" BSP
	1-1/4" x 1"	1/2" BSP
	1-3/8" x 1"	1/2" BSP

#### 2.2. Motor - standard

Type	IP 55 4 pole TEFC
Power	0.18/0.37 kW
Speed	1500 rev/min

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Supply	Standard	415 VAC/3 ph/50 Hz (star) 240 VAC/3 ph/50 Hz (delta)
	Optional	240 VAC/1 ph/50 Hz
Operation		Continuous

### 2.3. Dimensions

Weight	21 kg nett
Overall Length	345 mm
Overall Height	364 mm
Overall Width	159 mm

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**SECTION 3**

**PARTS LIST & DRAWINGS**



## **OPERATION AND MAINTENANCE MANUAL PYGME PLUNGER PUMP MK II**

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### **3.2. DRAWING LIST**

- 3.2.1. Parts Schedule - Gearbox Assembly
- 3.2.2. Parts Schedule - 5/16" to 1/2" Plunger Pump Head Assembly
- 3.2.3. Parts Schedule - 5/8" to 1-3/8" Plunger Pump Head Assembly
- 3.2.4. Exploded Diagram - Gearbox Assembly
- 3.2.5. Exploded Diagram - 5/16" to 1/2" Plunger Pump Head Assembly
- 3.2.6. Exploded Diagram - 5/8" to 1-3/8" Plunger Pump Head Assembly
- 3.2.7. Pygme Plunger Pump Installation Detail  
RG 482 latest issue
- 3.2.8. Pygme Plunger Pump with Variator Installation Detail  
GP1215 latest issue
- 3.2.9. Wiring Connection Diagram - Motors  
GP 1204 latest issue

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### 3.2.1. Parts Schedule - Gearbox Assembly

<u>Drg. No.</u>	<u>Description</u>	<u>Qty.</u>	<u>Part No.</u>
1	GEARBOX	1	717
2	MAIN SHAFT	1	650
3	WORMWHEEL	1	689
4	ECCENTRIC	1	648
5	ECCENTRIC-COMPLETE (OPTION)	1	862
6	CONNECTING ROD	1	649
7	MAIN THRUST WASHER	1	686
8	M6-1 x 20 SKT HD CAP SCREW	3	
9	M8-1.25 GRUBSCREW	1	
10	BEARING BUSH	3	693
11	CORE PLUG	3	654
12	CROSSHEAD	1	701
13	SMALL END PIN	1	655
14	M5-0.8 GRUBSCREW	1	
15	WORM	1	727
16	WORM THRUST WASHER	2	687
17	CRANKCASE BREATHER BODY	1	730
18	CRANKCASE BREATHER CAP	1	731
19	No. 4 DRIVE SCREW	5	
20	CRANKCASE JOINT	1	699
21	CRANK CASE COVER	1	647
22/23	OIL LEVEL INDICATOR 1/2" BSP	1	1773
24/25	DRAIN PLUG 1/4" BSP	1	1771
26	M6-1 x 20 HEX HD SCREW	4	
27	M6 FORM A SPRING WASHER	4	
28	NAMEPLATE	1	66

### 3.2.2. Parts Schedule - 5/16" to 1/2" Plunger Pump Head Assembly

<u>Drg. No.</u>	<u>Description</u>	<u>Qty.</u>	<u>Part No.</u>
1	PUMP END BODY	1	833
2	VALVE HOUSING O-RING	2	815
3	DELIVERY VALVE HOUSING	1	809
4	3/16" STAINLESS STEEL BALL	2	812
5	5/16" STAINLESS STEEL BALL	2	813
6	VALVE SPRING	1	814
7	VALVE TOP O-RING	2	816
8	VALVE TOP	1	810
9	SUCTION VALVE WASHER	1	811
10	SUCTION VALVE HOUSING	1	808
11	GLAND PACKING RING	5	457
12	GLAND NUT	1	704
13	PLUNGER	1	658
14	FLINGER	1	855

## OPERATION AND MAINTENANCE MANUAL PYGME PLUNGER PUMP MK II

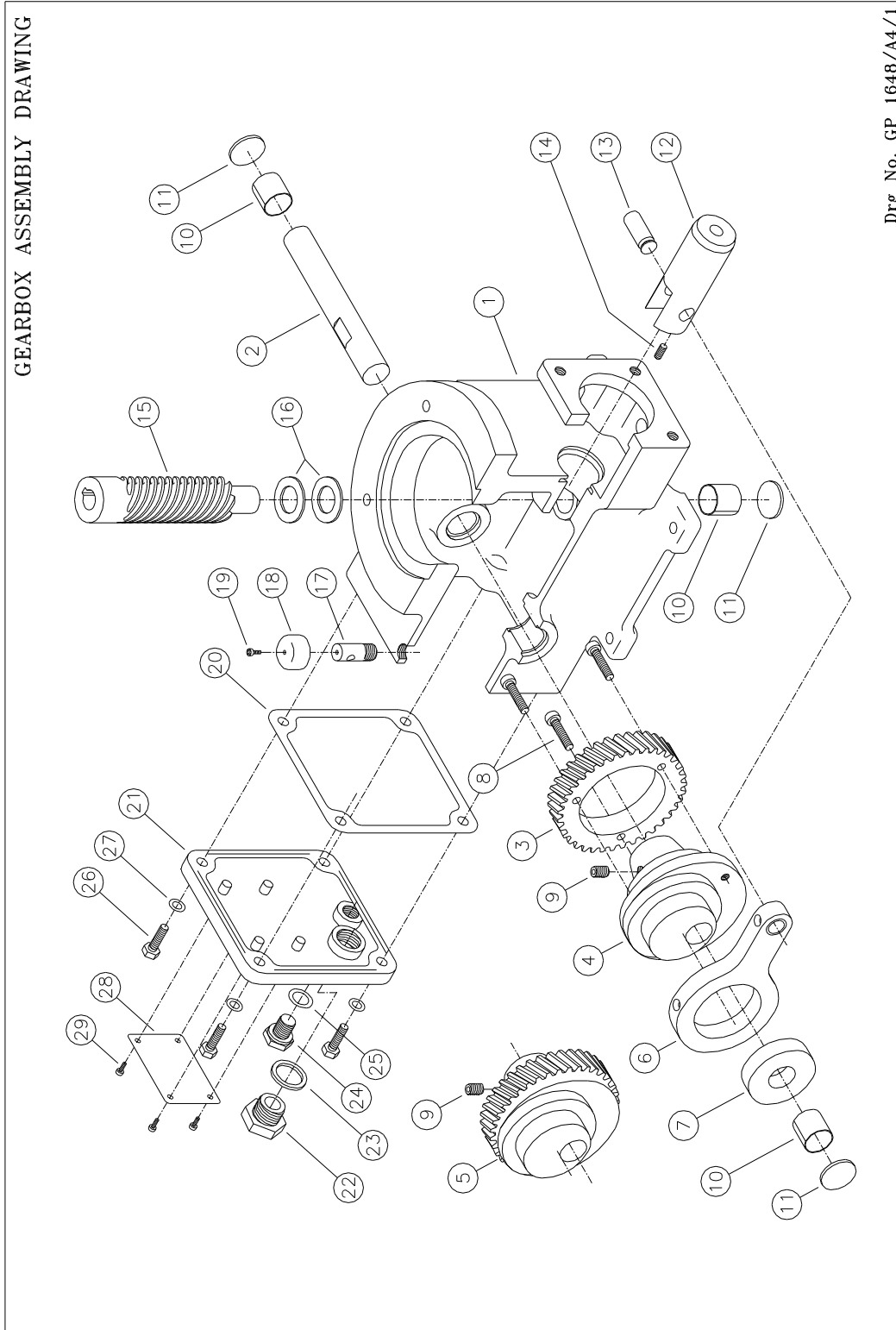
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### 3.2.3. Parts Schedule - 5/8" to 1-3/8" Plunger Pump Head Assembly

<u>Drg. No.</u>	<u>Description</u>	<u>Qty.</u>	<u>Part No.</u>
1	PUMP END BODY	1	760
2	VALVE BODY WASHER	2	72
3	VALVE BODY	2	780
4	5/8" BALL	2	765
5	VALVE SPRING	2	684
6	VALVE TOP WASHER	2	89
7	BALL VALVE COVER	2	709
8	NECK RING	1	734
9	SOFT HEADER	1	1634
10	GLAND PACKING RING	3	457
11	GLAND NUT	1	704
12	PLUNGER	1	658
13	FLINGER	1	855

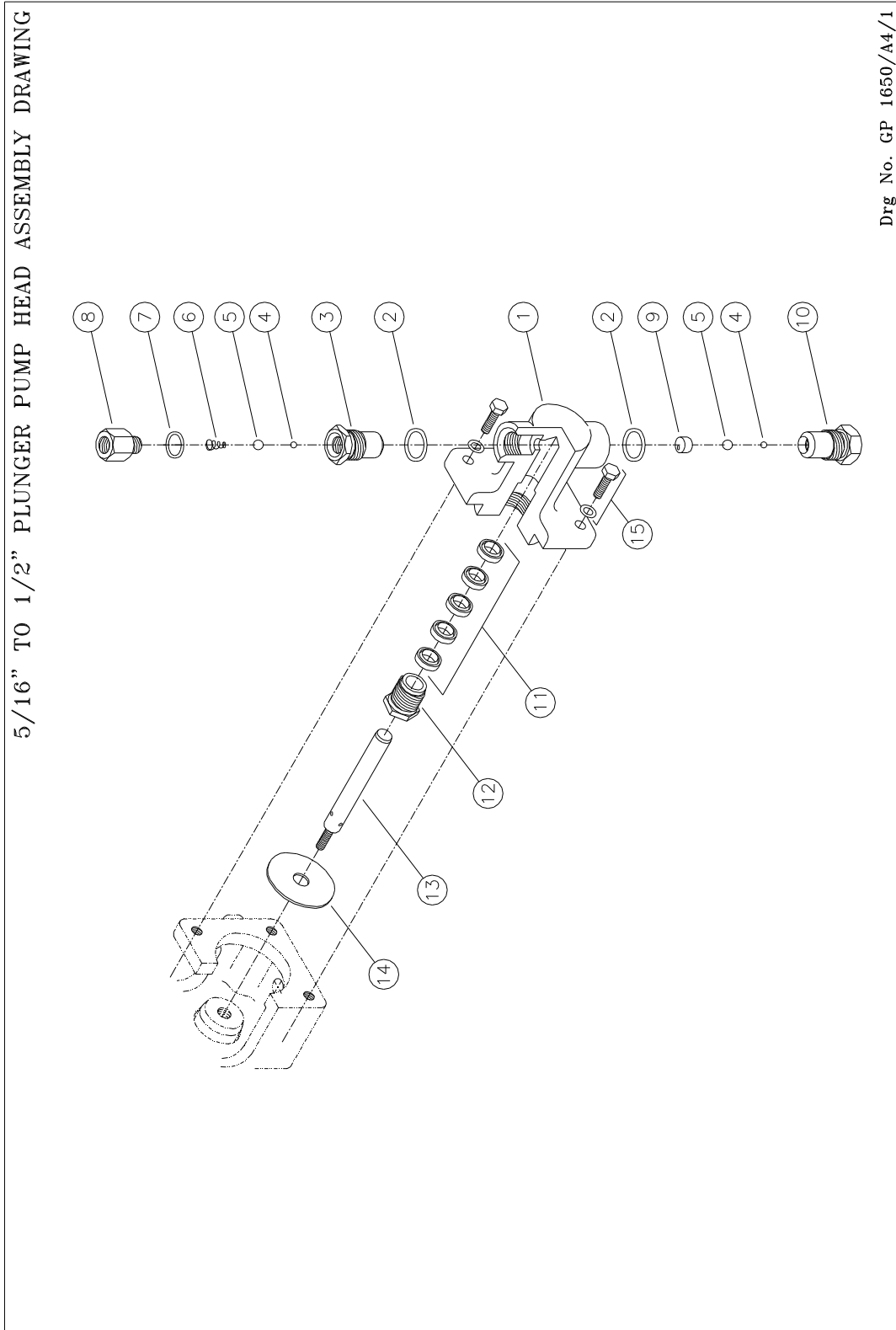
## OPERATION AND MAINTENANCE MANUAL PYGME PLUNGER PUMP MK II

### 3.2.4. Exploded Diagram - Gearbox Assembly



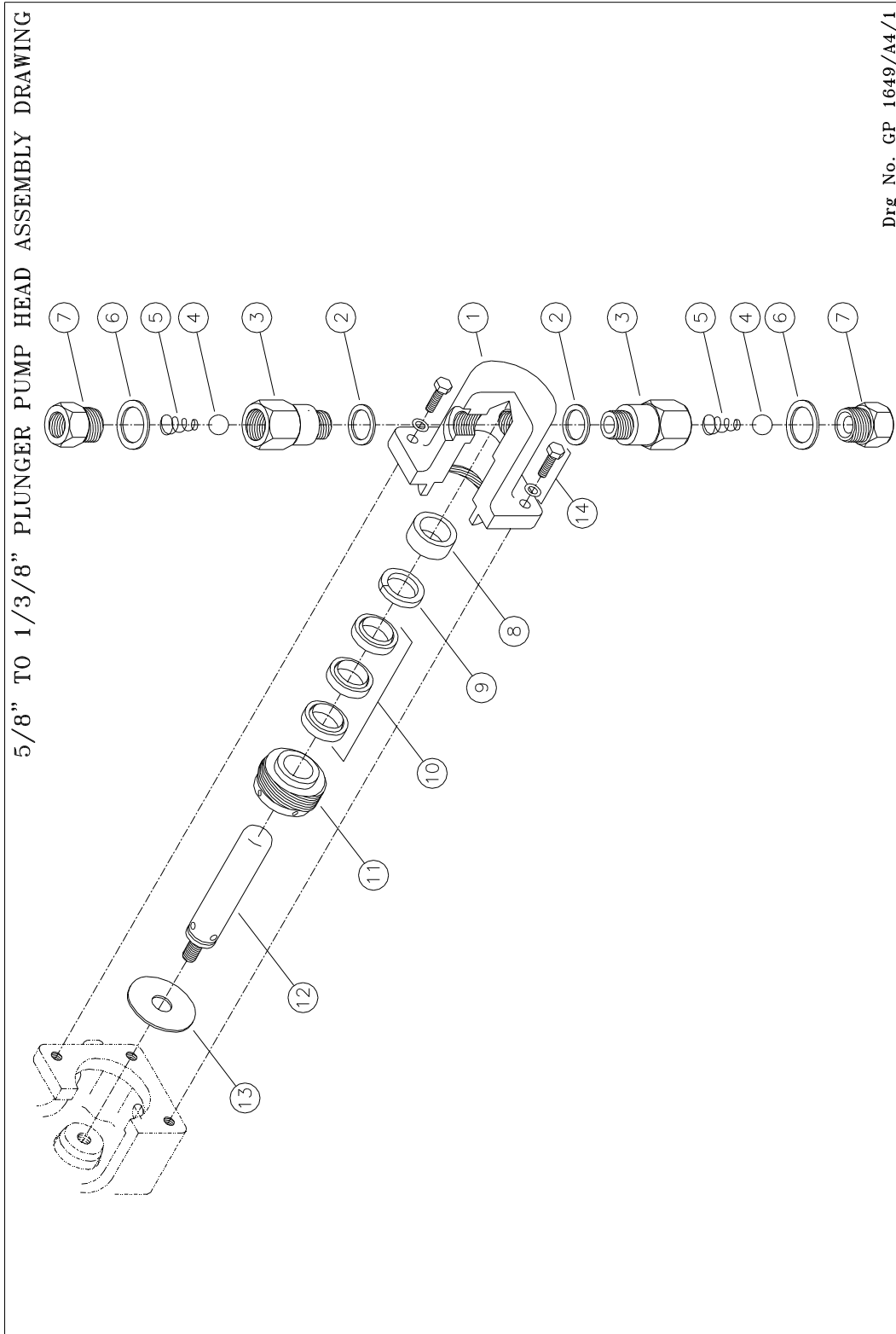
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3.2.5. Exploded Diagram - 5/16" to 1/2" Plunger Pump Head Assembly



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3.2.6. Exploded Diagram - 5/8" to 1-3/8" Plunger Pump Head Assembly



# OPERATION AND MAINTENANCE MANUAL PYGME PLUNGER PUMP MK II

## 3.2.1. Pygme Plunger Pump Installation Detail - RG 482

DRAWING NUMBER RG 482/A2/11

PROJECTION

MOTOR SIZE	ELECT. SUPPLY	'A' DIM'N			
		IP55	EE'd	EE'd	EE'd
		D63	D71	D63	D71
180 W	240 VAC		364		415
	415 VAC	339	364	403	
250 W	240 VAC				415
	415 VAC				429
370 W	240 VAC		364		415
	415 VAC		364		429

PUMP SIZE BORE x STROKE	PORT SIZE BSP	'N' DIM'N	'S' DIM'N	'E' DIM'N	'W' DIM'N	'END' DIM'N
5/16" x 5/16"						
5/16" x 1/2"						
3/8" x 5/16"						
3/8" x 1/2"	1/4"	62	50	N/A	N/A	N/A
5/16" x 1/2"						
3/8" x 1"						
1/2" x 1"						
5/8" x 1"	1/4"	80	80	80	80	47
3/4" x 1"	3/8"	85	85	85	85	52
7/8" x 1"						
1" x 1"						
1-1/8" x 1"	1/2"	90	90	90	90	57
1-1/4" x 1"						
1-3/8" x 1"						

**PIPE CONNECTIONS**

- VALVES HAVE BSP FEMALE SCREWED CONNECTIONS AS ABOVE.
- 5/16" TO 1/2" BORE PUMPS CAN ONLY HAVE INLET AT BOTTOM (S) & OUTLET AT TOP (N).
- ALL OTHER PUMP SIZES CAN BE SPECIFIED N.S.E.W OR END WHEN VIEWED AT END OF PUMP.
- UNLESS OTHERWISE SPECIFIED, PUMPS WILL BE SUPPLIED INLET W & OUTLET E.
- PUMP BODY CAN BE ROTATED THROUGH 360° AFTER MANUFACTURE (EXCEPT SIZES UP TO AND INCL. 1/2" X 1").

**FILE: VPMENRG482**  
**DATE: 9 DEC 94**  
**ORIGINAL SCALE: 1:4**

ISSUE	DATE	ALTERATION	BY	DATE
11	9 DEC 94	REDRAWN ON A2 SHEET	CHU	

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FILE: VPMENRG482	DATE: 9 DEC 94	ORIGINAL SCALE: 1:4	DATE: 9 DEC 94
FILE: VPMENRG482	DATE: 9 DEC 94	ORIGINAL SCALE: 1:4	DATE: 9 DEC 94

REMARKS: ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN. SURFACE FINISH OR WHERE MARKED AS PER MACHINE ALL SIZES OR WHERE MARKED AS PER SURFACE FINISH UNLESS OTHERWISE SHOWN.

TITLE	SHEET	OF
PYGME PLUNGER PUMP INSTALLATION DETAIL	1	1

# OPERATION AND MAINTENANCE MANUAL PYGME PLUNGER PUMP MK II

## 3.2.2. Pygme Plunger Pump with Variator Installation Detail GP1215

DRAWING NUMBER: GP1215/A2/3

PROJECTION

PG 16 TERMINAL PORT  
2 CABLE ENTRIES ON BOTH  
SIDES OF TERM. BOX

ADJUSTMENT  
HANDWHEEL

DELIVERY PORT

SUCTION PORT

5/16", 3/8" AND 1/2" BORE  
PUMP BODY DETAIL

4-HOLES Ø 8  
POSITIONS AS SHOWN

±0.15

MOTOR SIZE	ELECT. SUPPLY	'A' DIM'N		PORT SIZE BSP	'N' DIM'N	'S' DIM'N	'E' DIM'N	'W' DIM'N	'END' DIM'N
		IP55	EEkd						
180 W	240 VAC	D63	D71	D63					
	415 VAC		559						
250 W	240 VAC		510	574					
	415 VAC				50		N/A	N/A	N/A
370 W	240 VAC		559						
	415 VAC		559						

PUMP SIZE	PORT SIZE BSP	'N' DIM'N	'S' DIM'N	'E' DIM'N	'W' DIM'N	'END' DIM'N
5/16"x5/16"						
5/16"x1/2"						
3/8"x5/16"						
3/8"x1/2"	1/4"	62				
5/16"x1"						
3/8"x1"						
1/2"x1"						
5/8"x1"	1/4"	80	80	80	80	47
3/4"x1"	3/8"	85	85	85	85	52
7/8"x1"						
1"x1"						
1-1/8"x1"	1/2"	90	90	90	90	57
1-1/4"x1"						
1-3/8"x1"						

**PIPE CONNECTIONS:**

1. VALVES HAVE BSP FEMALE SCREWED CONNECTIONS AS ABOVE.
2. 5/16" TO 1/2" BORE PUMPS CAN ONLY HAVE INLET AT BOTTOM (S) & OUTLET AT TOP (N).
3. ALL OTHER PUMP SIZES CAN BE SPECIFIED N.S.E.W OR END WHEN VIEWED AT END OF PUMP.
4. UNLESS OTHERWISE SPECIFIED, PUMPS WILL BE SUPPLIED INLET W & OUTLET E.
5. PUMP BODY CAN BE ROTATED THROUGH 360° AFTER MANUFACTURE (EXCEPT SIZES UP TO AND INCL. 1/2" X1").

ISSUE DATE: 30 AUG 95

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FILE: PUMP/PYGME/GP1215

DIMENSIONS IN MM

ORIGINAL SCALE 1: 4

MACHINE ALL OVER OR WHERE MARKED SURFACE FINISH UNLESS OTHERWISE SHOWN

3.7

8 SHARTEBURY INDUSTRIAL CENTRE, THE PINNINGS, CHELTENHAM, GLOS GL51 6NH, ENGLAND.

TITLE: PYGME PLUNGER PUMP WITH DELTA VARIATOR INSTALLATION DETAIL

SHEET 1 OF 1

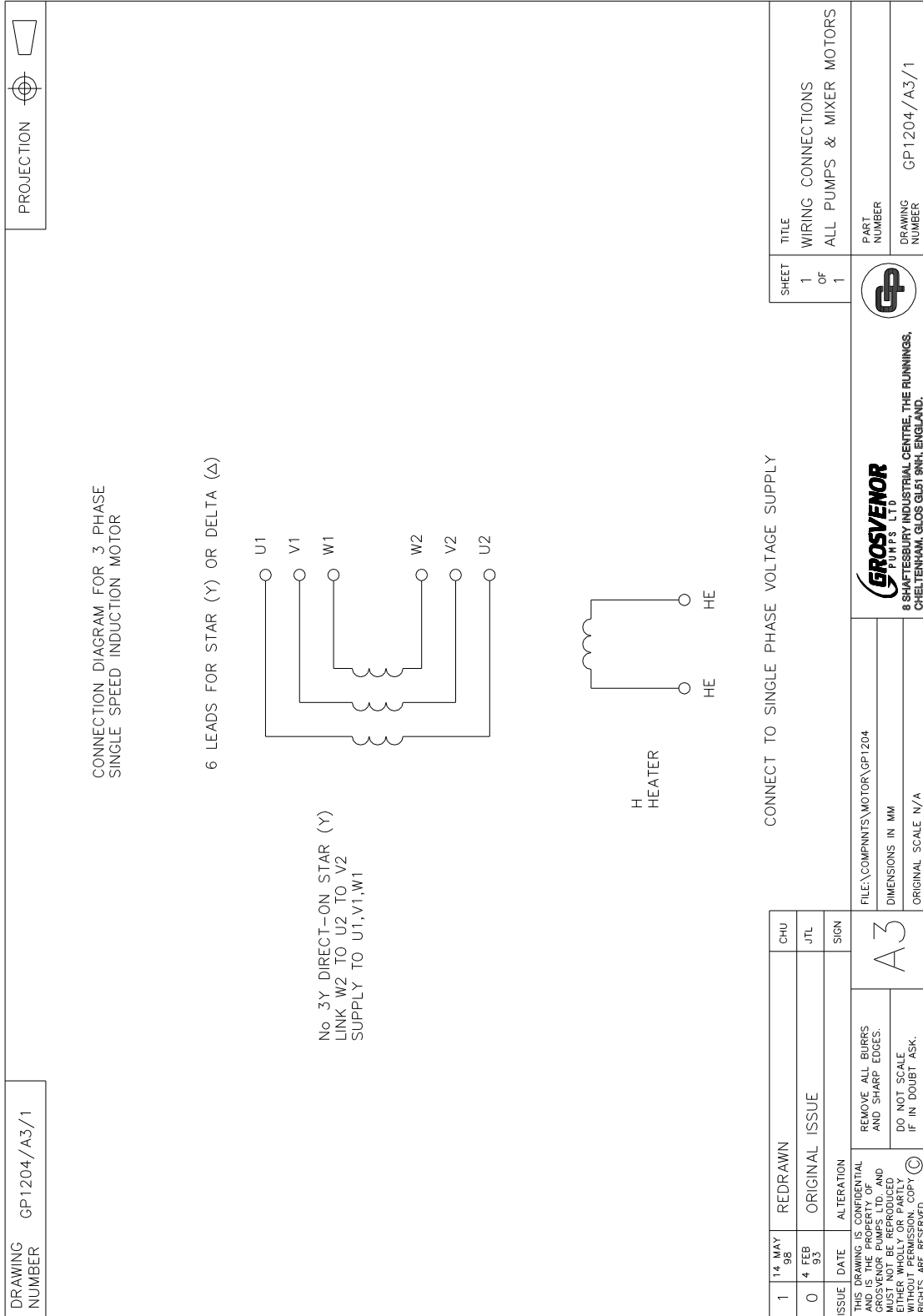
PART NUMBER: GP1215/A2/3

DRAWING NUMBER: GP1215/A2/3



# OPERATION AND MAINTENANCE MANUAL PYGME PLUNGER PUMP MK II

## 3.2.3. Wiring Connection Diagram - Motors - GP 1204



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**SECTION 4**

**SAFETY**

## OPERATION AND MAINTENANCE MANUAL PYGME PLUNGER PUMP MK II

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### 4. SAFETY

#### 4.1. Standard Precautions

- 4.1.1. To comply with normal safety-standards the following measures are to be taken:
- 4.1.2. A minimum issue of standard protective clothing to be available to all personnel involved in the handling of chemicals and operation of the dosing plant, consisting of:
- 4.1.3. Goggles - with wide-angle vision, contact the skin in complete seal around both eyes and adequately vented without allowing access to spillage.
- 4.1.4. Safety Helmet - of metal or reinforced plastic to the relevant British Standard or equivalent.
- 4.1.5. Gloves - wrist length, of soft PVC or rubber permitting full flexure.
- 4.1.6. Overalls - to be worn in conjunction with the items above or a one-piece chemical suit.
- 4.1.7. Standard site safety provisions, safety precautions and first aid instructions, in condensed form shall be advertised at site and in site vehicles. All employees shall be in possession of literature giving full details of safety precautions and first aid action.
- 4.1.8. The following personal precautions are to be taken when handling chemicals:
- 4.1.9. Wear standard protective clothing and equipment as detailed above.
- 4.1.10. Ensure that the nature and properties of the chemical being handled are known in advance.
- 4.1.11. Ensure that the correct precautions for the chemical being handled are observed. IF IN DOUBT ASK.
- 4.1.12. Treat all materials as harmful.
- 4.1.13. Do not touch chemicals or residues with bare hands.
- 4.1.14. Wash away accidental contact immediately.
- 4.1.15. Keep self and clothes clean.
- 4.1.16. Wash contaminated clothing before re-use.
- 4.1.17. Wash thoroughly after handling chemicals. Do not eat drink or smoke unless decontaminated.
- 4.1.18. Erect WARNING barriers where necessary.
- 4.1.19. Follow specific process instruction carefully.
- 4.1.20. Mix chemicals in the order specified.
- 4.1.21. **CAUTION: CHEMICALS CAN BE HARMFUL. PLEASE OBSERVE MANUFACTURER'S HANDLING AND STORAGE GUIDELINES.**
- 4.1.22. Health Hazards - Harmful in contact with the skin and irritating to the eyes.
- 4.1.23. Handling - Avoid contact with the skin and eyes. Wear suitable protective clothing gloves and eye protection. Wash out empty container thoroughly with water and add solution to system being treated.
- 4.1.24. Storage - Keep container in a cool, well ventilated place. Keep away from source of ignition. NO SMOKING.

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- 4.1.25. Spillage and Disposal - Shut off all sources of ignition. Absorb spillage in earth and sand, collect up and remove all contaminated clothing. Eye exposure; in case of contact with eyes, rinse immediately with copious quantities of water. Ingestion; remove patient to fresh air, rest and warm. Administer oxygen or artificial respiration as necessary.

**IN ALL CASES SEEK MEDICAL ADVICE AS SOON AS POSSIBLE.**



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**SECTION 5**

**INSTALLATION, COMMISSIONING  
& OPERATION**

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**5. INSTALLATION, COMMISSIONING & OPERATION****5.1. Mounting**

- 5.1.1. For maximum operating life, the pump should be located in a clean cool dry environment. If the site is classified as a hazardous area ensure the pump meets the site requirements. Position the pump on a rigid base preferably as low as possible relative to the supply for the optimum suction condition. Fix the pump gearbox firmly to the base using four M8-1.25 screws or suitable floor bolts.
- 5.1.2. If the pump is to be installed in an aggressive, hot, dirty environment, it is advisable to provide some cover. However it is essential to leave adequate ventilation for motor cooling. Do not obstruct the motor fan cover.

**5.2. Pipe Connections**

- 5.2.1. The suction pipe sizes should be larger than the port connection. The number of pipe bends should be kept to a minimum to reduce flow losses, pulsation and water hammer effects. Increase the pipe size if long pipe runs are unavoidable. If water hammer is present, fit a pulsation damper unit in the delivery pipe line as close to the pump as possible. For technical advice, please refer to Grosvenor Pumps.
- 5.2.2. The pump is designed to be self-priming. However, if difficulties are experienced with priming, loosen/remove the delivery valve sub-assembly, fill the pumping chamber with the pumped liquid and refit the valve. Appropriate care should be taken if the liquid is harmful.
- 5.2.3. Allow sufficient time to fill large diameter and/or long pipe lengths to build up hydraulic pressure. If the pressure does not increase, check:-  
All joints are tight and fully sealed and any dump/flushing valves are shut.  
The relief valve is adjusted to the correct pressure.  
The suction and delivery lines are connected to the correct pump ports.  
The liquid is free of large debris and contaminants. Large solids will reduce valve efficiency. Fit a suction strainer/filter.  
Entrapped air pockets. Bleed the system.
- 5.2.4. If there is a high suction head present, a loading valve may be required to prevent syphoning.

**5.3. Gearbox Oil**

- 5.3.1. Note the pump gearbox is supplied without lubrication oil. Unscrew the orange filler breather unit and fill the gearbox with a sufficient quantity of suitable oil (refer to Section 5 - Maintenance for approved lubricants). The level should be half way up the oil level indicator glass.

**5.4. Electrical**

- 5.4.1. Before beginning any electrical work, isolate the supply at the mains.

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- 5.4.2. Open up the motor terminal box. Connect up a suitably rated power supply to the motor. Use suitable power multi-core power cable with a cable gland nut. Fasten the power leads firmly to the terminal points. Always connect the supply earth lead.
- 5.4.3. Three phase motors can be controlled by a direct on-line starter or a frequency inverter. The standard motors can be wired in star or delta with a corresponding voltage variation e.g. either 415 VAC or 240 VAC. Therefore check the power supply.
- 5.4.4. The motor rotation should be anti-clockwise when viewed from the fan side. For three phase supply, if the rotation is clockwise, change any two of the three supply phases over. The direction for single phase motors has been factory set to be anti-clockwise. However, if the rotation is clockwise interchange the blue and yellow leads on terminals 2 and 3.
- 5.4.5. As the pump will operate upto the motor stalling point, it is recommended that an electrical overload trip device is fitted and/or a hydraulic relief valve fitted in the delivery line. To allow for start-up current surge, current trips should be 6 to 7 times the full load motor current. If the supply is from a frequency inverter, the motor should be specified with a thermistor which is compatible with the frequency inverter. Unless a blower is fitted to the motor, turndown must be limited to 3:1 with an inverter.

### **5.5. Commissioning**

- 5.5.1. After pipe and electrical installation has been completed run the pump between 30 and 60 minutes at minimum hydraulic load and full flow. Examine the entire hydraulic system including the pump for any leakages. Check the pump for unusual noises and vibration. For the first 14 days operation, expect the pump gearbox to run at a temperature of 65-70°C. This will in no way affect the overall pump performance.

### **5.6. General Operation**

- 5.6.1. Operate the pump within the duty specified in the customer's order. Please note that the performance data specified in section 2.1. is the maximum capable for each pump.
- 5.6.2. Never run the pump dry for more than 5 minutes or the plunger Chevron Packing will wear out prematurely.
- 5.6.3. Check the pump will operate satisfactorily if it is to be used for another duty, i.e. different liquid, pressure, environment, power supply.
- 5.6.4. Always handle the pump by gripping the gearbox case and not by the pump head or any pipework attached to the pump head.
- 5.6.5. For long plunger packing life it is acceptable for slight leakage at the gland. The packing relies on the liquid it is sealing for lubrication. Never overtighten the gland nut or the packing will run dry and wear out prematurely. Should gland leakage be greater than 1 drop per second, tighten the gland nut by 15°. Run the pump and observe any leakage.

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Repeat as required until leakage is at an acceptable level. If the packings still leaks after a full turn, they will need replacing.

- 5.6.6. Check the pump for excessive vibration and overheating.
- 5.6.7. Ensure that all associated instruments are functioning correctly and the readings are meaningful.
- 5.6.8. Periodically check the pump is maintaining delivery and pressure. Check the motor current is within its acceptable operation limit.



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**SECTION 6**

**MAINTENANCE**

## OPERATION AND MAINTENANCE MANUAL PYGME PLUNGER PUMP MK II

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### 6. MAINTENANCE

#### 6.1. Safety

- 6.1.1. **CAUTION: BEFORE STARTING ANY MAINTENANCE PROCEDURE, ENSURE THAT ALL SAFETY INSTRUCTIONS DETAILED IN THE CURRENT WORKS MANUAL AND STANDARD PROCEDURES HAVE BEEN COMPLIED WITH.**

#### 6.2. General Maintenance

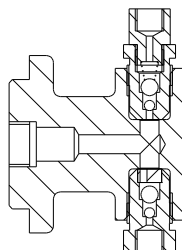
- 6.2.1. General maintenance is an oil change every 6 months. If the pump is in continuous operation at maximum duty, a detailed inspection of parts will be required at 12 month intervals. The pump unit is best dismantled in a fully toolled workshop. Special tool Bearing Bush mandrel - Grosvenor Part No. 1841 will be required. Full spares and any special tools are available from Grosvenor Pumps.

#### 6.3. Motor

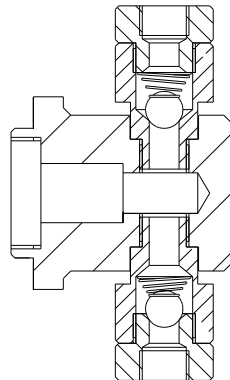
- 6.3.1. Isolate the electric power supply at the mains. Disconnect wires from the Motor terminal box. The Motor lifts off the Gearbox after removing the four screws on the motor flange. The Worm (727) will come away with the motor shaft. The Motor is non-serviceable. Examine for any wear and/or damage. Replace if necessary.
- 6.3.1. Reposition the Worm in the Gearbox. Insert Motor Shaft into the Worm shaft hole taking care not to dislodge the Key (1081). Press the Motor fully down onto the Gearbox before tightening the four flange screws.
- 6.3.2. Connect wiring to ensure rotation is anti-clockwise when viewing Motor on the fan end. Refer to Section 5.4.

#### 6.4. Valve Assemblies

- 6.4.1. There are two Valve Assembly types fitted to the standard range.



Part 801 & 802



Part 1032 & 1033

The Suction and Delivery Valve Assemblies 801 & 802 are fitted to pump sizes upto and including 1/2" x 1" and Assemblies 1032 & 1033 to sizes from 5/8" x 1" to 1-3/8" x 1".

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- 6.4.2. Before removing the Valve Assemblies, flush and drain the suction and delivery lines. Shut off any isolating valves. Unscrew the Valve Assemblies from the Pump Head noting the orientation of the components.
- 6.4.3. Examine all parts for wear or damage. Discard and replace as necessary. Always refit with new seals.
- 6.4.4. Reassemble the Valve Assemblies in their respective types and port orientation.

### **6.5. Pump Head Assembly**

- 6.5.1. To remove the Pump Head Assembly slacken the Gland Nut. Remove the four mounting screws holding the Pump Head (781) to the Gearbox. Slide the Pump Head Assembly off the Plunger. Unscrewing the Gland Nut (704) will provide access to the Plunger Chevron Packing (457) and Neck Ring (734). Note the order and orientation of the Neck Ring, Packing elements and Header.
- 6.5.3. Using a suitable size metal dowel unscrew the Plunger (695) from the Crosshead (701). Do not use a mole grip type wrench on the sealing surface. Discard and replace the Plunger if the surface is anything but a smooth and mirror finish (Ra 0.4 microns maximum). It is permissible to polish out any light marks with a fine metal polish.
- 6.5.4. Reassemble in the reverse order. Refit the Plunger using Loctite 270 thread sealant or an equivalent on the threads. Check the order and orientation of the Neck Ring, Packing elements and Header when refitting into the Pump Head. Loosely refit the Gland Nut. Slide the Pump Head over the Plunger. Check port orientation and fasten with the four mounting screws.
- 6.5.5. Check the chevron packing sealing integrity. Hand tighten the gland nut. Then give turn it a 15°. Start the pump with minimum hydraulic load. Check for leakage at the gland nut. If the leakage is persistent, adjust 15° every 15 minutes until the leakage is reduced. When the Pump is fully recommissioned it may be necessary to retighten the Gland Nut. For long plunger packing life it is acceptable to have slight gland leakage. The packing relies on the liquid it is sealing for lubrication. Never overtighten the Gland Nut otherwise the Packing will run dry and wear out. Should any gland leakage be greater than 1 drop per second, tighten the gland nut by 15°. Run the pump and observe any leakage. Repeat as required until the leakage is at an acceptable level. If the Gland still leaks badly after a full turn, the packing will need replacing.

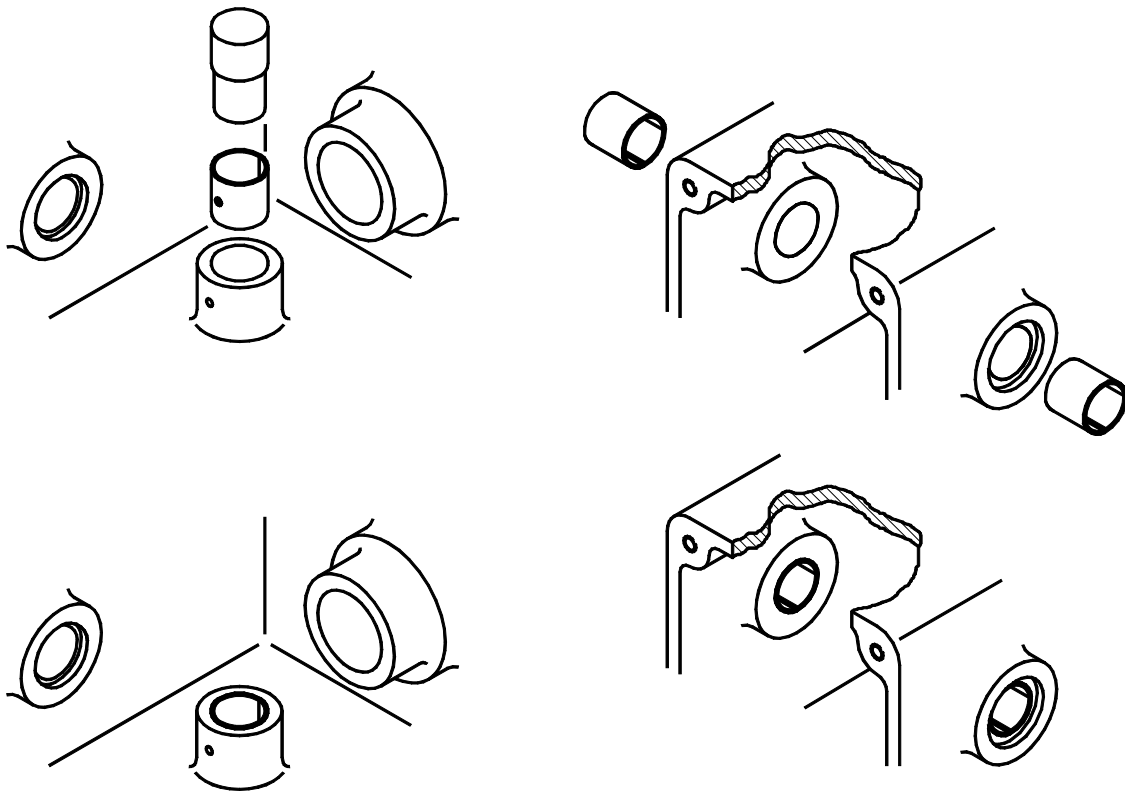
### **6.6. Gearbox Assembly**

- 6.6.1. Special tool Bearing Bush mandrel - Grosvenor Part No. 1841
- 6.6.2. It is impractical to strip the Gearbox Assembly with the Pump still mounted in its installed environment. Remove the Motor and Pump Head assembly.
- 6.6.3. Undo the drain Plug (1771) and drain and discard the gearbox oil.

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- 6.6.4. Lift out the Worm (727) (if not already out on the Motor Shaft). Examine the Worm journal for wear damage. Discard and replace if required.
- 6.6.5. Removing the Crankcase Cover (647) allows access to internal parts. To remove internals first loosen the locking grub screw in the Eccentric (648). Turn the Gearbox on its side and with a centre punch, hammer out the Core Plugs (654) from either side. Ease out the Main Shaft (650). Pull out the Worm Wheel/Eccentric sub-assembly (689/648), Side Thrust Washer (686), Connecting Rod (649) and the Crosshead (701). Remove the locking screw holding the Small End Pin (655) in the Crosshead and push out the Small End Pin. Examine all parts for wear damage. Discard and replace any parts as required.
- 6.6.6. Examine the two Main Shaft, the Worm journal bearing bushes for wear and/or damage. If required press them out with the mandrel and replace.



- 6.6.7. Refit the gearbox internals in reverse. To refit the bearing bushes, turn the Gearbox onto its side. Squirt some oil onto the bearing bushes and press in with the Bearing Bush mandrel with the split line upper most or nearest the pump head side.
- 6.6.8. Put the Worm Wheel/Eccentric sub-assembly, Side Thrust Washer, Connecting Rod and the Crosshead in the Gearbox in their relative order. Align the Main Shaft with the machined flat section facing the Eccentric locking Grubscrew and slide it through the Bearing Bush, Eccentric, Washer and the second Bearing Bush.

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- 6.6.9. Coat waterproof sealant (Hermetite/liquid gasket) around the edge of a Core Plug and place it onto the gearbox bearing counterbore. Hammer the Core Plug firmly into place. Repeat for the remaining bearing bushes.
- 6.6.10. Refill with correct quantity and grade of oil.
- 6.6.11. Fit the Drain Plug, Oil Level Indicator and Filler Breather.
- 6.6.12. Fit the Worm with a Worm Thrust Washer into the Gearbox.
- 6.6.13. Pour in enough oil upto the Oil Level Indicator. Turn the Worm with the worm crank handle. Check for smoothness of operation.

### **6.7. Final Assembly**

- 6.7.1. Fit the Motor.
- 6.7.2. Fit Nameplate and Crosshead Guard
- 6.7.3. Connect wiring to give correct rotation.
- 6.7.4. Run-in for the Gearbox for 2 hours. Drain the gearbox and refill with fresh oil.
- 6.7.5. Replace pumphead and valve assemblies. The complete pump is ready for commissioning.

### **6.8. Spare Parts**

- 6.8.1. Spare parts can be identified to drawing by part number. Always quote pump serial number which can be found on pump crankcase cover. Parts should be ordered from:-

**Grosvenor Pumps Limited,  
Trevoole, Praze,  
Camborne,  
Cornwall. TR14 0PJ  
Tel: 01209 831 500                      Fax: 01209 831 939**

### **6.9. Lubrication**

- 6.9.1. The gearbox is empty when supplied and must be filled before commissioning. Recommended grades from major oil companies are shown on the pump nameplate. Equivalent grades for other oil companies are listed here. The oil level is set by the level plug and should be checked weekly. The oil should be changed every 6 months. All gearbox parts are lubricated by splash. Motor bearings are fully charged with grease for life by the manufacturer.

**Oil capacity - 0.3 litres Approx.**

### **6.10. Approved Lubricants**

- 6.10.1. Oil grades based on ambient temperatures, suitable for normal applications. The recommendations are based on current information available and responsibility cannot be accepted for quality or suitability of oil supplied nor to any mechanical defect due to unsatisfactory lubrication.

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- 6.10.2. Oils marked \* contain mild E.P. additives and should not be used for units operating above 80°C normal running temperatures.
- 6.10.3. In general these oils should not be used below -4°C. If intended for such use, Grosvenor Pumps can recommend suitable oils for lower temperatures. Oils marked # are usually obtainable at most garages and motor factors.

**SUPPLIER**

BP Oil Ltd.

Burmah - Castrol (UK) Ltd.

Esso Petroleum Ltd.

Mobil Oil Co. Ltd.

Shell

Texaco Ltd.

**OILS**

Energol HLP 320

Energol CS 320 \*

Hypogear 90 EP #

Alpha ZN 320

Castrol ST 90 #

Hypoy EP 90 #

Teresso 320

GX 85W/90

DTE AA

HD 140 #

GX 140 #

Vitrea 320 \*

Macoma R 320 \*

Tellus V320

HD 90/140#

Regal R &amp; O 320