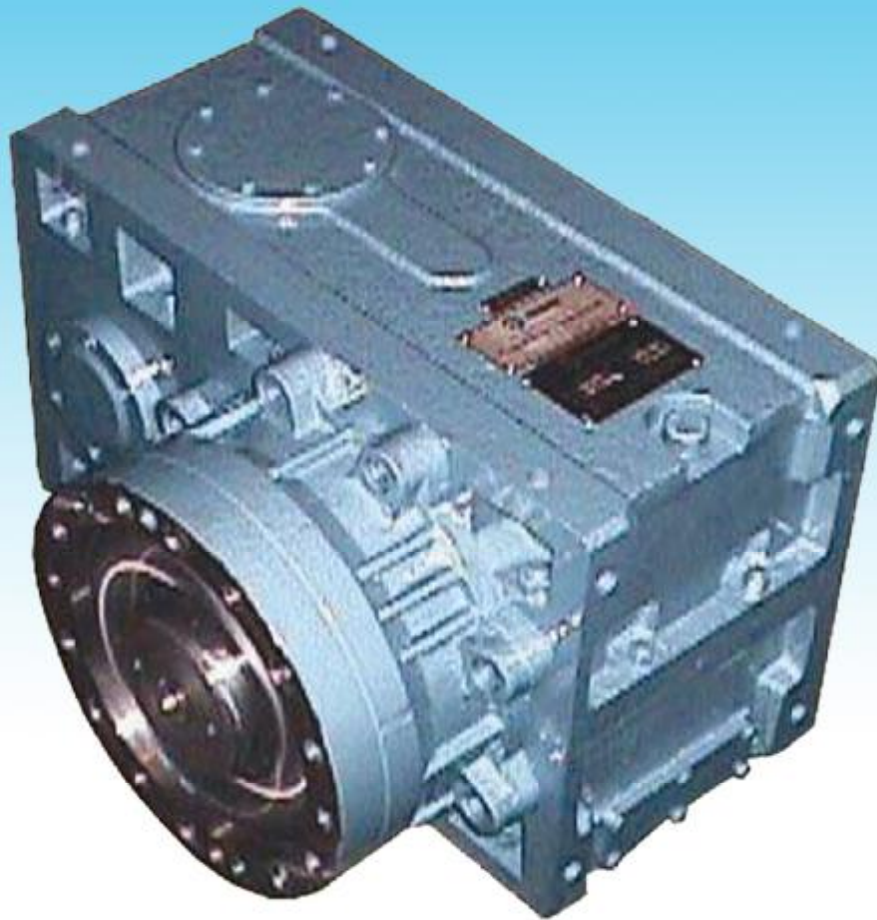




**PREMIUM**

## **Installation and Routine Maintenance**



# **GREAVES**

## **SINGLE SCREW EXTRUDER GEARBOXES**

# INTRODUCTION

The 'Premium' GHE-Series Single screw Extruder gear units incorporates the very best in modern gear design. It is a self-contained unit of simple rigid construction involving the minimum number of moving parts and embodying a lubrication system which ensures a positive supply of oil to gears and bearings at all running speeds.

Each unit is produced using the most up-to-date machinery and production technique ensuring the highest standards of accuracy and precision.

Maintenance of the 'Premium' Single screw Extruder units was one of the criteria considered at the design stage, and has led to the development of a unit that requires little maintenance but when needed may be worked on with a very nominal effort.

'Premium' GHE Series Extruder gearbox is double reduction helical gear train with an inbuilt separable thrust bearing to provide a compact and efficient drive for extruder applications. The units upto sizes 160 are supplied in uni-cast housing whereas 180 & above are with horizontally split housing.

This publication outlines all necessary steps for correct installation and maintenance of the Single screw Extruder reducers; following this sequence should ensure the long trouble-free life of your unit.



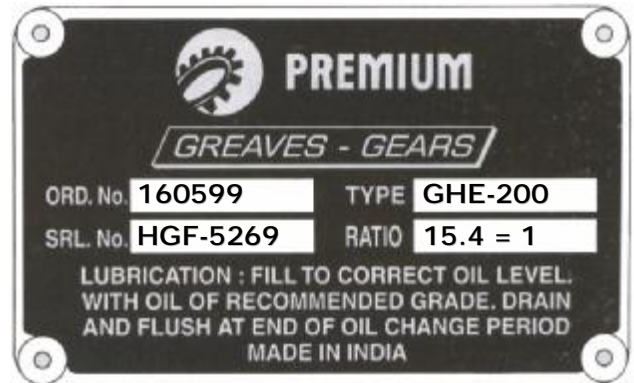
# UNIT IDENTIFICATION

## How to Identify your Unit:

1. Each unit carries nameplate for *Product description*. It depicts an individual six figure order number (O.No.) for identification purposes. This is in the form 160599. An enquiry to 'Premium' quoting this order number shall enable it to identify positively the gear units.

2. All gear units also have a code number on the nameplate for the designation purpose. This is in the form:

<b>GHE</b> -----	<b>200</b>
Type of Gear	Unit Size



By using this reference in conjunction with the sales brochure the gear unit can be identified.

Note: When ordering replacement parts quote from the nameplates the following:

1. Order Number 2. Serial Number 3. Ratio 4. Type

These are essential. Replacement parts cannot be identified without this information.

## General Construction:

### GEARS AND PINIONS:

Helical gears and pinions made of high quality alloy case hardening steels are flank ground to precision grade for ensuring high standard of accuracy, long life and quiet running characteristics.

### CASE:

The main case along with top bearing housing is of high-quality close-grained cast iron. The casing accommodates the bearings and the gear trains and is design optimized to provide precisely calculated strengthening ribs and optimal wall thickness in critical load carrying areas. They are provided with easily accessible service ports.

### SHAFTING:

Input pinion shaft and hollow output shaft (sleeve) is manufactured from direct hardening alloy steel / carbon steel capable of transmitting high torque.

### BEARINGS:

Branded taper roller / Spherical rollers bearings are used, as appropriate. These bearings are of ample capacity to support combined radial & thrust load.

### SHAFT SEALS:

Shaft extensions are fitted with spring-loaded rubber seals to prevent outflow of oil.

# STORAGE

## **P**rotection of Unit:

All units prior to despatch are test run with a rust preventive oil giving adequate protection to internal parts for a period of six months covering normal transport inland and overseas and coverage storage. When the unit is installed, the rust preventative dissolves in the first fill of lubricant without harmful effect. Shaft extensions are protected with a rust inhibitor which is proof against sea water and suitable for under-cover storage upto 12 months.

### **Notes:**

1. Where gear units are to operate in abnormal conditions, or where they are to stand for long periods without running, e.g. in plant installation, 'Premium' must be notified so that suitable protective arrangements can be made.
2. Gear units which are commissioned and then left standing for an extended period should be operated, loaded or unloaded for a short time every week to circulate the lubricant to protect surfaces. If, this is not possible the unit should be protected from corrosion.

# INSTALLATION

## **I**nstallation :

1. Clean shaft extensions, bores and ventilator.
2. Secure unit to a rigid foundation using HD bolts to GR8.8 specification minimum. Locate the unit in position ensuring it is as close as possible to screw on the driven shaft. The foundation on which the unit is to be installed should be rigid, composed of either R.C.C. or properly machined steel structure of sufficient stiffness to ensure freedom from vibration.
3. Align unit (see notes on shaft alignment)  
*(Note: It is important to ensure when aligning units that all machined mounting points are supported over their full area)*
4. Fit guards in accordance with factory acts.
5. Check motor wiring for correct direction of rotation, this is important to ensure such that the thrust screw rotates in the intended direction.

### **Warnings:**

All units are despatched without Oil or Grease. On installing the unit fill the recommended lubricant to correct level as per dipstick marking. (To prevent burning and fast wearing out of the lips of oilseals due to dry running, till oil circulation due to splash lubrication is established, a few drops of oil must be squirted on the lips of the oilseals to wet them prior to starting up of the gearbox initially as well as every re-start after rest period in excess of 24 hours.)

# SHAFT ALIGNMENT

**W**hilst no general rule can be laid down for permissible error in lining up it is recommended that, for flexible couplings, faces are true to within  $0.05\text{mm} + 0.0002D$  (where  $D$  = shaft diameter) and the peripheries within  $0.1\text{mm}$ . With rigid type couplings this figure should be halved.

Errors of alignment are either angularity (Fig. 1) or eccentricity (Fig. 2) or a combination of both. 'GHE' series units are fitted with taper roller bearings on all input which are assembled with a predetermined amount of axial float.

When the shafts move axially it does so with a rocking motion, therefore, to facilitate accurate alignment of the coupling halves, it is necessary that this end float is temporarily eliminated by the adjustment of the end cover farthest away from the coupling. The end cover should be removed and shims inserted between its spigot and bearing outer race, care being taken not to tip the outer track or over tighten the bolts.

**Errors of angularity** : Correct before any attempt is made to eliminate errors of eccentricity. The procedure is shown in Fig. 3 using a thickness gauge in conjunction with filler gauges. Readings should be taken in positions 1,2,3 and 4 with any axial float taken up. Adjust units by shimming under feet.

**Errors of eccentricity** : These occur when the centre lines of shafts do not intersect (Fig. 2). When the misalignment is in the vertical plane, it can be corrected by altering the height of the either units by means of packing shims placed under feet.

When the error is in the horizontal plane, correction may be made by moving unit transversely until set in the required position.

If both coupling halves are of the same diameter, their concentricity can be checked with the use of a straight edge as shown in Fig. 4. If the coupling diameters are not equal, a straight edge should be used in conjunction with a feeler gauge equal to half the difference in diameter.

## Effect of Temperature :

If there is a substantial difference between the running temperature of the gear casing and the adjacent machinery, differences in heights may be appreciable. The co-efficient of linear expansion of cast iron is  $0.000011$  per unit length per  $^{\circ}\text{C}$  ( $0.000006$  per unit length per  $^{\circ}\text{F}$ ).

For a  $280\text{ mm}$  ( $11''$ ) centre height and a difference of  $50^{\circ}\text{F}$  ( $27.7^{\circ}\text{C}$ ) between gear case and machine the error of alignment, if correct when cold, will be  $0.08$  ( $0.0033\text{in}$ )

Such operating conditions can produce, particularly in large and close coupling units, very heavy additional bearing loads and it is recommended that allowance be made such that the alignment will be correct under normal working conditions.

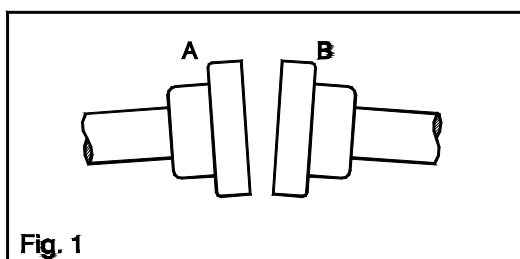


Fig. 1

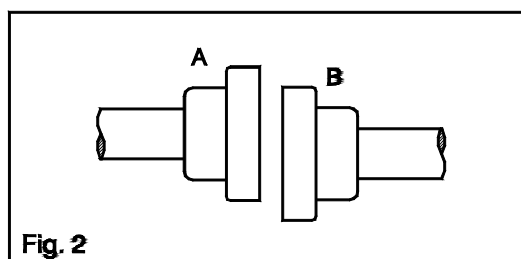


Fig. 2

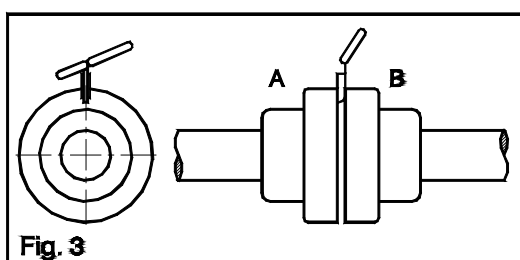


Fig. 3

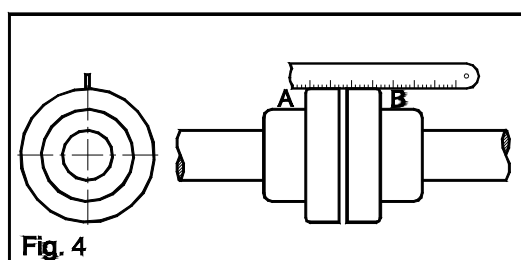


Fig. 4

# BEARINGS AND SEALS

## Bearings :

The bearings for GHE-Series Single screw extruder units are selected very carefully to best suit the requirements of each unit and to more than adequately deal with the designed maximum loads acting on them. Because of the load carrying capacity at higher speeds, taper roller bearings are used in the input and 2<sup>nd</sup> reduction line. Spherical roller bearings are used in the output line along with a spherical roller thrust bearing to absorb thrust arising out of extrusion process.

If unit is dismantled or partly dismantled, on reassembly, the bearing end floats should be checked and adjusted as required. The taper roller bearings have tight tolerances of bearing end float and require careful setting. (Refer Table for Bearing End Float)

## Oil seals :

Oil seal should be replaced whenever unit is dismantled or if in service it shows signs of leakage or damage.

### RECOMMENDED PROCEDURE FOR REPLACING INPUT OIL SEAL:

1. Clean and drain unit.
2. Remove any part that may obstruct the access to oil seal.
3. Remove cap screws with suitable Allen keys and withdraw oil catcher. Do not alter the shaft position.
4. Check for burrs and scratches on the input shaft as these could damage the new seal.
5. Tap the old oil seal out of the housing.
6. Clean joint faces input oil catcher and gearcase.
7. Coat joint faces of oil catcher and gearcase with a good jointing compound.
8. Replace oil catcher and tighten cap screws.
9. Fit replacement seal. Protect seal lips by wrapping shaft with thin strong paper coated with oil or grease. Coat seal lips with grease, then using appropriate sized, drift press into housing. For best performance, ensure that seal is seated square with the shaft.
10. Fill unit with the recommended lubricant to correct level and check the grease availability.

### RECOMMENDED PROCEDURE FOR REPLACING OUTPUT OIL SEAL:

#### A. (Thrust end)

1. Clean and drain unit.
2. Remove cap screws with suitable Allen keys and withdraw thrust adaptor plate cum oil catcher.
3. Check for burrs and scratches on the hollow output shaft (sleeve) as these could damage the new seal.
4. Tap the old oil seal out of the housing.
5. Clean joint faces.
6. Coat joint faces of thrust adaptor plate cum oil catcher and main casing with a good jointing compound.
7. Replace adaptor plate cum oil catcher and tighten cap screws.
9. Fit replacement seal. Protect seal lips by wrapping shaft with thin strong paper coated with oil or grease. Coat seal lips with grease, then using appropriate sized, drift press into housing. For best performance, ensure that seal is seated square with the shaft.
10. Fill unit with the recommended lubricant to correct level.



# TIGHTNING TORQUE

## Tightening torque :

Standard units are fitted with joint studs, secured with loctite. Nuts / Bolts should be tightened to the correct torque during routine maintenance.

Gearbox Size	Case Joining Studs/Bolts			Cover and Housing Bolts		
	Thread Size	Torque (Nm)	Torque (lbf in)	Thread Size	Torque (Nm)	Torque (lbf in)
112	M10	35	310	M6	12	106
				M8	20	177
	M12	60	531	M10	40	354
125	M10	35	310	M8	20	177
	M12	60	531	M10	40	354
140	M10	35	310	M10	40	354
	M12	60	531	M12	70	619
160	M10	35	310	M10	40	354
	M12	60	531	M16	180	1593
180	M10	35	310	M10	40	354
	M12	60	531			
	M16	160	1416	M16	180	1593
200	M12	60	531	M10	40	354
	M16	160	1416	M16	180	1593
225	M12	60	531	M12	70	619
	M16	160	1416			
	M20	310	2743	M20	350	3097
225	M16	160	1416	M12	70	619
	M20	310	2743	M20	350	3097

# LUBRICATION AND LUBRICANTS

**New Units:** All units are despatched without oil. Before operating a new unit it should be filled with a recommended lubricant upto the dipstick mark. Wherever possible run the unit for a short time without load to circulate the lubricant thoroughly. Subsequently stop the unit and recheck the oil level and if necessary, top up to the correct mark.

**Warning:** Do not overfill unit as this can cause leakage and overheating.

**Oil Changes:** As the oil is used, degradation takes place and since this process is more rapid at elevated temperatures, the oil must be changed to ensure satisfactory lubrication. The type of oil and time spent at highest temperatures determines the interval between oil changes.

## Oil Change Period:

Regular oil changes are essential to ensure that the gearbox gives long and trouble free service. The procedure for changing the oil should be to drain the oil preferably when hot and after circulation. If the unit is to be flushed, the unit should be filled to the highest level with an flushing oil of viscosity grade 22 of any manufacturer and run before the flushing oil is drained. The activity should be carried out for a considerable period which will depend upon the amount of contaminations of the lubricating oil due to generation of wear debris and formation of sludge. Continue the flushing out operation till the original color of flushing oil is observed and signs of contamination is not visible. The procedure should be followed especially if the type of oil is to be changed.

Recycling of flushing oil may be done after passing through filters of 200 mesh.

The top bearings if grease lubricated, should be re-greased at 2000 to 3000 hours intervals unless otherwise specified.

Operating Temperature	Oil Change period
Upto 110°C	6 Calendar month



Use Greaves Traxol Lubricant oil G-32 for optimizing gear performance and service life. Available at all PETL outlets.

Recommended Lubricant ISO VG320	
Brand	Grade
Greaves	Greaves Traxol 32
Bharat Petroleum	Cabol 320 or Amocam 320
Castrol	Alpha ZN 320
Gulf	Harmony 320
Hindustan Petroleum	Enklo 320
Indian Oil	Servomesh SP 320
Veedol	Avalon 320
Esso Petroleum Co. Ltd.	Sparton EP 320
Shell Group	Omala Oil 320
Balmer Lawrie	Protomac SP 320

## Oil required for first filling (litres) approx.:

Mounting	Oil Capacities in litres (approx.)							
	112	125	140	160	180	200	225	250
Horizontal	5	6	7	11	15	20	27	35
Vertical	6	7	8	13	16	22	30	38

# SHIPPING SPECIFICATION

## Net & gross weight (kg):

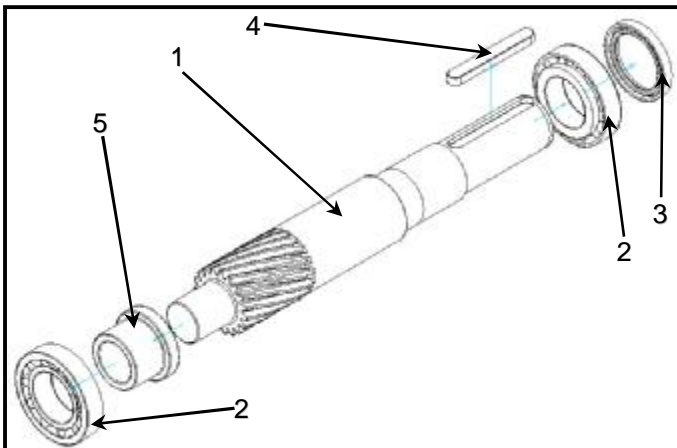
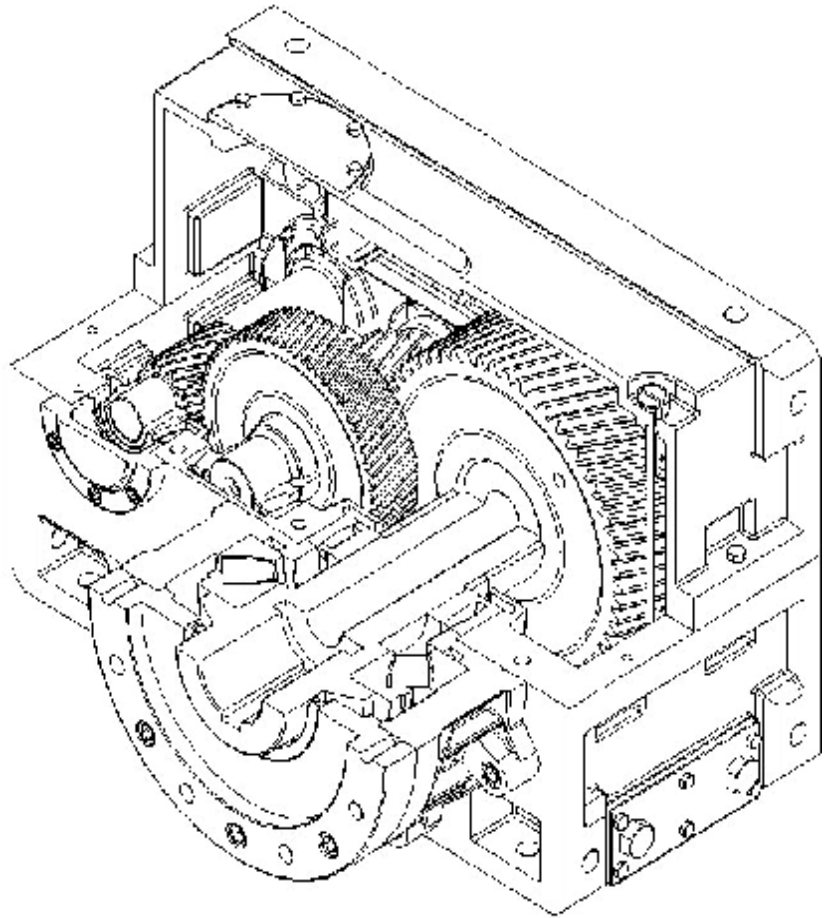
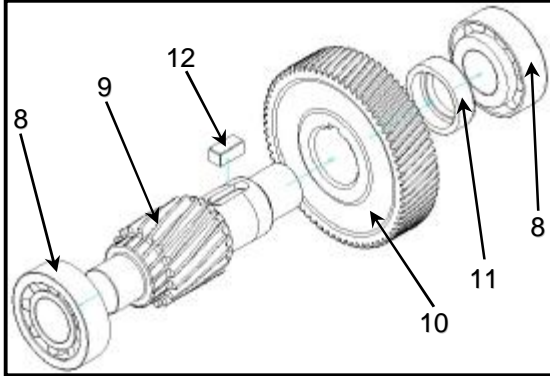
Thrust Bearing Size	Net Weight and Gross Weight (in bracket) in kg (approx.)							
	112	125	140	160	180	200	225	250
29412E	85 (95)							
29413E	89 (99)							
29414E	94 (103)	108 (125)						
29415E		113 (120)						
29416E		120 (138)	200 (225)					
29417E			204 (228)					
29418E			210 (235)	274 (307)				
29420E				281 (314)	322 (362)			
29422E				289 (323)	329 (371)	433 (488)		
29424E					337 (375)	439 (494)		
29426E					348 (388)	447 (502)	574 (634)	
29428E						454 (509)	581 (641)	
29430E							590 (650)	
29432E							602 (662)	812 (892)
29434E								832 (912)
29436E								851 (931)
29438E								872 (952)

**WARNING :** The customer shall be responsible for the proper use of articles supplied by the company, particularly the rotating elements between their driven members, and their guarding for safety, and the company shall not be responsible for any injury or damage sustained as a result of the improper use of the article supplied.  
Attention is hereby drawn to the danger of using naked lights in proximity of openings in geared motors supplied by the company, and the company shall not be liable for any claim for injury or damage arising from any contravention of this warning.

# IDENTIFICATION OF PARTS

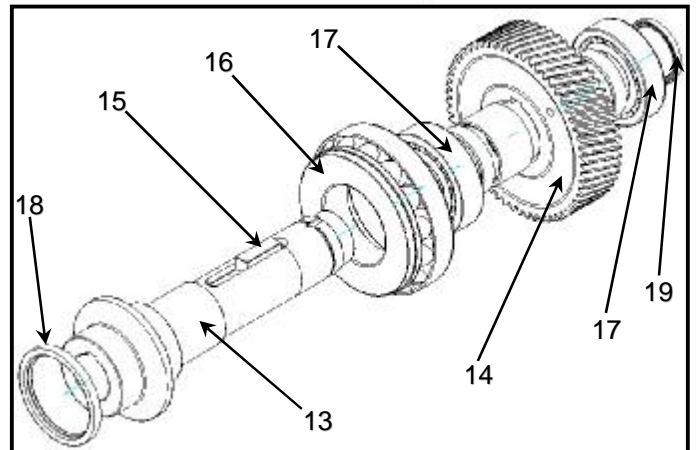
## GHE-Series

### Final Pinion Shaft Assembly



### Input Shaft Assembly

1. Input pinion shaft
2. Input bearing
3. Input Oil seal
4. Input extension key
5. Input bearing sleeve



### Output Sleeve Assembly

8. Final pinion shaft bearing
9. Final pinion shaft
10. 1<sup>st</sup> Reduction Wheel
11. Final reduction distance piece
12. Final reduction wheel seat key
13. Hollow Output shaft (sleeve)
14. Output wheel
15. Output wheel seat key
16. Spherical roller thrust bearing
17. Output bearing
18. Output oil seal (Thrust end)
19. Output oil seal (Non thrust end)

#### Important :

When ordering spares or replacement parts the following details from the name plate must be quoted :

1. Serial No.
2. Geared reducer Type / Size
3. Ratio

**GREAVES GEARS**

Leadership in Power Transmission



**PREMIUM**

**Premium Energy Transmission Limited**

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Website : [www.premiumtransmission.com](http://www.premiumtransmission.com)

**Branch Offices :**

**Western Region :**

**Mumbai :** Industry Manor, Appasaheb Marathe Marg, Prabhadevi, Mumbai - 400 025.  
Tel. : (91-22) 24223747, 24365510, Fax : (91-22) 24377730.

**Ahmedabad :** "Jaldanshar", Ashram Road, Navrangpura, Ahmedabad - 380 009.  
Tel. : (91-79) 26580428/0518/1861, Fax : (91-79) 26587783.

**Nagpur :** "Guman", Pandit Jawaharlal Nehru Marg, Sadar, P. B. No. 129, Nagpur - 440 001.  
Tel. : (91-712) 2526588, 2524125, 2526038, Fax : (91-712) 2541142.

**Northern Region :**

**New Delhi :** Express Building Annex, 9-10, Bahadur Shah Zafar Marg, New Delhi - 110 002.  
Tel. : (91-11) 23730554 (8 lines), Fax : (91-11) 23359782.

**Eastern Region :**

**Kolkata :** Thapar House, 25, Brabourne Road, P. B. No. 702, Kolkata - 700 001.  
Tel. : (91-33) 22423811, 22423780, 22423805, Fax : (91-33) 22424325.

**Ranchi :** Rani Kuthi, 82, Burdwan Compound, P.B. No. 139, Ranchi - 834 001.  
Tel. : (91-651) 2562651, Fax : (91-651) 2562027.

**Southern Region :**

**Chennai :** "Wivoo Mansion", 6th Floor, New No. 48, (Old No. 39), Rajaji Sahai, Chennai - 600 001.  
Tel. : (91-44) 25240142, Fax : (91-44) 25224557.

**Bangalore :** 16/3, Ali Asker Road, P. B. No. 216, Bangalore - 560 052.  
Tel. : (91-80) 22268773/2506, Fax : (91-80) 22253472.

**Hyderabad :** 6-2-47, A. C. Guards, 1st floor, P. B. No. 9, Hyderabad - 500 004.  
Tel. : (91-40) 23314025, 23390544, 23316446, Fax : (91-40) 23318557.

**Kochi :** 39/5567, M. G. Road, Ernakulam, Kochi - 682 015.  
Tel. : (91-484) 2359190, 2359372, Telefax : (91-484) 2359589.

