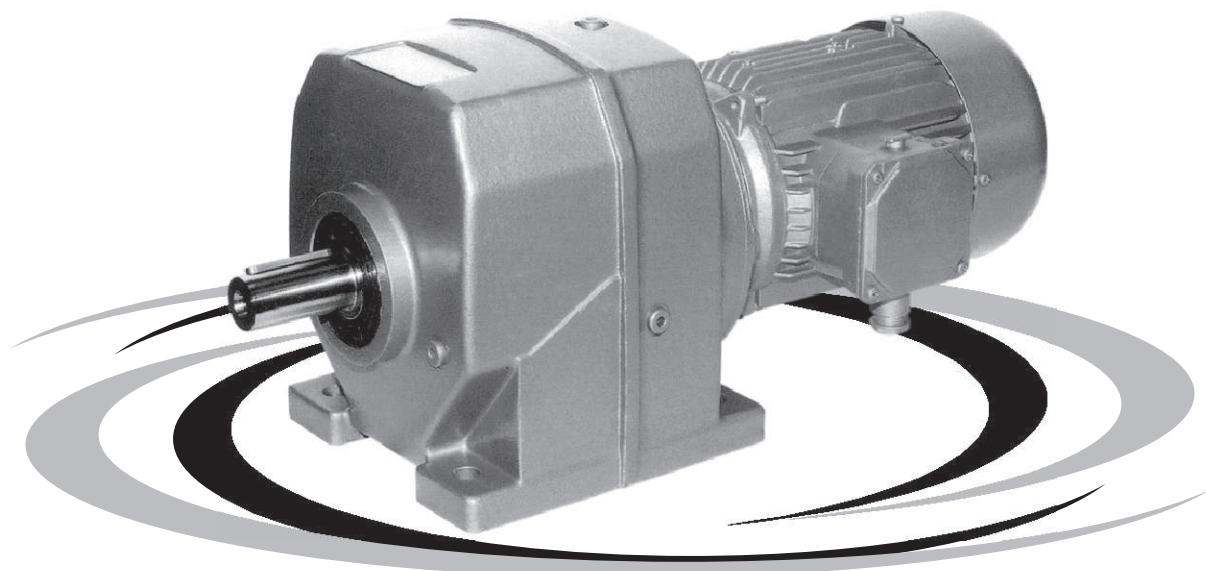


Series M

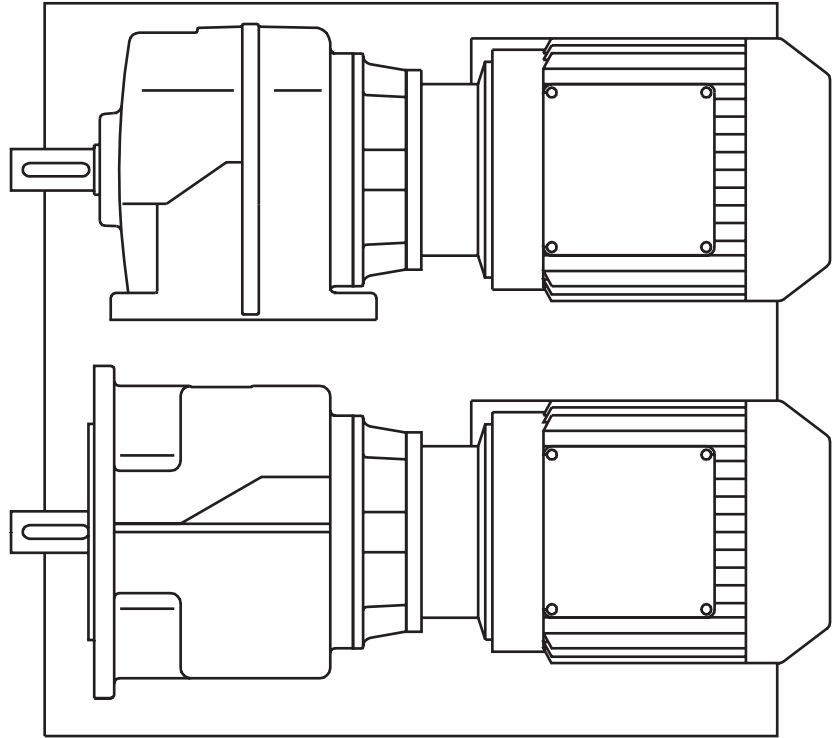


Installation & Maintenance Manual



POWER BUILD LIMITED

Engineering Excellence - a sure advantage



**INSTALLATION
&
MAINTENANCE
SERIES M**



POWER BUILD LIMITED



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 Limited 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 Limited 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. 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 Limited 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. The rotating components (gears and shafts) must be turned a few revolutions once a month (to prevent bearings brinelling).
 - (b) External gearbox components may be supplied with preservative 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 Limited 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, torques or with external loads beyond those for which it was designed.
 - (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.

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 Limited.



SECTION	DESCRIPTION	PAGE No
1	Unit Identification _____	1
2	General Information _____	2
3	Fitting of Components to Shafts _____	2
4	Weather Protection of Unit _____	2
5	Installation	
5.1	Motorised and Reducers _____	3
5.2	Gearheads _____	3
5.3	Fixing to Customer Equipment _____	3
5.4	Motor Connections _____	3
5.5	Foot Mounted Units _____	4
5.6	Replacement of Oil Seals _____	4
6	Lubrication and Maintenance	
6.1	Lubrication _____	5
6.2	Periodic Inspection _____	5
6.3	Lubricant Changes _____	5
6.4	Lubricant Quantity _____	6
6.5	Approved Lubricants _____	6
6.6	Approved Greases _____	6
6.7	Cleaning _____	6
7	Noise _____	6
APPENDIX		
1	Assembly of Motor and Motor Adaptor to the Gearhead _____	7
2	Lubricant Quantity _____	8
	Approved Lubricants _____	8
	Mounting Positions _____	9
3	Three Phase Induction Motor Installation _____	10
4	Approved Bearing Greases _____	11
5	Connection with the Driven Machine _____	12 - 13
PART LIST	M 03 to M 14	14 - 25



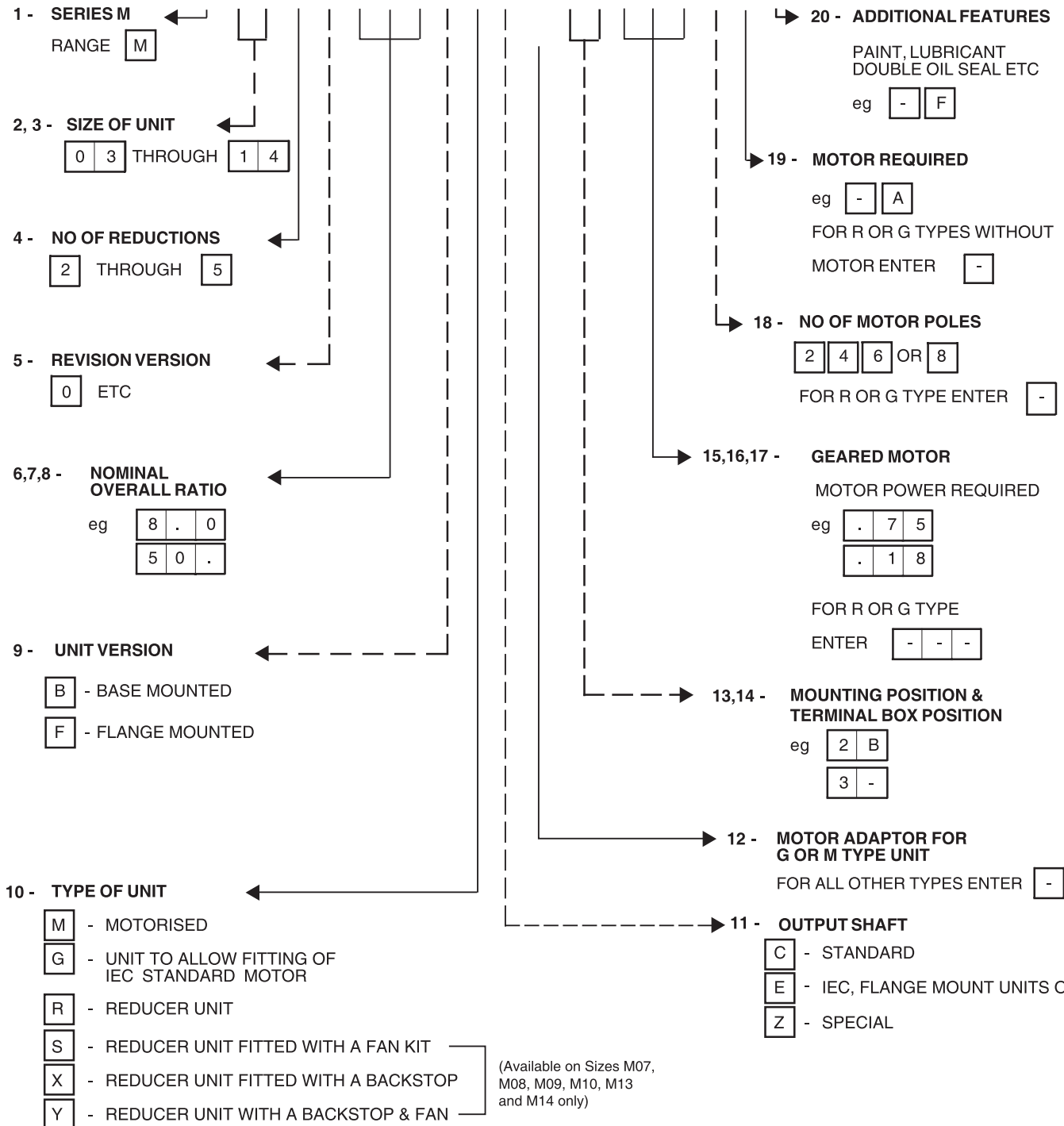
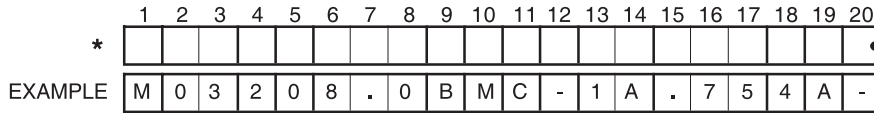
1 UNIT IDENTIFICATION

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

- Unit Type
- Sr. Number

		POWER BUILD LIMITED	
		VALLABH VIDYANAGAR-388120 GUJARAT-INDIA	
UNIT TYPE			
Sr. No.		OIL GRADE	
INPUT KW		ASSEMBLY POSITION	
RATIO		OUTPUT RPM	

* See Appendix 2





2 GENERAL INFORMATION

The following instructions will help you achieve a satisfactory installation of your Power Build Ltd. Series M 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 ≤ 50mm) and m6 (for shaft diameter > 50mm) and the fitted components should be to ISO tolerance M7 (for bore diameter ≤ 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
M0320 / M0330	M5 x 12.5 mm deep	M6 x 16 mm deep
M0420 / M0430	M5 x 12.5 mm deep	M10 x 22 mm deep
M0620	M6 x 16 mm deep	M10 x 22 mm deep
M0630	M5 x 12.5 mm deep	
M0720	M8 x 19 mm deep	M16 x 36 mm deep
M0730	M6 x 16 mm deep	
M0820	M10 x 22 mm deep	M16 x 36 mm deep
M0830	M8 x 19 mm deep	
M0920	M12 x 28 mm deep	M20 x 42 mm deep
M0930	M10 x 22 mm deep	
M1020	M16 x 36 mm deep	M20 x 42 mm deep
M1030	M12 x 28 mm deep	
M1320 / M1330	M20 x 42 mm deep	M24 x 50 mm deep
M1420 / M1430	M20 x 42 mm deep	M24 x 50 mm deep

4 WEATHER PROTECTION OF UNIT

All Series M 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, 06 & 07)

Motorised and Reducer types of sizes 03, 04, 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 Appendix 2 of this document for the revised quantities
- See Appendix 1 for the methodology for doing this.

MOTORISED AND REDUCERS (SIZES 08, 09, 10, 13 & 14)

Motorised and Reducer types of sizes 08, 09, 10, 13 & 14 are shipped less oil, for the customer to fill on site once installed. The different mounting positions are indicated in Appendix 2 with the appropriate oil fill quantities. The units have several oil fill and drain plugs to cater for all mounting positions. A list of approved lubricants is supplied in Appendix 2.

5.2 GEAR HEADS (ALL SIZES SERIES M)

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 M03, 04, 06 & 07 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 or feet to the customer equipment use set screws to ISO grade 8.8 minimum.

Torque tighten to:-

Set Screw Size	Tightening Torque
M8	25 Nm
M10	50 Nm
M12	85 Nm
M16	200 Nm
M20	350 Nm
M24	610 Nm
M30	1220 Nm
M36	2150 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 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 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 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 holdback device is fitted.
- h) 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 (see Appendix 4).
- 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 Appendix 2.



6 LUBRICATION AND MAINTENANCE

6.1 LUBRICATION

- Unit sizes M03, 04, 06 and 07 are factory filled with Mineral oil.
- Unit sizes M08, 09, 10, 13 and 14 will be oil filled by client. (See Appendix 2)

6.2 PERIODIC INSPECTION

Check oil level every 3000 hours or 6 months whichever is sooner on sizes M06, 07, 08, 09, 10, 13 and 14 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	
	MINERAL OIL	SYNTHETIC OIL
75 OR LESS	18000 HOURS OR 3 YEARS	26000 HOURS OR 3 YEARS
80	12500 HOURS OR 3 YEARS	26000 HOURS OR 3 YEARS
85	9000 HOURS OR 3 YEARS	22000 HOURS OR 3 YEARS
90	6000 HOURS OR 2 YEARS	15000 HOURS OR 3 YEARS
95	4500 HOURS OR 17 MONTHS	10500 HOURS OR 3 YEARS
100	3000 HOURS OR 12 MONTHS	7500 HOURS OR 2 1/2 YEARS
105	2200 HOURS OR 8 MONTHS	6000 HOURS OR 2 YEARS
110	1500 HOURS OR 6 MONTHS	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 Table 1, Appendix 2. A diagram showing mounting position designations is also included in Appendix 2.

6.5 APPROVED LUBRICANTS

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

6.6 APPROVED GREASES

Appendix 5 gives the 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 M 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).

Any further information or clarification required may be obtained by contacting:-

Power Build Limited
P.B.No. 28
Anand-Sojitra Road ,
Vallbha Vidyanagar - 388 120.
Dist. Anand

**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.

		M0320/0420 M0330/M0430/M0630		M0620/0730		M0720/M0830	
MOTOR FLANGE	MOTOR FRAME	C (B14)	D (B5)	C (B14)	D (B5)	C (B14)	D (B5)
63		N/A	A		G		
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				G	G	M	G
160							G

	M0820/M0930	M0920/M1030	M1020	M1320/M1330	M1420/M1430
ALL MOTOR FRAME SIZES	G	G	G	G	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

- 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 thread sealant.

SET SCREW TORQUES:-

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



The standard lubricant is suitable for operation in ambient temperatures of 0° to 35°C, outside of this please consult Table 2 or Power Build Limited.

TABLE 1 LUBRICANT QUANTITY (Litres) Oil quantities are approximate, fill gearbox until oil escapes from level plug hole

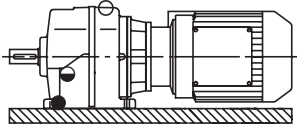
DOUBLE AND TRIPLE REDUCTION AND FINAL STAGE QUADRUPLE AND QUINTUPLE REDUCTION																			
Unit Size	M0320	M0330	M0420	M0430	M0620	M0630	M0720	M0730	M0820	M0830	M0920	M0930	M1020	M1030	M1320	M1330	M1420	M1430	
MOUNTING POSITION	1	0.6	0.8	0.6	0.9	1.7	1.8	2.8	3.0	4.6	6.4	10.5	11.5	11.0	11.0	17.0	17.0	24.0	24.0
	2	0.6	0.8	0.6	0.9	2.1	2.4	4.0	4.9	6.8	7.1	12.0	11.5	22.0	23.0	31.0	33.0	49.0	50.0
	3	0.8	1.0	1.1	1.3	2.4	2.8	4.4	5.4	7.3	6.9	12.0	11.5	22.0	23.0	31.0	33.0	49.0	50.0
	4	0.8	1.0	1.1	1.3	2.7	3.4	5.4	7.0	6.4	6.9	12.0	11.5	19.0	20.0	28.0	30.0	41.0	43.0
	5	0.8	1.7	1.4	2.1	3.5	4.8	5.2	9.0	10.0	8.0	16.8	16.8	32.0	32.0	47.0	47.0	72.0	72.0
	6	1.0	1.5	1.6	2.1	3.2	4.8	6.0	9.0	9.6	9.3	16.4	16.5	26.0	27.0	38.0	40.0	65.0	67.0
	7	0.6	0.8	0.6	0.9	1.7	2.2	3.3	3.4	2.6	2.4	5.5	6.0	8.0	8.0	14.0	14.0	20.0	20.0
	8	0.8	1.7	1.4	2.1	3.1	5.0	6.3	10.0	9.5	9.0	16.0	16.0	22.0	22.0	45.0	45.0	65.0	65.0
	9	1.0	1.5	1.6	2.1	3.6	5.0	6.8	9.0	10.5	10.0	17.0	19.0	28.0	29.0	43.0	44.0	65.0	67.0
PRIMARY STAGE QUADRUPLE AND QUINTUPLE REDUCTION (Quantities obtained from above double and triple for sizes indicated)																			
Unit Size		M0640	M0650	M0740	M0750	M0840	M0850	M0940	M0950	M1040	M1050	M1340	M1350	M1440	M1450				
PRIMARY UNIT		M0420	M0430	M0420	M0430	M0620	M0620	M0620	M0620	M0720	M0720	M0820	M0720	M0820	M0720				
SECONDARY UNIT		M0620	M0620	M0720	M0720	M0820	M0830	M0920	M0930	M1020	M1030	M1320	M1330	M1420	M1430				

TABLE 2 RECOMMENDED LUBRICANTS

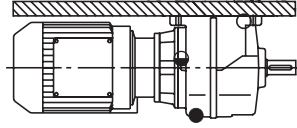
LUBRICANT SUPPLIER	LUBRICANT RANGE NAME	NUMBERS IN BRACKETS INDICATES RECOMMENDED MINIMUM OPERATING TEMPERATURE °C.		
		ISO VISCOSITY / GRADE NO.		
Type E - Mineral oils containing industrial EP additives		220 / 5E	320 / 6E	460 / 7E
		AMBIENT TEMPERATURE RANGE °C		
		-5 to 20	0 to 35	20 to 50
Batoyle Freedom Group	Remus	220 (-2)	320 (-2)	460 (-2)
Boxer Services incorporated with Millers Oils Limited	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 Ltd	Gear Compound EP (USA version)	220 (-16)	320 (-13)	460 (-10)
	Gear Compound 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	Spartan EP	220 (-16)	320 (-13)	460 (-7)
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	632 (-13)	632 (-13)	634 (-1)
	Mobil gear XMP	220 (-19)	320 (-13)	460 (-7)
Omega Manufacturing Division	Omega 690		85w/140 (-15)	
Optimol 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 (-4)
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 Lubricating Oil Co.	Gear Lube EP	EP220 (-1)	EP230 (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 (-7)	320 (-7)	460 (-4)
	Carter VP/CS	220 (-16)	320 (-13)	460 (-7)
Tribol GmbH	Molub-Alloy Gear Oil	90 (-18)	690 (-16)	140 (-13)
	Tribol 1100	220 (-20)	320 (-18)	460 (-16)
Type H - Polyalphaolefin base synthetic lubricants with EP additives		ISO VISCOSITY / GRADE NO.		
		220 / 5H	320 / 6H	460 / 7H
		AMBIENT TEMPERATURE RANGE °C		
		-30 to 20	0 to 35	20 to 50
Batoyle Freedom Group	Tifan	220 (-31)	320 (-28)	
Boxer Services incorporated with Millers Oils Limited	Silkgear	220 (-35)	320 (-35)	460 (-35)
BP Oil International Limited	Energyn 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 Oil Company Ltd	Tegra	220 (-46)	320 (-33)	460 (-31)
Esso/Exxon	Spartan Synthetic EP	220 (-46)	320 (-43)	460 (-40)
Fuchs Lubricants (UK) Plc	Renogear SG	220 (-32)	320 (-30)	
	Renolin Unisyn CLP	220 (-37)	320 (-34)	460 (-28)
Klüber Lubrication	Klüberbersynth GEM 4	220 (-35)	320 (-35)	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)



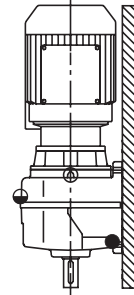
MOUNTING 1 B3



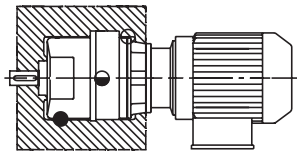
MOUNTING 4 B8



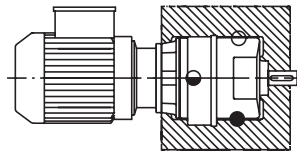
MOUNTING 5 V5



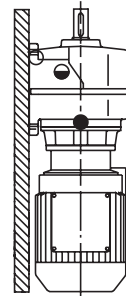
MOUNTING 3 B6



MOUNTING 2 B7

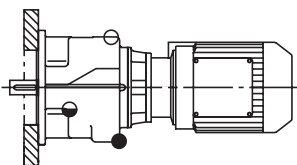


MOUNTING 6 V6

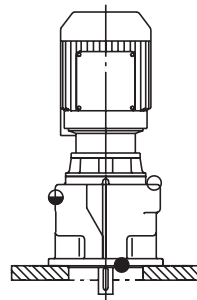


MOTOR MUST BE FITTED WITH SEAL FOR THIS POSITION

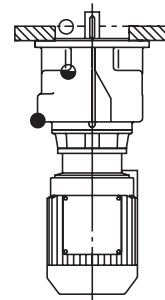
MOUNTING 7 B5



MOUNTING 8 V1



MOUNTING 9 V3



MOTOR MUST BE FITTED WITH SEAL FOR THIS POSITION

PLUG POSITIONS APPLY FOR SIZES M06 AND LARGER

- DRAIN POSITION
- LEVEL POSITION
- VENTILATOR/FILLING POSITION

MOUNTING POSITIONS - SHOWN AS MOTORISED - APPLIES ALSO FOR REDUCERS

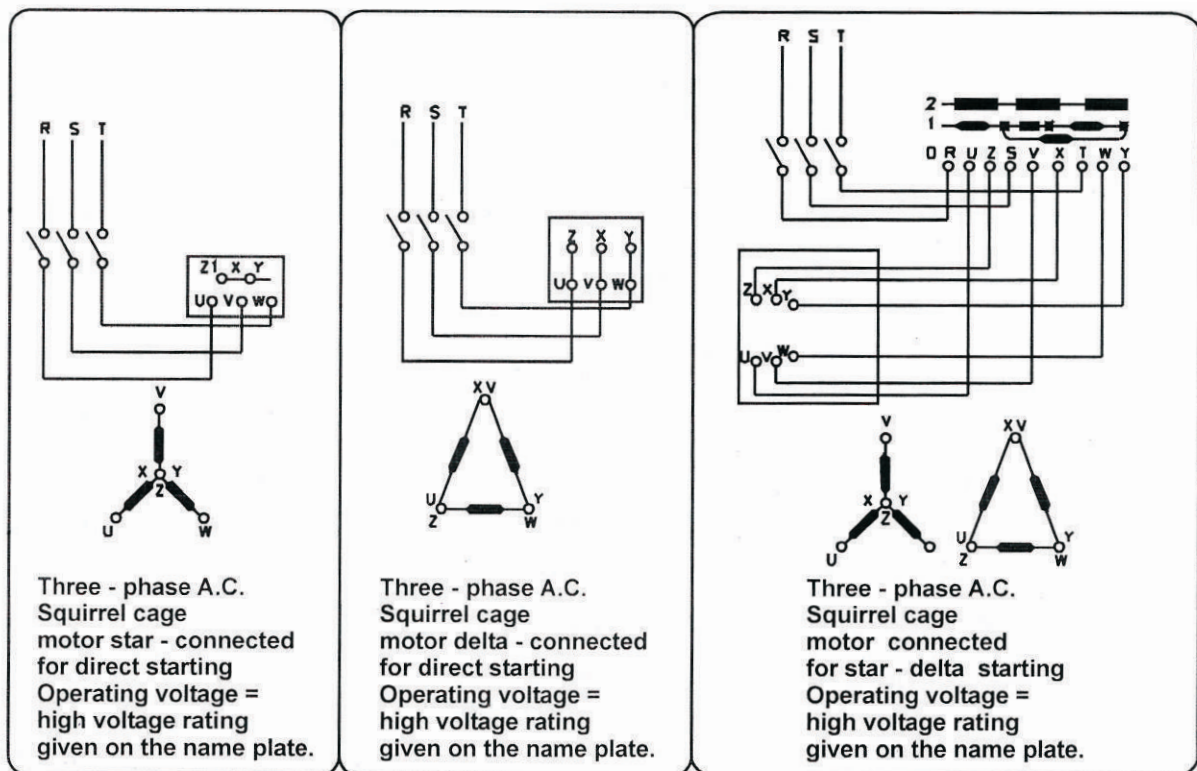
Connetion to Power System

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 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:

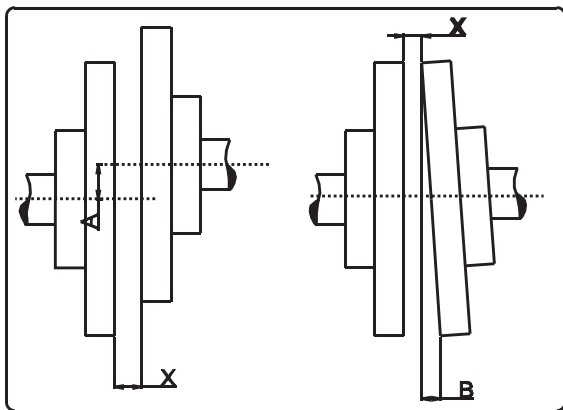
- 1) All the above greases are NLGI grade 2.
- 2) Refer to Power Build Ltd. Application Engineers if the unit is operating in an ambient temperature outside the range of -30°C to 50°C.

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.)

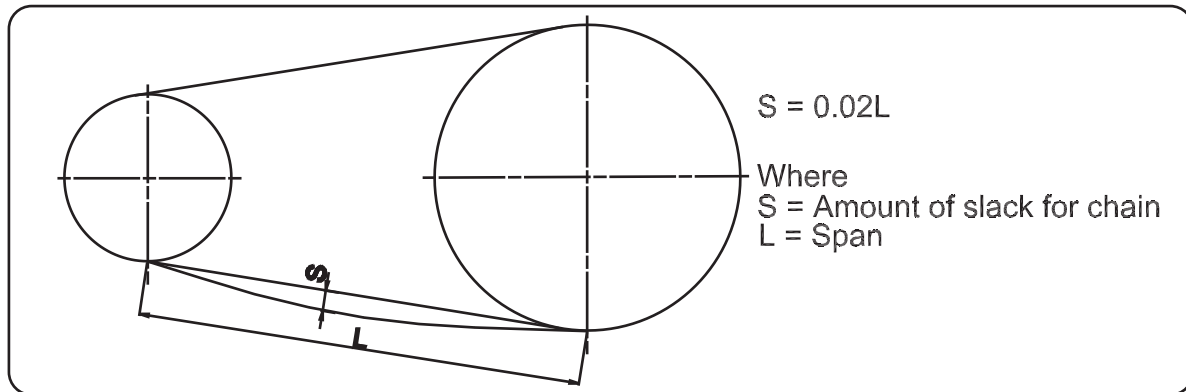


Fig. 2

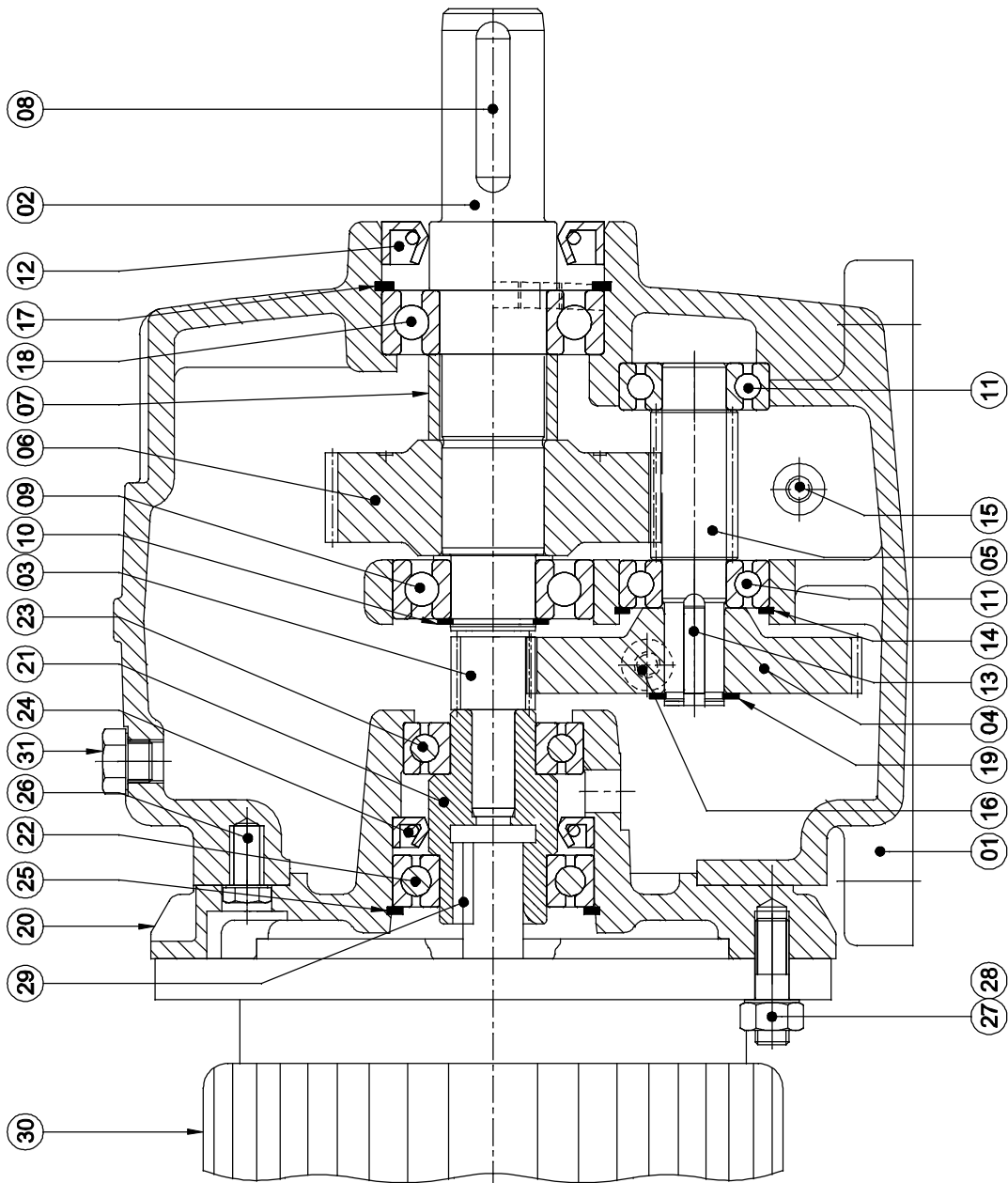
(c) Layout of chain driving:

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

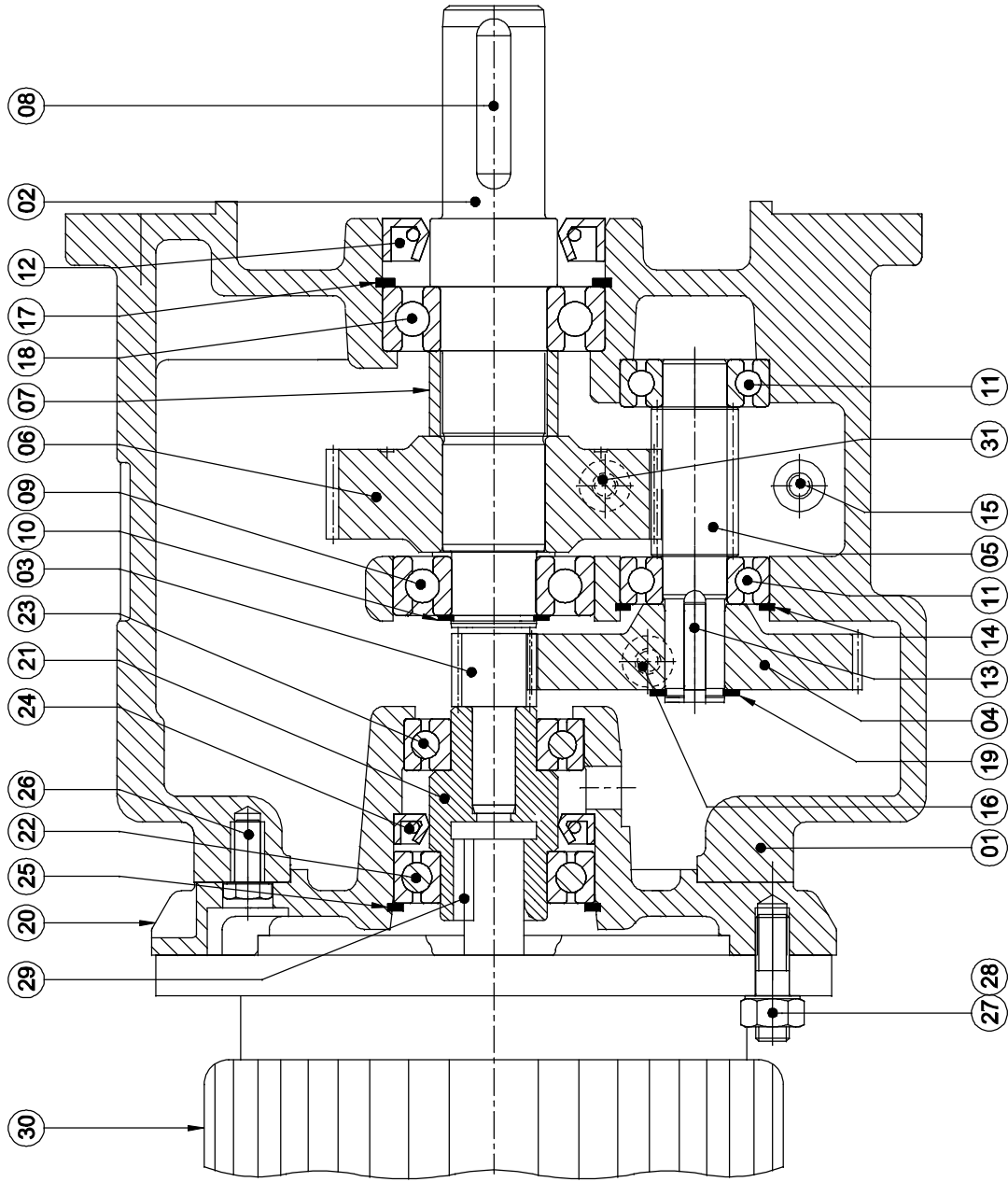
Dimension of the shaft end keyway is in accordance with DIN 6885.



SR. NO.	DESCRIPTION
1	GEAR CASE
2	OUTPUT SHAFT
3	PRIMARY PINION
4	PRIMARY WHEEL
5	FINAL PINION
6	FINAL WHEEL
7	DISTANCE PIECE
8	KEY
9	BALL BEARING
10	EXTERNAL CIRCLIP
11	BALL BEARING
12	OIL SEAL
13	KEY
14	INTERNAL CIRCLIP
15	DRAIN PLUG
16	OIL LEVEL INDICATOR
17	INTERNAL CIRCLIP
18	BALL BEARING
19	EXTERNAL CIRCLIP
20	MOTOR ADAPTOR
21	PLUG IN SHAFT
22	BALL BEARING
23	BALL BEARING
24	OIL SEAL
25	INTERNAL CIRCLIP
26	HEX. HEAD SET SCREW
27	STUD
28	NUT
29	KEY
30	ELECTRIC MOTOR
31	BREATHER PLUG

SR. NO. 15,16,31
 NOT AVAILABLE FOR M03, M04

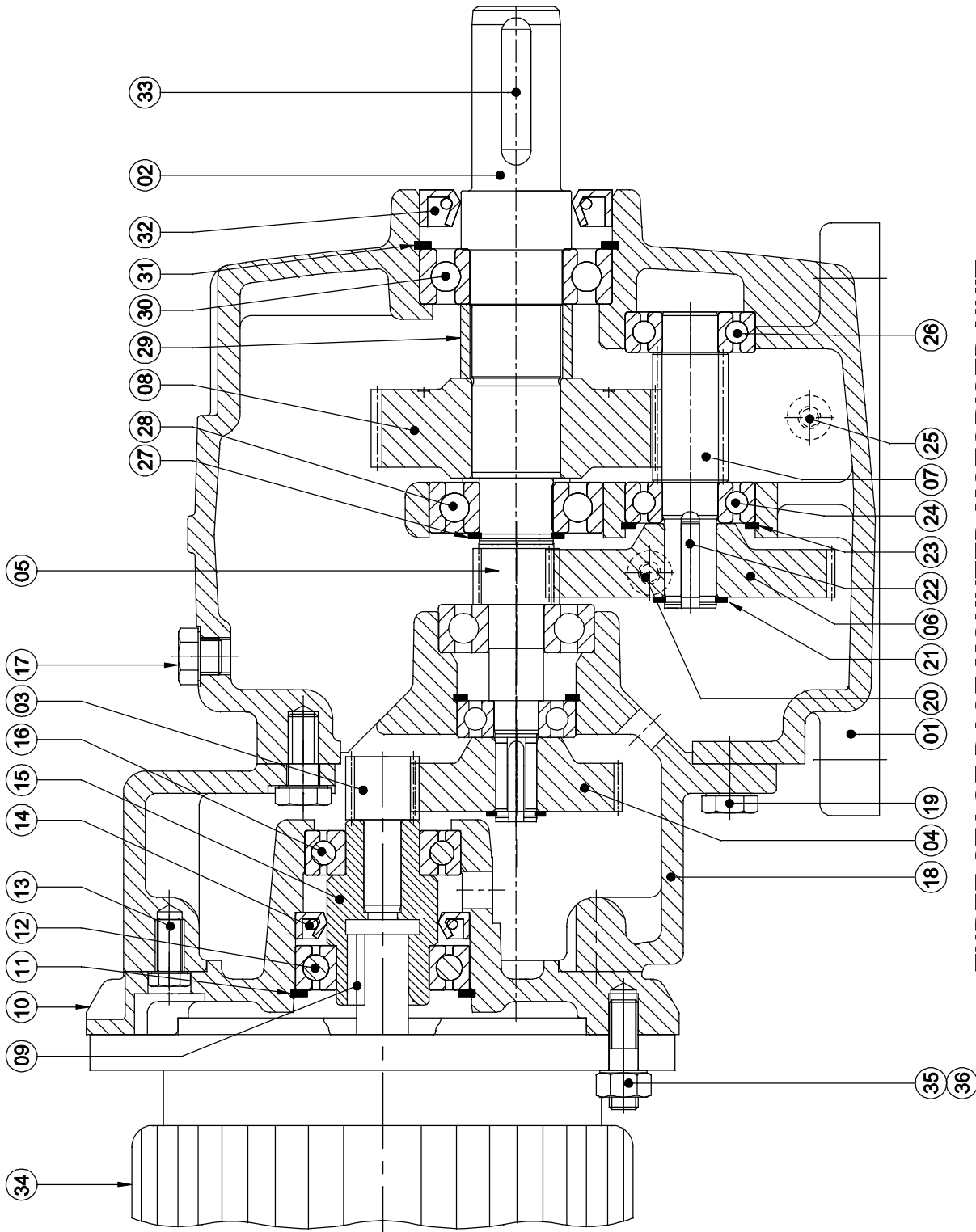
TWO STAGE BASE MOUNTED MOTORIZED UNIT
SIZE : M03,M04,M06,M07



SR. NO.	DESCRIPTION
1	GEAR CASE
2	OUTPUT SHAFT
3	PRIMARY PINION
4	PRIMARY WHEEL
5	FINAL PINION
6	FINAL WHEEL
7	DISTANCE PIECE
8	KEY
9	BALL BEARING
10	EXTERNAL CIRCLIP
11	BALL BEARING
12	OIL SEAL
13	KEY
14	INTERNAL CIRCLIP
15	DRAIN PLUG
16	OIL LEVEL INDICATOR
17	INTERNAL CIRCLIP
18	BALL BEARING
19	EXTERNAL CIRCLIP
20	MOTOR ADAPTOR
21	PLUG IN SHAFT
22	BALL BEARING
23	BALL BEARING
24	OIL SEAL
25	INTERNAL CIRCLIP
26	HEX. HEAD SET SCREW
27	STUD
28	NUT
29	KEY
30	ELECTRIC MOTOR
31	BREATHER PLUG

SR. NO. 15,16,31
NOT AVAILABLE FOR M03, M04

TWO STAGE FLANGE MOUNTED MOTORIZED UNIT
SIZE : M03,M04,M06,M07

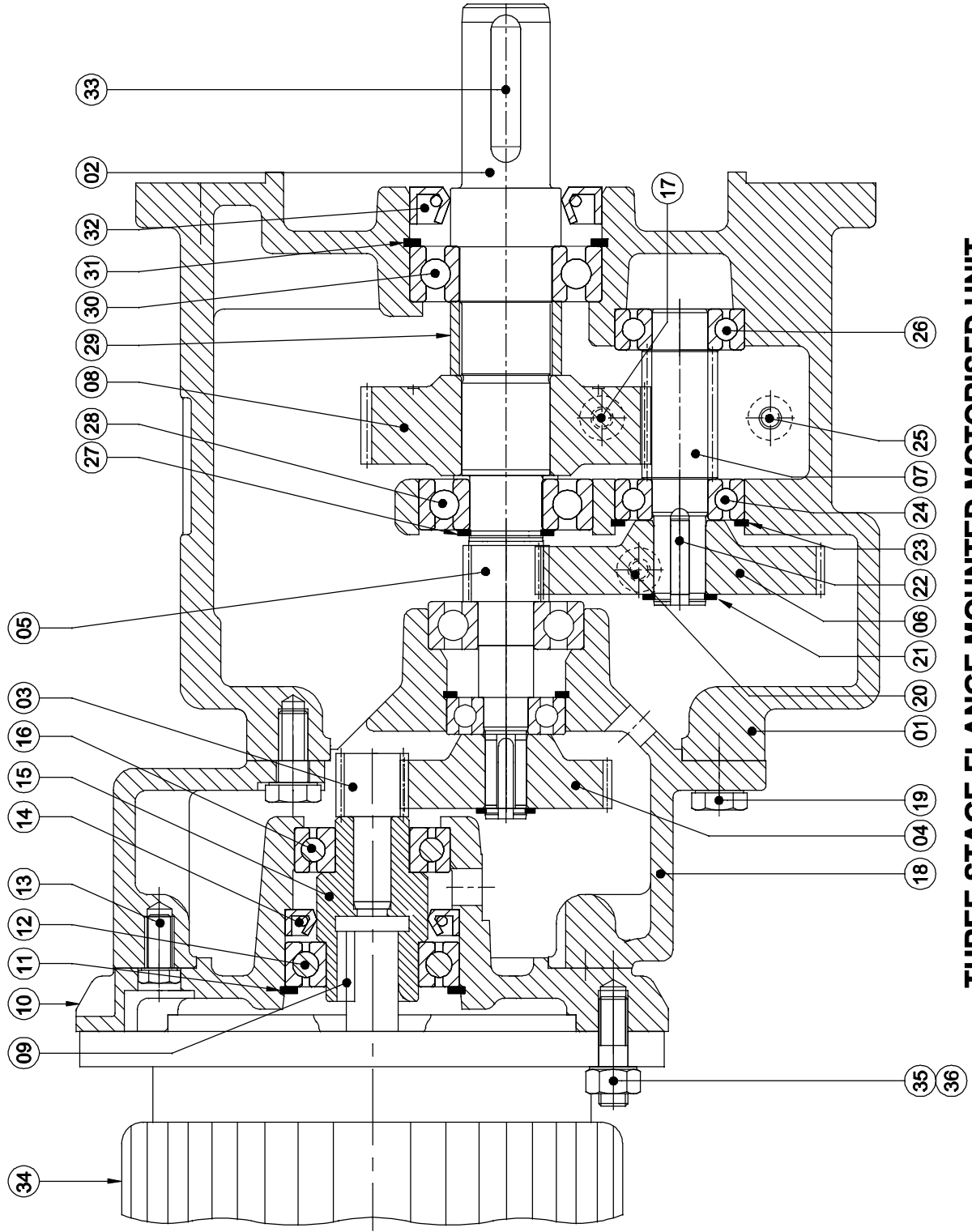


SR. NO.	DESCRIPTION
1	GEAR CASE
2	OUTPUT SHAFT
3	PRIMARY PINION
4	PRIMARY WHEEL
5	SECOND REDUCTION PINION
6	SECOND REDUCTION WHEEL
7	FINAL PINION
8	FINAL WHEEL
9	KEY
10	MOTOR ADAPTOR
11	INTERNAL CIRCLIP
12	BALL BEARING
13	HEX HEAD SET SCREW
14	OIL SEAL
15	PLUG IN SHAFT
16	BALL BEARING
17	BREATHER PLUG
18	TRIPAL HOUSING
19	HEX HEAD SET SCREW
20	OIL LEVEL INDICATOR
21	EXTERNAL CIRCLIP
22	KEY
23	INTERNAL CIRCLIP
24	BALL BEARING
25	DRAIN PLUG
26	BALL BEARING
27	EXTERNAL CIRCLIP
28	BALL BEARING
29	DISTANCE PIECE
30	BALL BEARING
31	INTERNAL CIRCLIP
32	OIL SEAL
33	KEY
34	ELECTRIC MOTOR
35	STUD
36	NUT

SR. NO. 17,20,25
NOT AVAILABLE FOR M03, M04

THREE STAGE BASE MOUNTED MOTORISED UNIT
SIZE : M03,M04,M06,M07

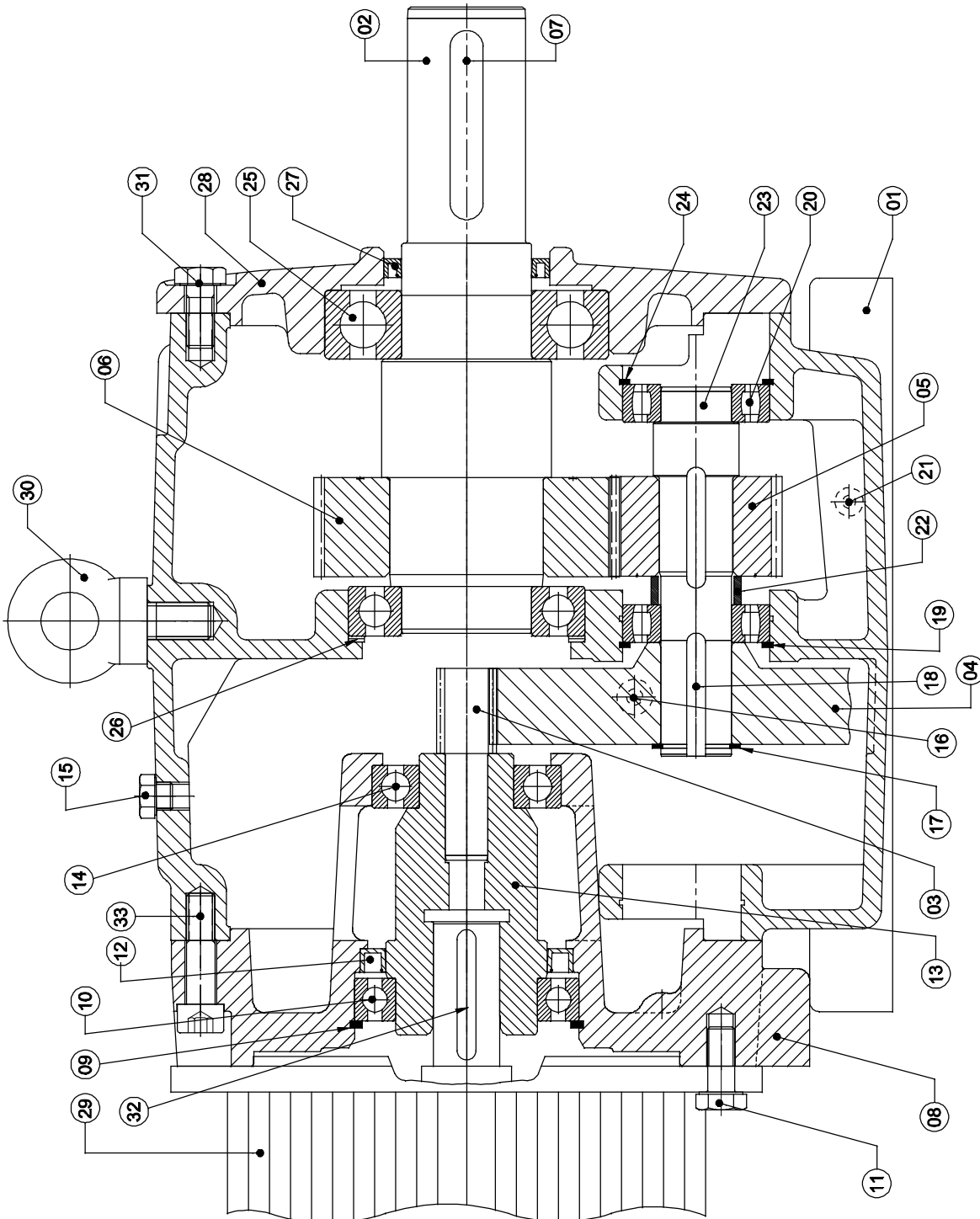
SR. NO.	DESCRIPTION
1	GEAR CASE
2	OUTPUT SHAFT
3	PRIMARY PINION
4	PRIMARY WHEEL
5	SECOND REDUCTION PINION
6	SECOND REDUCTION WHEEL
7	FINAL PINION
8	FINAL WHEEL
9	KEY
10	MOTOR ADAPTOR
11	INTERNAL CIRCLIP
12	BALL BEARING
13	HEX. HEAD SET SCREW
14	OIL SEAL
15	PLUG IN SHAFT
16	BALL BEARING
17	BREATHER PLUG
18	TRIPAL HOUSING
19	HEX. HEAD SET SCREW
20	OIL LEVEL INDICATOR
21	EXTERNAL CIRCLIP
22	KEY
23	INTERNAL CIRCLIP
24	BALL BEARING
25	DRAIN PLUG
26	BALL BEARING
27	EXTERNAL CIRCLIP
28	BALL BEARING
29	DISTANCE PIECE
30	BALL BEARING
31	INTERNAL CIRCLIP
32	OIL SEAL
33	KEY
34	ELECTRIC MOTOR
35	STUD
36	NUT



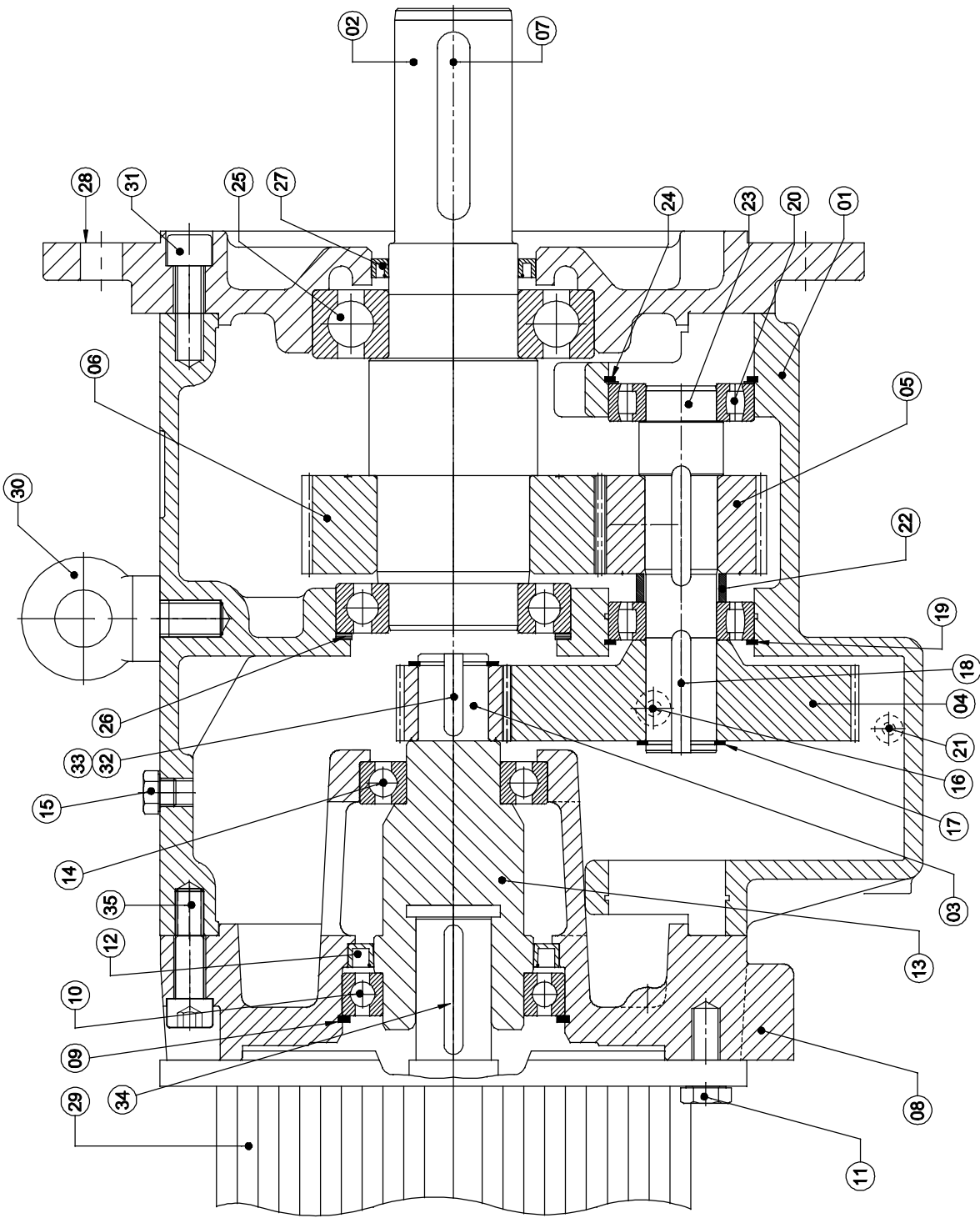
SR. NO. 17,20,25
NOT AVAILABLE FOR M03, M04

THREE STAGE FLANGE MOUNTED MOTORIZED UNIT
SIZE : M03,M04,M06,M07

SR. NO.	DESCRIPTION
1	GEAR CASE
2	OUTPUT SHAFT
3	PRIMARY PINION
4	PRIMARY WHEEL
5	FINAL PINION
6	FINAL WHEEL
7	KEY
8	MOTOR ADAPTOR
9	INTERNAL CIRCLIP
10	BALL BEARING
11	HEX. HEAD SET SCREW
12	OIL SEAL
13	PLUG IN SHAFT
14	BALL BEARING
15	BREATHER PLUG
16	OIL LEVEL INDICATOR
17	EXTERNAL CIRCLIP
18	KEY
19	INTERNAL CIRCLIP
20	ROLLER BEARING
21	DRAIN PLUG </td
22	DISTANCE PIECE
23	FINAL PINION SHAFT
24	INTERNAL CIRCLIP
25	BALL BEARING
26	SHIM
27	OIL SEAL
28	BEARING HOUSING
29	ELECTRIC MOTOR
30	EYE BOLT
31	HEX. HEAD SET SCREW
32	KEY
33	CAP SCREW



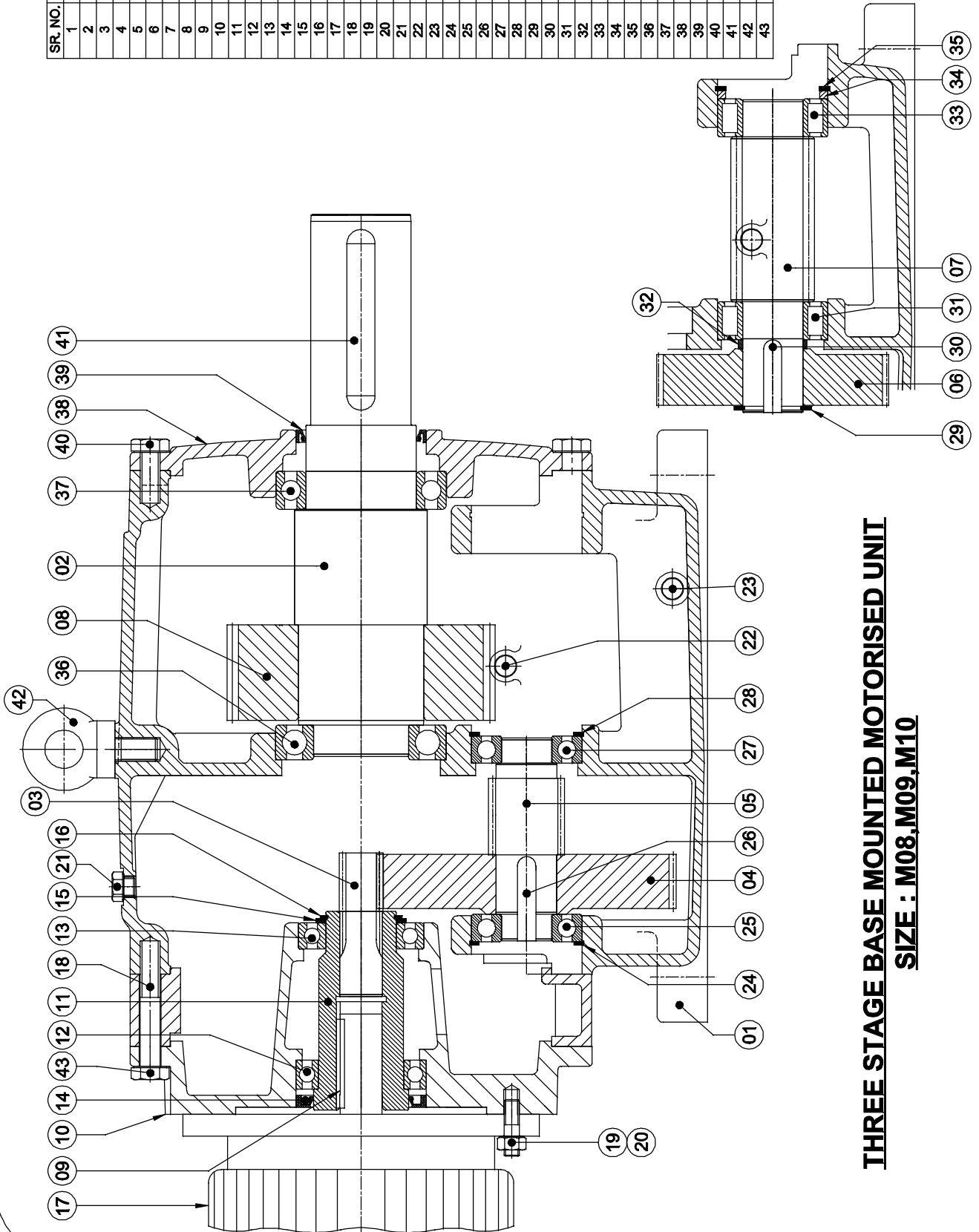
TWO STAGE BASE MOUNTED MOTORIZED UNIT
SIZE : M08,M09,M010



SR. NO.	DESCRIPTION
1	GEAR CASE
2	OUTPUT SHAFT
3	PRIMARY PINION
4	PRIMARY WHEEL
5	FINAL PINION
6	FINAL WHEEL
7	KEY
8	MOTOR ADAPTOR
9	INTERNAL CIRCLIP
10	BALL BEARING
11	HEX. HEAD SET SCREW
12	OIL SEAL
13	PLUG IN SHAFT
14	BALL BEARING
15	BREATHER PLUG
16	OIL LEVEL INDICATOR
17	EXTERNAL CIRCLIP
18	KEY
19	INTERNAL CIRCLIP
20	ROLLER BEARING
21	DRAIN PLUG
22	DISTANCE PIECE
23	FINAL PINION SHAFT
24	INTERNAL CIRCLIP
25	BALL BEARING
26	SHIM
27	OIL SEAL
28	BEARING HOUSING
29	ELECTRIC MOTOR
30	EYE BOLT
31	CAP SCREW
32	KEY
33	EXTERNAL CIRCLIP
34	KEY
35	CAP SCREW

TWO STAGE FLANGE MOUNTED MOTORISED UNIT
SIZE : M08.M09.M010

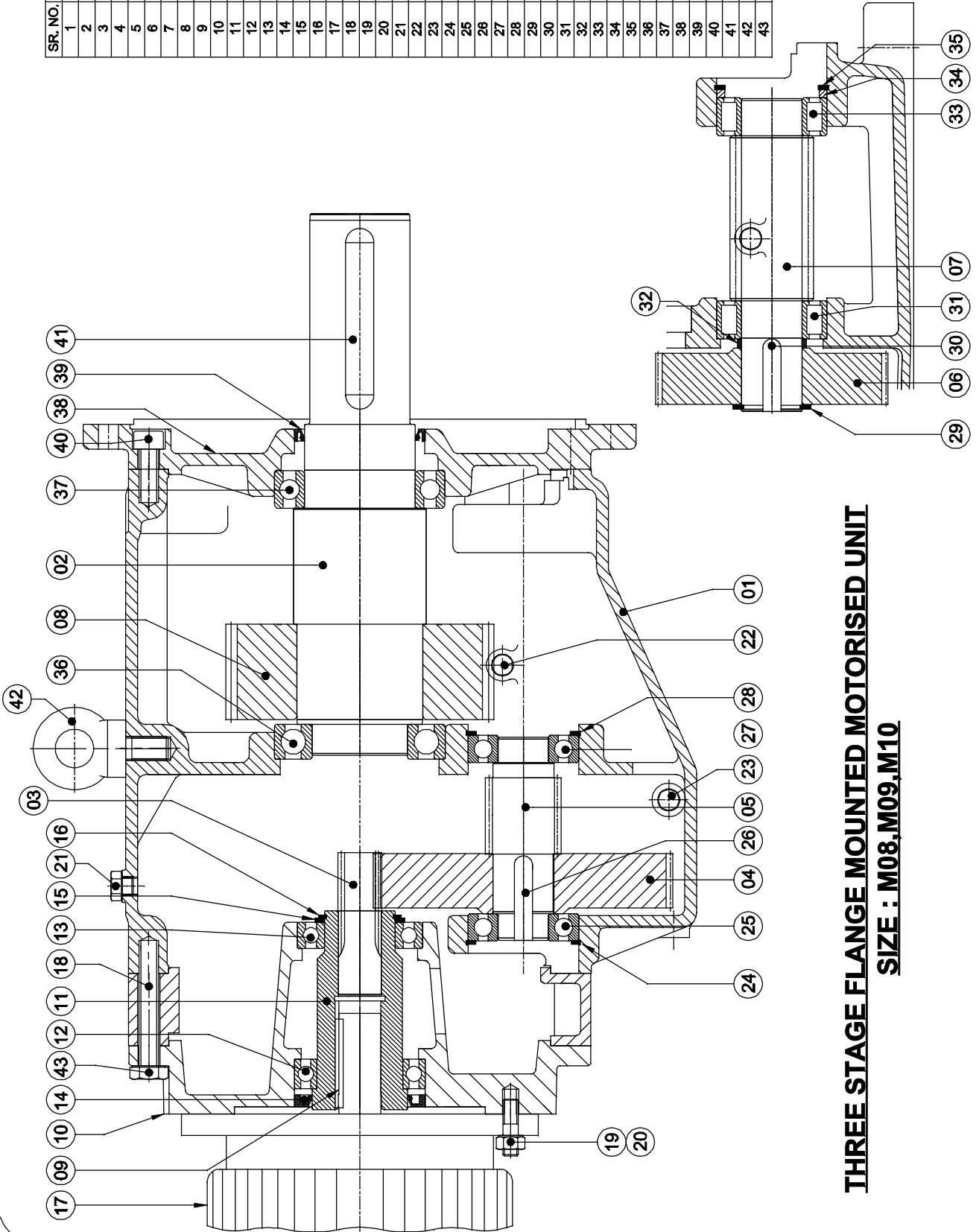
SR. NO.	DESCRIPTION
1	GEAR CASE
2	OUTPUT SHAFT
3	PRIMARY PINION
4	PRIMARY WHEEL
5	SECOND REDUCTION PINION
6	SECOND REDUCTION WHEEL
7	FINAL PINION
8	FINAL WHEEL
9	KEY
10	MOTOR ADAPTOR
11	PLUG IN SHAFT
12	BALL BEARING
13	BALL BEARING
14	OIL SEAL
15	SHIM
16	EXTERNAL CIRCLIP
17	ELECTRIC MOTOR
18	HEX. HEAD. SET SCREW
19	STUD
20	NUT
21	BREATHER PLUG
22	OIL LEVEL INDICATOR
23	DRAIN PLUG
24	EXTERNAL CIRCLIP
25	BALL BEARING
26	KEY
27	BALL BEARING
28	INTERNAL CIRCLIP
29	EXTERNAL CIRCLIP
30	KEY
31	ROLLER BEARING
32	DISTANCE PIECE
33	ROLLER BEARING
34	SUPPORT WASHER
35	INTERNAL CIRCLIP
36	BALL BEARING
37	BALL BEARING
38	BEARING HOUSING
39	OIL SEAL
40	HEX. HEAD. SET SCREW
41	KEY
42	EYE BOLT
43	HEX. HEAD. SET SCREW



THREE STAGE BASE MOUNTED MOTORISED UNIT

SIZE : M08, M09, M10

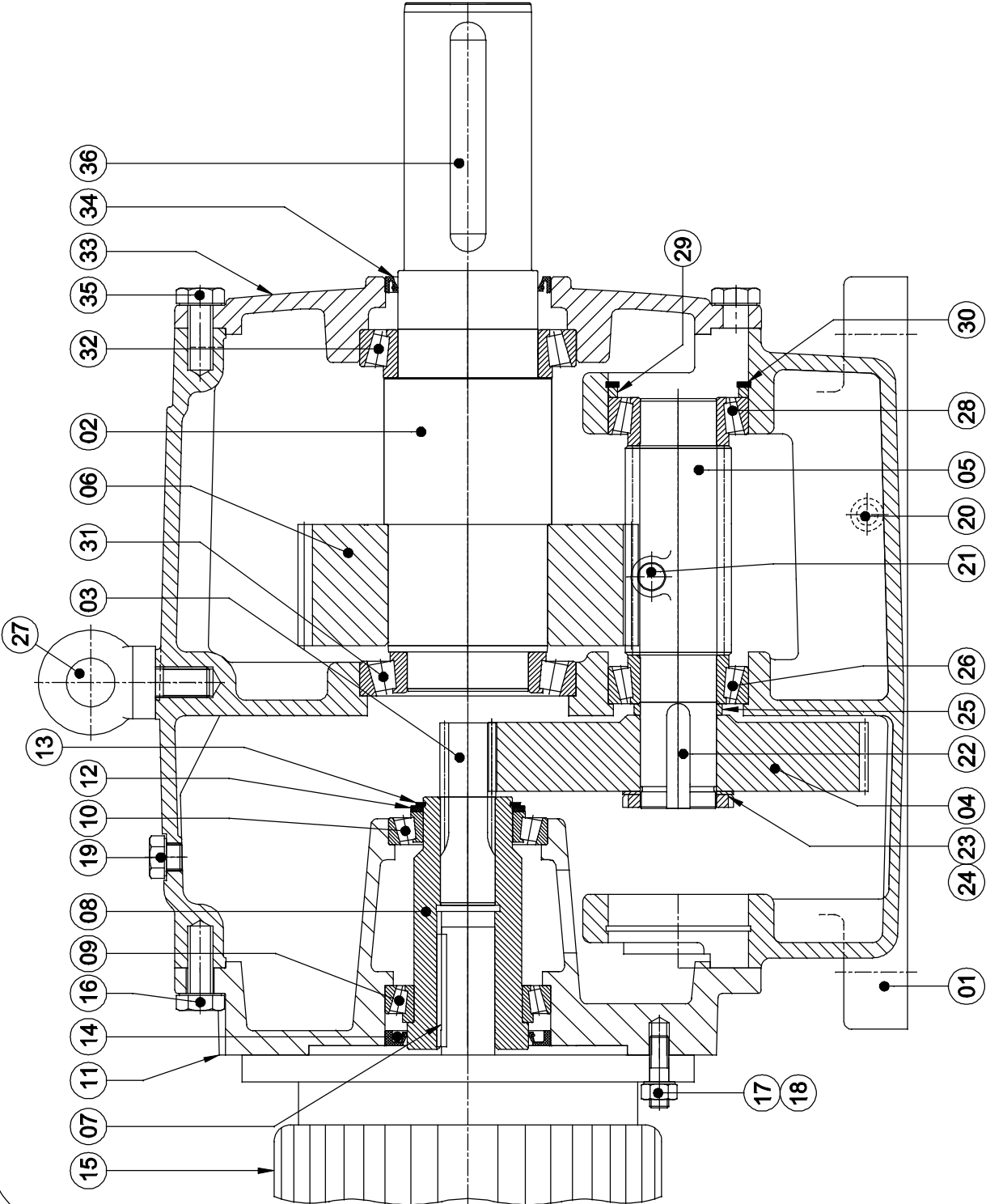
SR. NO.	DESCRIPTION
1	GEAR CASE
2	OUTPUT SHAFT
3	PRIMARY PINION
4	PRIMARY WHEEL
5	SECOND REDUCTION PINION
6	SECOND REDUCTION WHEEL
7	FINAL PINION
8	FINAL WHEEL
9	KEY
10	MOTOR ADAPTOR
11	PLUG IN SHAFT
12	BALL BEARING
13	BALL BEARING
14	OIL SEAL
15	SHIM
16	EXTERNAL CIRCLIP
17	ELECTRIC MOTOR
18	HEX. HEAD. SET SCREW
19	STUD
20	NUT
21	BREATHER PLUG
22	OIL LEVEL INDICATOR
23	DRAIN PLUG
24	EXTERNAL CIRCLIP
25	BALL BEARING
26	KEY
27	BALL BEARING
28	INTERNAL CIRCLIP
29	EXTERNAL CIRCLIP
30	KEY
31	ROLLER BEARING
32	DISTANCE PIECE
33	ROLLER BEARING
34	SUPPORT WASHER
35	INTERNAL CIRCLIP
36	BALL BEARING
37	BEARING HOUSING
38	BEARING HOUSING
39	OIL SEAL
40	CAP SCREW
41	KEY
42	EYE BOLT
43	HEX. HEAD. SET SCREW



THREE STAGE FLANGE MOUNTED MOTORISED UNIT

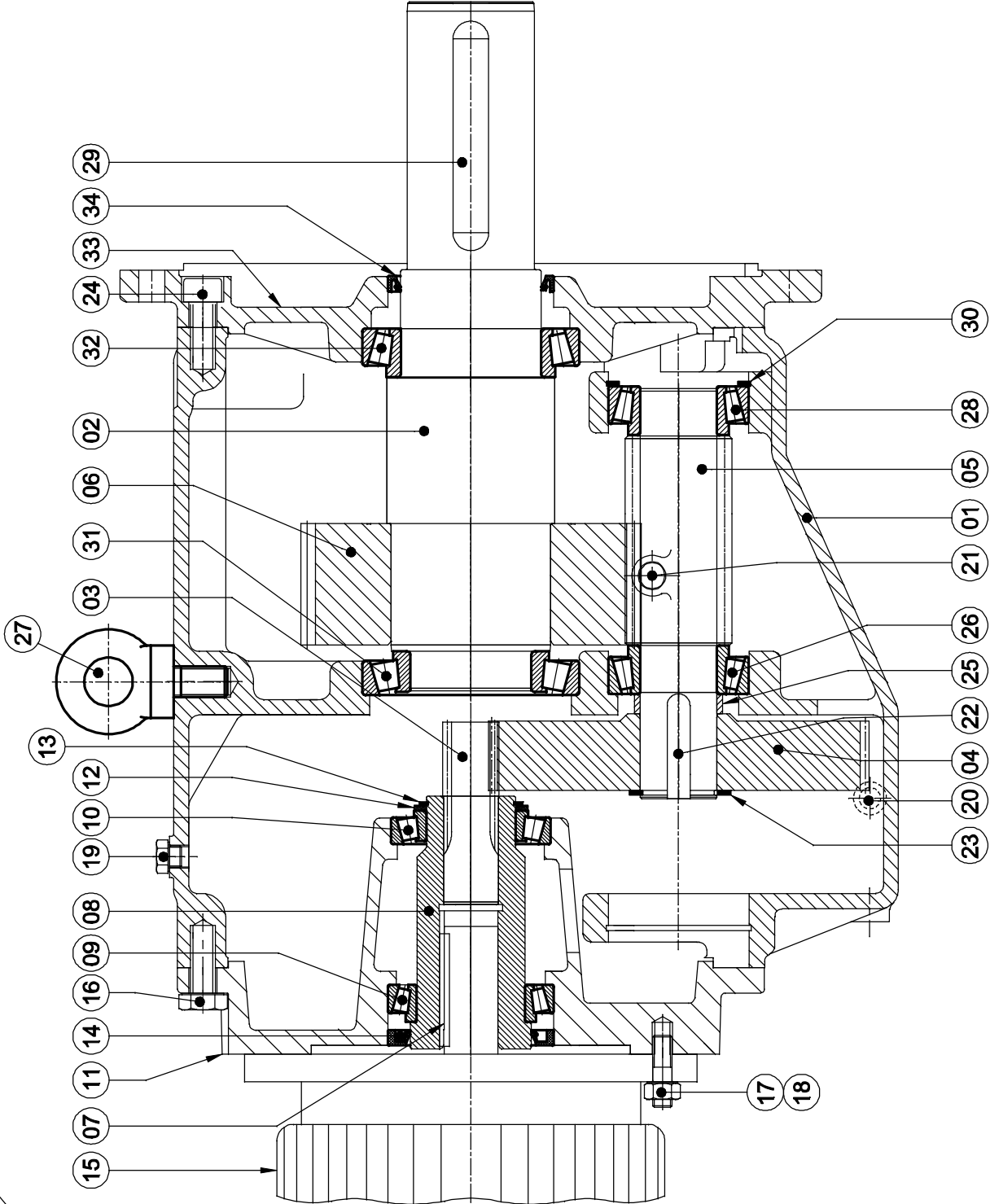
SIZE : M08,M09,M10

SR. NO.	DESCRIPTION
1	GEAR CASE
2	OUTPUT SHAFT
3	PRIMARY PINION
4	PRIMARY WHEEL
5	FINAL PINION
6	FINAL WHEEL
7	KEY
8	PLUG IN SHAFT
9	TAPER ROLLER BEARING
10	TAPER ROLLER BEARING
11	MOTOR ADAPTOR
12	SHIM
13	EXTERNAL CIRCLIP
14	OIL SEAL
15	ELECTRIC MOTOR
16	HEX. HEAD. SET SCREW
17	STUD
18	NUT
19	BREATHER PLUG
20	DRAIN PLUG
21	OIL LEVEL INDICATOR
22	KEY
23	LOCK NUT
24	LOCK WASHER
25	DISTANCE PIECE
26	TAPER ROLLER BEARING
27	EYE BOLT
28	TAPER ROLLER BEARING
29	SUPPORT WASHER
30	INTERNAL CIRCLIP
31	TAPER ROLLER BEARING
32	TAPER ROLLER BEARING
33	BEARING HOUSING
34	OIL SEAL
35	HEX. HEAD. SET SCREW
36	KEY



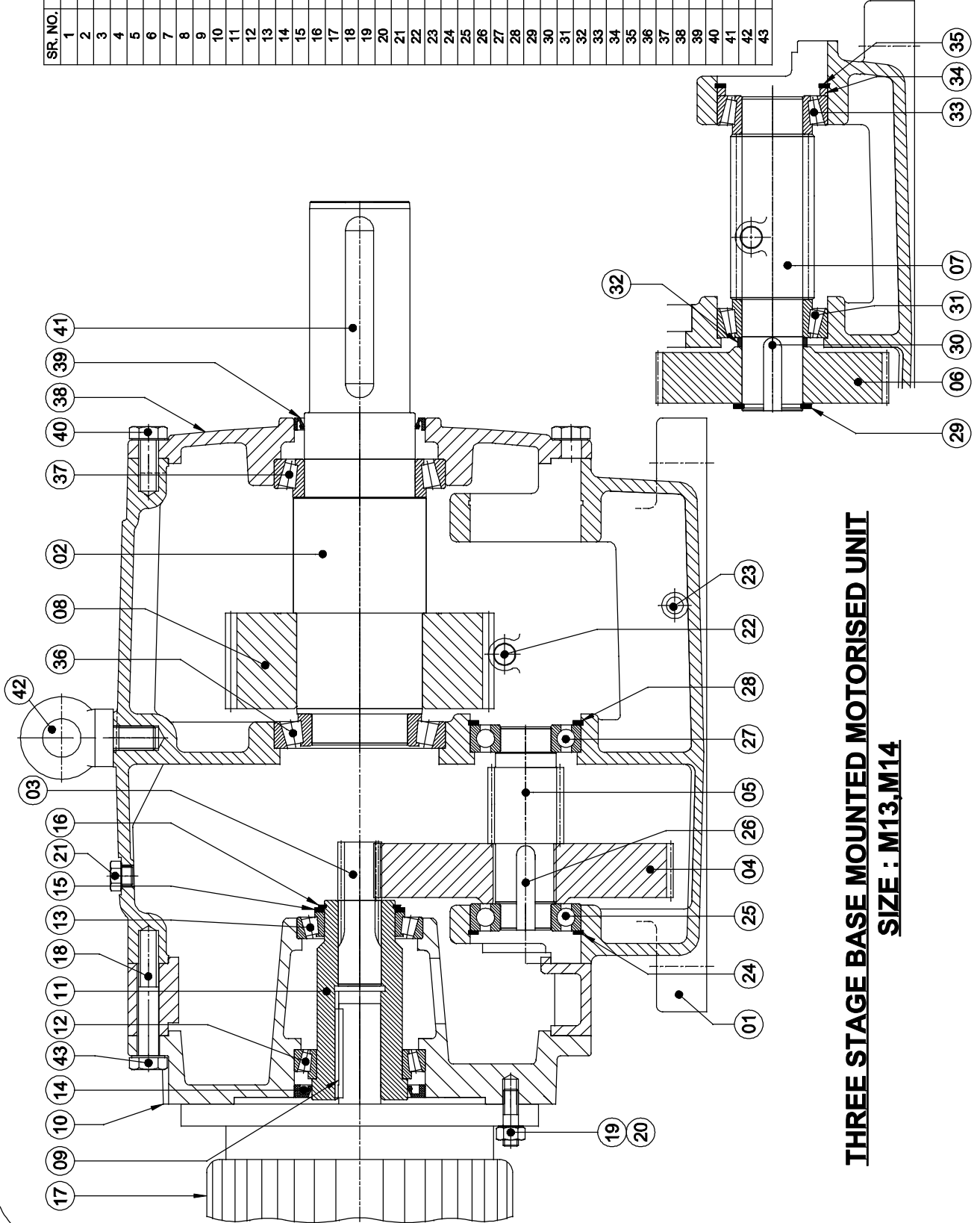
TWO STAGE BASE MOUNTED MOTORISED UNIT
SIZE : M13,M14

SR. NO.	DESCRIPTION
1	GEAR CASE
2	OUTPUT SHAFT
3	PRIMARY PINION
4	PRIMARY WHEEL
5	FINAL PINION
6	FINAL WHEEL
7	KEY
8	PLUG IN SHAFT
9	TAPER ROLLER BEARING
10	TAPER ROLLER BEARING
11	MOTOR ADAPTOR
12	SHIM
13	EXTERNAL CIRCLIP
14	OIL SEAL
15	ELECTRIC MOTOR
16	HEX. HEAD. SET SCREW
17	STUD
18	NUT
19	BREATHER PLUG
20	DRAIN PLUG
21	OIL LEVEL INDICATOR
22	KEY
23	EXTERNAL CIRCLIP
24	CAP SCREW
25	DISTANCE PIECE
26	TAPER ROLLER BEARING
27	EYE BOLT
28	TAPER ROLLER BEARING
29	KEY
30	INTERNAL CIRCLIP
31	TAPER ROLLER BEARING
32	TAPER ROLLER BEARING
33	BEARING HOUSING
34	OIL SEAL



TWO STAGE FLANGE MOUNTED MOTORISED UNIT
SIZE : M13,M14

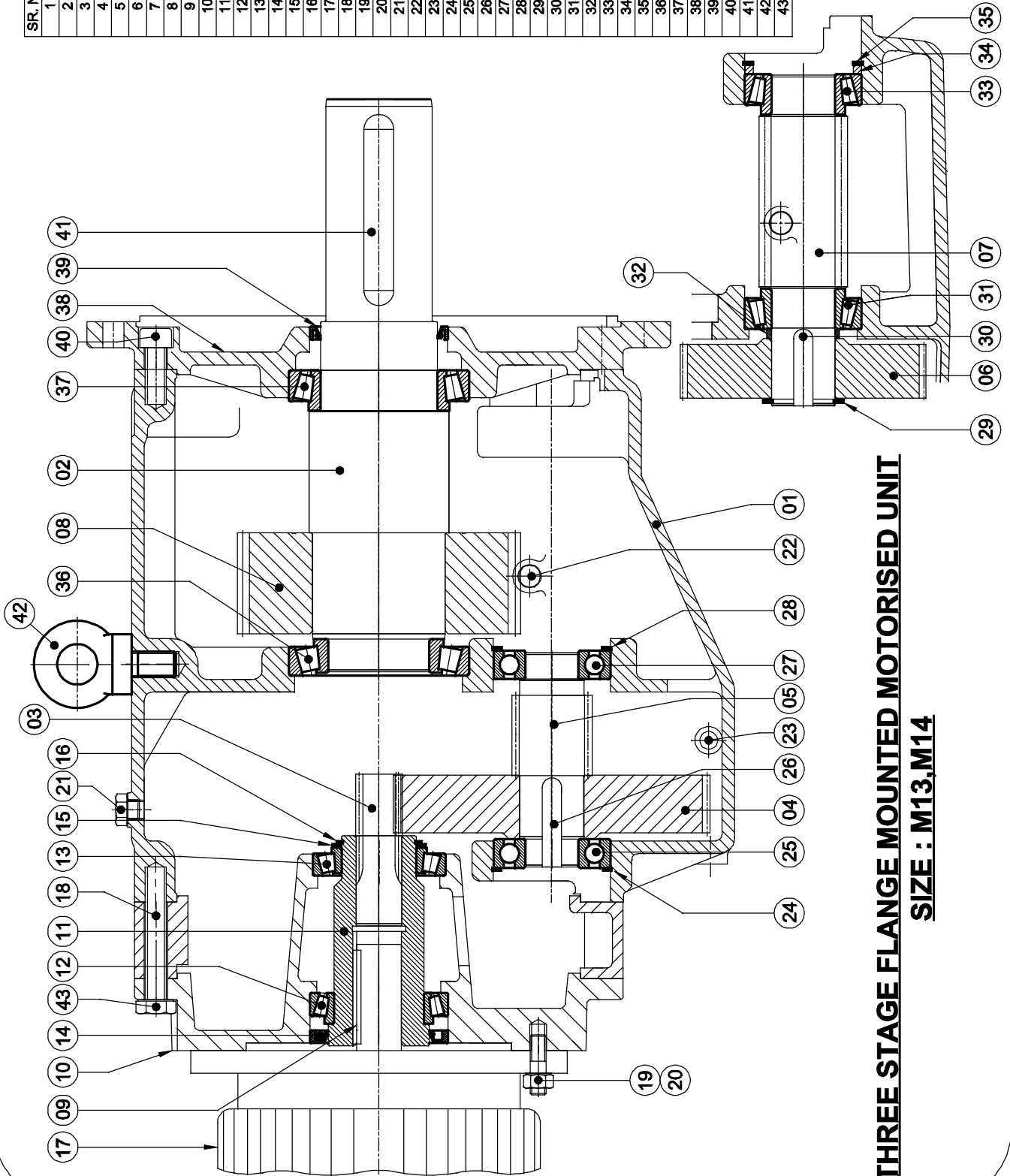
SR. NO.	DESCRIPTION
1	GEAR CASE
2	OUTPUT SHAFT
3	PRIMARY PINION
4	PRIMARY WHEEL
5	SECOND REDUCTION PINION
6	SECOND REDUCTION WHEEL
7	FINAL PINION
8	FINAL WHEEL
9	KEY
10	MOTOR ADAPTOR
11	PLUG IN SHAFT
12	TAPER ROLLER BEARING
13	TAPER ROLLER BEARING
14	OIL SEAL
15	SHIM
16	EXTERNAL CIRCLIP
17	ELECTRIC MOTOR
18	HEX. HEAD. SET SCREW
19	STUD
20	NUT
21	BREATHER PLUG
22	OIL LEVEL INDICATOR
23	DRAIN PLUG
24	EXTERNAL CIRCLIP
25	BALL BEARING
26	KEY
27	BALL BEARING
28	INTERNAL CIRCLIP
29	EXTERNAL CIRCLIP
30	KEY
31	TAPER ROLLER BEARING
32	DISTANCE PIECE
33	TAPER ROLLER BEARING
34	SUPPORT WASHER
35	INTERNAL CIRCLIP
36	TAPER ROLLER BEARING
37	TAPER ROLLER BEARING
38	BEARING HOUSING
39	OIL SEAL
40	HEX. HEAD. SET SCREW
41	KEY
42	EYE BOLT
43	HEX. HEAD. SET SCREW



THREE STAGE BASE MOUNTED MOTORIZED UNIT

SIZE : M13,M14

SR. NO.	DESCRIPTION
1	GEAR CASE
2	OUTPUT SHAFT
3	PRIMARY PINION
4	PRIMARY WHEEL
5	SECOND REDUCTION PINION
6	SECOND REDUCTION WHEEL
7	FINAL PINION
8	FINAL WHEEL
9	KEY
10	MOTOR ADAPTOR
11	PLUG IN SHAFT
12	TAPER ROLLER BEARING
13	TAPER ROLLER BEARING
14	OIL SEAL
15	SHIM
16	EXTERNAL CIRCLIP
17	ELECTRIC MOTOR
18	HEX. HEAD. SET SCREW
19	STUD
20	NUT
21	BREATHER PLUG
22	OIL LEVEL INDICATOR
23	DRAIN PLUG
24	EXTERNAL CIRCLIP
25	BALL BEARING
26	KEY
27	BALL BEARING
28	INTERNAL CIRCLIP
29	EXTERNAL CIRCLIP
30	KEY
31	TAPER ROLLER BEARING
32	DISTANCE PIECE
33	TAPER ROLLER BEARING
34	SUPPORT WASHER
35	INTERNAL CIRCLIP
36	TAPER ROLLER BEARING
37	TAPER ROLLER BEARING
38	BEARING HOUSING
39	OIL SEAL
40	CAP SCREW
41	KEY
42	EYE BOLT
43	HEX. HEAD. SET SCREW



THREE STAGE FLANGE MOUNTED MOTORISED UNIT
SIZE : M13,M14



POWER BUILD LIMITED

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