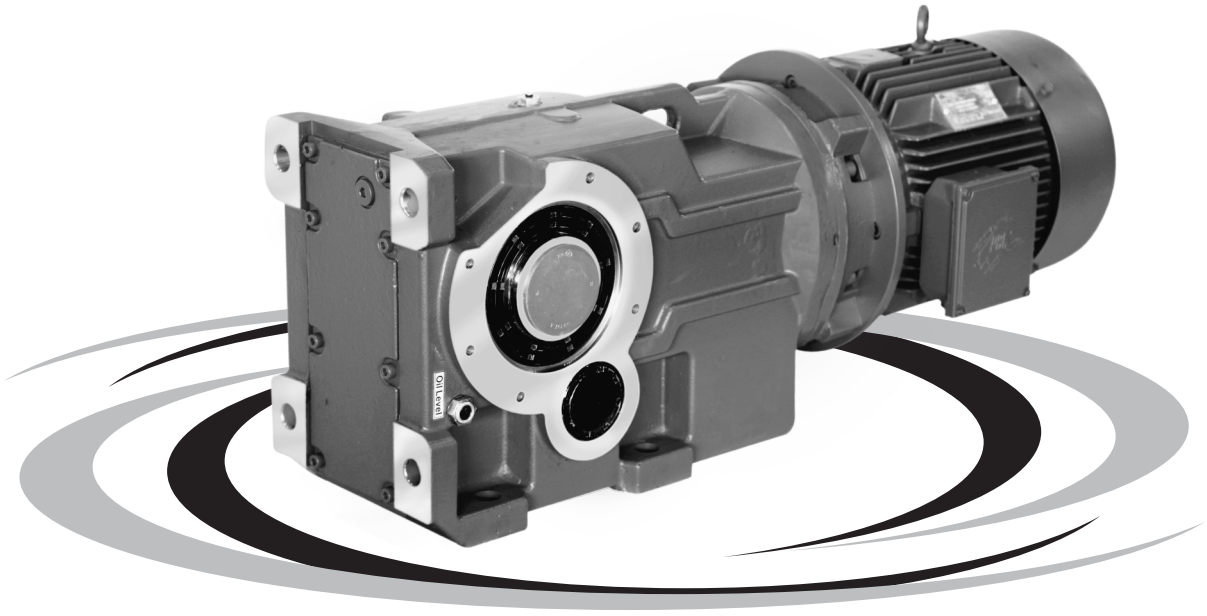
RADICON POWERBUILD

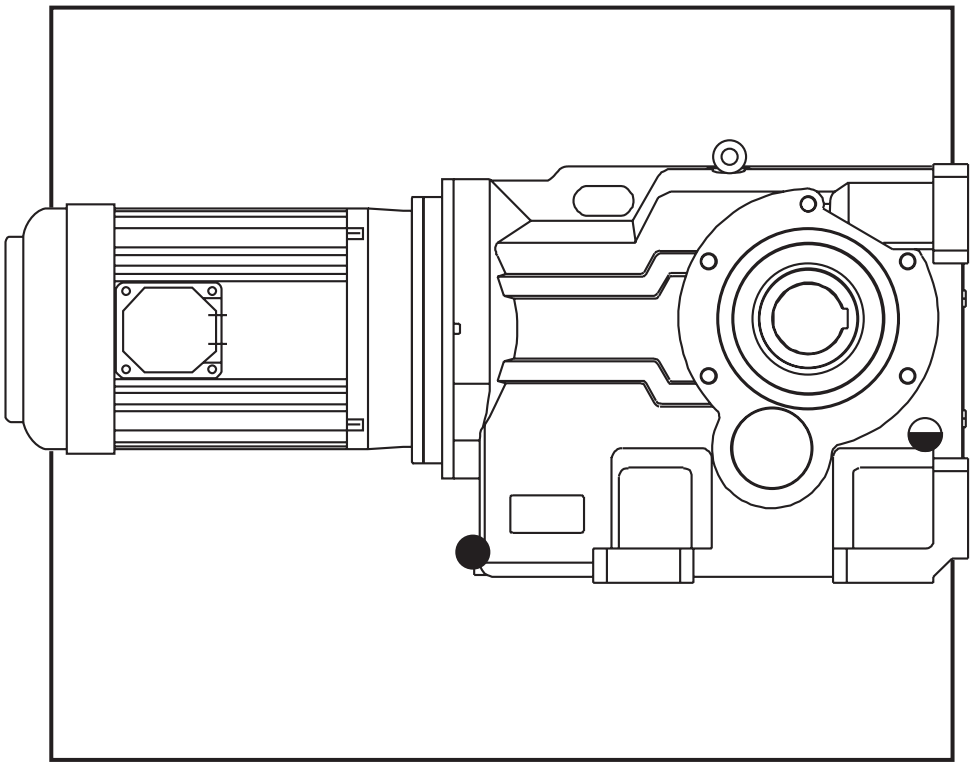
Series K

Installation & Maintenance Manual



GEARED MOTORS · GEARBOXES · GEAR ASSEMBLIES · DRIVE SOLUTIONS

Cat.No.: IM_K-3.04INP1221



INSTALLATION & MAINTENANCE

SERIES K

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.

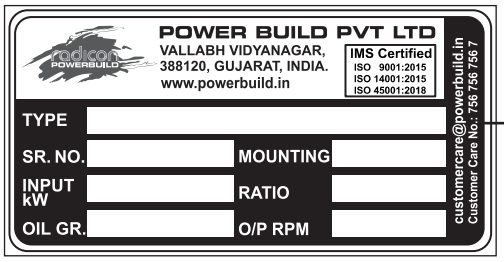
Any further information or clarification required may be obtained by contacting Power Build Pvt. Ltd.

CONTENTS

1 UNIT IDENTIFICATION

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

- Unit Type
- Sr. Number



	Gearbox Codes													Motor Codes					
	Series	Size of Unit		No of Reductions	Revision Version	Nominal Overall Ratio			Unit Version	Type of Unit	Output Shaft	Motor Adaptor	Mounting Position		Geared Motor Power			No of Motor Poles	Additional Motor Features	Additional Gearbox Features
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
*																				●
Example	K	0	8	3	2	5	0	.	B	M	C	G	1	D	4	.	0	A	-	-

1 - Series K

Range [K]

2, 3 - Size of Unit

[0 3] [1 6]

4 - No of Reductions

[3] [5]

5 - Revision Version

[2]

6, 7, 8 - Nominal Overall Ratio

e.g. [5 0 .]

9 - Unit Version

Standard Unit with Feet	B			
STD Unit with Output Flange	F	on Left **	H	on Right**
STD Unit with Torque Bracket	T	on Left **	Q	on Right**

10 - Type of Unit

- [M] - Motorized with IEC standard motor
- [G] - Unittoallow 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

** Looking on Inputshaft Mounting Position 1 (See unit handings page)

*** Non Standard and Handing - Consult Application Engineering

11 - OUTPUT SHAFT

Standard Single Extension	C	on Left **	E	on Right ***
Standard Double Extension	D			
Standard Hollow Shaft	H			
Standard Shrink disc	X	on Left **	Y	on Right ***

12 - Motor Adaptor For Unit Types Column 10 Entries M, N, H, E, G or A

See Pages 9 and 10

For All Other Types Enter [-]

13, 14 - Mounting Position

e.g. [2 B]

15, 16, 17 - Geared Motor Powers

Motor Power required (For 50 Hz enter kW)

e.g. . [. 7 5]

For reducer and non standard motor types enter [- - -]

18 - No of Motor Poles

[-] 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

e.g. [- A]

For Types Without Motor Enter [-]

20 - Additional Gearbox Features

Double Oil Seal, Motorized Backstop etc

e.g. [- 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 K 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.

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).

- Clean shaft extensions.
- 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
K0332	M5 x 0.8, 12 deep	M10 x 1.5, 22 deep
K0432	M5 x 0.8, 12 deep	M12 x 1.75, 28 deep
K0532	M6 x 1.0, 16 deep	M16 x 2, 36 deep
K0632	M6 x 1.0, 16 deep	M16 x 2, 36 deep
K0732	M8 x 1.25, 19 deep	M16 x 2, 36 deep
K0832	M10 x 1.5, 22 deep	M20 x 2.5, 42 deep
K0932	M12 x 1.75, 28 deep	M20 x 2.5, 42 deep
K1032	M16 x 2.0, 36 deep	M20 x 2.5, 42 deep
K1232	M20 x 2.5, 42 deep	M24 x 3, 55 deep
K1532	M20 x 2.5, 42 deep	M24 x 3.0, 55 deep
K1632	M20 x 2.5, 42 deep	M30 x 3.5, 60 deep

4 WEATHER PROTECTION OF UNIT

All Series K 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 03, 04, 05, 06 & 07)

Motorised and Reducer types of sizes 03, 04, 05, 06 & 07 are supplied ready filled with the appropriate amount of lubricant for the mounting position identified in the original order. (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 Lubrication Section 6 for the revised quantities
- Sizes K06 & K07 have several oil fill and drain plugs to cater for all mounting positions. See Appendix 1 for plug positions.

MOTORISED AND REDUCERS (SIZES 08, 09, 10, 12, 15 & 16)

Motorised and Reducer types of sizes 08, 09, 10, 12, 15 & 16) are shipped less oil, for the customer to fill on site once installed. The different mounting positions are indicated in Appendix 1 with the appropriate oil fill quantities in Lubrication Section 6. The units have several oil fill and drain plugs to cater for all mounting positions. See Appendix 1 for plug positions.

5.2 FIXING TO CUSTOMER EQUIPMENT

Fixing gear unit flange facings or feet to the customer's equipment use set screws to ISO grade 8.8 minimum.

Torque tighten to:-

Set Screw Size	Tightening Torque	
	Holding Down Bolts / Output Flange Bolts	Motors to Gearhead
M6	10 Nm	10 Nm
M8	25 Nm	18 Nm
M10	50 Nm	37 Nm
M12	85 Nm	64 Nm
M16	200 Nm	150 Nm
M20	350 Nm	260 Nm
M24	610 Nm	-
M30	1220 Nm	-
M36	2150 Nm	-

5.3 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 2 of this document if the motor is of Power Build Pvt Ltd plating.
Alternatively if the motor is supplied separately or if fitted with a motor from a different manufacturer, then this should have appropriate documentation provided with it.

5.4 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 Power Build Pvt Ltd 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 3)
Note: It is important to ensure when aligning unit on baseplate 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 finale 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 bedplates 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 backstop device is fitted.

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

5.5 SHAFT MOUNTED UNITS

The following procedure is recommended for all shaft and foot/shaft mounted units with a standard output bore for other shaft bore options see Appendix 7 for Shrink Disc.

a) Clean shaft extensions and output line bore of the unit.

b) Spray the gear unit bore with Rocol DFSM anti fretting compound or similar.

b) Locate the unit in position onto the head shaft by the most convenient method shown in Appendix 4, ensuring it is as close as possible to the bearing on the driven machine.

c) Anchor the unit to a secure point on the structure by means of the torque arm (reference Appendix 8 for more detail).

d) Fit guards in accordance with the factory acts.

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

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

5.6 REPLACEMENT OF OIL SEALS

a) Clean and drain the unit.

b) Remove any equipment from the outputshaft such as couplings and remove the output key.

c) Remove the old seal

d) Smear oil seals with grease (NLGI Grade 2 grease).

e) Fit replacement seal on a seal guide, slide it along the shaft and press the seal into the housings.

f) Fill with the correct amount of an approved lubricant, see Lubrication Section 6.

6 LUBRICATION AND MAINTENANCE

6.1 LUBRICATION

Gear units 03, 04, 05, 06 & 07 will be supplied filled with a quantity of EP mineral oil appropriate to the intended mounting position. However if, as requested, the unit is supplied without lubricant then the oil quantity required is obtained from Table 2. Gear units 08, 09, 10, 12, 15 & 16 are supplied without lubricant (unless factory filled by request). Recommended lubricants are listed in the Approved Lubricant scheme booklet.

NOTE: Clients wishing to use food compatible or biodegradable lubricants should contact Power Build Pvt Ltd for further information.

6.2 PERIODIC INSPECTION

Check oil level every 3000 hours or 6 months whichever is sooner on sizes K06, 07, 08, 09, 10, 12, 15 & 16 and if necessary top up with the recommended grade of lubricant.

6.3 OIL CHANGES

- Sizes 03, 04 and 05 units are lubricated for life.
- All other sizes of Series K will require an oil change:
  - 10,000 hours for mineral oil
  - 20,000 hours for synthetic oil

6.4 TEMPERATURE LIMITATIONS

The standard lubricant is suitable for operation in ambient temperatures of 20°C to 50°C, outside of this consult Table 1 or Power Build Pvt Ltd Application Engineers.

TABLE 1 OIL GRADES

LUBRICANT	AMBIENT TEMPERATURE RANGE		
	-5°C to 20°C (type E) -30°C to 20°C (type H)	0°C to 35°C	20°C to 50°C
EP Mineral Oil (type E)	5E (VG 220)	6E (VG 320)	7E (VG 460)
Polyalphaolefin based Synthetic with EP additive (type H)	5H (VG 220)	5H (VG 220)	6H (VG 320)

6.5 GREASE LUBRICATION

Where re-greasing points are provided add 2 shots monthly of NLGI 2 grade grease. Appendix 8 gives the greases approved for use in the unit.

6.6 VENTILATOR

If a ventilator plug is supplied with the unit, remove the filler plug as indicated in Appendix 1, mounting positions page, and fit the ventilator plug in that position.

6.7 LUBRICATION QUANTITIES

TABLE 2 LUBRICANT QUANTITY (Litres) TRIPLE REDUCTION

K03, K04 & K05 - fill with correct quantity of lubricant

K06, K07, K08, K09, K10, K12, K15 & K16

Oil quantities are approximate, fill gearbox until oil escapes from level plug hole

Triple Reduction												
Size		K0332	K0432	K0532	K0632	K0732	K0832	K0932	K1032	K1232	K1532	K1632
Mounting Position	1	0.5	0.7	1.1	1.5	2.7	4.4	9.3	15	23	40	68
	2	0.7	0.9	1.5	1.8	3.6	3.7	8.3	15	27	44	77
	3	0.8	1.1	1.7	2.8	4.0	7.6	18	28	33	66	117
	4	1.0	1.3	1.9	2.7	4.5	7.5	17	30	39	74	122
	5	1.2	1.7	2.5	3.6	5.7	9.6	21	34	50	94	159
	6	0.9	1.2	2.0	2.6	4.5	7.6	16	25	35	72	120

TABLE 3 LUBRICANT QUANTITY (Litres) QUINTUPLE REDUCTION

		Quintuple Reduction											
Size		K0352		K0452		K0552		K0652		K0752		K0852	
		Primary	Secondary	Primary	Secondary	Primary	Secondary	Primary	Secondary	Primary	Secondary	Primary	Secondary
		M0122	K0332	M0122	K0432	M0322	K0532	M0322	K0632	M0322	K0732	M0522	K0832
Mounting Position	1	0.5	0.5	0.5	0.7	0.8	1.1	0.8	1.5	0.8	2.7	1.5	4.4
	2	0.5	0.7	0.5	0.9	0.8	1.5	0.8	1.8	0.8	3.6	1.5	3.7
	3	0.5	0.8	0.5	1.1	0.8	1.7	0.8	2.8	0.8	4.0	1.5	7.6
	4	0.5	1.0	0.5	1.3	0.8	1.9	0.8	2.7	0.8	4.5	1.5	7.5
	5	0.7	1.2	0.7	1.7	1.1	2.5	1.1	3.6	1.1	5.7	2.0	9.6
	6	1.0	0.9	1.0	1.2	1.4	2.0	1.4	2.6	1.4	4.5	2.6	7.6

		Quintuple reduction..Cont									
Size		K0952		K1052		K1252		K1552		K1652	
		Primary	Secondary	Primary	Secondary	Primary	Secondary	Primary	Secondary	Primary	Secondary
		M0522	K0932	M0722	K1032	M0722	K1232	M0722	K1532	M0922	K1632
Mounting Position	1	1.5	9.3	2.6	15	2.6	23	2.6	40	10.5	68
	2	1.5	8.3	2.6	15	2.6	27	2.6	44	10.5	77
	3	1.5	18	2.6	28	2.6	33	2.6	66	10.5	117
	4	1.5	17	2.6	30	2.6	39	2.6	74	10.5	122
	5	2.0	21	3.2	34	3.2	50	3.2	94	16.8	159
	6	2.6	16	4.7	25	4.7	35	4.7	72	16.5	120

* NOTE: Primary units filled with Power Build Limited Grade 6E lubricant suitable for all ambient temperatures between 0°C and 50°C

7 STARTING UP

7.1 PRIOR TO STARTING UP

a) ensure ventilator is fitted (K06 & above)
b) check oil level (K06 & above) top up if necessary
c) ensure all safety devices are in place (ie guards fitted)
d) remove any safety devices fitted to prevent machine rotation

7.2 Starting up should be performed or supervised by suitably qualified personnel

Caution: any deviation from normal operating conditions, (increased temperature, noise, vibrations, power consumption etc) suggest a malfunction, inform maintenance personnel immediately.

8 OPERATION

8.1 NOISE

The range of Series K 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).

8.2 GENERAL SAFETY

Potential hazards which can be encountered during installation, maintenance and operation of drives is covered in greater detail in the product safety page at the front of this booklet.

Advice is also given on sensible precautions which need to be taken to avoid injury or damage.
PLEASE READ !

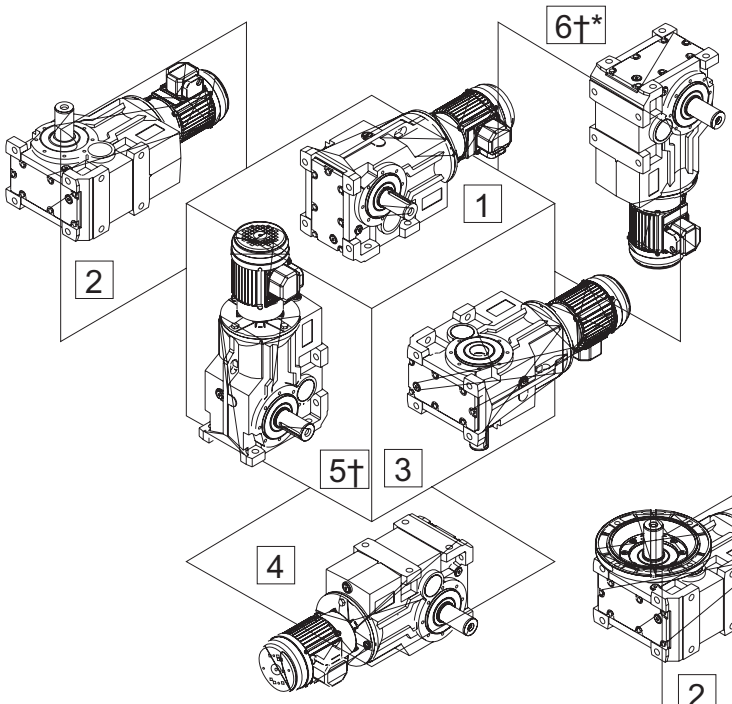
9 CLEANING

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.

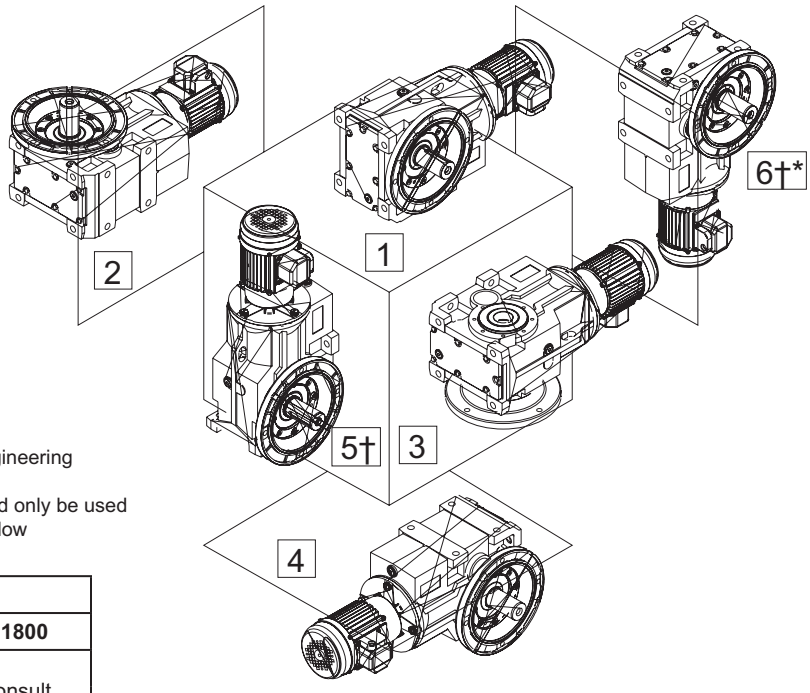
Any further information or clarification required may be obtained by contacting Power Build Pvt Ltd, Please see contact details at the back of this booklet.

Column 13 entry

Base Mounted Units



Flange Mounted Units



* Not Recommended for Geared Motors - Consult Application Engineering

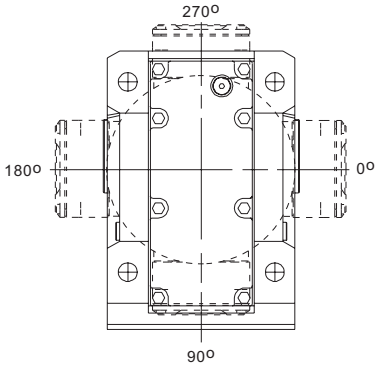
† Gear Units selected for use in mounting positions 5 and 6 should only be used with overall ratios greater or equal to those shown in the table below

Size	Input Speed (rpm)			
	< 1000	< 1500	< 1800	> 1800
K08	All	All	All	Consult Application Engineering
K09	All	11.0	14.0	
K10	11.0	20	25.0	
K12- K16	16.0	32	36.0	

Mounting Positions - shown as motorised - applies also for reducers

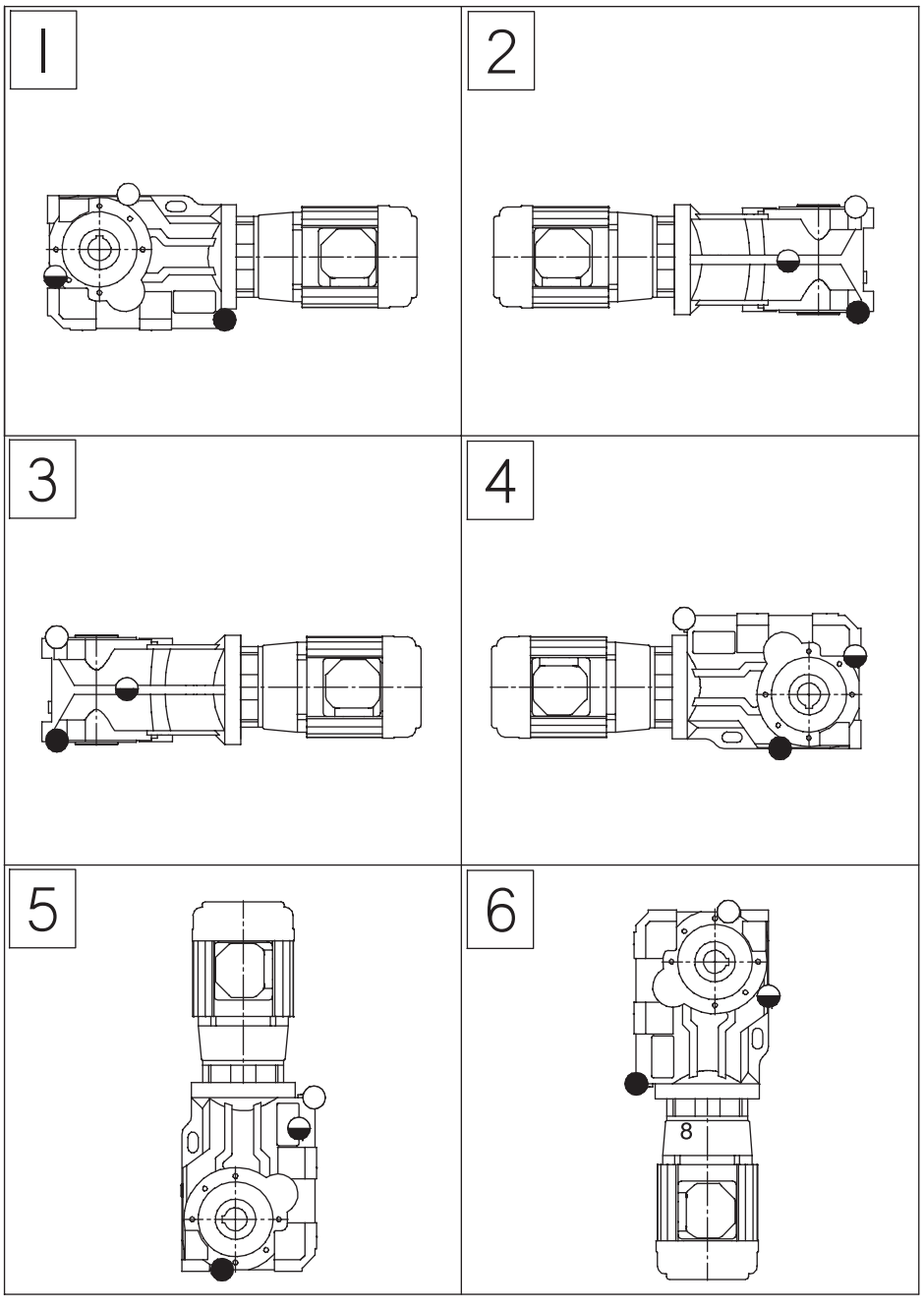
Column 14 entry

All motors



Column 14 entry	Terminal Box Position
A	0º
B	90º
C	180º
D	270º
-	Reducerornomotorfitted

PLUG POSITIONS

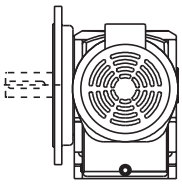
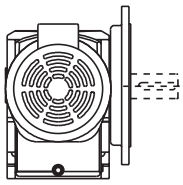
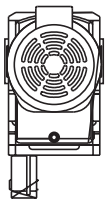
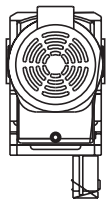


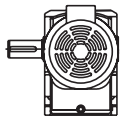
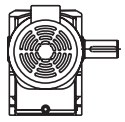
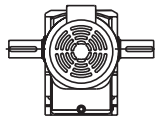
Drain Position

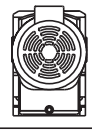
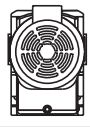
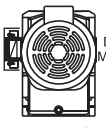
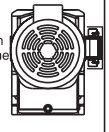
Level Position

Ventilator Position

UNIT HANDINGS

Column 9 Entry Unit Version	Left	Right
Std Unit with Output Flange	F 	H 
Std Unit with Torque Bracket	T 	Q 

Column 11 Entry	Metric	
	Left	Right
Single Output Shaft	C 	E 
Double Output Shaft	D 	

Hollow Shaft	H 	
Kibo	Column 11 entry depends on shaft bore diameter, please see page 15 	
Taper Release	W  Driven Machine Side Note: non-standard handing	V  Driven Machine Side
Shrink Disc	X  Driven Machine Side Note: non-standard handing	Y  Driven Machine Side

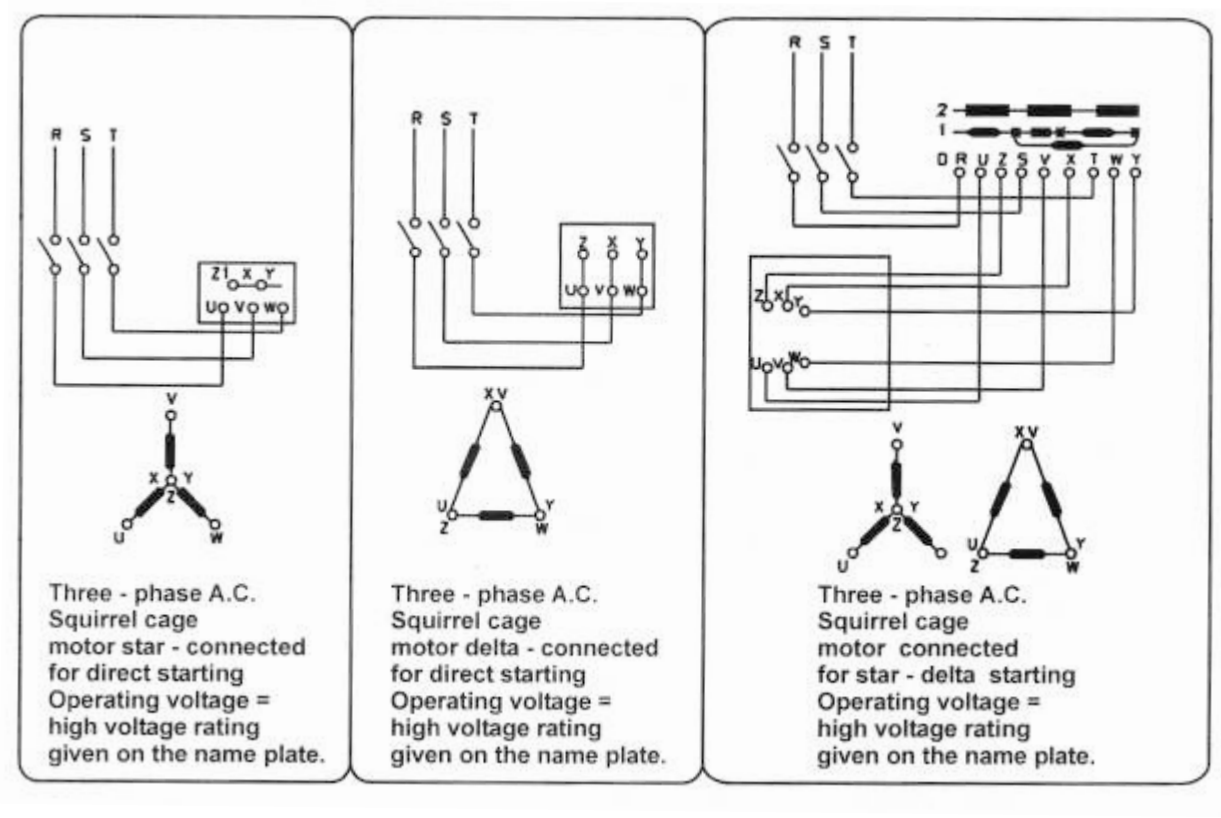
Connetion to Power System

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.



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.

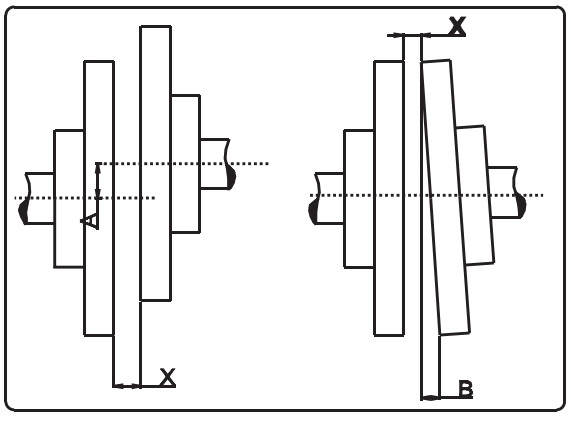
APPENDIX 3
CONNECTION WITH THE DRIVEN MACHINE

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.)

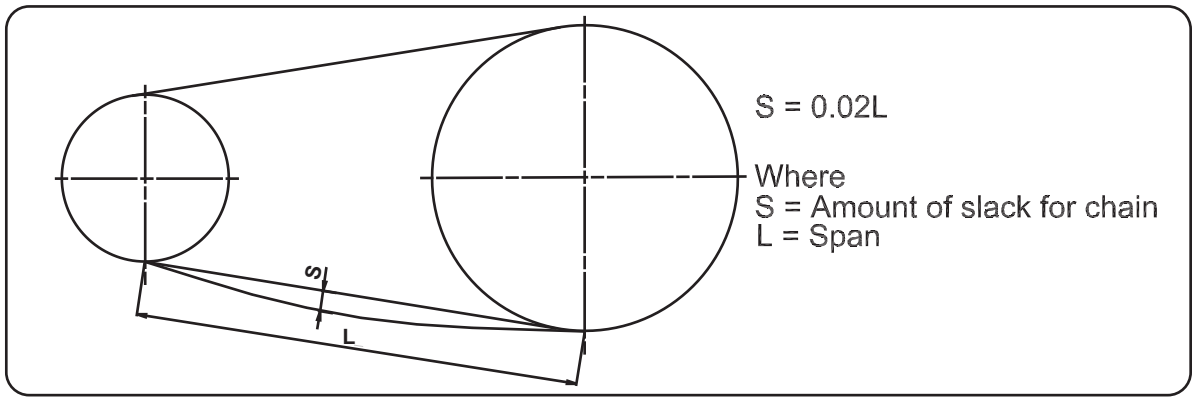


Fig. 2

(c) Layout of chain driving:

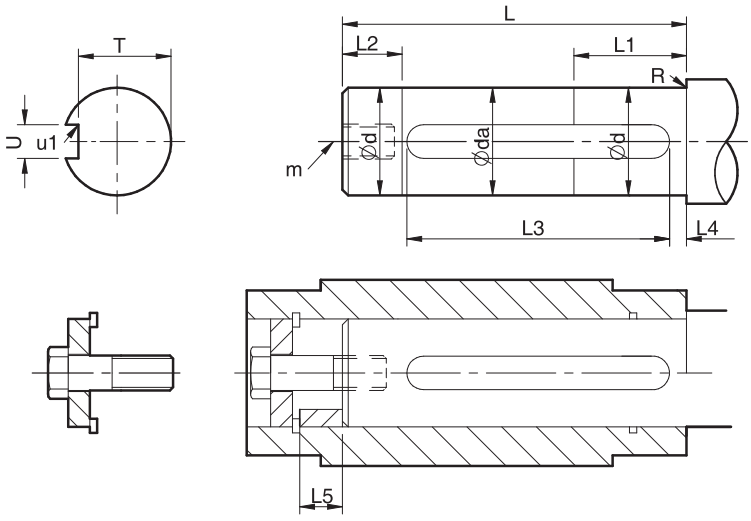
When using chain horizontally for connection with the drive and the driven machine, arrange shafts so as to give tension to the upper side of chain. Shaft arrangement of vertical transmission is not recommended, however, if necessary, the large wheel should be positioned at lower end.

(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.

Assembly Onto Shaft - Customers Shaft Detail



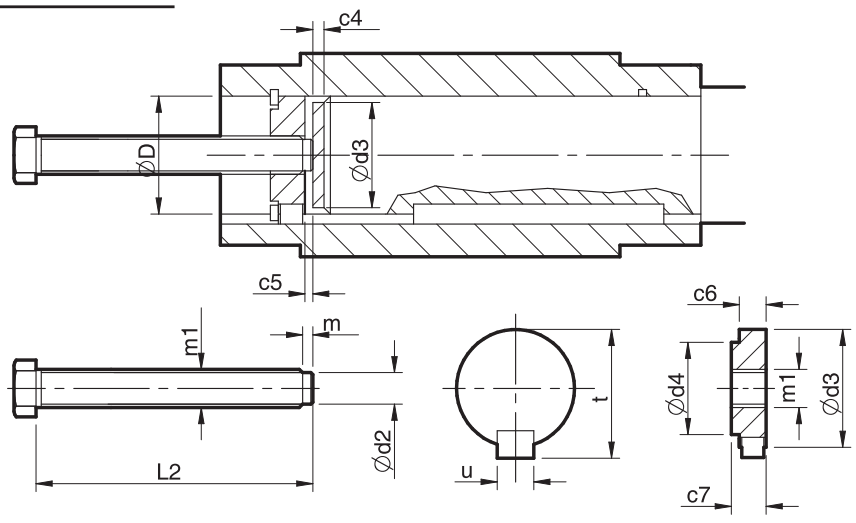
Size	d	da	L	L1	L2	L3	L4	L5	m	N	R	T	U	u1
K03	29.993/ 29.980	29.6	82	45	15	70.3 70.0	3	23	M10x1.5x22	15Nm	0.8R	26.0 25.8	8.000/ 7.964	0.16 0.25R
K04	34.991/ 34.975	34.6	109	60	20	90.5 90.0	3	23	M12x1.75x30	20Nm	0.8R	30.0 29.8	10.000/ 9.964	0.16 0.25R
K05	39.991/ 39.975	39.6	112	60	20	92.5 92.0	3	30	M16x2x38	45Nm	0.8R	35.0 34.8	12.000/ 11.957	0.4 0.25R
K06	39.991/ 39.975	39.6	126	75	25	100.5 100.0	3	30	M16x2x38	45Nm	0.8R	35.0 34.8	12.000/ 11.957	0.4 0.25R
K07	49.991/ 49.975	49.6	153	90	30	130.5 130.0	3	30	M16x2x38	45Nm	0.8R	44.0 44.3	14.000/ 13.957	0.4 0.25R
K08	59.970/ 59.971	59.6	173	90	30	148.5 148.0	3	37	M20x2.5x42	85Nm	0.8R	53.0 52.8	18.000/ 17.957	0.4 0.25R
K09	69.991/ 69.975	69.6	232	105	35	161.5 161.0	3	38	M20x2.5x42	85Nm	0.8R	62.5 62.3	20.000/ 19.948	0.6 0.4R
K10	79.991/ 79.975	79.6	275	120	40	188.5 188.0	5	38	M20x2.5x42	85Nm	0.8R	71.0 70.8	22.000/ 21.948	0.6 0.4R
K12	99.988/ 99.966	99.6	327	150	50	238.5 238.0	10	46	M24x3x50	200Nm	0.8R	90.0 89.8	28.000/ 27.948	0.6 0.4R
K15	119.988/ 119.966	119.5	434	180	60	272.5 272.0	15	26	M24x3x50	200Nm	1.0R	109.0 108.8	32.000/ 31.948	1.0 0.7R
K16	134.986/ 134.961	134.5	540	180	60	336.5 336.0	15	30	M30x3.5x60	400Nm	1.0R	123.0 122.7	36.000/ 35.948	1.0 0.7R

Assembly Instructions

1. Spray the hollow shaft bore and mating diameter of the output shaft with Rocol DFSM or equivalent anti-scuffing 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.

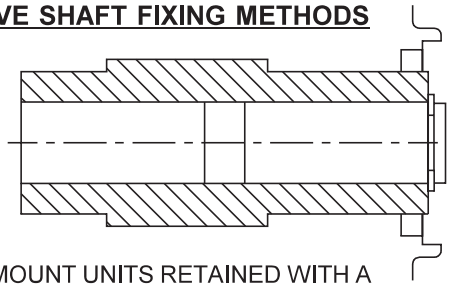
APPENDIX 4 - STANDARD DISASSEMBLY / ALTERNATIVE SHAFT FIXING METHODS

Disassembly Method from Shaft

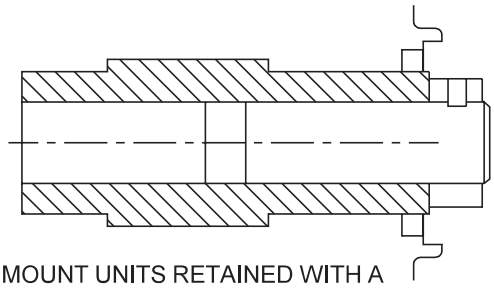


Size	c4	c5	c6	c7	D	d2	d3	d4	L2	m	m1	t	u
K03	5	3	15	17	30	13	29.9	20	130	3	M16 x 2.0	33	8
K04	5	3	15	17	35	13	34.9	25	160	3	M16 x 2.0	38	10
K05	5	4	20	23	40	20	39.9	29	190	3	M24 x 2.5	43	12
K06	5	4	20	23	40	20	39.9	29	190	3	M24 x 3.0	43	12
K07	5	4	20	23	50	20	49.9	39	220	3	M24 x 3.0	53.5	14
K08	8	5	24	27	60	25	59.9	47	250	5	M30 x 3.5	64	18
K09	8	6	24	27	70	25	69.9	53	310	5	M30 x 3.5	74.5	20
K10	8	6	24	27	80	25	79.9	62	360	5	M30 x 3.5	95	22
K12	8	8	30	34	100	30	99.9	80	420	5	M36 x 4.0	116	28
K15	10	10	30	34	120	30	119.9	96	520	5	M36 x 4.0	127	32
K16	10	10	36	40	135	36	134.9	110	630	5	M42 x 4.5	143	36

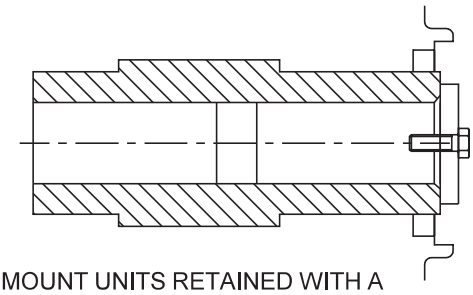
ALTERNATIVE SHAFT FIXING METHODS



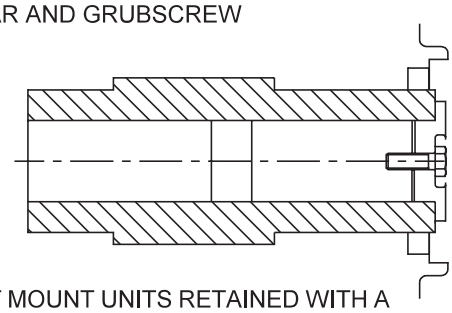
SHAFT MOUNT UNITS RETAINED WITH A CIRCLIP



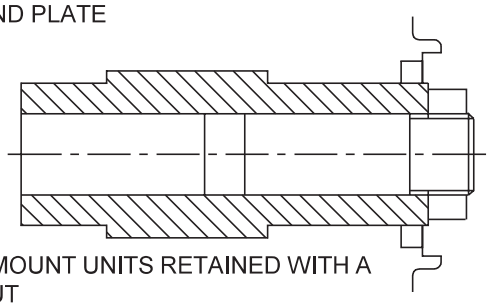
SHAFT MOUNT UNITS RETAINED WITH A COLLAR AND GRUBSCREW



SHAFT MOUNT UNITS RETAINED WITH A BOLT AND PLATE

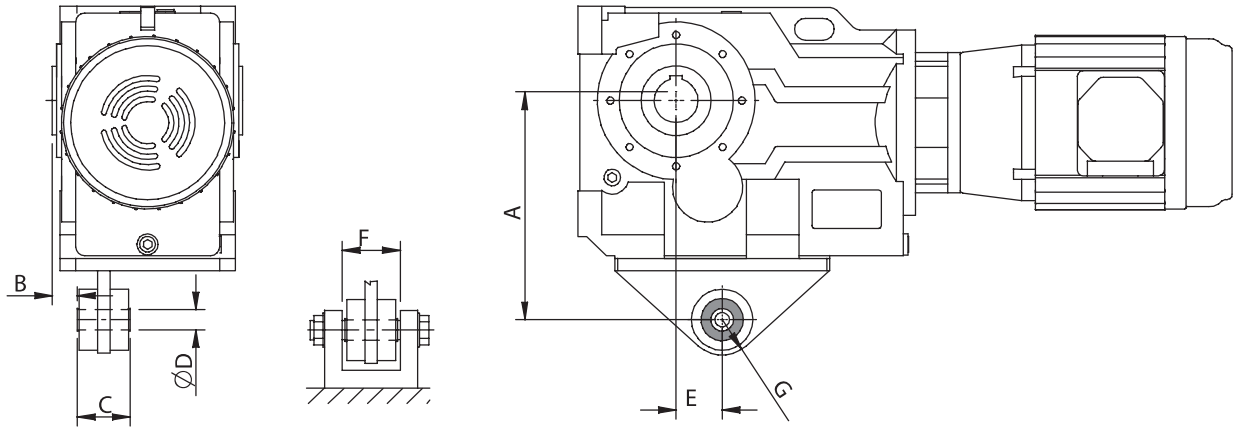


SHAFT MOUNT UNITS RETAINED WITH A RECESSED PLATE AND BOLT



SHAFT MOUNT UNITS RETAINED WITH A LOCKNUT

Series K Torque Bracket



CAUTION

1. It is recommended that the torque bracket is positioned on the side of the gear unit adjacent to the driven machine.
2. The torque bracket requires a clevis type anchoring as shown above (not supplied)
3. The clevis position should be carefully adjusted at assembly so that it does not exert any external radial or axial pressure on the torque bracket

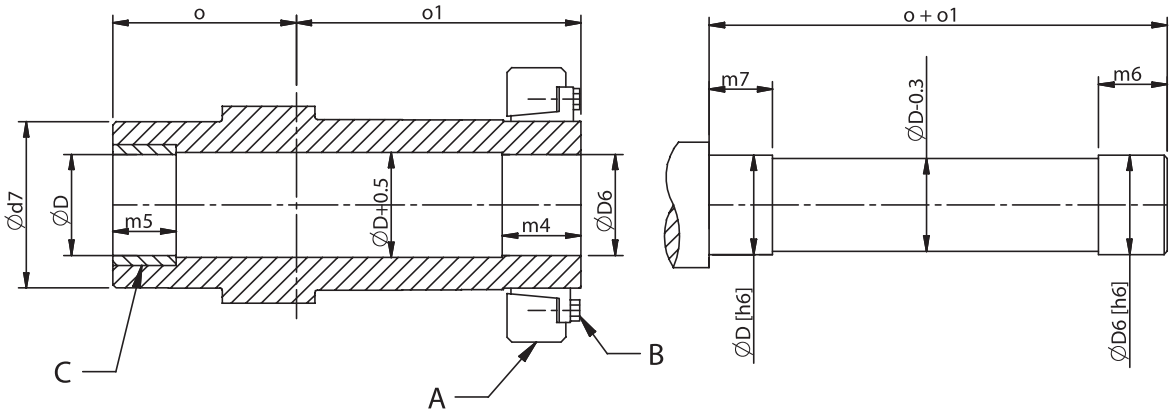
Torque Bracket Dimensions mm

Unit	A	B	C	D	E	F (min)	G
K03	140	20	36	10.4	23.5	41	23
K04	160	20	36	10.4	30	41	23
K05	192	18	60	16.4	40	65	38
K06	200	25	60	16.4	45	65	38
K07	250	25	60	16.4	52.5	65	38
K08	300	30	80	25	60	85	45
K09	350	40	100	25	70	105	45
K10	450	45	100	25	74	105	45
K12	550	10	126	38	60	131	63
K15	700	2	126	38	50	131	70
K16	-	-	-	-	-	-	-

Series K - With Shrink Disc

The Shrink Disc option requires a gear unit with a Shrink Disc type output bore, together with a Shrink Disc (A) locking device.

The Shrink Disc is a friction device (without keys) which exerts an external clamping force on the hollow gearbox shaft resulting in a mechanical shrink fit of the gear unit and driven shaft.



Dimensions (mm)

SIZE	D	D6	d7	m4	m5	m6	m7	o	o1	Torque Ta (Nm)
K03	30	30	50	31	20	36	25	60	86	29
K04	35	35	55	32	20	37	25	75	102	29
K05	40	40	60	36	20	41	25	83	112	29
K06	40	40	70	38	20	43	25	90	118	29
K07	50	50	80	36	30	41	35	105	136	35
K08	65	65	90	41	40	46	45	120	161	58
K09	75	75	100	55	40	60	55	150	195	58
K10	95	95	120	65	60	70	65	175	230	100
K12	105	105	140	85	60	90	75	205	280	160
K15	125	125	160	90	60	95	75	250	330	295
K16	140	140	180	120	60	125	75	305	423	295

CAUTION

Assembly

1. Clean and degrease the locating diameters of the gear unit hollow shaft bore, the driven shaft and the shrink disk locating surfaces
2. Ensure the Anti-fret yellow metal bush(C) is correctly inserted in the non driving end of the gear unit hollow shaft
3. Draw the gear unit onto the driven shaft.
4. Check and re-apply if necessary molykote 321R (or similar) to the tapered surfaces of the Shrink Disc inner ring and locking collar.
5. Fit the Shrink Disk inner ring and collar into position on the shaft, fit and tighten all the locking screws gradually in succession, do **not** tighten in a diametrically opposite sequence. This tightening sequence will require several passes until all the screws are tightened to the torque specified in the table above.
6. Fit the protective cover.

Disassembly - Similar to the reverse of the assembly procedure.

A. Remove any rust and dirt from the assembly
B. Loosen off the locking screws in succession but do not completely remove.
C. Remove the shrink disk and withdraw the gear unit from the driven shaft.

NOTE: If the Shrink Disk is to be re-used it should be dismantled and cleaned thoroughly and Molykote 321R (or similar) applied to the tapered surfaces of the inner ring and collar

Approved Lubrication.

Type E Mineral oil containing industrial EP additives

SUPPLIER	LUBRICANT RANGE	GRADE NUMBERS		
		5E	6E	7E
Batoyle Freedom	Remus	220 (-2)	320 (-2)	460 (-2)
Boxer Services / Millers Oils	Indus	220 (-10)	320 (-10)	460 (-10)
BP Oil International Limited	Energol GR-XF	220 (-16)	320 (-13)	460 (-1)
	Energol GR-XP	220 (-15)	320 (-10)	460 (-7)
Caltex	Meropa	220 (-4)	320 (-4)	460 (-4)
	RPM Borate EP Lubricant	220 (-7)	320 (-4)	460 (-7)
Carl Bechem GmbH	Berugear GS BM	220 (-20)	320 (-13)	460 (-10)
	Staroil G	220 (-13)	320 (-13)	460 (-10)
Castrol International	Alpha Max	220 (-19)	320 (-13)	460 (-10)
	Alpha SP	220 (-16)	320 (-16)	460 (-1)
Chevron International Oil Company Limited	Gear Comp EP (USA ver)	220 (-16)	320 (-13)	460 (-10)
	Gear Comp EP (Eastern ver)	220 (-13)	320 (-13)	460 (-13)
	Ultra Gear	220 (-10)	320 (-7)	460 (-7)
Eko-Elda Abee	Eko Gearlub	220 (-13)	320 (-10)	460 (-1)
Engen Petroleum Limited	Gengear	220 (-15)	320 (-12)	460 (-3)
Esso/Exxon	Spartan EP	220 (-12)	320 (-12)	460 (-4)
Fuchs Lubricants	Powergear		P/Gear (-16)	M460 (-4)
	Renogear V	220EP (-13)	320EP (-4)	460EP (-4)
	Renogear WE	220 (-7)	320 (-4)	400 (-4)
	Renolin CLPF Super	6 (-13)	8 (-10)	10 (-10)
Klüber Lubrication	Klüberoil GEM1	220 (-5)	320 (-5)	460 (-5)
Kuwait Petroleum International	Q8 Goya	220 (-16)	320 (-13)	460 (-10)
Lubrication Engineers Inc.	Almasol Vari-Purpose Gear	607 (-18)	605 (-13)	608 (-10)
Mobil Oil Company Limited	Mobil gear 600 series	630 (-13)	632 (-13)	634 (-1)
	Mobil gear XMP	220 (-19)	320 (-13)	460 (-7)
Omega Manufacturing Division	Omega 690		85w/140 (-15)	
Optimal Ölwerke GmbH	Optigear BM	220 (-11)	320 (-10)	460 (-7)
	Optigear	220 (-18)	320 (-9)	460 (-7)
Pertamina (Indonesia)	Masri	220 (-4)	320 (-4)	460 (-7)
Petro-Canada	Ultima EP	220 (-22)	320 (-16)	460 (-10)
Rocol	Sapphire Hi-Torque	220 (-13)	320 (-13)	460 (-13)
Sasol Oil (Pty) Limited	Cobalt	220 (-4)	320 (-1)	460 (-4)
	Hemat	220 (-10)	320 (-7)	460 (-4)
Saudi Arabian Lubr. Oil Co.	Gear Lube EP	EP220 (-1)	EP320 (0)	EP460 (0)
Shell Oils	Omala	220 (-4)	320 (-4)	460 (-4)
	Omala F	220 (-13)	320 (-10)	460 (-4)
Texaco Limited	Meropa	220 (-16)	320 (-16)	460 (-10)
	Meropa WM	220 (-19)	320 (-16)	460 (-11)
Total	Carter EP	220 (-21)	320 (-15)	460 (-12)
	Carter XEP	220 (-24)	320 (-18)	460 (-13)
Tribol GmbH	Molub-Alloy Gear Oil	90 (-18)	690 (-16)	140 (-13)
	Tribol 1100	220 (-20)	320 (-18)	460 (-16)

Numbers in brackets indicate the minimum pour point temperature of the specified oil in °C

THE UNIT MUST NOT BE RUN BELOW THIS TEMPERATURE.

APPENDIX 7
APPROVED LUBRICANTS

SYNTHETIC OILS

Type H - Polyalphaolefin based synthetic lubricants with Anti-Wear or EP additives. These have a medium to high load carrying capacity.

SUPPLIER	LUBRICANT RANGE	LUBRICATING OIL GRADE		
		5H	6H	7H
		AMBIENT TEMPERATURE RANGE °C		
		-30 to 10	-10 to 30	20 to 50
Batoyle Freedom Group	Titan	220 (-31)	320 (-28)	
Boxer Services / Millers Oils	Silkgear	220 (-35)	320 (-35)	460 (-35)
BP Oil International Limited	Enersyn EPX		320 (-28)	
Caltex	Pinnacle EP	220 (-43)	320 (-43)	460 (-37)
Carl Bechem GmbH	Berusynth GP	220 (-38)	320 (-35)	460 (-32)
Castrol International	Alphasyn EP	220 (-37)	320 (-31)	460 (-31)
	Alphasyn T	220 (-31)	320 (-28)	460 (-28)
Chevron International	Tegra	220 (-46)	320 (-33)	460 (-31)
Esso/Exxon	Spartan Synthetic EP	220 (-46)	320 (-43)	460 (-40)
Fuchs Lubricants	Renogear SG	220 (-32)	320 (-30)	
	Renolin Unisyn CLP	220 (-37)	320 (-34)	460 (-28)
Klüber Lubrication	Klübersynth GEM 4	220 (-30)	320 (-25)	460 (-30)
Kuwait Petroleum International	Q8 EL Greco	220 (-22)	320 (-19)	460 (-16)
Lubrication Engineers Inc	Synolec Gear Lubricant	9920 (-40)		
Mobil Oil Company Limited	Mobilgear SHC	220 (-40)	320 (-37)	460 (-32)
	Mobilgear SHC XMP	220 (-40)	320 (-33)	460 (-31)
Optimol Ölwerke GmbH	Optigear Synthetic A	220 (-31)	320 (-31)	
Petro-Canada	Super Gear Fluid	220 (-43)	320 (-37)	460 (-37)
Shell Oils	Omala HD	220 (-43)	320 (-40)	460 (-37)
Texaco Limited	Pinnacle EP	220 (-43)	320 (-43)	460 (-37)
	Pinnacle WM	220 (-43)	320 (-40)	
Total	Carter SP	220 (-34)	320 (-31)	460 (-28)
Tribol GmbH	Tribol 1510	220 (-36)	320 (-33)	460 (-28)

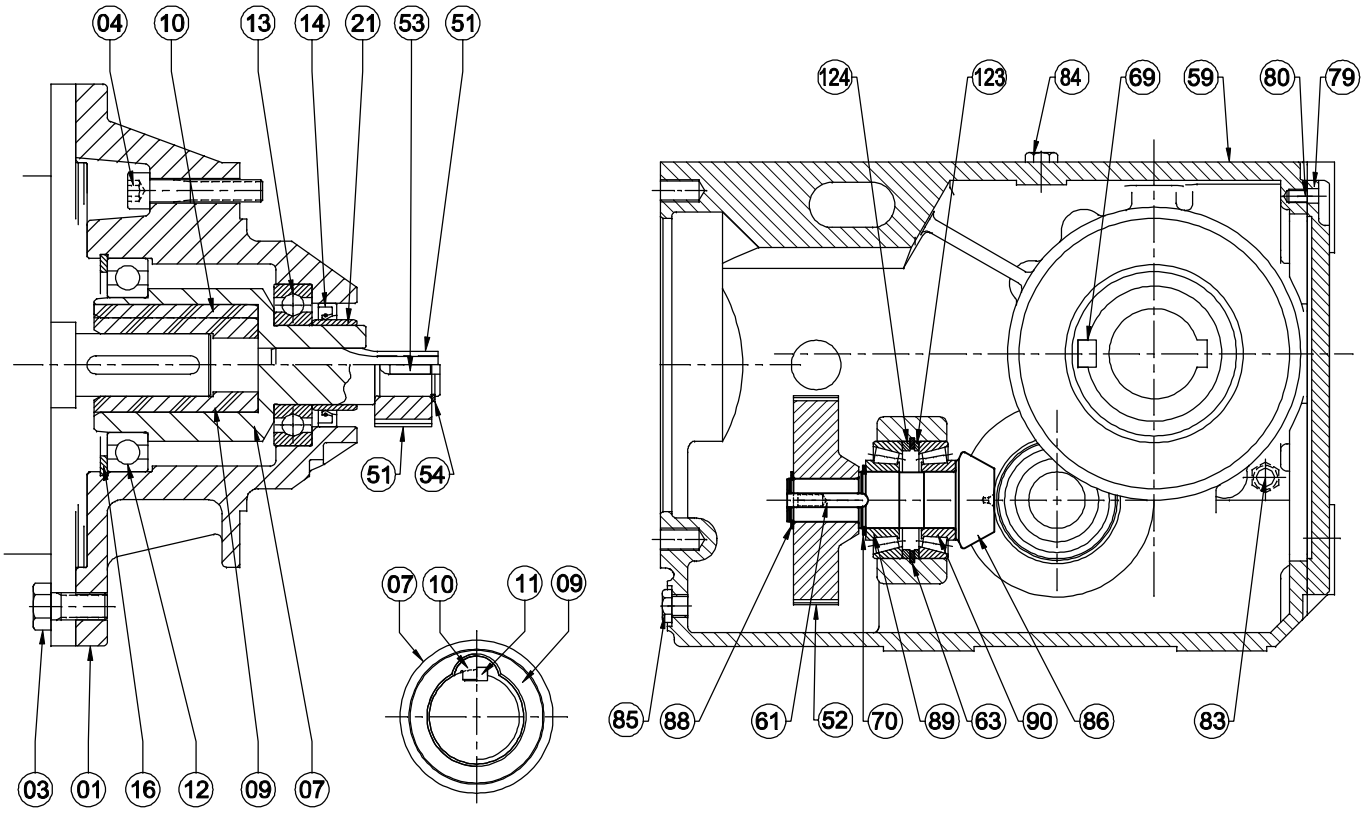
APPENDIX 8
APPROVED BEARING GREASES

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.



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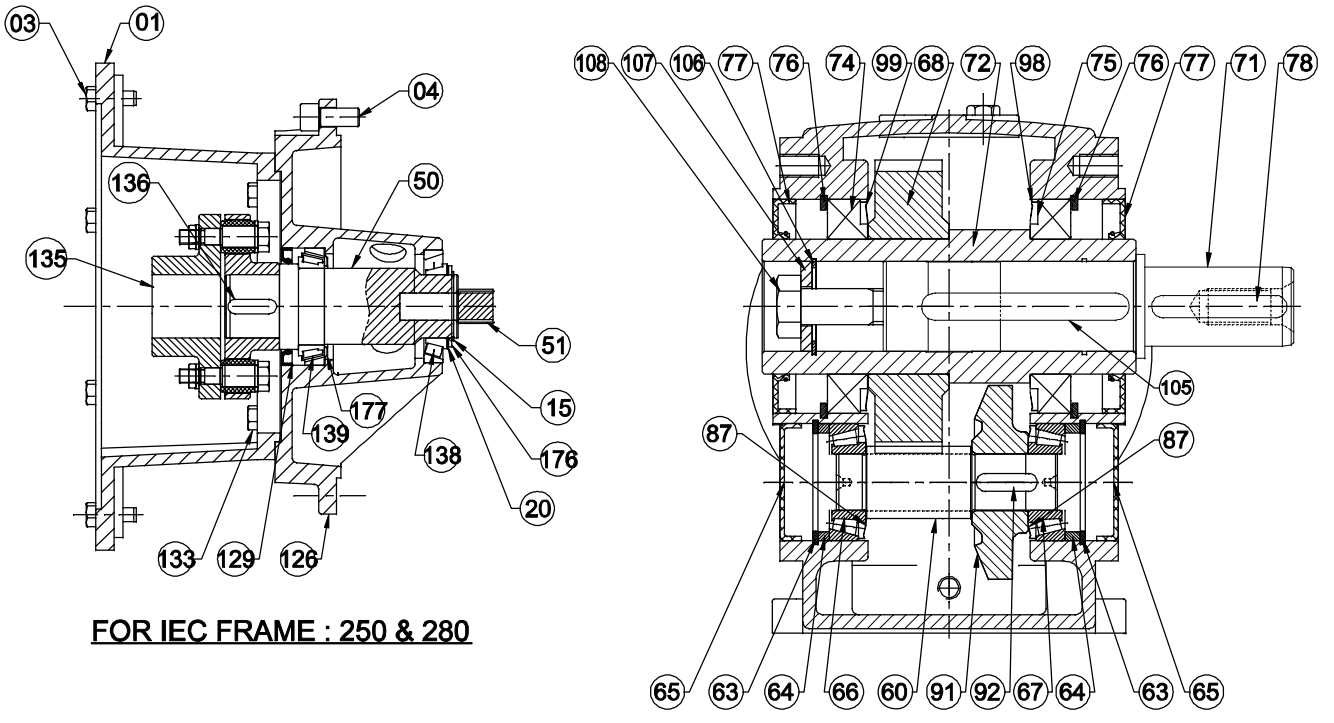

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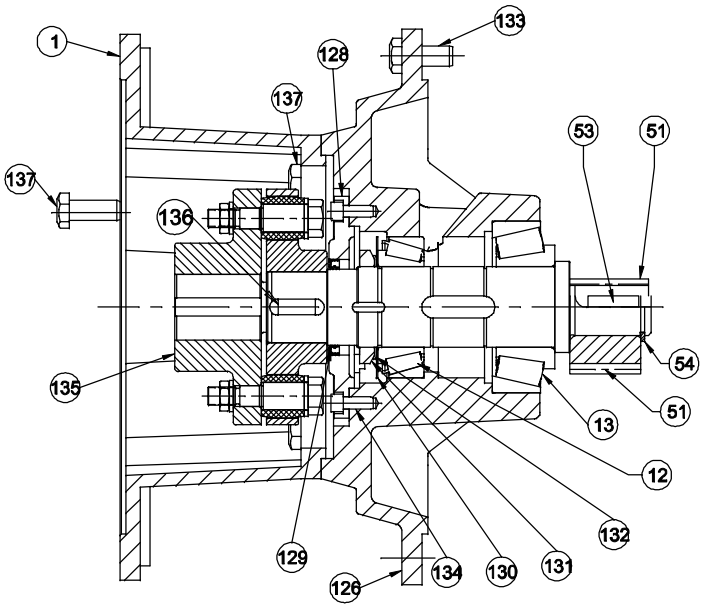
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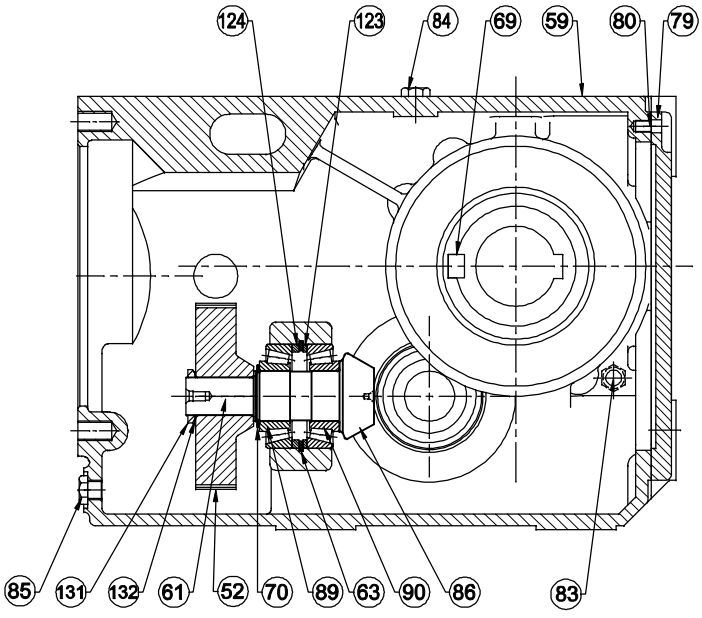
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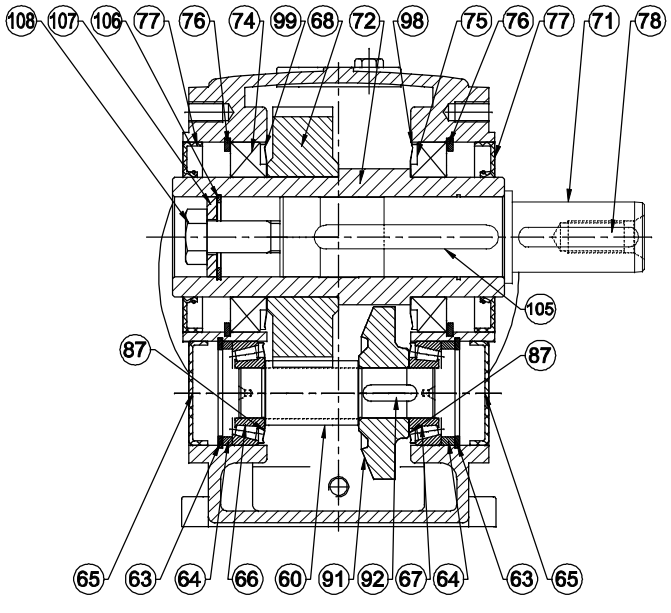
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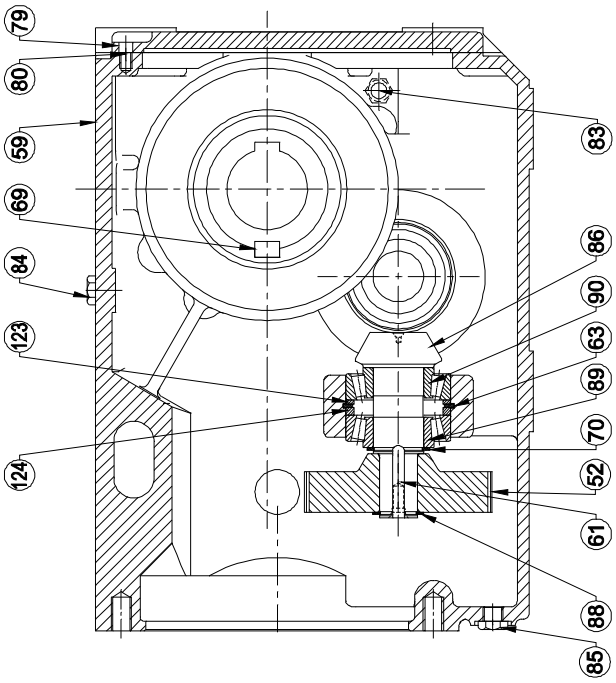
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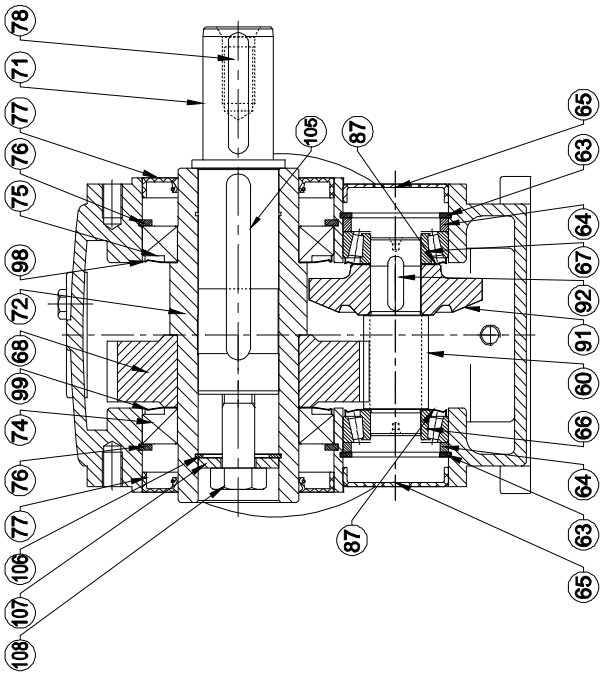
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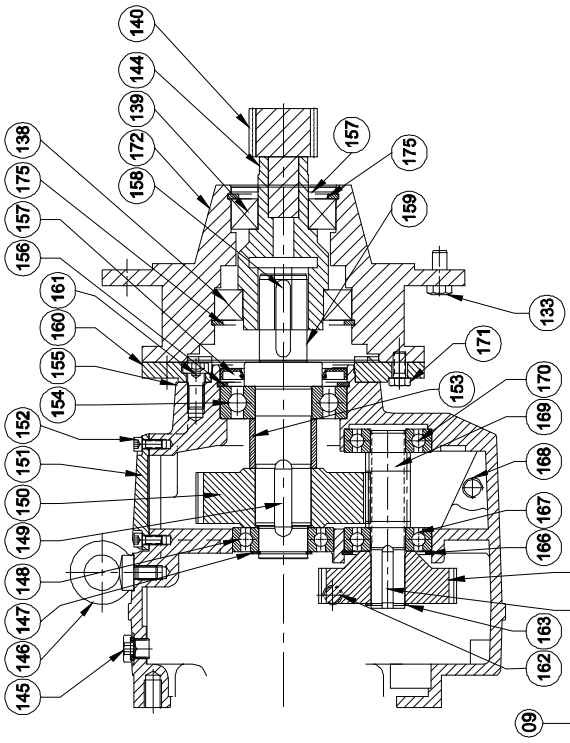
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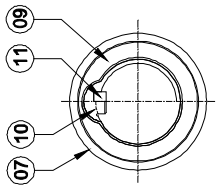
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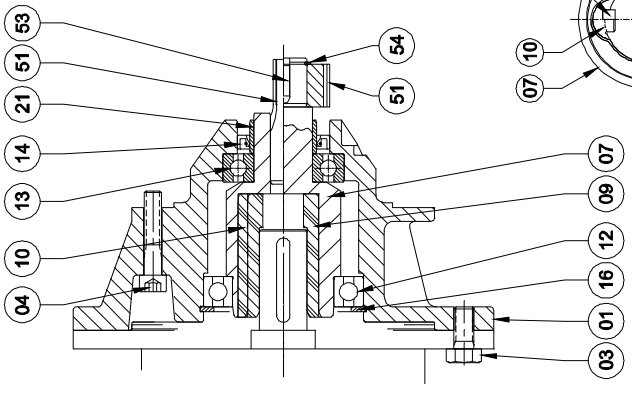
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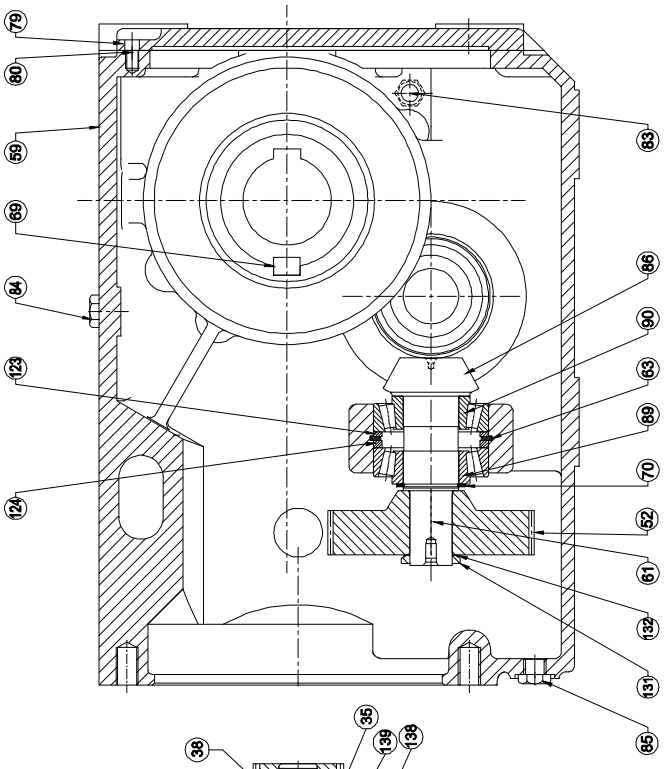
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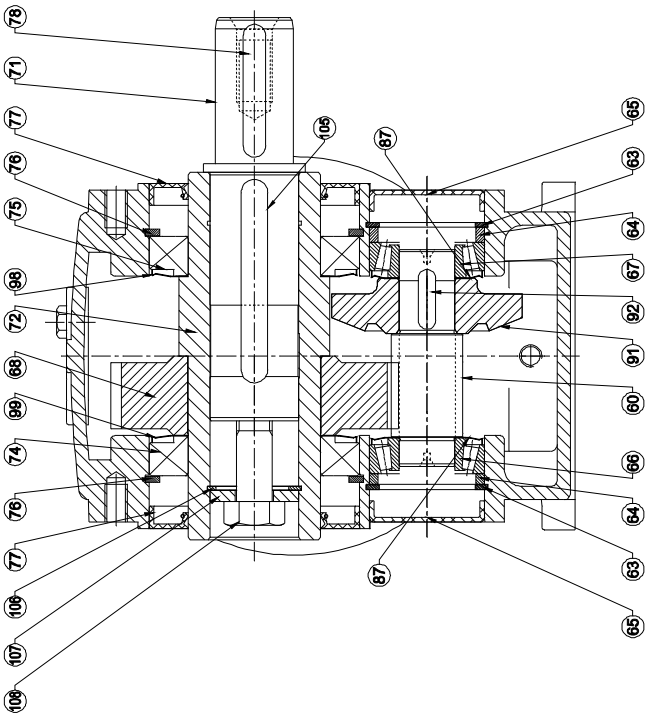
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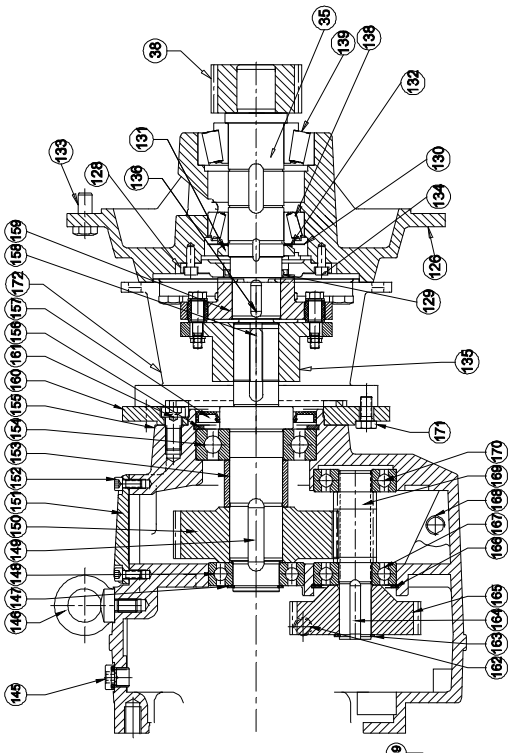
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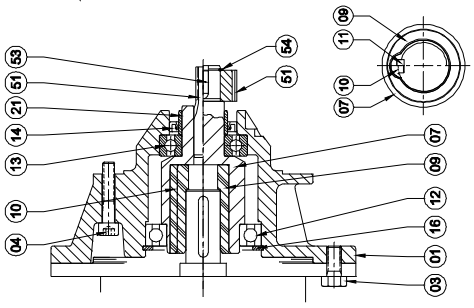
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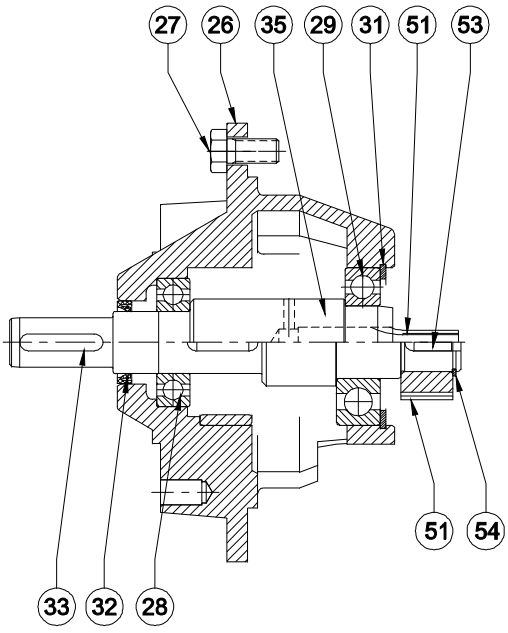
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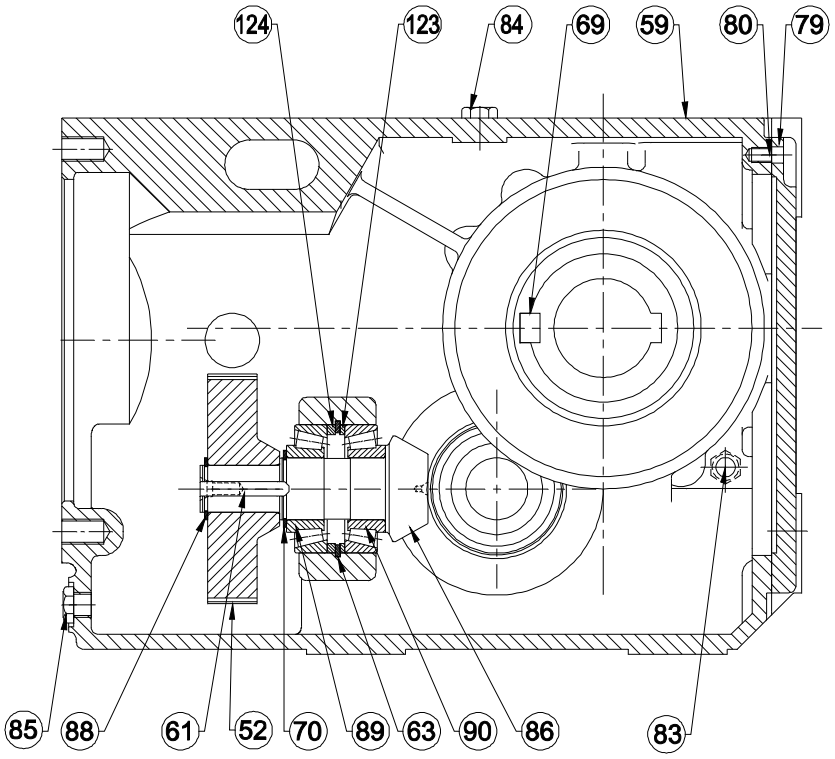
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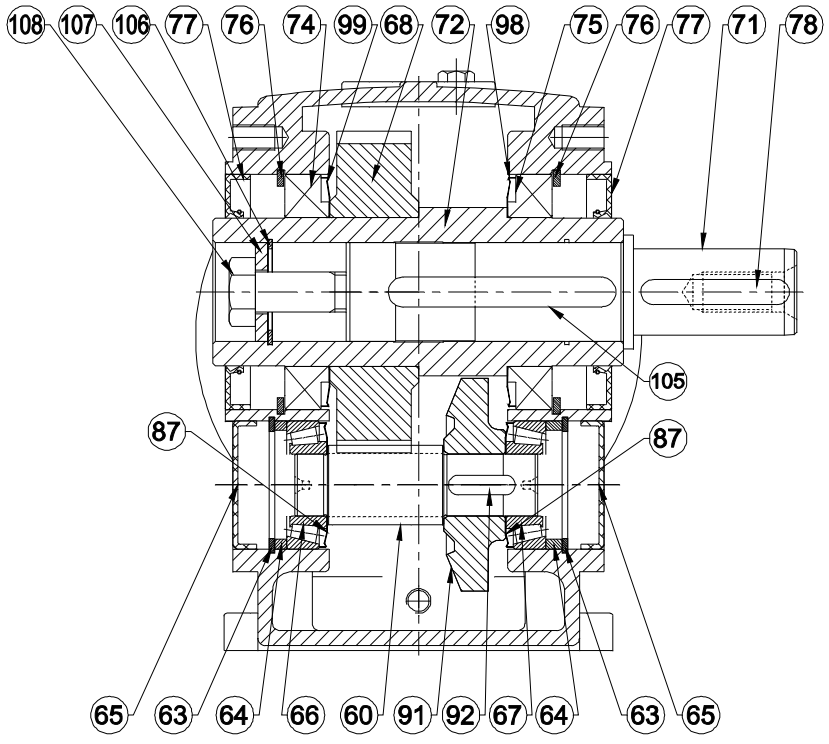
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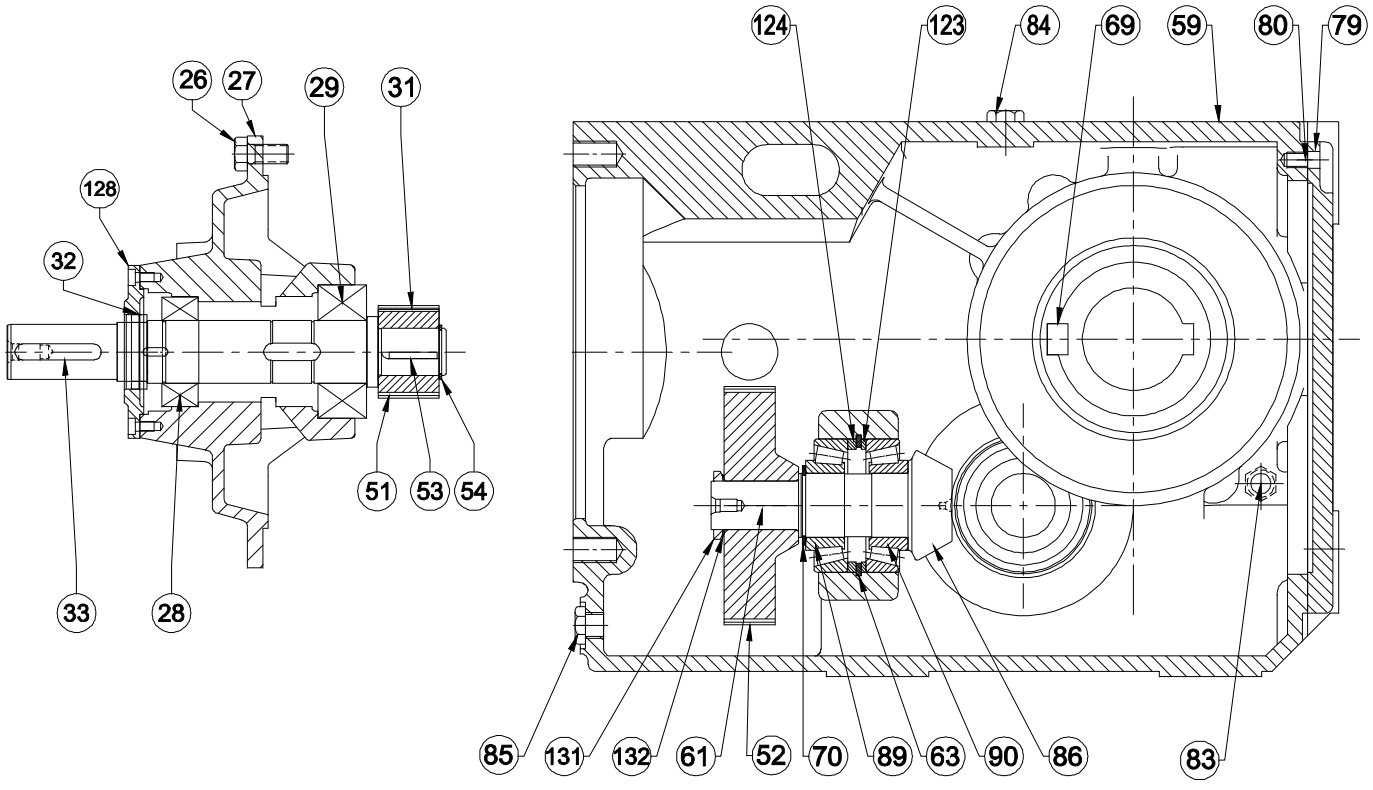
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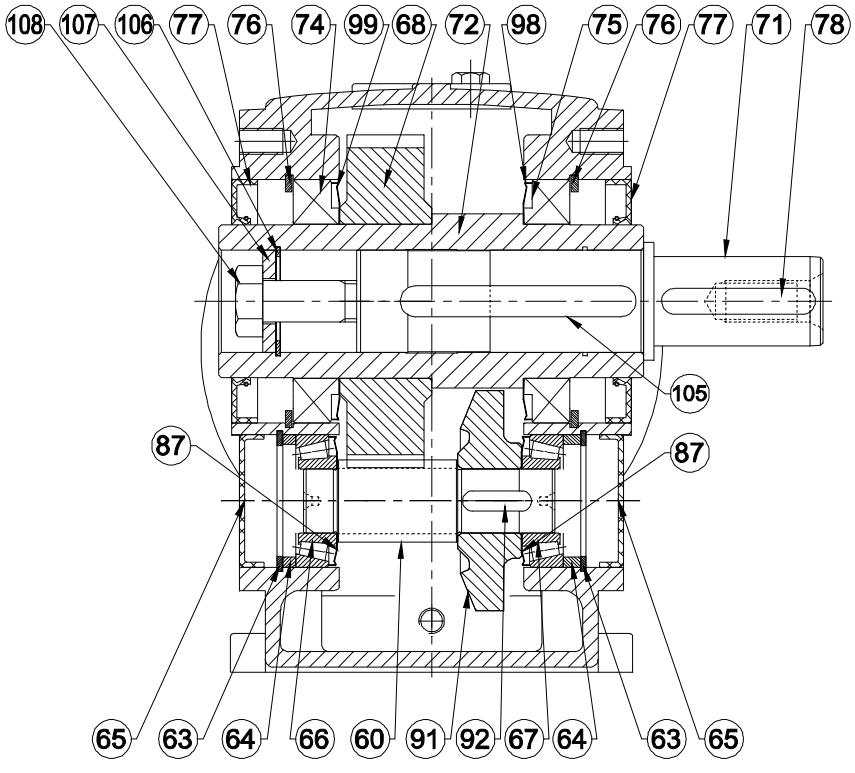
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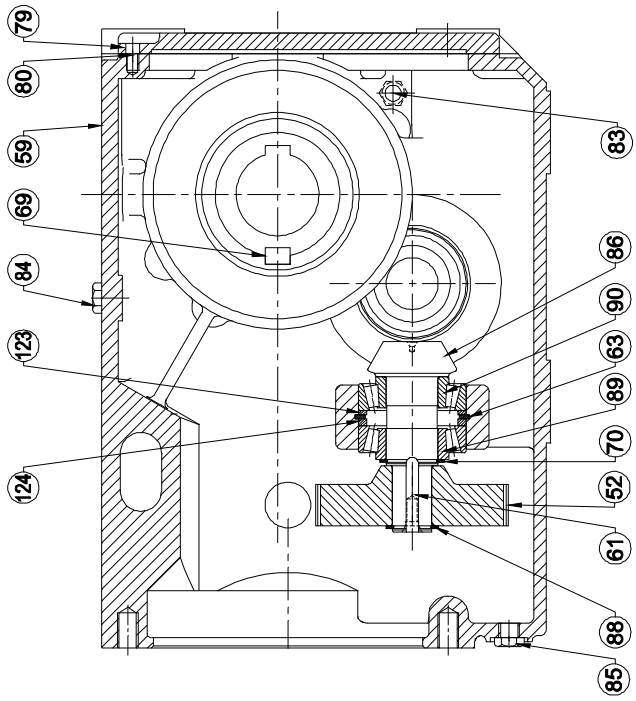
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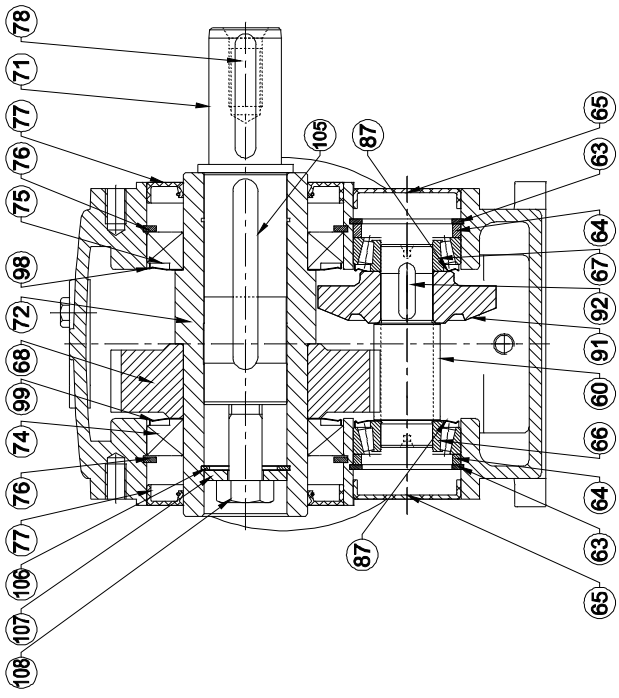
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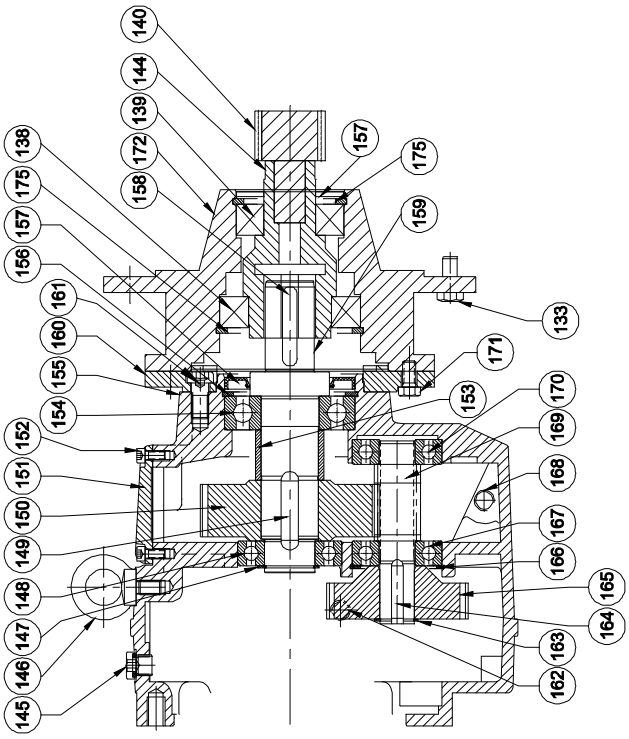
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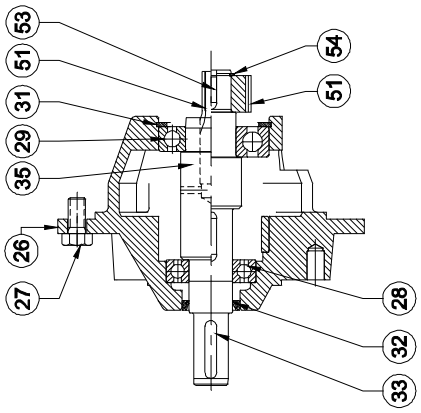
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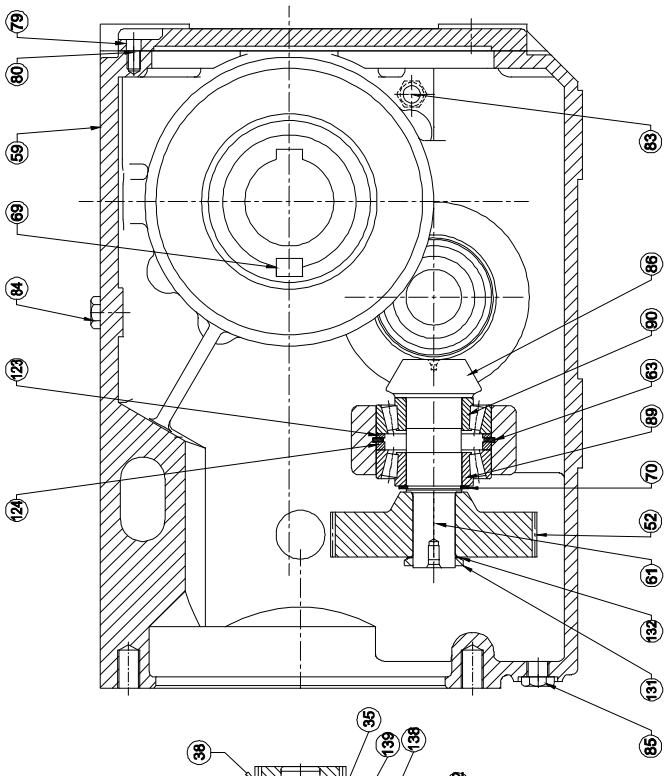
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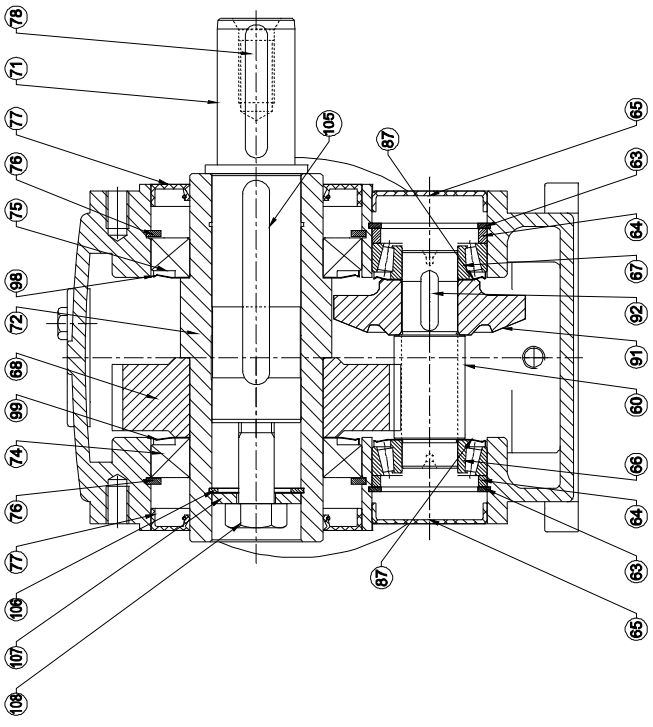
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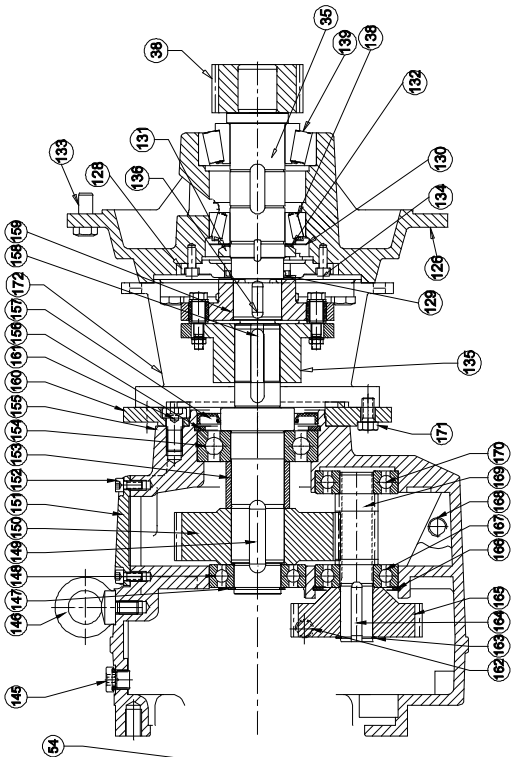
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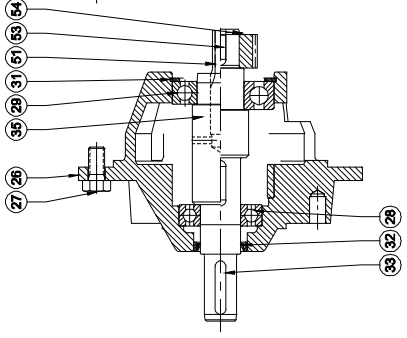
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1	Motor Adaptor	71	O/p Shaft (M,C,F,K)(Double Extended)	126	Motor Adaptor
2	Flange (Adaptor)	72	O/p Sleeve (C,F,K)	127	External Circlip
3	Fastener (Adaptor+Motor)	73	Distance Piece (O/p Shaft/Sleeve)	128	Oil Catcher
4	Fastener (Adaptor+Flange)	74	Bering 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 :

MARKETING & SERVICING FIRM

EMTICI MARKETING LLP

REGISTERED OFFICE :

Anand - Sojitra Road, Vallabh Vidyanagar - 388 120. Gujarat, INDIA.
Phones : +91 269 223 0168, +91 269 223 1125 Fax : +91 269 223 6508

: BRANCH OFFICES :

Ahmedabad:
Phone: +91 79 26406683
Email : infopbl@powerbuild.in

Bangalore:
Phone: +91 80 25251834,
+91 80 25250219
Email : infopbl@powerbuild.in

Chennai:
Phone: +91 44 24349237,
+91 44 24349497,
+91 44 24322455
Email : infopbl@powerbuild.in

Coimbatore:
Phone: +91 97277 19344
Email : infopbl@powerbuild.in

Indore:
Phone: +91 97277 19344
Email : infopbl@powerbuild.in

Jamshedpur:
Phone: +91 7631199950
Email : infopbl@powerbuild.in

Jaipur:
Phone: +91 97277 19344
Email : infopbl@powerbuild.in

Kolkata:
Phone: +91 33 24761861
+91 33 24761904
Email : infopbl@powerbuild.in

Mumbai:
Phone: +91 97277 19344
Email : infopbl@powerbuild.in

Nagpur:
Phone: +91 97277 19344
Email : infopbl@powerbuild.in

New Delhi:
Phone: +91 97277 19344
Email : infopbl@powerbuild.in

Pune:
Phone: +91 97277 19344
Email : infopbl@powerbuild.in

Raipur:
Phone: +91 97277 19344
Email : infopbl@powerbuild.in

Hyderabad:
Phone: +91 97277 19344
Email : infopbl@powerbuild.in

Vadodara:
Phone: +91 265 2313670
Email : infopbl@powerbuild.in

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