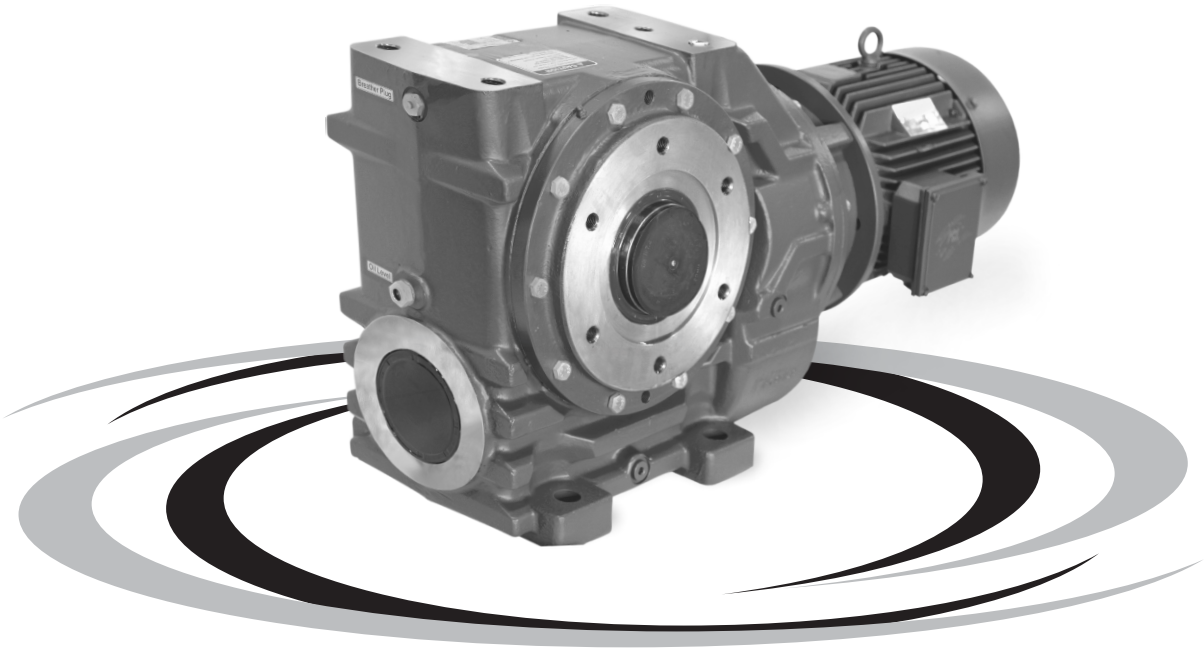
RADICON POWERBUILD

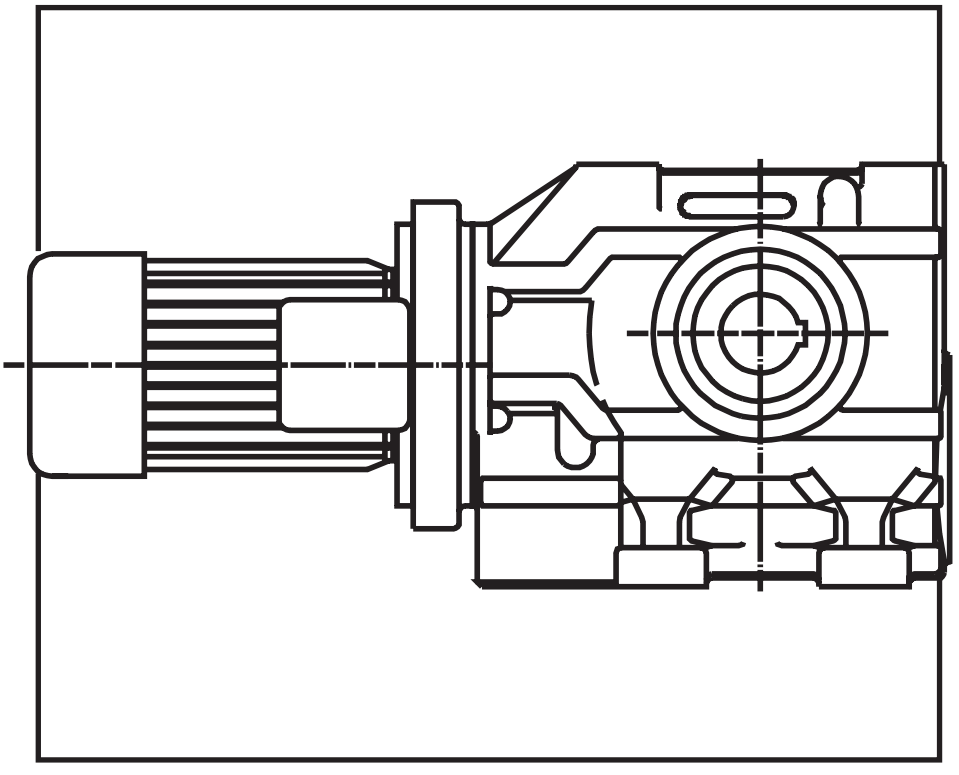
Series C

Installation & Maintenance Manual



GEARED MOTORS · GEARBOXES · GEAR ASSEMBLIES · DRIVE SOLUTIONS

Cat. No.: IM_C-2.04INP1221



INSTALLATION & MAINTENANCE

SERIES C

POWER BUILD PVT LTD

Leaders in Power Transmission Solutions

IMPORTANT

Product Safety Information

General - The following information is important in ensuring safety. It must be brought to the attention of personnel involved in the selection of Power Build Pvt. Ltd. equipment, those responsible for the design of the machinery in which it is to be incorporated and those involved in its installation, use and maintenance.

Power Build Pvt. Ltd. is not liable for damage arising from non-compliance of the operating manual.

The operating manual is a part of the product.

- Always keep the operating manual ready to hand near the product as it contains important information.
- Pass on the operating manual if the product is supplied with main equipment / machine.

Power Build Pvt. Ltd. equipment will operate safely provided it is selected, installed, used and maintained properly. As with any power transmission equipment **proper precautions must** be taken as indicated in the following paragraphs, to ensure safety.

Potential Hazards - these are **not** necessarily listed in any order of severity as the degree of danger varies in individual circumstances.

Instructions on the protective measures to be taken by the user, including where appropriate, the personal protective equipment to be provided.

It is important therefore that the list is studied in its entirety:-

1) Fire/Explosion

a) Oil mists and vapour are generated within gear units. It is therefore dangerous to use naked lights in the proximity of gearbox openings, due to the risk of fire or explosion.

b) In the event of fire or serious overheating (over 300°C), certain materials (rubber, plastics, etc.) may decompose and produce fumes. Care should be taken to avoid exposure to the fumes, and the remains of burned or overheated plastic/rubber materials should be handled with rubber gloves.

2) Guards - Rotating shafts and couplings must be guarded to eliminate the possibility of physical contact or entanglement of clothing. It should be of rigid construction and firmly secured.

3) Noise - High speed gearboxes and gearbox driven machinery may produce noise levels which are damaging to the hearing with prolonged exposure. Ear defenders should be provided for personnel in these circumstances.

4) Lifting - Where provided (on larger units) only the lifting points or eyebolts must be used for lifting operations (see maintenance manual or general arrangement drawing for lifting point positions). Failure to use the lifting points provided may result in personal injury and/or damage to the product or surrounding equipment. Keep clear of raised equipment.

5) Lubricants and Lubrication

a) Prolonged contact with lubricants can be detrimental to the skin. The manufacturer's instruction must be followed when handling lubricants.

b) The lubrication status of the equipment must be checked before commissioning. Read and carry out all instructions on the lubricant plate and in the installation and maintenance literature. Take notice of all warning tags. Failure to do so could result in mechanical damage and in extreme cases risk of injury to personnel.

6) Electrical Equipment - Observe hazard warnings on electrical equipment and isolate power before working on the gearbox or associated equipment, in order to prevent the machinery being started.

7) Installation, Maintenance and Storage

a) In the event that equipment is to be held in storage, for a period exceeding 6 months, prior to installation or commissioning, Power Build Pvt. Ltd. must be consulted regarding special preservation requirements. Unless otherwise agreed, equipment must be stored in a building protected from extremes of temperature and humidity to prevent deterioration.

b) The rotating components (gears and shafts) must be turned a few revolutions once a month (to prevent bearings brinelling). External gearbox components may be supplied with reservative materials applied, in the form of a "waxed" tape overwrap or wax film preservative. Gloves should be worn when removing these materials. The former can be removed manually, the latter using white spirit as a solvent.

Preservatives applied to the internal parts of the gear units do not require removal prior to operation.

c) Installation must be performed in accordance with the manufacturer's instructions and be undertaken by suitably qualified personnel.

d) Before working on a gearbox or associated equipment, ensure that the load has been removed from the system to eliminate the possibility of any movement of the machinery and isolate power supply. Where necessary, provide mechanical means to ensure the machinery cannot move or rotate. Ensure removal of such devices after work is complete.

e) Ensure the proper maintenance of gearboxes in operation. Use only the correct tools and Power Build Pvt. Ltd. approved spare parts for repair and maintenance. Consult the Maintenance Manual before dismantling or performing maintenance work.

8) Hot Surfaces and Lubricants

a) During operation, gear units may become sufficiently hot to cause skin burns. Care must be taken to avoid accidental contact.

b) After extended running the lubricant in gear units and lubrication systems may reach temperatures sufficient to cause burns.

Allow equipment to cool before servicing or performing adjustments.

9) Selection and Design

a) Where gear units provide a backstop facility, ensure that back-up systems are provided if failure of the backstop device would endanger personnel or result in damage.

b) The driving and driven equipment must be correctly selected to ensure that the complete machinery installation will perform satisfactorily, avoiding system critical speeds, system torsional vibration, etc.

c) The equipment must not be operated in an environment or at speeds, powers, and torques or with external loads beyond those for which it was designed.

Unintended use includes:

- Overloading the gearbox or exceeding the limits that are defined in the technical data;
- Converting or modifying the gearbox;
- Using the gearbox for an application that it was not designed for.

d) As improvements in design are being made continually the contents of this catalogue are not to be regarded as binding in detail, and drawings and capacities are subject to alterations without notice.

10) Waste Disposal

Waste (Used oil, Rubber items, Packing material etc) should be disposed as per local rules of disposal.

The above guidance is based on the current state of knowledge and our best assessment of the potential hazards in the operation of the gear units.

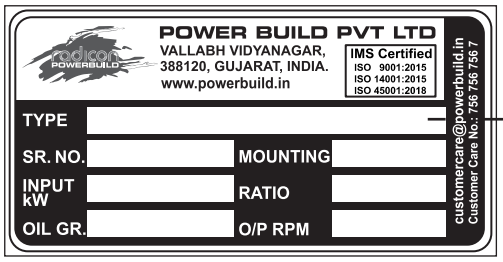
Any further information or clarification required may be obtained by contacting Power Build Pvt. Ltd.

SERIES C
CONTENTS

1 UNIT IDENTIFICATION

When requesting further information, or service support quote the following information from the nameplate:

- Unit Type
- Sr. Number



Gear codes													Motor codes						
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
C																			

Example* C 0 3 2 1 5 0 . B M C - 1 D . 1 8 A - -

1 - Series C
Range C

2, 3 - Size of Unit
Through
0 3 — 1 0

4 - No of Reductions
2 3 — 4

5 - Revision Version
1 For Sizes 03 to 10

6,7,8 - Nominal Overall Ration
eg. 5 0 .

9 - Unit Version

- W - Standard Unit (C03 - C06 Only)
- B - Standard Unit with Base Mounted Feet
- E - Standard Unit with End Mounted Feet
- R - Standard Unit with Top Mounted Feet

Std Unit with Output Flange F on Left H on Right

- G - Std Unit with Output Flange Reduced Dia (C03 Only)

Std Unit withTorque Arm T on Left Q on Right

- U - Std Unit withTorque Arm - Heavy Duty (C10 Only)

10 - Type of Unit

- M - Motorized with IEC standard motor
- G - Unit to allow fitting of IEC motor (customer own motor)
- R - Reducer unit
- S - Reducer unit with fan kit
- W - Reducer unit with backstop CCW rotation
- X - Reducer unit with backstop CW rotation
- Y - Reducer unit with fan and backstop CW rotation
- Z - Reducer unit with fan and backstop CCW rotation

11 - Output Shaft

Standard Single Extension C on Left E on Right
Standard Double Extension D

Standard Hollow Shaft H
Unit with Hollow Shaft with Reduced Bore Dia Z
Heavy Duty Single Extension (Size C06) J
Heavy Duty Double Extension (Size C06) K

12 - Motor Adaptor For Unit Types Column 10 Entries M, G
For All Other Types Enter -

13, 14 - Mounting Position
eg 2 B

15, 16, 17 - Geared Motor Powers
Motor Power Required
eg . 7 5
For Reducer or Non-Standard Motor Types Enter - - -

18 - No of Motor Features
- No motor

	50 Hz		60 Hz	
4 Pole (Std) 1500 rpm	A	1800 rpm	B	
4 Pole (High)1500 rpm	K	1800 rpm	L	
6 Pole (Std) 1000 rpm	C	1200 rpm	D	
6 Pole (High)1000 rpm	M	1200 rpm	N	
2 Pole 3000 rpm	E	3600 rpm	F	
8 Pole 750 rpm	G	900 rpm	H	

S Dual Speed or Special Motor

19 - Additional Motor Features
eg - A
For Types Without Motor Enter -

20 - Additional Gearbox Features
Double Oil Seal, Motorised Backstop Etc
eg - F

* This page may be photocopied allowing the Customer to enter their order

2 GENERAL INFORMATION

The following instructions will help you achieve a satisfactory installation of your Power Build Pvt Ltd Series C unit, ensuring the best possible conditions for a long and trouble free operation.

All units are tested and checked prior to despatch, a great deal of care is taken in packing and shipping arrangements to ensure that the unit arrives at the customer in the approved condition.

Series C gear units will perform satisfactorily if subjected to full load immediately after installation. However, optimum performance is best achieved by a process of gradual load increments, up to the full value, over the first 50 hours or so of their working life. During these early stages of running, sensible precautions should be taken to avoid overloads.

The gear unit operating temperature may be higher during this period of run-in. A progressive reduction in temperature may occur over many hours until the unit has reached its highest efficiency.

3 FITTING OF COMPONENTS TO EITHER THE UNIT INPUT OR OUTPUT SHAFT

The input or output shaft extension diameter tolerance is to ISO tolerance k6 (for shaft diameter $\leq$ 50mm) and m6 (for shaft diameter > 50mm) and the fitted components should be to ISO tolerance M7 (for bore diameter $\leq$ 50mm) and K7 (for bore diameter > 50 mm).

- Items (such as gears, sprockets, couplings etc) should not be hammered onto these shafts since this would damage the shaft support bearings.
- The item should be pushed onto the shaft using a screw jack device fitted into the threaded hole provided in the end of the shaft.
- Items being fitted may be heated to 80/100°C to aid assembly further.

THREADED HOLE DETAILS

UNIT SIZE	INPUT SHAFT	OUTPUT SHAFT
C0321 / C0331	M5 x 12.5 mm deep	M6 x 16 mm deep
C0421 / C0431	M5 x 12.5 mm deep	M10 x 22 mm deep
C0521 / C0531	M5 x 12.5 mm deep	M10 x 22 mm deep
C0621	M6 x 16 mm deep	M12 x 25 (35mm ø Shaft)
C0631	M5 x 12.5 mm deep	M16 x 36 (45mm ø Shaft)
C0721	M8 x 19 mm deep	M16 x 36 mm deep
C0731	M6 x 16 mm deep	M16 x 36 mm deep
C0821	M10 x 22 mm deep	M20 x 42 mm deep
C0921	M12 x 28 mm deep	M20 x 42 mm deep
C1021	M16 x 36 mm deep	M24 x 50 mm deep

4 WEATHER PROTECTION OF UNIT

All Series C units are provided with protection against normal weather conditions. Where units are to operate in extreme conditions, or where they are to stand for long periods without running, eg during plant construction, we should be notified when ordering so that arrangements for adequate protection can be made.

5 INSTALLATION

5.1 MOTORISED AND REDUCERS

- Sizes C03, 04, 05 and 06 are supplied factory filled with correct amount of lubricant for mounting position quoted.
- Sizes C07, 08, 09 and 10 will be oil filled by client.
  If the unit is to be mounted in a different position to that originally intended then the amount of lubricant in the unit will require amending
  - See Appendix 2 of this document for the revised quantities
  - See Appendix 1 for the methodology for doing this.

NOTE: It is important that the same oil is used as is already in the unit.

If an oil other than factory filled is to be used the unit should be drained and flushed with the oil to be used and filled with the correct quantity.

5.2 GEAR HEADS

If the unit has been supplied as a Gear Head type to allow fitting of the motor separately then refer to Appendix 1. For sizes C03, 04, 05 & 06 only, units satisfying condition 'G' (ref Appendix 1) will be supplied filled with oil, and units satisfying condition 'A' or 'M' (ref Appendix 1) will be supplied less oil.

5.3 FIXING TO CUSTOMER EQUIPMENT

Fixing the Gear Head flange facing, 'C' facing or feet to the customer equipment use set screws to ISO grade 8.8 minimum.

Torque tighten to:-

Set Screw Size	Tightening Torque
M6	10 Nm
M8	25 Nm
M10	50 Nm
M12	85 Nm
M16	200 Nm
M20	350 Nm
M24	610 Nm

5.4 MOTOR CONNECTIONS

TO MAINS

Connection of the electric motor to the mains supply should be made by a qualified person. The current rating of the motor will be identified on the motor plate, and correct sizing of the cables to electrical regulations is essential.

MOTOR TERMINAL CONNECTION

Circuit diagrams for the correct wiring of the motor terminal box are included as Appendix 3.

5.5 FOOT-MOUNTED UNITS

The following procedure is recommended for all foot mounted units.
Foot mounted units are supplied either as free standing units, or if required, mounted on a standard baseplate with a foot mounted motor correctly aligned and connected by a flexible coupling.

a) Clean shaft extensions and ventilator when fitted.

b) Secure unit, or baseplate if fitted to a rigid foundation using heavy duty bolts to ISO grade 8.8 minimum.

c) Ensure baseplate is not distorted
Note: Units not supplied on baseplates should if possible be mounted on the same bedplate as the prime mover.

d) Align unit (see Appendix 5)
Note: It is important to ensure when aligning unit on base plate that all machined mounting points are supported over their full area.
If steel packings are used these should be placed either side of the foundation bolt as close as possible. During the final bolting ensure the unit or baseplate is not distorted this will cause strains in the gear case resulting in errors of alignment of shafts and gearing.

e) For units mounted on base plates after alignment select any two diagonally opposite feet, drill ream and dowel in position.

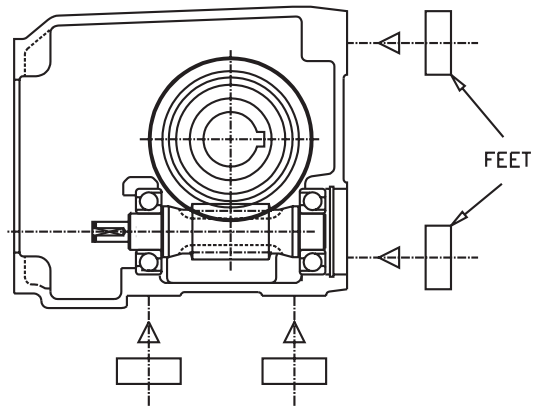
f) Fit guards in accordance with the factory acts.

g) Check motor wiring for correct direction of rotation this is important when a holdback device is fitted.

h) Fill gear unit with oil (if not factory filled) as detailed in Section 6.

5.6 FITTING FEET ON UNITS

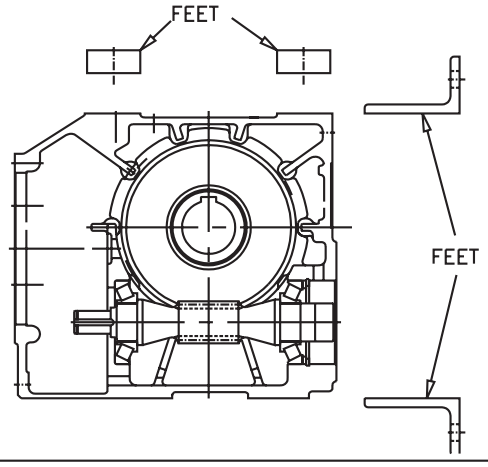
Series C units are fitted with detachable feet. These are normally factory fitted to clients specification, but if for any reason the feet are supplied separately, or dismantling is necessary after supply, they should be re-fitted and torque tightened to the following settings.



FOR SIZES C03, C04, C05 & C06

- Scrape any paint etc off foot location faces on casing.
- Clean feet and case fixing faces with Lowtox or Loctite 7061.
- Fit feet with setscrews to torques:

Unit Size	Bolt Size	Torque
C03	M8	25 Nm
C04/C05	M10	50 Nm
C06	M12	85 Nm



FOR SIZES C07, C08, C09 & C10

- Scrape any paint etc off foot location faces on casing.
- Clean feet and case fixing faces with Lowtox or Loctite 7061.
- Fit feet with setscrews to torques:

Unit Size	Bolt Size	Torque
C07/C08	M20	176 Nm
C09/C10	M24	240 Nm

5.7 SHAFT MOUNTED UNITS

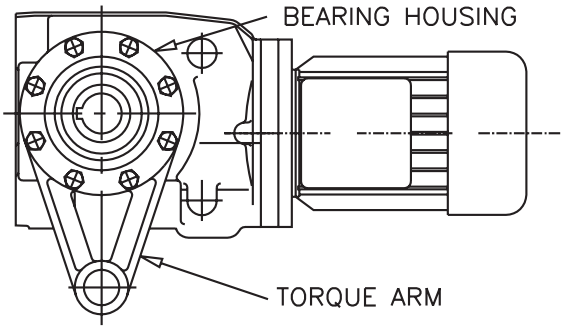
The following procedure is recommended for all shaft and foot/shaft mounted units.

a) Clean shaft extensions, bore and ventilator when fitted.

b) Locate in position, using the most convenient method available see Appendix 6, ensuring it is as close as possible to the bearing on the driven machine.

c) Secure unit onto the shaft using chosen method from Appendix 6.

d) Fit torque arm to the side of the unit adjacent to the driven machine where possible, as detailed below.
Note: Unless specified otherwise, the torque arm will be supplied loose.

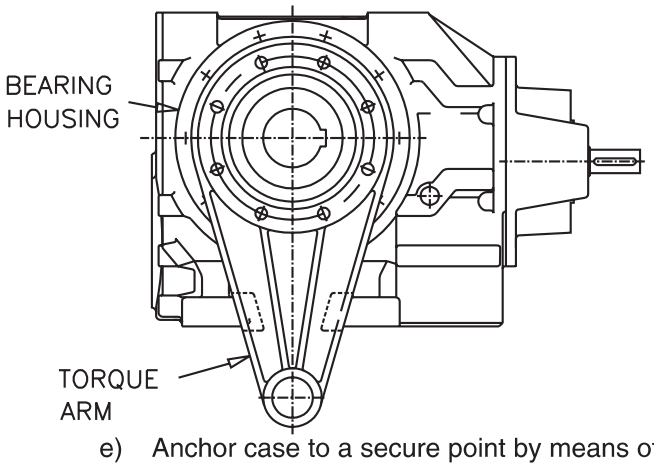


FOR SIZES C03, C04, C05 & C06

- Remove bearing housing bolts (note: take care not to split gasket joint).
- Clean torque arm & bearing housing facings with Lowtox or Loctite 7061.
- Fit torque arm as shown (unless order states otherwise) with longer bolts provided

Torque to:

Unit Size	Bolt Size	Torque
C03/C04/C05	M8	25 Nm
C06	M10	50 Nm



FOR SIZES C07, C08, C09 & C10

- Clean torque arm & bearing housing facings with Lowtox or Loctite 7061.
- Fit torque arm as shown (unless order states otherwise) with bolts provided

Torque to:

Unit Size	Bolt Size	Torque
C07/C08	M12	85 Nm
C09/C10	M16	200 Nm

e) Anchor case to a secure point by means of the torque arm.

f) Fit guards in accordance with the factory acts.

g) Check motor wiring for correct direction of rotation, this is important when a holdback device is fitted.

h) Fill gear unit with oil (if not factory filled) as detailed in Section 6.

5.8 REPLACEMENT OF OIL SEALS

1. Clean and drain the unit.
2. Remove the holding screws and withdraw cover.
   NOTE: Take care not to damage the shims and do not alter the shaft position. Check for burrs or scratches on the shaft which could damage the new seal.
3. Tap the old seal out of the housing or cover using an appropriate sized drift.
4. Ensure that joint faces and shims are clean and position the shims in the cover.
5. Coat joint faces of cover and case with a good jointing compound, replace oil catcher and tighten screws.
6. Smear oil seals with grease (See Appendix 4).
7. Fit replacement seal on a seal guide, slide it along the shaft and press the seal into the housing or cover.
8. Fill with the correct amount of an approved lubricant, see Appendix 2.

5.9 REPLACEMENT OF HOLDBACKS

If and when it becomes necessary to replace the holdback contact Power Build Pvt Ltd.

6 LUBRICATION AND MAINTENANCE

6.1 LUBRICATION

- Unit sizes C03, 04, 05 and 06 are factory filled with a quantity of polyglycol synthetic oil.
- Unit sizes C07, 08, 09 and 10 will be oil filled by client (See Appendix 2).

6.2 PERIODIC INSPECTION

a. Check oil level
every 3000 hours or 6 months whichever is sooner on sizes C05 & C06
every 1000 hours or 2 months whichever is sooner on sizes C07, C08, C09 & C10
and if necessary top up with the recommended grade of lubricant.

6.3 OIL CHANGES

Size 03 and 04 units are lubricated for life. On all other sizes regular oil changes are essential and the following factors should be used to determine the frequency at which these are carried out.

a. Oil temperature - unit operating under load.
b. Type of oil.
c. Environment - humidity, dust, etc.
d. Operating conditions - shock, loading, etc.

At elevated temperatures the effective life of the oil is very much reduced. This is most pronounced with oils containing fatty and E.P. additives. To prevent damage to the unit through lubricant breakdown the oil should be renewed as detailed in the following table:

UNIT OPERATING TEMPERATURE °C	RENEWAL PERIOD
	SYNTHETIC OIL
70 or less	26000 HOURS OR 3 YEARS
75	22000 HOURS OR 3 YEARS
80	15000 HOURS OR 3 YEARS
85	10500 HOURS OR 3 YEARS
90	7500 HOURS OR 2 1/2 YEARS
95	6000 HOURS OR 2 YEARS
100	4500 HOURS OR 18 MONTHS

NB: INITIAL FILL OF OIL SHOULD BE CHANGED IN A NEW GEAR UNIT AFTER 1000 HOURS OPERATION OR ONE YEAR OR HALF THE ABOVE LIFE WHICHEVER IS THE SOONEST

Note:
Figures quoted are for oil temperatures when the unit has attained normal running temperature when operating under load. These figures are based on normal running but where conditions are particularly severe it may be necessary to change the oil more frequently. When changing lubricant, if same lubricant is not used then unit must be flushed out and filled only with one type of lubricant.

6.4 LUBRICANT QUANTITY

The quantity of lubricant required by size and mounting position is given in Tables 2 and 3, Appendix 2. A diagram showing mounting position designations is also included in Appendix 2.

6.5 APPROVED LUBRICANTS

Table 4 Appendix 2 gives the lubricants approved for use in the gear unit.

6.6 APPROVED GREASES

Appendix 4 gives the bearing greases approved for use in the unit.

6.7 CLEANING

With the drive stationary periodically clean any dirt or dust from the gear unit and the electric motor cooling fins and fan guard to aid cooling.

7 NOISE

The range of Series C product satisfies a noise (sound pressure level) of 85 dB(A) or less when measured at 1 metre from the unit surface.
Measurements taken in accordance with B.S.7676 Pt1 : 1993 (ISO 8579-1 : 1993).

ASSEMBLY OF MOTOR AND MOTOR ADAPTOR TO THE GEAR HEAD

Depending on motor frame size and type of flange facing (C or D flange) determines whether or not the motor adaptor is attached firstly to the motor or to the Gear Head.

	C0321/C0421/C0521 C0331/C0431/C0531/C0631		C0721		C0621/C0731	
MOTOR FLANGE \ MOTOR FRAME	C (B14)	D (B5)	C (B14)	D (B5)	C (B14)	D (B5)
63	N/A	A				
71	M	G			M	G
80	M	G	M	G	M	G
90	G	G	M	G	M	G
100 / 112	G	G	M	G	M	G
132			M	G	G	G
160				G		

A - Adaptor sandwiched between motor and Gear Head
M - Fix adaptor to motor then fix assembly to Gear Head
G - Fix adaptor to Gear Head first then fit motor
N/A - Not available

C08/09/10
ON ALL MOTOR FRAME SIZES
G

Note:

- For build condition 'A' and 'M' only, prior to fitting the motor adaptor, fill the gearcase with the correct amount of lubricant (Appendix 2). Apply liquid gasket material (Loctite 518) to the upturned face of the gearhead in a continuous bead. The gasket material should be outside any leak path and all screw holes should be ringed. (Health and Safety instructions with the material must be observed).

- When fitting the motor adaptor to the electric motor for build condition 'M', ensure that the copper washers supplied with the kit are fitted under the heads of the set screws fixing the adaptor to the motor, and that the threads of the set screws are coated with Loctite Nut Lock 243.

SET SCREW TORQUES:-

SET SCREW SIZES	RECOMMENDED TORQUE
M6	10 Nm
M8	18 Nm
M10	37 Nm
M12	64 Nm
M16	150 Nm
M20	260 Nm

LUBRICANT AND QUANTITY

Unit sizes C03, 04, 05 and 06 are factory filled with a appropriate Lubricant

Unit sizes C07, 08, 09 and 10 will be despatched without oil.

Note: Catalogue ratings are based on the polyglycol range of synthetic oils recommended on this page. The use of mineral or special oils will require a derate, please contact Power Build Pvt Ltd Application Engineers.

The oil grade is stamped on the name plate and the oil level should be taken using the level plug, see page 11. These are determined from the operating speed of the gear unit and the ambient temperature range, which if not given when ordering will be assumed to be 1450 rev / min input and ambient temperature range 20°C to 50°C. Oil grades and oil level should therefore always be checked before installation, instructions are provided with all units despatched.

To determine the oil grade refer to table 1, and then subsequently to table 4 which gives approved lubricants.
To determine the oil capacity refer to appropriate table 2 or 3. Do not overfill as excess will cause overheating and leakage.

Table 1 Series C oil grades

Oil capacities are only approximate and units should be filled until oil escapes from the level plug holes.

Gear unit details			Ambient temperature range		
Type	Ratio	Input Speed (Rev/min)	-30°C - 20°C	0°C - 35°C	20°C - 50°C
Doubles	8 - 18	0 - 750	6G	6G	8G
		>750 - 2000	5G	6G	7G
		>2000 - 3000	4G	6G	6G
	20 - 36	0 - 2000	6G	6G	8G
		>2000 - 3000	5G	6G	7G
	40 - 250	0 - 3000	6G	6G	8G
Quadruples	< - 2800	0 - 750	6G	7G	9G
		>750 - 3000	6G	6G	8G
	3200 - 16000	0 - 3000	6G	7G	9G

* For other ambient temperatures please refer to our Application Engineers.

Table 2 lubricant quantity (Litres) (double reduction and final stage quadruple reduction)

Double, Triple & Final stage Quadruple Reduction															
Size			C0321	C0331	C0421	C0431	C0521	C0531	C0621	C0631	C0721	C0731	C0821	C0921	C1021
Mounting position	1	Level 1 *	0.3	0.4	0.4	0.5	0.7	0.9	1.5	2.1	4.5	4.8	7.1	17	28
		Level 2 *									3.0	3.8	5.9	11	17
	2		0.5	0.8	0.7	0.9	1.0	1.4	2.3	2.5	3.5	3.7	6.2	12	21
	3		0.5	0.8	0.7	0.9	1.0	1.4	2.2	2.5	3.5	3.7	6.2	12	21
	4	Level 1 *	0.7	1.2	1.0	1.5	1.4	2.1	3.1	4.0	5.1	5.9	9.5	17	26
		Level 2 *									3.0	3.6	4.8	8.3	14
	5		0.6	1.0	0.9	1.3	1.4	2.0	3.0	4.6	5.6	6.6	9.6	18	31
	6	Level 1 *	0.7	1.2	1.0	1.5	1.4	1.9	3.2	4.0	7.4	9.2	12	25	42
		Level 2 *									5.1	6.9	9.5	17	28

* Use Level 1 for output speeds lower than 100 rpm * Use Level 2 for output speeds of 100 rpm and higher.

Table 3 lubricant quantity (Litres) (primary stage quadruple reduction)

Primary stage quadruple reduction									
Size		C0341	C0441	C0541	C0641	C0741	C0841	C0941	C1041
Secondary unit (Lubricant quantity see table 2)		C0321	C0421	C0521	C0621	C0721	C0821	C0921	C1021
Primary unit		M0122	M0122	M0122	M0322	M0322	M0522	M0522	M0722
Primary Quantitty (unit lubricant)	1 to 4	0.5	0.5	0.5	0.8	0.8	1.5	1.5	2.6
	5 & 6	1.0	1.0	1.0	1.4	1.4	2.6	2.6	4.7

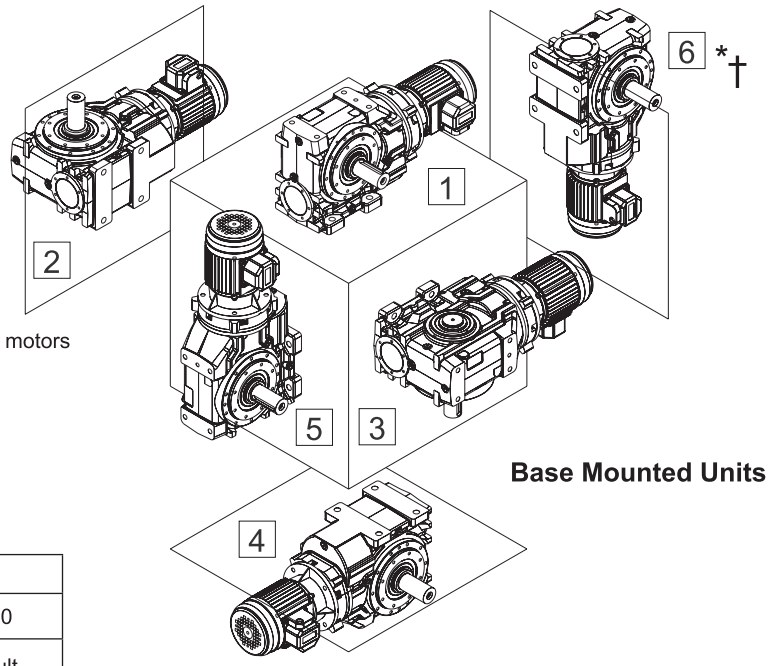
TABLE 4 APPROVED LUBRICANTS
TYPE G - POLYGLYCOL BASE SYNTHETIC

* Only one grade available hence no grade designation

		OIL GRADE No					
LUBRICANT SUPPLIER	LUBRICANT RANGE NAME	4G	5G	6G	7G	8G	9G
Batoyle Freedom Group	Helicol W	* (-15)					
Boxer Services / Millers Oils Limited	Boxergear W	150 (-15)	220 (-31)	320 (-31)	460 (-28)		
BP Oil International Limited	Enersyn SG-XP		220 (-31)		460 (-34)	680 (-28)	
Caltex	Synlube CLP	150 (-37)	220 (-34)	320 (-31)	460 (-28)	680 (-31)	
Carl Bechem GmbH	Berusynth EP	150 (-26)	220 (-25)	320 (-25)	460 (-25)	680 (-28)	1000 (-28)
Castrol International	Alphasyn PG	150 (-34)	220 (-34)	320 (-31)	460 (-28)		
Esso/Exxon	Glycolube	150 (-25)	220 (-25)	320 (-25)	460 (-23)		
Fuchs Lubricants	Renogear PGW	120 (-23)					
	Renolin PG	150 (-34)	220 (-34)	320 (-34)	460 (-34)	680 (-28)	1000 (-28)
Klüber Lubrication	Klübersynth GH6	150 (-30)	220 (-25)	320 (-25)	460 (-20)	680 (-20)	1000 (-20)
Kuwait Petroleum International	Q8 Gade		220 (-22)	320 (-22)	460 (-22)		
Laporte Performance Chemicals Ltd	Breox Worm Gear Lube	65 (-25)					
	Breox Industrial Lubricant Sw	150 (-25)	220 (-25)	320 (-25)	460 (-23)		
	Breox Oil Soluble Industrial Lub	220 (-23)					
Mobil Oil Company Limited	Glygoyle	22 (-25)	30 (-22)	HE320 (-37)	HE460 (-35)		
Optimol Ölwerke GmbH	Optiflex A	150 (-31)	220 (-28)	320 (-28)	460 (-28)	680 (-28)	1000 (-25)
Shell Oils	Omala S4WE	SA (-25)	SB (-25)	SC (-25)	SD (-23)		
	Omala S4WE	150 (-40)	220 (-34)	320 (-34)	460 (-34)	680 (-34)	1000 (-31)
Texaco Limited	Synlube CLP	150 (-37)	220 (-34)	320 (-31)	460 (-28)	680 (-31)	
Total	Carter SY		220 (-25)	320 (-28)	460 (-22)		
Tribol, GmbH	Tribol 800	150 (-37)	220 (-27)	320 (-25)	460 (-25)	680 (-25)	1000 (-23)

HANDING & MOUNTING POSITIONS

Colum 13 Entry

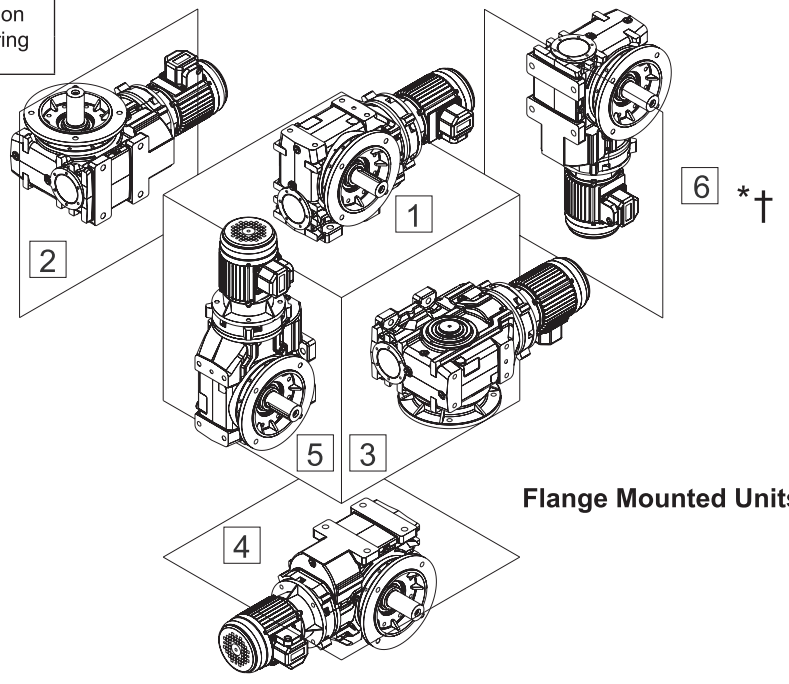


Base Mounted Units

* Mounting Position 6 is not recommended for geared motors - Consult Application Engineering

† Gear Units for use in mounting positions 5 and 6 should only be selected with overall ratios greater or equal to those shown in table below

Size	Input speed (RPM)			
	1000	1500	1800	>1800
C03-C08	All	All	All	Consult application engineering
C09	18:1	18:1	25:1	
C10	18:1	40:1	63:1	

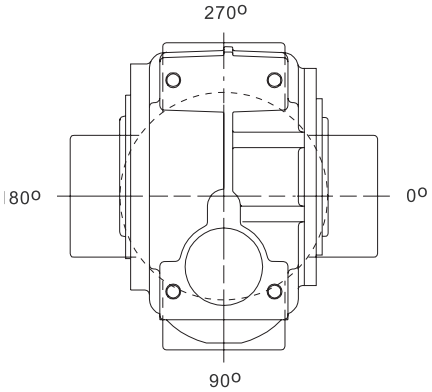


Flange Mounted Units

Mounting Positions- Shown as Motorised - Applies also for Reducers

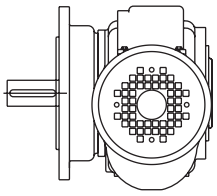
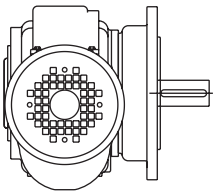
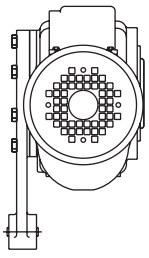
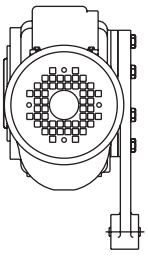
COLUMN 14 ENTRY

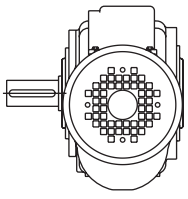
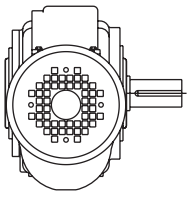
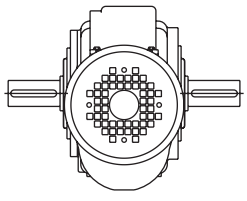
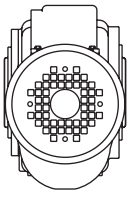
All motors



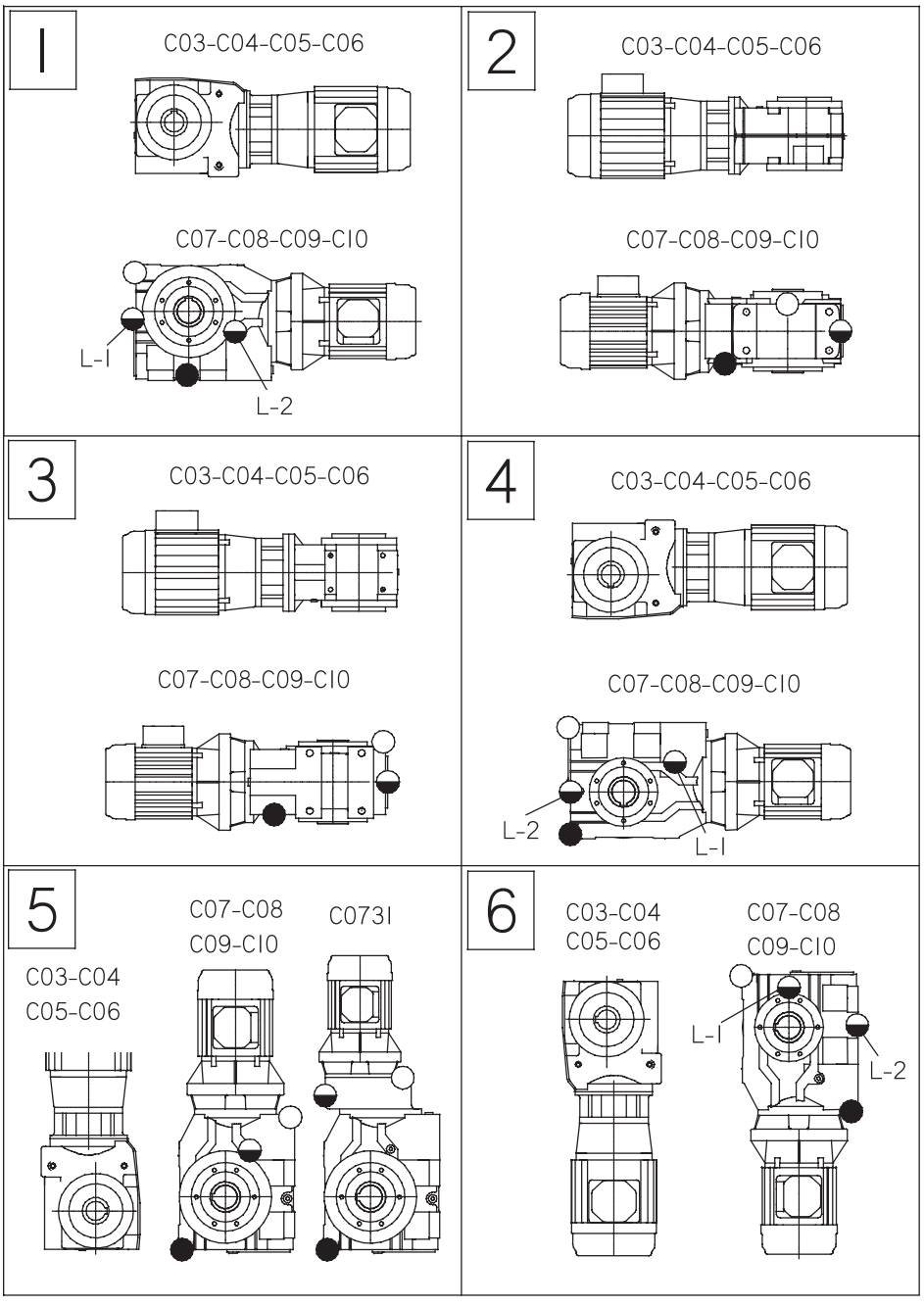
Column 14 entry	Terminal box position
A	0º
B	90º
C	180º
D	270º
-	Reducer or no motor fitted

APPENDIX 2
HANDING & MOUNTING POSITIONS / RATIO SPLITS

Column 9 entry	Left	Right
Std unit with output flange	F 	H 
Std unit with Torque bracket	T 	Q 

Column entry 11	Metric	
	Left	Right
Single output shaft	C 	E 
Double output shaft	D 	
Hollow shaft	H 	

Series C Mounting Positions and Lubrication fill levels



Drai n Position

Level Position

Ventilator Position

APPENDIX 3
THREE PHASE INDUCTION MOTOR

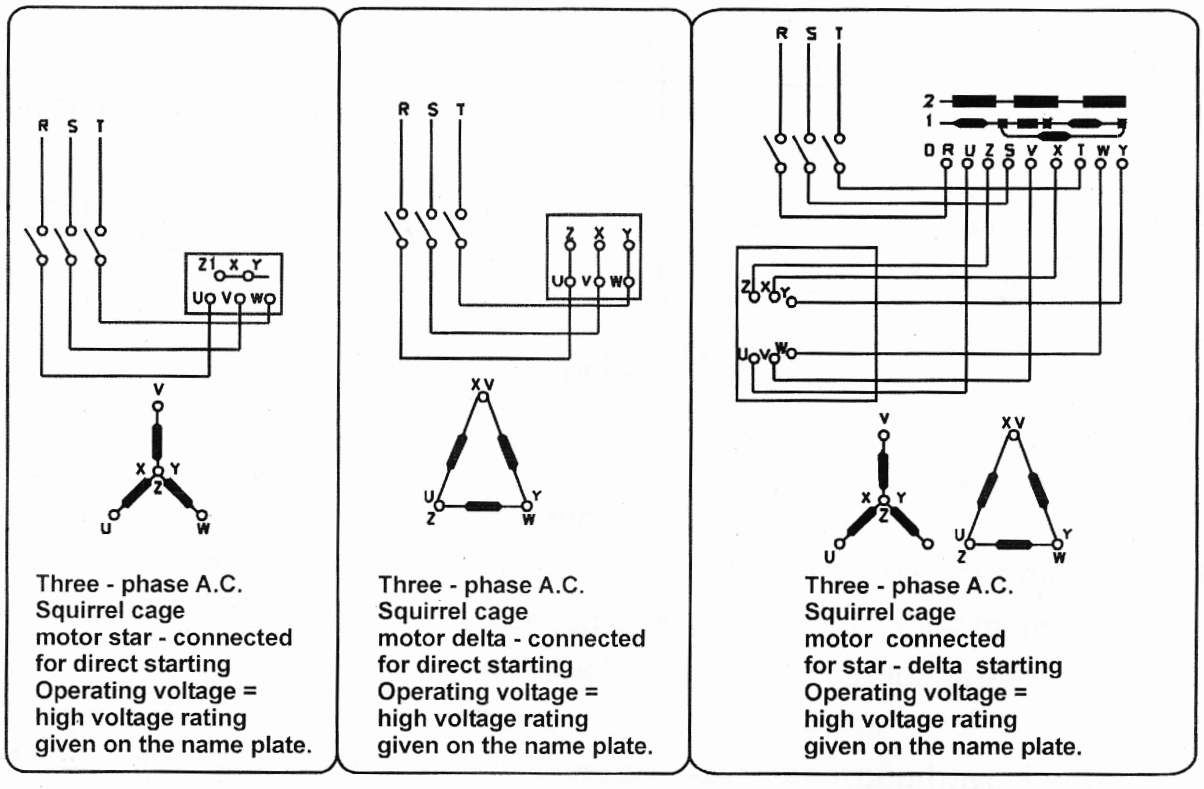
Connetion to Power System

All geared motors are factory-adjusted for maximum voltage if not stipulated otherwise. Make sure that the voltage on the installation site coincides with that indicated on the rating plate of the motor. The direction of rotation may be changed by interchanging two phases of the mains.

The geared motors are connected to the power supply system like any other three-phase A.C. Motors. There are no special instructions for Geared Motors beyond applicable for standard electric motors. The feed lines should be of sufficient diameter to avoid any notable drop of voltage upon starting the geared motors.

It is advisable to fit a protective motor switch with adjustable overload relays. This switch, which is adjusted to the motor rating, cuts out all three phases in case of overload or failure of one phase. The normal fuses can not give sufficient overload protection.

The connection diagram given below shows the usual types of connection of three phase A.C. Squirrel cage motors.



Three - phase A.C. Squirrel cage motor star - connected for direct starting Operating voltage = high voltage rating given on the name plate.

Three - phase A.C. Squirrel cage motor delta - connected for direct starting Operating voltage = high voltage rating given on the name plate.

Three - phase A.C. Squirrel cage motor connected for star - delta starting Operating voltage = high voltage rating given on the name plate.

Geared Motors with pole and voltage changing system as well as motors for braking gears are provided with special connection diagrams which will be found on the inside of the terminal box of each motor.

APPENDIX 4
APPROVED BEARING GREASES

SUPPLIER	LUBRICANT RANGE	ALLOWABLE OPERATING TEMPERATURE RANGE °C	
		ABOVE	TO
BP Oil International Limited	Energrease LS-EP	-30	130
Caltex	Multifak EP	0	120
Castrol International	LMX Grease	-40	150
	Spheerol AP	-30	110
	Spheerol EPL	-10	120
Fuchs Lubricants	Renolit EP	-25	100
Klüber Lubrication	Klüberlub BE 41-542	-20	140
Mobil Oil Company Limited	Mobilgrease XHP	-15	150
	Mobilith SHC	-20	180
Omega Manufacturing Division	Omega 85	-40	230
Optimol Ölwerke GmbH	Longtime PD	-45	140
Shell Oils	Albida RL	-20	150
	Alvania EP B	-20	120
	Nerita HV	-30	130
Texaco Limited	Multifak All Purpose EP	-30	140

Notes:

1) All the above greases are NLGI grade 2.

2) Refer to Power Build Pvt Ltd Application Engineers if the unit is operating in an ambient temperature outside the range of -30°C to 50°C.

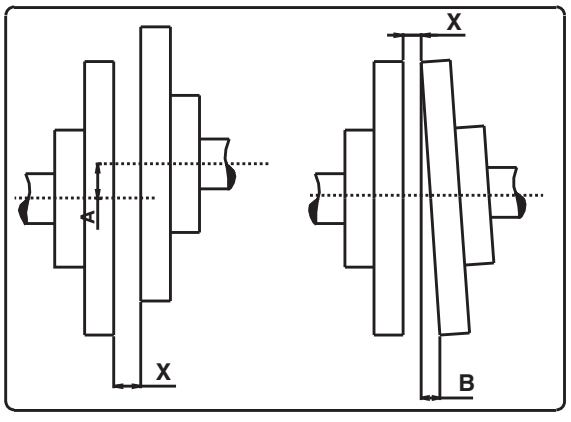
APPENDIX 5
CONNECTION WITH THE DRIVEN MACHINE

Connection with the Driven Machine

Since output shaft (low-speed shaft) and input shaft (high-speed shaft) are protected with rust preventive coating, remove it with thinner or a similar solvent.

1. Direct Connection

(a) When the input shaft of the driven machine and the output shaft (low-speed shaft) of the geared motor/reducer are coupled directly, use a "flexible coupling" and make sure that both ends are in alignment. (Refer to Fig. 1.)



Allowance of Dimension A	**0.05 mm**
Allowance of Dimension B	**0.04 mm**
Dimension X	**Specified by coupling maker**

Fig. 1 Accuracy of alignment of direct coupling connection

2. When the machine is driven by V-belt, chain or gearing.

Make arrangement to ensure that the shaft of driven machine and that of geared motor/reducer is positioned parallel. When the machine is driven by V-belt or chain, ensure that the center distance is not too long by setting the proper distance and belt and chain are stretched at right angle. When the machine is driven by gearing, geared motor/reducer should be installed setting up the accurate center distance and avoiding partial bearing of gears, and the output shaft is pushed downward.

(a) Point of load application on the output shaft :

When load (overhung load) is applied on the tip of the shaft, it may cause damage to the shaft. The gearing or chain sprocket wheel must be mounted such that the point of load application is as near as possible to the face of the unit to minimize overhung load.

(b) Tension of chain:

When using chain, it is necessary to give suitable slack to chain. If the tension of chain is too loose, excessive shock will be generated at starting or load fluctuations, which may damage both the geared motor/reducer and the driven machine. Generally, the recommended amount of slack is 2% of span distance. (Refer to Fig. 2.)

APPENDIX 5
CONNECTION WITH THE DRIVEN MACHINE

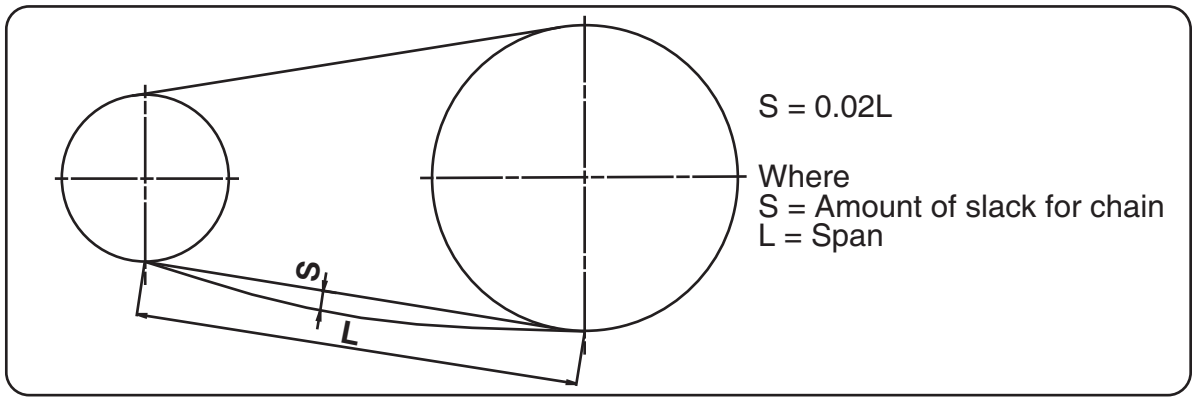


Fig. 2

(c) Layout of chain driving:

When using chain horizontally for connection with the drive and the driven machine, arrange shafts so as to give tension to the upper side of chain. Shaft arrangement of vertical transmission is not recommended, however, if necessary, the large wheel should be positioned at lower end.

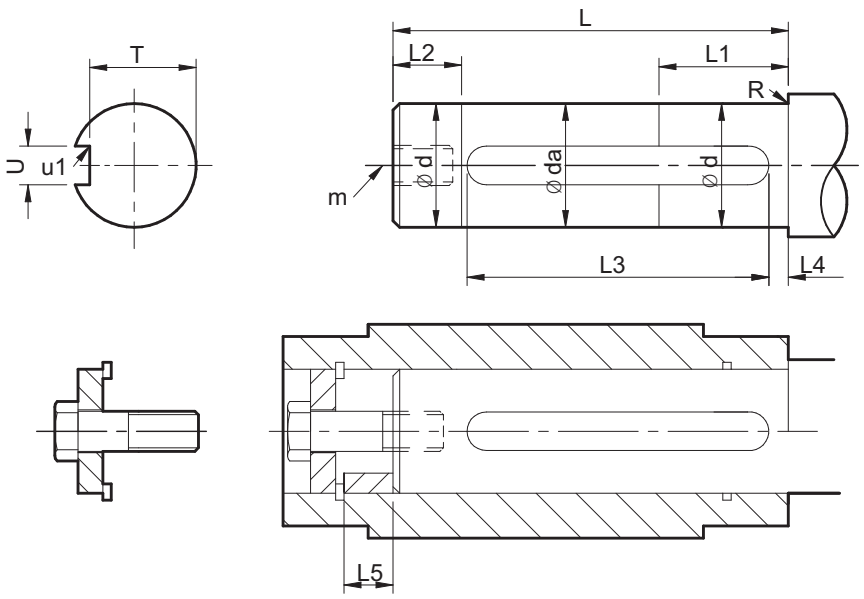
(d) When load (overhung load) is applied on the output shaft, please make sure that it is within the limit of allowable value. Allowable value of overhung load is shown in graph of catalogue.

3. Dimension of keyway

Dimension of the shaft end keyway is in accordance with DIN 6885.

APPENDIX 6
DIMENSIONS STANDARD BORE ASSEMBLY

ASSEMBLY ONTO SHAFT - CUSTOMERS SHAFT DETAIL



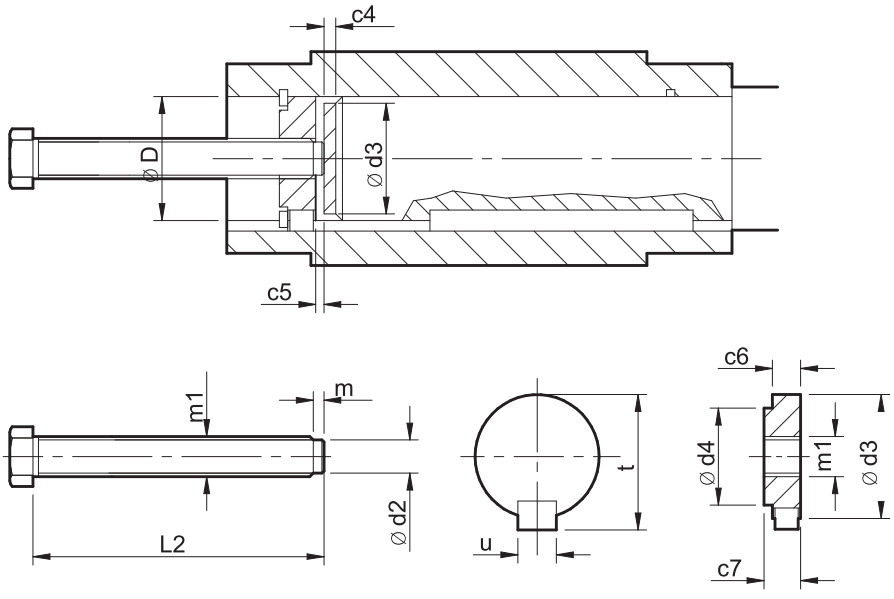
Size	Bore	d	da	L	L1	L2	L3	L4	L5	m	N	R	T	U	u1
C03	Std	19.993/ 19.980	19.6	82	30	10	61.3 61.0	3	22	M6x1.0x16	8 Nm	0.8R	16.5 16.4	6.000 / 5.970	0.16 0.25R
C04	Reduced	24.993/ 24.980	24.6	99	38	13	79.3 79.0	3	23	M10x1.5x22	15 Nm	0.8R	21.0 20.8	8.000 / 7.964	0.16 0.25R
	Std	29.993/ 29.980	29.6	99	45	15	79.3 79.0	3	26	M10x1.5x22	15 Nm	0.8R	26.0 25.8	8.000 / 7.964	0.16 0.25R
C05	Reduced	29.993/ 29.980	29.6	104	45	15	79.3 79.0	3	23	M10x1.5x22	15 Nm	0.8R	26.0 25.8	8.000 / 7.964	0.16 0.25R
	Std	34.991/ 34.975	34.6	104	53	18	77.3 77.0	3	23	M12x1.75x28	20 Nm	0.8R	30.0 29.8	10.000 / 9.964	0.16 0.25R
C06	Reduced	39.991/ 39.975	39.6	125	60	20	100.5 100.0	3	31	M16x2x36	45 Nm	0.8R	35.0 34.8	12.000 / 11.957	0.4 0.25R
	Std	44.991/ 44.975	44.6	125	68	23	101.5 101.0	3	31	M16x2x36	45 Nm	0.8R	39.5 39.3	14.000 / 13.957	0.4 0.25R
C07	Reduced	49.991/ 49.975	49.6	153	75	25	130.5 130.0	3	35	M16x2x38	45 Nm	1.2R	44.5 44.3	14.000 / 13.957	0.4 0.25R
	Std	59.990 / 59.971	59.6	153	90	30	148.5 148.0	3	38	M20x2.5x42	85 Nm	1.2R	53.0 52.8	18.000 / 17.957	0.4 0.25R
C08	Reduced	59.990 / 59.971	59.6	183	91	31	148.5 148.0	3	37	M20x2.5x42	85 Nm	1.2R	53.0 52.8	18.000 / 17.957	0.4 0.25R
	Std	69.990 / 69.971	69.6	183	105	35	177.5 177.0	3	37	M20x2.5x42	85 Nm	1.2R	62.5 62.3	20.000 / 19.94	0.6 80.4R
C09	Reduced	69.990 / 69.971	69.6	227	105	35	177.5 177.0	3	58	M20x2.5x42	85 Nm	1.2R	62.5 62.3	20.000 / 19.94	0.6 80.4R
	Std	89.988 / 89.966	89.6	227	135	45	221.5 221.0	3	58	M24x3.0x50	200 Nm	1.2R	81.0 80.8	25.000 / 24.948	0.6 0.4R
C10	Reduced	79.990 / 79.971	79.6	260	120	40	225.5 225.0	3	53	M20x2.5x42	85 Nm	1.2R	71.0 70.8	22.000 / 21.946	0.6 0.4R
	Std	99.988/ 99.966	99.6	327	150	45	238.5 238.0	10	46	M24x3x50	200 Nm	1.2R	90 89.8	28.000/ 27.948	0.4 0.4R

Assembly Instructions

1. Spray the hollow shaft bore and mating diameter of the output shaft with Rocol DFSM or equivalent antiscuffing spray.
2. Fit key into shaft.
3. Fit the circlip into the output sleeve.
4. Fit the spacer tube only if the output shaft has no shoulder, then fit the output shaft into the output sleeve.
5. Secure in place with the washer and bolt. Torque tighten to the values stated in column N of the above table.
6. Fit plastic protective cover.

APPENDIX 6
DIMENSIONS STANDARD BORE DISASSEMBLY

DISASSEMBLY METHOD FROM SHAFT

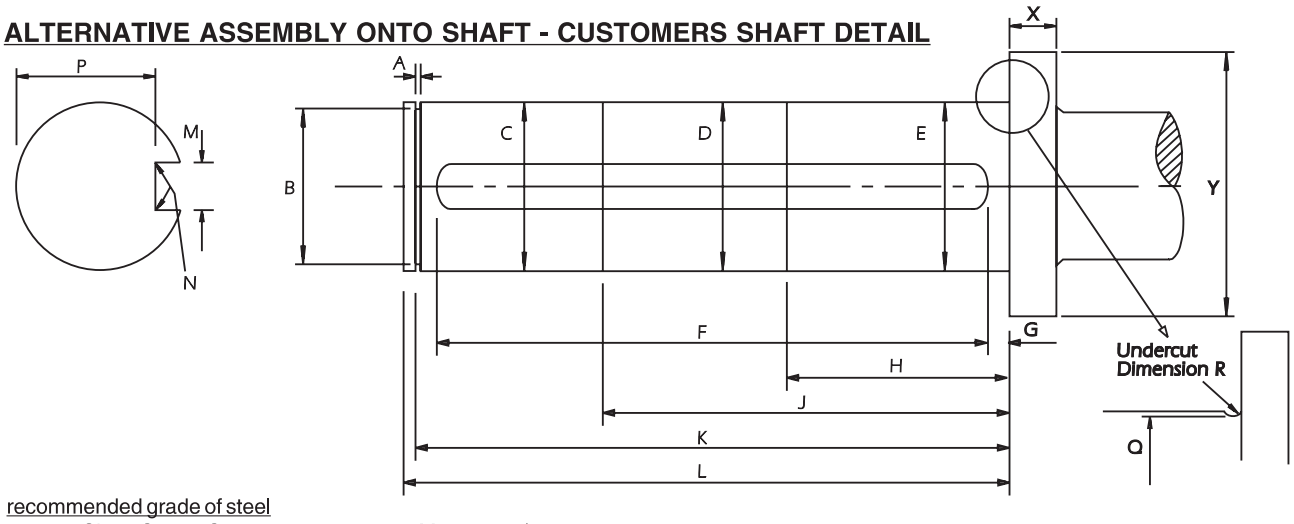


PARTS SUPPLIED BY CUSTOMER

Size	Bore	c4	c6	c7	D (H7)	d2	d3	d4	L2	m	m1	t	u
C03	Std	5	10	12	20	7	19.9	11.2	120	3	M10 x 1.5	22	6
C04	Reduced	5	15	17	25	13	24.9	16.2	160	3	M16 x 2.0	2	8
	Std	5	15	17	30	13	29.9	20.8	160	3	M16 x 2.0	33	8
C05	Reduced	5	15	17	30	13	29.9	20.8	160	3	M16 x 2.0	33	8
	Std	5	15	17	35	13	34.9	25.2	160	3	M16 x 2.0	38	10
C06	Reduced	5	20	23	40	20	39.9	30.9	220	3	M24 x 3.0	43	12
	Std	5	20	23	45	20	44.9	34.1	220	3	M24 x 3.0	49	14
C07	Reduced	5	20	23	50	20	49.9	39.0	220	3	M24 x 3.0	54	14
	Std	8	24	27	60	26	59.9	47.4	250	5	M30 x 3.5	64	1
C08	Reduced	8	24	27	60	26	59.9	47.4	250	5	M30 x 3.5	64	1
	Std	8	24	27	70	26	69.9	58.4	310	5	M30 x 3.5	74.5	20
C09	Reduced	8	24	27	70	26	69.9	58.4	310	5	M30 x 3.5	74.5	20
	Std	8	24	27	90	26	89.9	75.3	360	5	M30 x 3.5	95	25
C10	Reduced	8	24	27	80	26	79.9	65.5	360	5	M30 x 3.5	85	22
	Std	8	30	34	100	32	99.9	84.1	420	5	M30 x 3.5	106	2

APPENDIX 6
ALTERNATIVE SHAFT FIXING METHODS

ALTERNATIVE ASSEMBLY ONTO SHAFT - CUSTOMERS SHAFT DETAIL

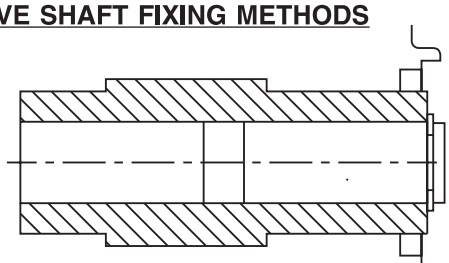


recommended grade of steel

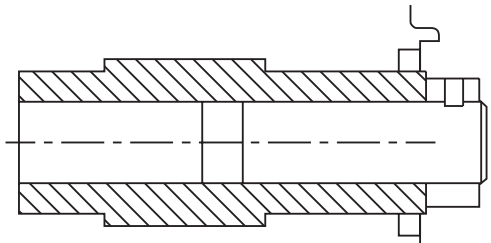
Sizes C03 to C06	-	605M36	55/65 t
Sizes C07 to C10	-	709M40T	55/65 t

SIZE	A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R	X	Y
C03	1.44 1.30	19.00 18.87	19.992 19.980	-	19.993 19.980	61.3 61.0	32	-	-	125.30 125.20	127	5.982 5.953	0.2R	16.50 16.40	19	0.8R	3	26
C04	1.74 1.60	28.60 28.39	29.992 29.980	-	29.993 29.980	78.3 78.0	26	-	-	131.60 131.50	134	7.985 7.949	0.4R	26.00 25.80	29	0.8R	4	36
C05	1.74 1.60	33.00 32.75	34.991 34.976	-	34.991 34.975	77.4 77.0	31.5	-	-	141.61 141.50	144	9.985 9.949	0.4R	30.00 29.80	34	0.8R	4	40
C06	1.99 1.85	42.50 42.25	44.991 44.976	-	44.991 44.975	100.5 100.0	38	-	-	181.85 181.75	186	13.982 13.939	0.4R	39.50 39.30	44	0.8R	7	51
C07	2.29 2.15	57.00 56.70	59.990 59.971	59.62 59.38	60.000 59.981	199.5 199.0	9.5	79	139	220.10 220.05	225	18.000 17.957	0.9 0.7R	53.00 52.80	58	1.2R	10	70
C08	2.79 2.65	67.00 66.70	69.990 69.971	69.62 69.38	70.000 69.981	236.5 236.0	7.0	90	160	252.65 252.60	258	20.000 19.948	0.9 0.7R	62.50 62.30	68	1.2R	10	80
C09	3.33 3.15	86.50 86.15	89.988 89.966	89.62 89.38	90.000 89.978	281.5 281.0	9.5	107.5	192.5	303.15 303.10	309	25.000 24.948	1.5 1.25R	81.00 80.80	88	1.2R	10	100
C10	3.33 3.15	96.50 96.15	99.988 99.966	99.62 99.38	100.000 99.978	330.5 330.0	10.0	132.5	217.5	353.15 353.10	359	28.000 27.948	1.5 1.25R	90.00 89.80	98	1.2R	21	110

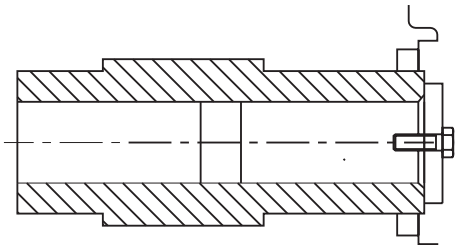
ALTERNATIVE SHAFT FIXING METHODS



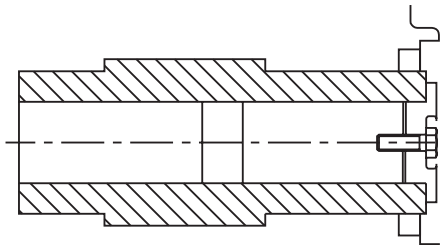
SHAFT MOUNT UNITS RETAINED WITH A CIRCLIP



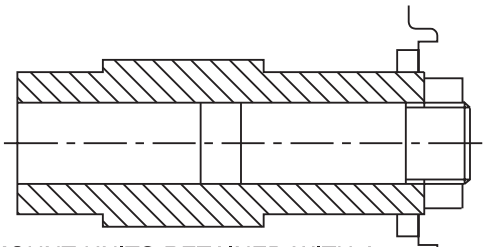
SHAFT MOUNT UNITS RETAINED WITH A COLLAR AND GRUBSCREW



SHAFT MOUNT UNITS RETAINED WITH A BOLT AND PLATE

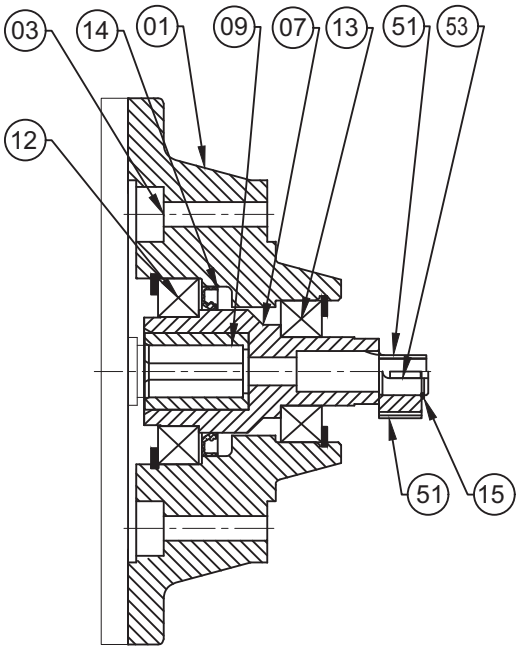


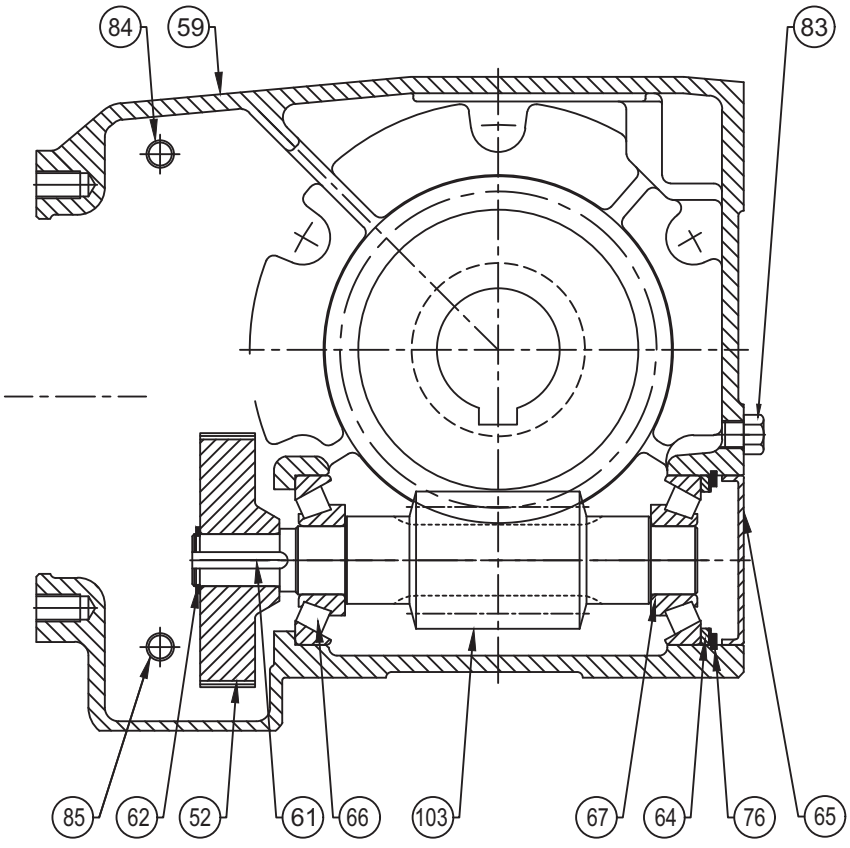
SHAFT MOUNT UNITS RETAINED WITH A RECESSED PLATE AND BOLT

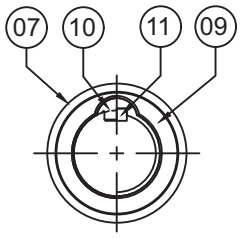


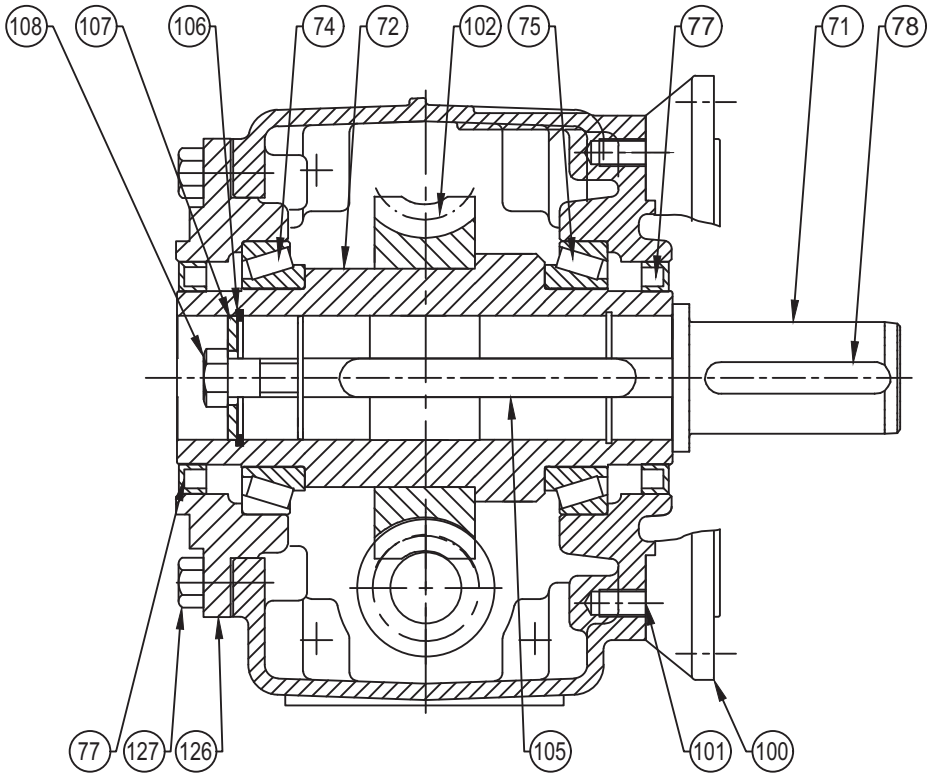
SHAFT MOUNT UNITS RETAINED WITH A LOCKNUT

TWO STAGE GEARED MOTOR UNIT
C03 - C10

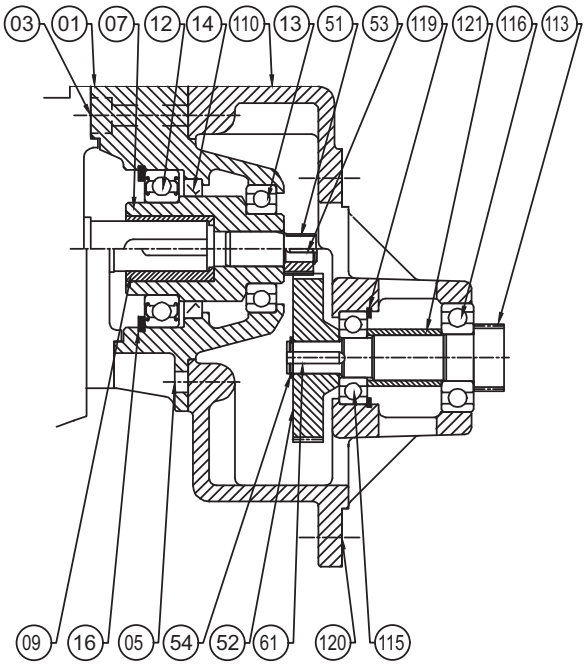


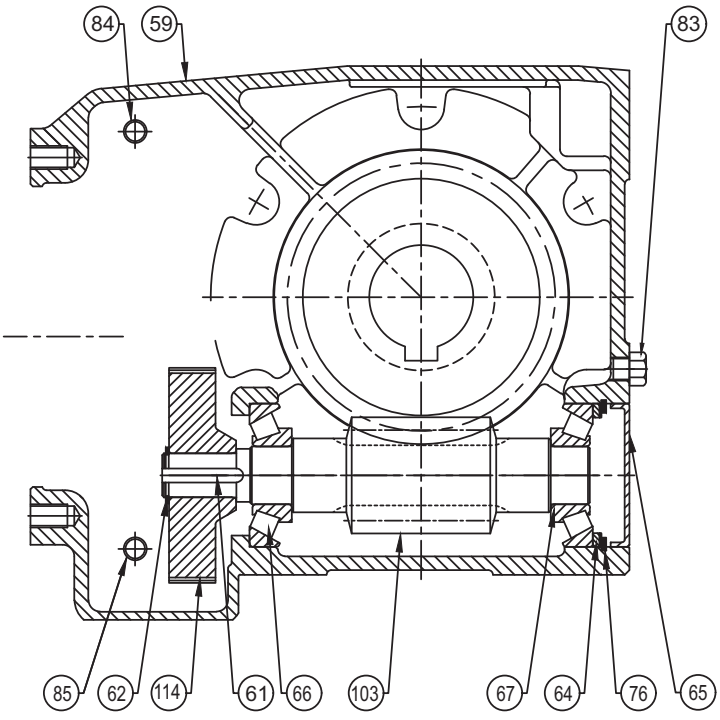


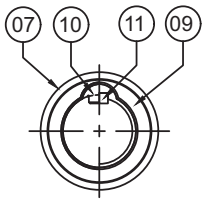


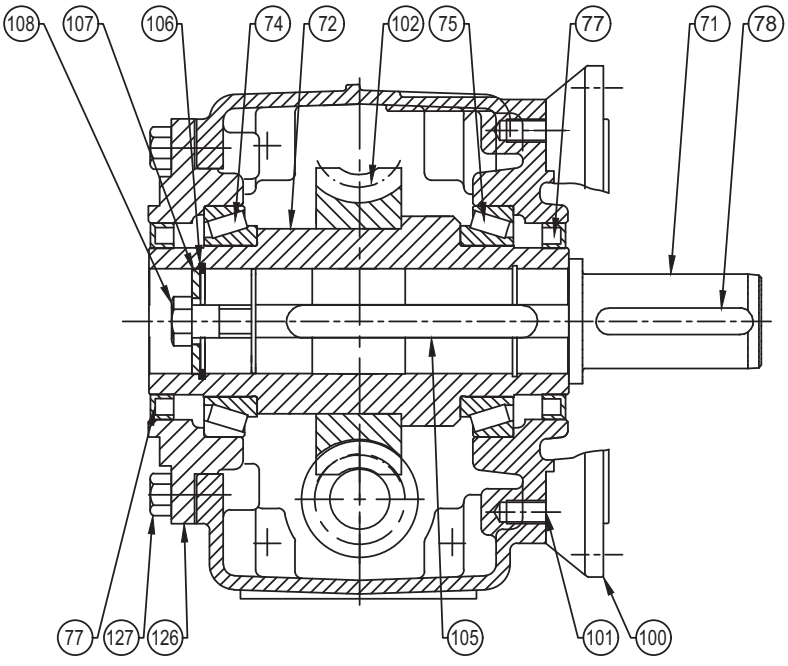


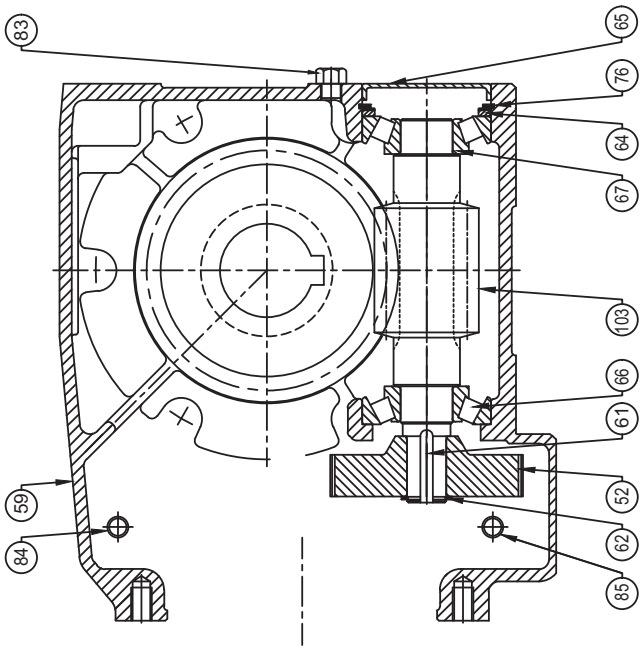
THREE STAGE GEARED MOTOR UNIT
C03 - C07







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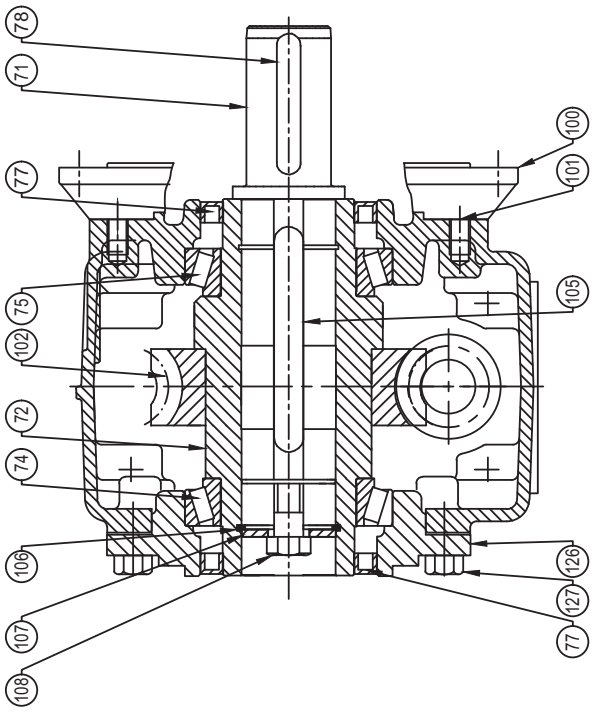
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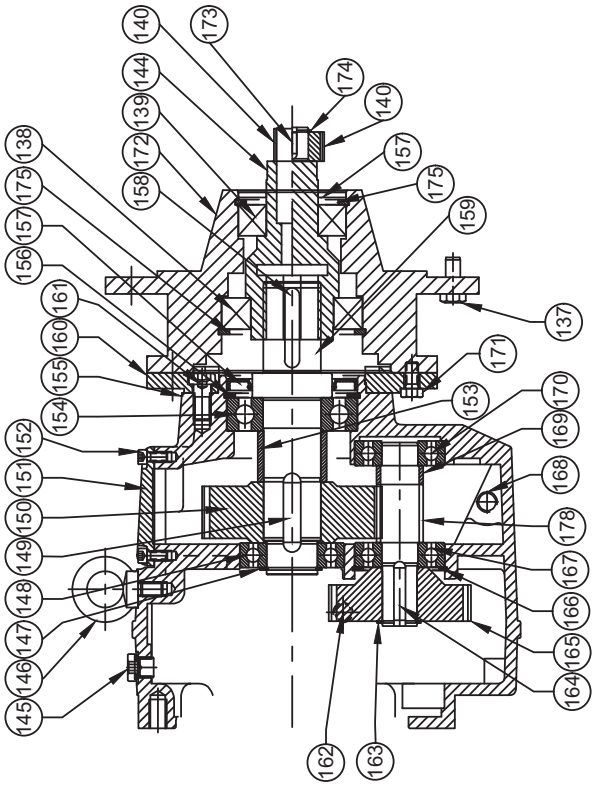
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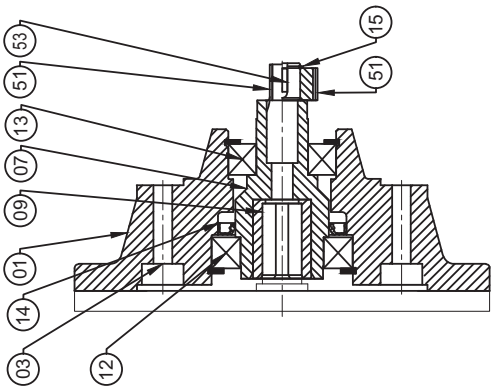
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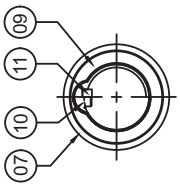
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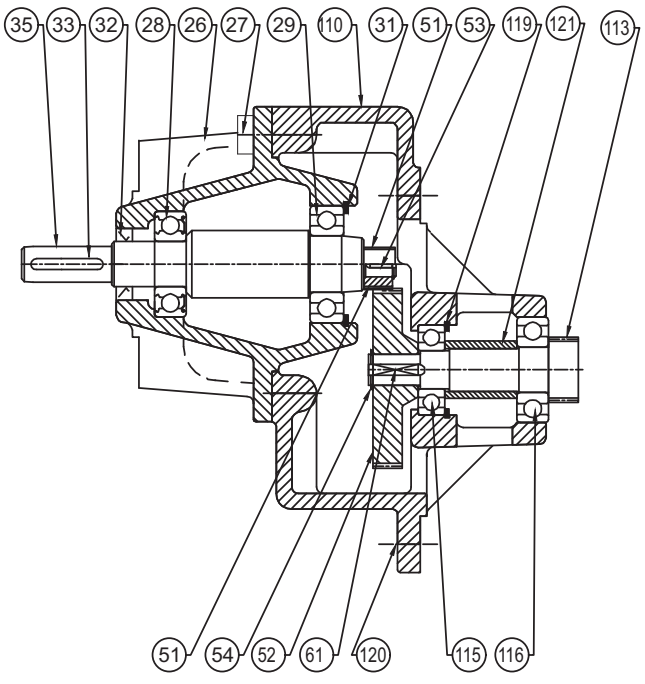
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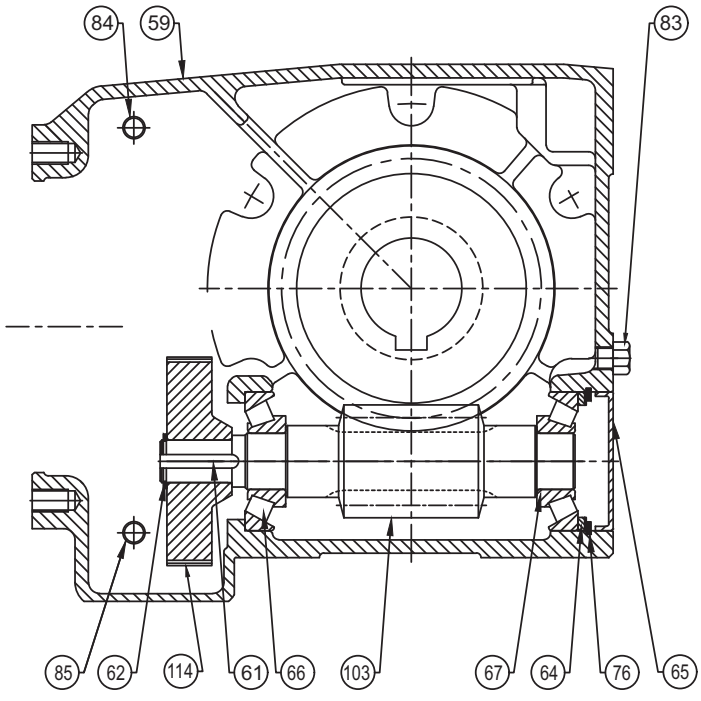
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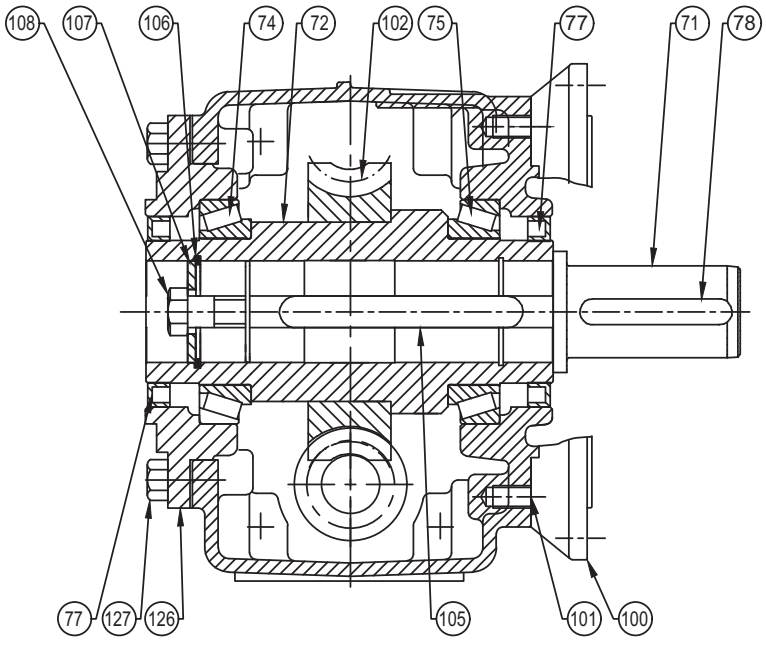
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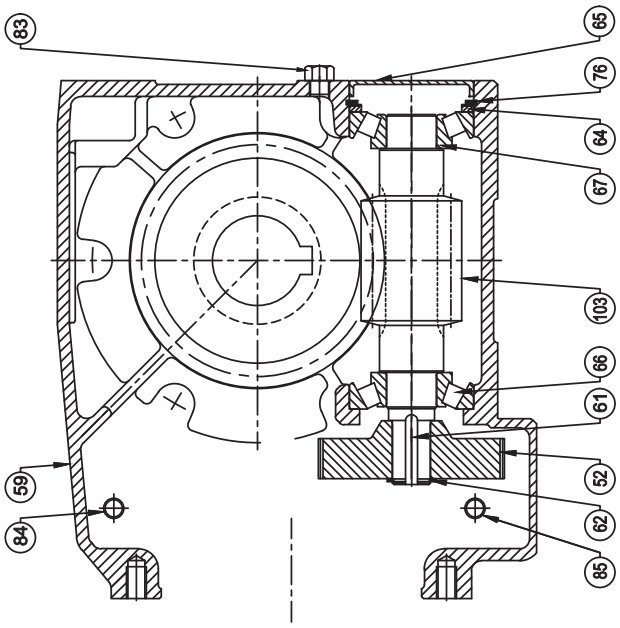
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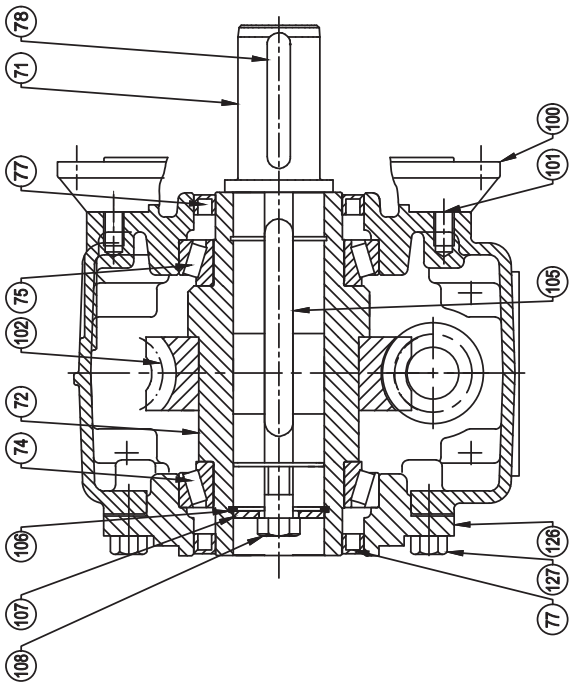
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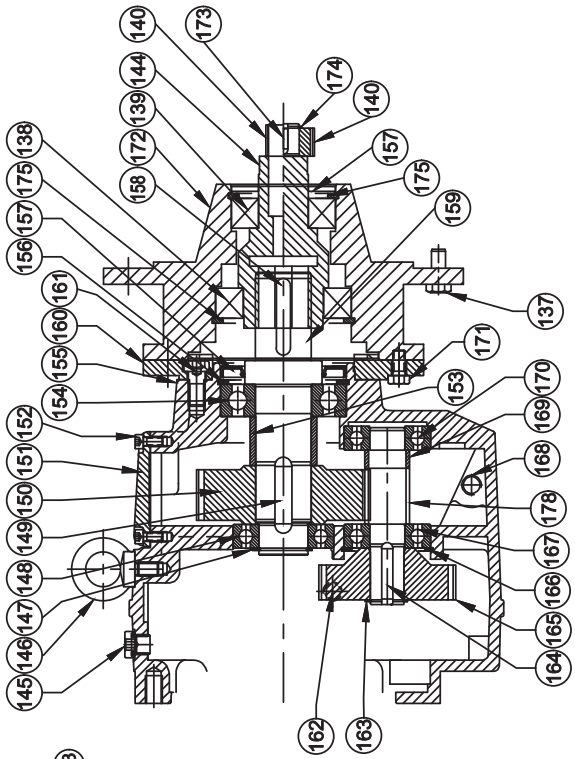
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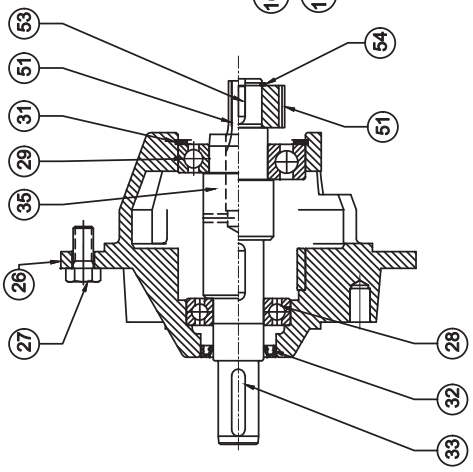
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Sr.No.	Description	Sr.No.	Description	Sr.No.	Description
1	Motor Adaptor	71	O/p Shaft (M,C,F,K)(Double Extended)	126	Motor Adaptor
2	Flange (Adaptor)	72	O/p Sleeve (C,F,K)	127	External Circlip
3	Fastener (Adaptor+Motor)	73	Distance Piece (O/p Shaft/Sleeve)	128	Oil Catcher
4	Fastener (Adaptor+Flange)	74	Bering O/p Shaft (Wheel End)	129	Oil Seal
5	Fastener (Flange+Gear Case)	75	Bering O/p Shaft (O/p End)	130	Flinger
6	Nut (In Triple Only)	76	Internal Circlip O/p End Bearing	131	Lock Nut
7	Plug in Shaft	77	O/p Oil Seal	132	Lock Washer
8	Coupling	78	Key (O/p Shaft End)	133	Fasteners (Adaptor+Gear Case)
9	Motor Sleeve (Nylon)	79	Inspection Cover	134	Fasteners (Oil Catcher+Adaptor)
10	Nylon Key	80	Fastener Gear Case+Cover	135	Input Coupling
11	Key	81	Eye Bolt	136	Key
12	Bearing (Motor Side)	82	Shim	137	Screw
13	Bearing (Pinion Side)	83	Oil Level Indicator	138	Bearing (Coupling Side)
14	Oil Seal Input	84	Vent Plug	139	Bearing (Pinion Side)
15	Circlip (Pinion Side)	85	Drain Plug	140	Pinion
16	Circlip (Motor Side)	86	Bevel Pinion (K)	141	Key
17	Nilos Ring	87	Nilos Ring On FG Pinion (K03-K12)	142	Circlip (Pinion Side)
18	Grease Nipple	88	Circlip For PG Wheel on Bevel Pinion	143	Circlip (Motor Side)
19	Support Washer	89	Bearing 1 on Bevel Pinion	144	Plug in Shaft
20	Shims	90	Bearing 2 on Bevel Pinion	145	Vent Plug
21	Wear Sleeve	91	Bevel Wheel (K)	146	Eye Bolt
22-25	-	92	Key (Bevel Wheel+FG Pinion)	147	External Criclip O/p End Bearing
26	Housing Input	93	End Cover For Bevel Bore	148	Bering O/p Shaft (Wheel End)
27	Fastener Housing+Gear Case	94	Internal Circlip For FG Pinion Bearing	149	Key (FG Wheel+O/p Shaft/Sleeve)
28	Bearing (Motor Side)	95	Backstop	150	FG Wheel
29	Bearing (Pinion Side)	96	Key For Backstop	151	Inspection Cover
30	Nilos Ring-32214JV	97	External Circlip for Backstop	152	Fastener Gear Case+Cover
31	Circlip	98	Nilos Ring 1 On O/p (K09-K12)	153	Distance Piece (O/p Shaft/Sleeve)
32	Oil Seal	99	Nilos Ring 2 On O/p (K09-K12)	154	Bering O/p Shaft (O/p End)
33	Key	100	O/p Flange (M)	155	Gear Case
34	Support Washer	101	Flange Fastener (M)	156	Internal Circlip O/p End Bearing
35	Input Shaft (For Reducer)	102	FG Worm Wheel + Sleeve	157	O/p Oil Seal
36	Shim	103	FG Worm Shaft	158	Key (O/p Shaft End)
37	Grease Nipple	104	Grease Nipple (C07-C10)	159	O/p Shaft (M,C,F,K)(Double Extended)
38-49	-	105	Key (O/p Sleeve+O/p Shaft)	160	O/p Flange (Couple)
50	Input Shaft (For MMR)	106	Circlip (O/p Sleeve+O/p Shaft)	161	Fasteners (Couple)
51	Primary (PG) Pinion	107	Washer (O/p Sleeve)	162	Oil Level Indicator
52	Primary (PG) Wheel	108	Bolt (O/p Sleeve+O/p Shaft)	163	Circlip For Triple Wheel on PG Pinion
53	Key	109	-	164	Key (PG Kit Pinion+Triple Wheel)
54	Circlip	110	Triple Housing	165	Triple Wheel
55	Lock Nut	111	Triple Ring	166	Internal Circlip for Intermediate Bearing)
56	Lock Washer	112	Copper Washer	167	Bearing Input Side
57-58	-	113	Triple Pinion Shaft	168	Drain Plug
59	Gear Case	114	Triple Wheel	169	Distance Piece
60	FG Pinion Shaft	115	Bearing Input Side	170	Bearing Pinion Side
61	Key (PG Wheel+FG Pinion)	116	Bearing Pinion Side	171	Fasteners (Flange+Connecting Adaptor)
62	Circlip for PG Wheel	117	Key (PG Kit Pinion+Triple Wheel)	172	Connecting Adaptor
63	Internal Circlip for Intermediate Brg.	118	Circlip For Triple Wheel on PG Pinion	173	Circlip
64	Distance Piece FG Pinion	119	Circlip For Triple Bore	174	Key
65	End cover for FG Pinion	120	Hexagon Socket Head Cap Screw	175	Circlip
66	Bearing 1 FG Pinion	121	Distance Piece	176	Washer
67	Bearing 2 FG Pinion	122	Key (PG Kit Pinion+Primary wheel)	177	NILOS RING
68	FG Wheel	123	Washer (Bevel side)	178	FG Pinion Shaft
69	Key (FG Wheel+O/p Shaft/Sleeve)	124	Washer (FG Wheel Side)		
70	External Criclip O/p End Bearing	125	-		

Notes :

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