RADICON POWERBUILD

Series PL

Installation & Maintenance Manual

GEARED MOTORS · GEARBOXES · GEAR ASSEMBLIES · DRIVE SOLUTIONS

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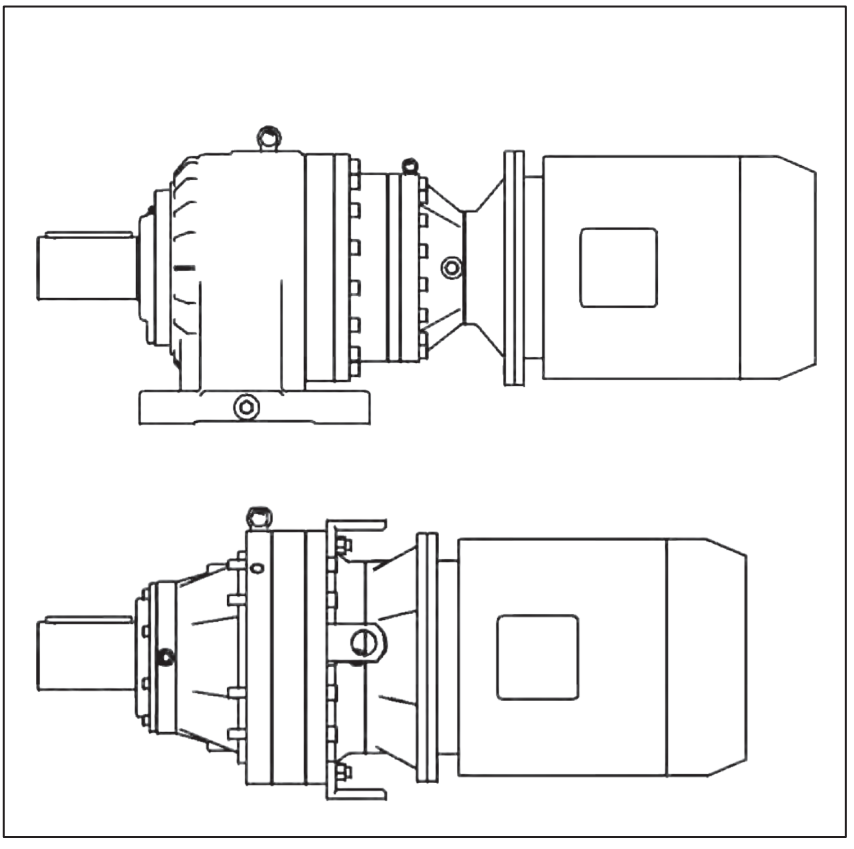


INSTALLATION & MAINTENANCE

SERIES PL

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.

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.

Safety Warning Symbols

Electrical Hazard
Could result in death or serious injury

Danger (Touch Hazard)
Could result in death or serious injury

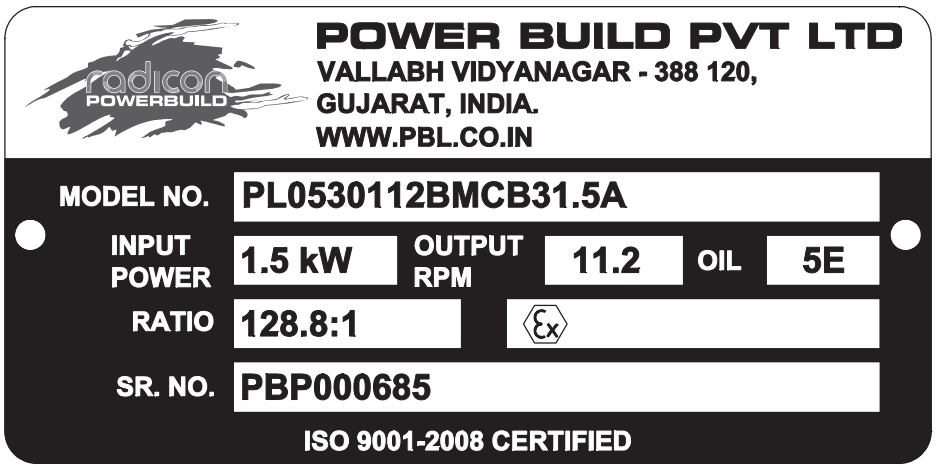
Danger
Could result in serious, slight or minor injuries

Damaging Situation
Could result in damage to gear unit or driven machinery

Cleaning
Periodic cleaning necessary

1. General Information

1.1. Reading the Nameplate



1.1.1. Unit Identification

When requesting any further information or service support, please quotes the following information from the nameplate:

- Unit type (Model No.)
- Serial No.

1.1.2. Gear Unit Rating

The power rating (kW) operating speed (rpm) and gear unit ratio are marked on the nameplate –

Check that these details match the requirements of the machine prior to installation

1.1.3. Mounting Position

The mounting position can be determined from characters 13 and14 of the Model Number (“B3”) See Appendix 3 for details. The gear unit must only be installed in the specified mounting position

1.1.4. Lubrication Grade

The lubrication grade is marked on the nameplate. See Appendix 3 for type and quantity of lubricant.

2. Installation

2.1. Safety Warning

WARNING! The customer shall be responsible for the proper use of articles supplied by the company, particularly rotating shafts between the driving and driven members, and the provision of safety guarding.

The company shall not be responsible for any injury or damage sustained as a result of the improper use of the articles supplied.

Attention is hereby drawn to the danger of using naked lights in proximity to openings in gearboxes and gear units supplied by the company, and the company shall not be liable for any claim for injury or damage arising from any action in contravention of this warning.

2.2. Prior to Installation

2.2.1. Checked gear unit has not been damaged.

2.2.2. Check the gear unit / motor nameplate matches the requirements of the machine the unit is to be installed on.

2.2.3. Thoroughly clean the shaft and mounting surfaces that are to be used of anti-corrosion agents using a commercially available solvent. Ensure solvent does not make contact with the oil seals.

2.3. Lifting

2.3.1. Use only the lifting points provided.

2.3.2. All units are fitted with a lifting eye bolt, other lifting provisions may be made dependant on mounting position.

2.3.3. If the unit is supplied completely assembled with a motor, then both the motor and gear unit lifting provisions should be used.

2.4. Fitting of Components to Either the Unit Input or Output Shaft

2.4.1. Ensure shaft extensions, bores & keys etc are cleaned.

2.4.2. 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 > 50mm).

2.4.3. Items (such as gears, sprockets, couplings etc) should not be hammered onto shafts since this could damage the shaft support bearings.

2.4.4. The component should be pushed onto the shaft using a screw jack device fitted into the threaded hole provided in the end of the shaft. See table1 below.

2.4.5. Items being fitted may be heated to 80/100°C to aid assembly further.

Shaft Diameter (mm)	Threaded Hole
31 - 38	M12 x1.75
39 - 50	M16 x 2.00
51 - 85	M20 x 2.50
86 - 130	M24 x 3.00
131 - 225	M30 x 3.50

Table 1

2.5. Fitting the Motor

Follow these instructions if the product is supplied without motor fitted.

2.5.1. Ensure motor shaft and flange facing is fully cleaned and degreased, clean and free of paint or other defects.

2.5.2. Ensure the motor drive key is correctly fitted and fully seated in the motor shaft.

2.5.3. Spray the gear unit plug-in bore with anti-fretting compound (Rocol DFSM or equivalent)

2.5.4. Slide the motor shaft fully into the plug-in bore (do not hammer)

2.5.5. Ensure motor flange facing and spigot are correctly engaged and secure using heavy duty bolts to ISO grade 8.8 minimum, torque tighten the bolts to value specified in Table 2

- *Bolt torques for aluminum flanged motors should be 75% of the Grade 8.8 values listed in Table 2*

2.6. Foot Mounted or Flange Mounted Units

2.6.1. Ensure the base foundation / flange mounting surface is clean, flat[1], vibration absorbing and torsionally rigid. *([1] Maximum permissible flatness error for the mounting surface is 0.12mm)*

2.6.2. The gear unit must be installed in the specified mounting position. The maximum deviation from the designated mounting position is ± 5° (unless the gear unit is suitably modified or is approved for a non-standard mounting position).

2.6.3. Flange Mounted Units

To ensure perfect alignment, it is important that the flange, spigot, and location recess area, are clean and free of paint or other defects.

Lightly grease the gear unit spigot, fit dowel rings (if supplied) and assemble onto the mounting surface ensuring the correct engagement of locating spigot and dowel rings (when supplied).

Secure using heavy duty bolts to ISO grade 8.8 minimum, torque tighten the bolts to value specified in Table 2.

- *It is recommended that higher grade 12.9 bolts are used for applications where the gear unit is subjected to severe impact loading, torque reversals or frequent stops/starts.*
- *On some larger units the flange is secured by the same fasteners that are used to secure the gear annulus to the unit housing, special length grade 12.9 fastenings are provided with these units, it is important that these fastenings are used.*

2.6.4. Base Mounted Units

Align the unit with the other equipment in accordance with Appendix 1.

It is important to ensure when aligning the unit on a base plate that all the machined mounting areas are clean and free of paint or other defects, and are supported over their full area, adjust if necessary by using steel packing's.

If steel packing's are used, they should be placed both sides of the foundation bolt or as close to it as possible.

During final bolting ensure the unit or base plate is not distorted as this would cause strains in the gear case resulting in errors of alignment of shafts and gearing.

Secure using heavy duty bolts to ISO grade 8.8 minimum, torque tighten the bolts to value specified in Table 2.

Screw Size	Tightening Torque (Grade 8.8)	Tightening Torque (Grade 12.9)
M6	10 Nm	16 Nm
M8	25 Nm	38 Nm
M10	50 Nm	75 Nm
M12	85 Nm	135 Nm
M16	200 Nm	340 Nm
M20	350 Nm	680 Nm
M24	610 Nm	1170 Nm
M30	1220 Nm	2350 Nm
M36	2150 Nm	4150 Nm

Table 2

2.7. Shaft Mounted Units

2.7.1. The Gear unit must be installed in the specified mounting position.

2.7.2. Assemble the gear unit on to the machine shaft and secure with shrink disc. See Appendix 2

2.7.3. Anchor gear unit to a secure point on the structure by means of a torque arm.

3. Lubrication

3.1. General

Units are supplied without lubricant (unless factory filled by request)
The correct lubricant type and grade is marked on the nameplate, for example: Grade 5E
Recommended lubricants and quantities are listed in Appendix 3.

Temperature Limitations

The standard recommended lubricant is Grade 5E mineral oil with an EP package
Grade 5E is equivalent to ISO CLP (CC) VG 220
Grade 5E lubricant is suitable for operation with ambient temperatures between 10°C and 40°C.

Synthetic lubricant should be considered for units continuously operating at the higher end of the temperature range, use of synthetic lubricants also extends the period between oil changes

3.2. Ventilator

Determine the correct ventilator location for the required mounting position. (See Appendix 3)

3.3. Oil Level

WARNING Units are supplied without oil (unless factory filled by request)

3.3.1. With the unit correctly assembled in the designated mounting position

3.3.2. remove the ventilator and level plug and fill with correct type of lubricant (See Appendix 3)

3.3.3. Fill via the ventilator position until oil escapes from the level plug.

WARNING Do not overfill as excess may cause overheating and leakage.

3.3.4. Re-fit the level plug and ventilator, check and tighten all plugs to the correct torque. (See the notes in maintenance section)
Ensure the ventilator is clean and not blocked, clean away any oil spillage.

4. Motor Connections

To mains:

4.1. 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:

4.2. The should be wired in accordance with the manufacturers instructions.

5. Starting Up

5.1. Prior to Starting Up

5.1.1. Ensure the ventilator is clean and not blocked and is fitted in the correct position.

5.1.2. Check the oil level, top up if necessary.

5.1.3. Ensure all safety devices are in place (i.e. guards fitted). Check and adjust guards and covers so that there is no ignition source from sparks that may be thrown by moving parts making contact with guards etc.

5.1.4. Remove any safety devices fitted to prevent machine rotation.

5.1.5. Starting up should only 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.

5.1.6. For units fitted with backstop device, ensure motor is correctly wired for free direction of rotation.

6. Operation

6.1. Noise

The range of product satisfies a noise (sound pressure level) of 85dB (A) or less when measured at 1 metre from the unit surface.

6.2. 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!

7. Maintenance

7.1. Prior to any maintenance operations

7.1.1. De-energise the drive and secure against un-intentional switch on.

7.1.2. Wait until the unit has cooled down – Danger of skin burns & pressure build up.

7.2. Oil plugs/ventilator

7.2.1. Prior to removing plugs, ensure that the unit has cooled sufficiently so that oil will not burn.

7.2.2. Remove ventilator plug prior to removing level and/or drain plug. Warning do not stand over ventilator plug whilst removing as pressure build up behind the valved ventilator may cause it to eject when removed.

7.2.3. Place a container under the oil drain plug to be removed. Note: it is recommended that the oil should be slightly warm, (40-50°C) when drained. (Cooler oil will be more difficult to drain efficiently).

7.2.4. Top ups or refills should be done through the ventilator position.

7.2.5. Remember to refit all plugs and torque tighten to table M1 below.

7.2.6. Clean away any oil spillage.

Plug Size	Torque
G-1/8	12 Nm
G-1/4	25 Nm
G-3/8	34 Nm
G-1/2	65 Nm
G-3/4	85 Nm

Table M1

7.3. Lubrication

7.3.1. Periodic Inspection

Check the oil level every 1000 operating hours or 3 months (whichever is sooner) and if necessary top up with the correct type and grade of lubricant.

7.3.2. Oil Changes

Units should be drained and refilled with correct quantity of lubricant in accordance with the schedule as listed in Table M2 - See Appendix 3 for oil quantity.

Unit Operating Temperature °C	**Lubricant Renewal Period**	
	Mineral Oil CLP(CC) Type E	**Synthetic Oil CLP(HC) Type H**
75 or LESS	17000 HOURS OR 3 YEARS	26000 HOURS OR 3 YEARS
80	12000 HOURS OR 3 YEARS	26000 HOURS OR 3 YEARS
85	8500 HOURS OR 3 YEARS	21000 HOURS OR 3 YEARS
90	6000 HOURS OR 2 YEARS	15000 HOURS OR 3 YEARS
95	4200 HOURS OR 17 MONTHS	10500 HOURS OR 3 YEARS
100	3000 HOURS OR 12 MONTHS	7500 HOURS OR 2.5 YEARS
105	2100 HOURS OR 8 MONTHS	6200 HOURS OR 2 YEARS
110	1500 HOURS OR 6 MONTHS	5200 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		

Table M2

Warning

Do not mix Synthetic and Mineral lubricants.
Do not overfill the unit as this can cause leakage and overheating.

7.4. Bearings

Bearings are checked after 5 years operation, and replaced (if necessary)

7.5. Grease Lubrication

Where re-greasing points are provided add 2 shots (6 grams) monthly of NLGI 2 grade grease.

See appendix 4 for details of approved grease.

7.6. Cleaning

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

7.6.2. Ensure any dust build up does not exceed 5mm (maximum)

7.7. Motor Replacement

7.7.1. Isolate and secure the driven machine, and disconnect the motor power supply

7.7.2. Remove the motor flange fastenings

7.7.3. Carefully slide the motor away from the gear unit (do not hammer)

7.7.4. Clean the gear unit plug-in bore and the flange surface

7.7.5. Check the replacement motor is the of correct frame size and power rating for the gear unit, and re-fit the motor as described in Section 2.5

7.7.6. Re-connect motor power supply – Connection of the electric motor to the mains supply should be made by a qualified person.

8. Fault diagnosis

Symptom	Possible Causes	Remedy
Output shaft does not rotate, even though the motor is running or the input	Drive between shafts interrupted in the gear unit.	Return the gear unit / geared motor for repair.
Unusual, regular running noise	a. A meshing or grinding sound : damage to bearings b. A knocking sound : irregularity in gearing	a. Check oil (See Maintenance) b. Contact our local Sales Office
Unusual, irregular running noise	Foreign matter present in the oil	a. Check oil (See Maintenance) b. Stop the unit, contact our local Sales Office
Oil leaking * ➢ from gear unit cover ➢ from motor flange ➢ from gear unit flange ➢ from output end oil seal	a. Defective gasket on gear unit cover b. Defective gasket c. Gear unit not ventilated	a. Retighten screws on gear unit cover and observe gear unit. If still oil leaks contact our Sales Office. b. Contact our Sales Office. c. Vent the gear unit.
Oil leaking from the ventilator	a. Gear unit over filled with oil b. Gear unit installed in an incorrect mounting position c. Frequent cold starts (oil foaming) and/ or high oil level	a. Correct the oil level (See Lubrication) b. Correct the mounting position and check c. oil level (See Lubrication) d. Check the oil level (See Lubrication)

* It is normal for small amounts of oil / grease to leak out of the oil seal during the running in period (24 hours running time)

When contacting our sales office
Please have the following information available:

Name Plate Data (complete)

- Type and extent of the problem encountered
- The time and the circumstances the problem occurred
- A possible cause

Any further information or clarification required may be obtained by contacting our sales office,
See contact details at the back of this booklet.

Shaft Alignment

Errors of alignment fall into categories of angularity (see Fig 1) and eccentricity (see Fig 2), or a combination of both. Errors of angularity should be checked for, and corrected, before errors of eccentricity.

Alignment in accordance with the following procedure will ensure vibration levels meeting those set out in ISO 10816 Part 1.

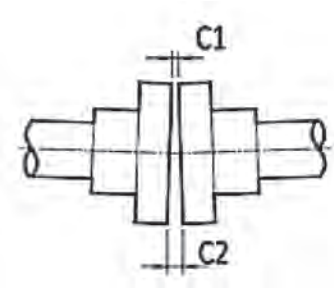


Fig 1

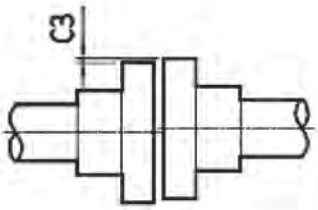


Fig 2

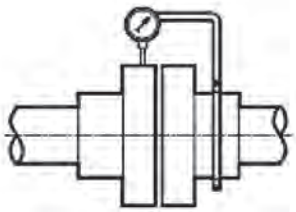


Fig 3

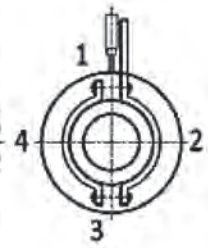


Fig 4

Errors of Angularity

The angularity can be checked by keeping both shafts stationary and taking measurements with a block gauge and feelers at four equal points around the circumference of the coupling hubs as shown in Figure 1. The difference between the vertical plane reading's (C1 and C2) will give the error of alignment over a length equal to the diameter of the coupling flange, Similarly, the difference between the readings on the horizontal plane gives the amount of sideways adjustment.

A simpler method of checking angularity is by marking adjacent points on the coupling hubs and rotating both together keeping the marks in line, by taking gap measurements each quarter-revolution the errors in the vertical and horizontal planes can be found.

NOTE: The alignment should be re-checked after running the unit until it has attained its normal working temperature. Any discrepancies should be rectified.

The permitted angularity error is as follows:

Type of Coupling	Allowable Difference in Gap (G) (mm)	NOTE: D is the diameter (mm) at which the gap is measured.
Rigid Coupling	G = 0.0005 D	
All other types	G = 0.001 D	

Errors of Eccentricity

The procedure for measuring eccentricity (C3 fig 2) is done by using a dial indicator suitably clamped to one half coupling hub, and bearing onto the hub or flange of the other hub, as shown in Figures 3 and 4.
Care must be taken to ensure the support for the dial indicator is sufficiently rigid to prevent the weight of the indicator from causing deflection, and in consequence inaccurate readings.
Extra care should be taken where taper roller bearings are fitted to ensure that alignment is checked with shafts in mid-point position and a final check made with the unit at operating temperature.

The permitted eccentricity error (in addition to that of angularity) is as follows:

Coupling	Output Shaft	Input Shaft
	Max Eccentricity (mm)	Max Eccentricity (mm)
Rigid	0.05	0.08
All other types	Consult the appropriate installation and maintenance instructions for coupling type and size fitted	

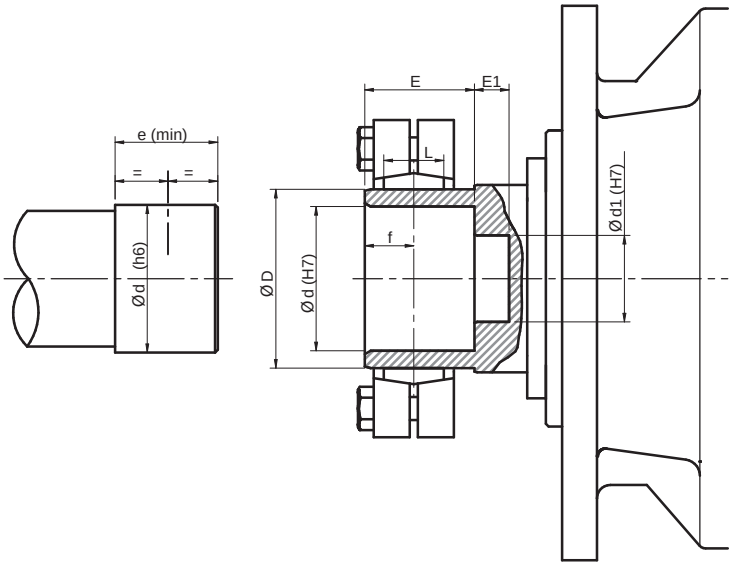
Special note concerning the alignment of rigid couplings

When lining up shafts fitted with rigid couplings it is important that no attempt is made to force the coupling hubs together by tightening up the coupling bolts, this will induce undue stresses in the shaft, coupling and bearings. This malpractice can be revealed by the springing apart of the coupling faces as the bolts are slackened off.

We produce a range of flexible couplings; please consult our Application Engineers for details

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.

CAUTION



SIZE	d	d1	D	E	E1	e (min)	f	L	Torque Ta (Nm)
PL/PR 01 PL/PR 02	50	30	62	38	12	30	16	23	12
PL/PR 03 PL/PR 05	75	40	100	70	25	50	30	34	30
PL/PR 08 PL/PR 12	90	50	125	100	35	57	35	42	59
PL/PR 16	100	60	140	100	40	65	40	46	100
PL/PR 25	130	80	175	100	30	80	50	56	250
PL/PR 40	140	130	185	115	50	100	60	71	250
PL/PR 65	165	155	220	160	40	125	75	88	250

Assembly

1. Clean and degrease the locating diameters of the gear unit hollow shaft bore, the driven shaft and the shrink disc locating surfaces.
2. Mount the Shrink Disc inner ring and collar into position on the gear unit shaft and loosely tighten the locking screws, apply a dry film lubricant spray (Molykote 321R or similar) to the tapered surfaces of the shrink disc inner ring and locking collar.
3. Draw the gear unit and shrink disc assembly onto the driven shaft.
4. 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 (Ta) specified in the table above.

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 (do not completely remove the screws) and withdraw the shrink disc. assembly back towards the driven machine (as far as possible)
C. Withdraw the gear unit from the driven shaft. A hole is provided in the gearbox output shaft (G-1/8) to connect with a hydraulic system to aid removal.

Note! If the Shrink Disc is to be re-used it should be dismantled and cleaned thoroughly and a dry film lubricant spray (Molykote 321R or similar) applied to the tapered surfaces of the inner ring and collar.

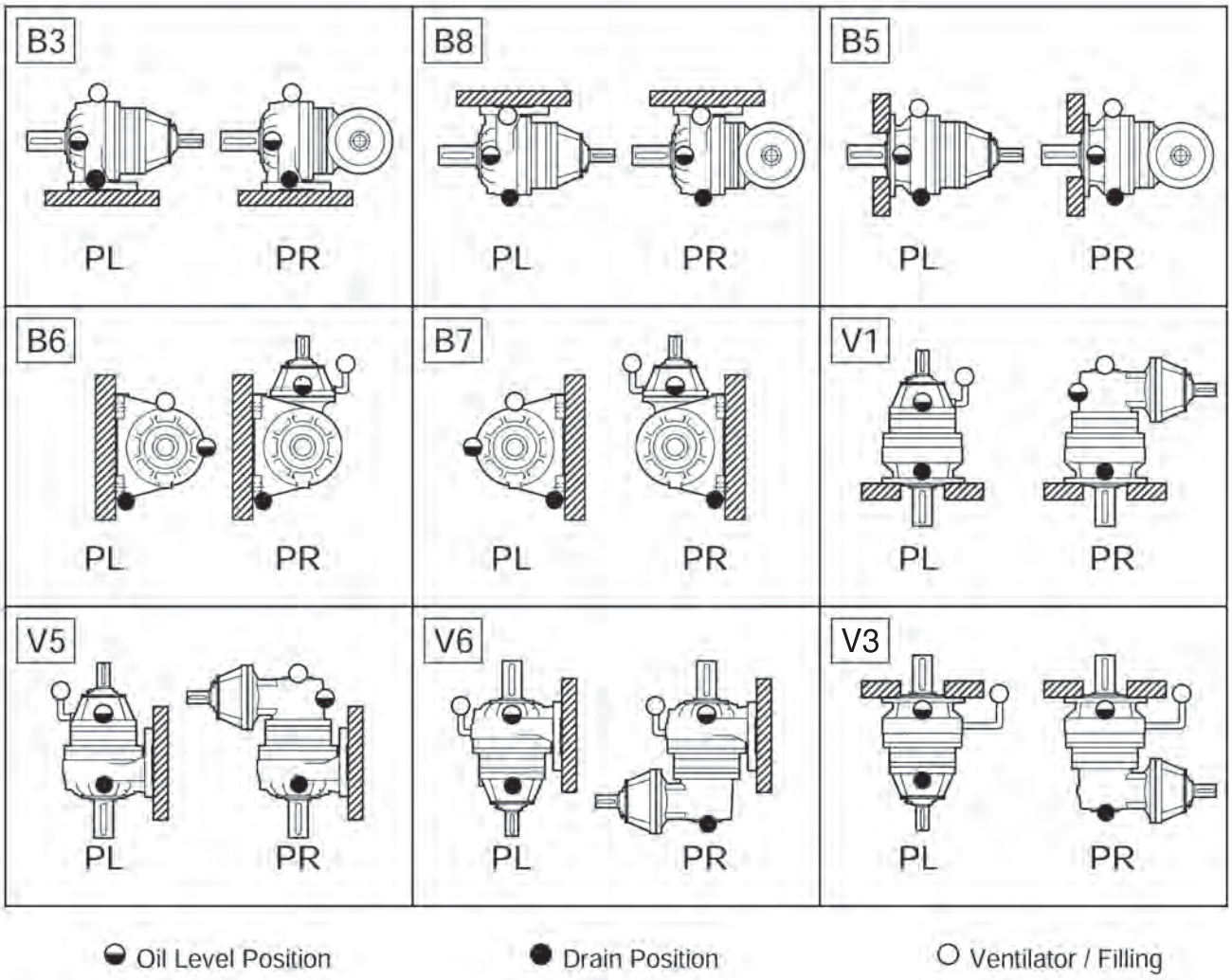
Lubrication

1. Check that the ventilator is positioned correctly for the intended mounting position.
2. Gear units are supplied without lubricant and must be filled via the ventilator position with the appropriate lubricant until oil escapes through the level plug hole.

    a. Please refer to the lubricant quantity table for approximate lubricant quantity
    b. Refer to the unit nameplate for the type and grade of lubricant.
    c. Refer the table of approved lubricants.

3. Maintenance: Oil levels should be checked and maintained by filling via the ventilator position until oil escapes through the level plug hole.

Mounting Positions and Lubrication Fill Levels



PL Units - Lubricant Quantities (Litres)

	PL0110	PL0120	PL0130	PL0140	PL0210	PL0220	PL0230	PL0240	PL0310	PL0320	PL0330	PL0340	PL0510	PL0520
B3	1.4	1.6	1.8	2.0	1.4	1.6	1.8	2.0	3.6	3.5	3.7	3.9	3.6	3.5
B5	0.8	1.0	1.2	1.4	0.8	1.0	1.2	1.4	2.0	1.9	2.1	2.3	2.0	1.9
B6	1.2	1.4	1.6	1.8	1.2	1.4	1.6	1.8	2.9	2.8	3.0	3.2	2.9	2.8
B7	1.2	1.4	1.6	1.8	1.2	1.4	1.6	1.8	2.9	2.8	3.0	3.2	2.9	2.8
B8	0.9	1.1	1.3	1.5	0.9	1.1	1.3	1.5	2.2	2.0	2.2	2.4	2.1	2.0
V1	1.6	2.0	2.4	2.8	1.6	2.0	2.4	2.8	4.1	3.8	4.2	4.6	4.0	3.8
V3	1.6	2.0	2.4	2.8	1.6	2.0	2.4	2.8	4.1	3.8	4.2	4.6	4.0	3.8
V5	2.4	2.8	3.2	3.6	2.4	2.8	3.2	3.6	5.9	5.7	6.0	6.4	5.9	5.6
V6	2.4	2.8	3.2	3.6	2.4	2.8	3.2	3.6	5.9	5.7	6.0	6.4	5.9	5.6

	PL0530	PL0540	PL0810	PL0820	PL0830	PL0840	PL1210	PL1220	PL1230	PL1240	PL1610	PL1620	PL1630	PL1640
B3	3.7	3.9	6.7	6.9	6.8	7.0	6.7	7.0	6.9	7.1	9.87	9.88	9.81	9.95
B5	2.1	2.3	3.3	3.6	3.5	3.7	3.4	3.6	3.5	3.7	4.98	4.99	4.92	5.05
B6	3.0	3.2	5.3	5.6	5.5	5.7	5.4	5.6	5.5	5.7	8.13	8.14	8.07	8.20
B7	3.0	3.2	5.3	5.6	5.5	5.7	5.4	5.6	5.5	5.7	8.13	8.14	8.07	8.20
B8	2.2	2.4	3.7	3.9	3.8	4.0	3.7	4.0	3.9	4.1	6.38	6.39	6.32	6.46
V1	4.2	4.6	6.6	7.2	7.0	7.4	6.7	7.2	7.0	7.4	9.95	9.96	9.83	10.11
V3	4.2	4.6	6.6	7.2	7.0	7.4	6.7	7.2	7.0	7.4	9.95	9.96	9.83	10.11
V5	6.0	6.4	10.7	11.2	11.0	11.4	10.8	11.3	11.1	11.5	16.25	16.26	16.13	16.41
V6	6.0	6.4	10.7	11.2	11.0	11.4	10.8	11.3	11.1	11.5	16.25	16.26	16.13	16.41

	PL2510	PL2520	PL2530	PL2540	PL4010	PL4020	PL4030	PL4040	PL6510	PL6520	PL6530	PL6540
B3	4.31	4.37	4.53	4.54	6.85	6.88	6.95	6.96	10.52	10.55	11.03	11.17
B5	4.31	4.37	4.53	4.54	6.85	6.88	6.95	6.96	10.52	10.55	11.03	11.17
B6	4.31	4.37	4.53	4.54	6.85	6.88	6.95	6.96	10.52	10.55	11.03	11.17
B7	4.31	4.37	4.53	4.54	6.85	6.88	6.95	6.96	10.52	10.55	11.03	11.17
B8	4.31	4.37	4.53	4.54	6.85	6.88	6.95	6.96	10.52	10.55	11.03	11.17
V1	8.62	8.75	9.05	9.08	13.70	13.76	13.89	13.90	21.05	21.10	22.07	22.34
V3	8.62	8.75	9.05	9.08	13.70	13.76	13.89	13.90	21.05	21.10	22.07	22.34
V5	8.62	8.75	9.05	9.08	13.70	13.76	13.89	13.90	21.05	21.10	22.07	22.34
V6	8.62	8.75	9.05	9.08	13.70	13.76	13.89	13.90	21.05	21.10	22.07	22.34

PR Units - Lubricant Quantities (Litres)

	PR0120	PR0130	PR0140	PR0220	PR0230	PR0240	PR0320	PR0330	PR0340	PR0520	PR0530	PR0540	PR0820
B3	1.7	1.9	2.1	1.7	1.9	2.1	3.9	3.8	4.0	3.9	3.8	4.0	7.7
B5	1.1	1.3	1.5	1.1	1.3	1.5	2.3	2.2	2.4	2.3	2.2	2.4	4.3
B6	1.5	1.7	1.9	1.5	1.7	1.9	3.2	3.1	3.3	3.2	3.1	3.3	6.3
B7	1.5	1.7	1.9	1.5	1.7	1.9	3.2	3.1	3.3	3.2	3.1	3.3	6.3
B8	1.2	1.4	1.6	1.2	1.4	1.6	2.5	2.3	2.5	2.4	2.3	2.5	4.7
V1	1.9	2.3	2.7	1.9	2.3	2.7	4.4	4.1	4.5	4.3	4.1	4.5	7.6
V3	1.9	2.3	2.7	1.9	2.3	2.7	4.4	4.1	4.5	4.3	4.1	4.5	7.6
V5	2.7	3.1	3.5	2.7	3.1	3.5	6.2	6.0	6.3	6.2	5.9	6.3	11.7
V6	2.7	3.1	3.5	2.7	3.1	3.5	6.2	6.0	6.3	6.2	5.9	6.3	11.7

	PR0830	PR0840	PR1220	PR1230	PR1240	PR1620	PR1630	PR1640	PR2530	PR2540	PR4030	PR4040	PR6540
B3	7.2	7.1	7.7	7.3	7.2	11.6	10.2	10.1	6.07	4.83	8.58	7.25	11.3
B5	3.9	3.8	4.4	3.9	3.8	6.68	5.29	5.22	6.07	4.83	8.58	7.25	11.3
B6	5.9	5.8	6.4	5.9	5.8	9.83	8.44	8.37	6.07	4.83	8.58	7.25	11.3
B7	5.9	5.8	6.4	5.9	5.8	9.83	8.44	8.37	6.07	4.83	8.58	7.25	11.3
B8	4.2	4.1	4.7	4.3	4.2	8.08	6.69	6.62	6.07	4.83	8.58	7.25	11.3
V1	7.5	7.3	7.7	7.5	7.3	11.7	10.3	10.1	10.5	9.35	15.5	14.2	22.4
V3	7.5	7.3	7.7	7.5	7.3	11.7	10.3	10.1	10.5	9.35	15.5	14.2	22.4
V5	11.5	11.3	11.8	11.6	11.4	18.0	16.6	16.4	10.5	9.35	15.5	14.2	22.4
V6	11.5	11.3	11.8	11.6	11.4	18.0	16.6	16.4	10.5	9.35	15.5	14.2	22.4

Approved Lubricants Type E

ISO: CLP-CC - Mineral oil's containing industrial EP additives

Supplier	Lubricant Type	4E	5E	6E
		Ambient Temperature Range		
		-5 to 20°C	10 to 40°C	30 to 50°C
BP Oil International Limited	Energol GR-XF	150 (-19)	220 (-16)	320 (-13)
	Energol GR-XP	150 (-19)	220 (-15)	320 (-10)
Caltex	Meropa	150 (-4)	220 (-4)	320 (-4)
Castrol International	Alpha SP	150 (-16)	220 (-16)	320 (-16)
Esso/Exxon	Spartan EP	150 (-19)	220 (-12)	320 (-12)
Fuchs Lubricants	Renolin CLP	150 (-17)	220 (-16)	320 (-14)
Klüber Lubrication	Klüberoil GEM1	150 (-5)	220 (-5)	320 (-5)
Kuwait Petroleum International	Q8 Goya	150 (-22)	220 (-16)	320 (-13)
Mobil Oil Company Limited	Mobil gear 600 series	629 (-19)	630 (-13)	632 (-13)
	Mobil gear XMP	150 (-22)	220 (-19)	320 (-13)
Optimal Ölwerke GmbH	Optigear BM	150 (-13)	220 (-11)	320 (-10)
Petro-Canada	Ultima EP	150 (-28)	220 (-22)	320 (-16)
Rocol	Saphire Hi-Torque	150 (-13)	220 (-13)	320 (-13)
Shell Oils	Omala	150 (-4)	220 (-4)	320 (-4)
	Omala F	150 (-16)	220 (-13)	320 (-10)
Texaco Limited	Meropa	150 (-19)	220 (-16)	320 (-16)
	Meropa WM	150 (-19)	220 (-19)	320 (-16)
Total	Carter EP	150 (-7)	220 (-7)	320 (-7)
Tribol	Tribol 1100	150 (-13)	220 (-20)	320 (-18)

Numbers in brackets indicate the minimum pour point temperature of the specified oil in °C
The gear unit must not be run below this temperature.

Approved Lubricants Type H

ISO: CLP-HC **-** Polyalphaolefin based synthetic lubricants with anti-wear or EP additives.

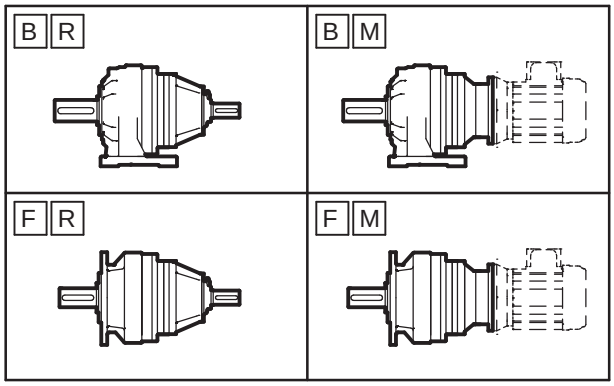
Supplier	Lubricant Type	4H	5H	6H
		Ambient Temperature Range		
		-30 to 20°C	-10 to 40°C	30 to 50°C
BP Oil International Limited	Enersyn EPX	-	-	320 (-28)
Caltex	Pinnacle EP	150 (-45)	220 (-43)	320 (-43)
Castrol International	Alphasyn EP	150 (-43)	220 (-37)	320 (-31)
	Alphasyn T	150 (-31)	220 (-31)	320 (-38)
Esso/Exxon	Spartan Synthetic EP	150 (-49)	220 (-46)	320 (-43)
Fuchs Lubricants	Renolin Unisyn CLP	150 (-40)	220 (-37)	320 (-34)
Klüber Lubrication	Klübersynth GEM4	150 (-35)	220 (-30)	320 (-25)
Kuwait Petroleum International	Q8 El Greco	150 (-28)	220 (-22)	320 (-19)
Mobil Oil Company Limited	Mobilgear SHC	150 (-40)-	220 (-40)	320 (-37)
Optimal Ölwerke GmbH	Optigear Synthetic A	-	220 (-31)	320 (-31)
Petro-Canada	Super Gear Fluid	150 (-37)	220 (-37)	320 (-37)
Shell Oils	Omala HD	150 (-49)	220 (-43)	320 (-40)
Texaco Limited	Pinnacle EP	150 (-45)	220 (-43)	320 (-43)
Total	Carter EP/HT	150 (-37)	220 (-34)	320 (-31)
Tribol GmbH	Tribol 1510	150 (-41)	220 (-36)	320 (-33)

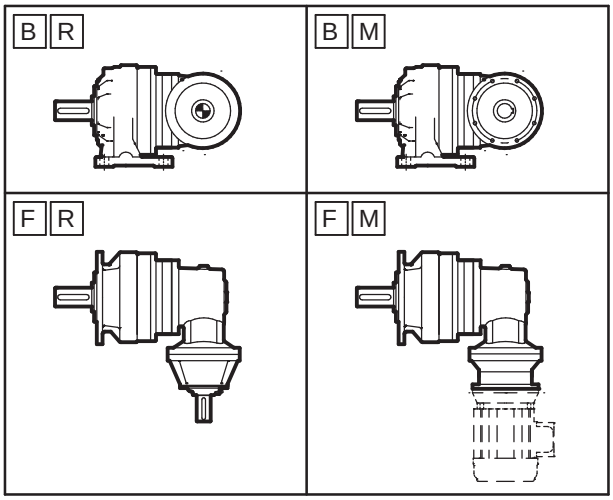
Numbers in brackets indicate the minimum pour point temperature of the specified oil in °C
The gear unit must not be run below this temperature.

Approved Bearing Greases

NLGI grade 2 grease's, suitable for operating in ambient temperature range of -20°C to 50°C
For use outside this range consult our Application Engineers.

Supplier	Lubricant Range
BP Oil International Limited	Energrease LS-EP
Caltex	Multifak EP
Castrol International	LMX Grease
Fuchs Lubricants	Renolit EP
Klüber Lubrication	Klüberlub BE 41-542
Mobil Oil Company Limited	Mobilgrease XHP
Omega Manufacturing Division	Omega 85
Optimol Ölwerke GmbH	Longtime PD
Shell Oils	Albida RL
	Alvania EP B
Texaco Limited	Multifak EP





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PL0110	30	27	28	25	28	25	30	27	30	27	31	27	32	29	-	-	-	-	-	-	-	-
PL0120	36	33	34	31	35	31	36	33	36	33	37	34	38	35	-	-	-	-	-	-	-	-
PL0130	42	39	40	37	41	38	42	39	42	39	43	40	44	41	-	-	-	-	-	-	-	-
PL0140	48	45	46	43	47	44	48	45	48	45	49	46	50	47	-	-	-	-	-	-	-	-
PL0210	32	29	30	27	31	28	32	29	32	29	33	30	34	31	-	-	-	-	-	-	-	-
PL0220	38	35	36	33	37	34	38	35	38	35	39	36	41	37	-	-	-	-	-	-	-	-
PL0230	45	42	43	40	43	40	45	42	45	42	46	42	47	44	-	-	-	-	-	-	-	-
PL0240	51	48	49	46	50	46	51	48	51	48	52	49	53	50	-	-	-	-	-		-	
PL0310	65	58	59	53	60	54	61	55	61	55	62	56	64	57	67	61	67	61	-	-	-	-
PL0320	65	59	64	57	64	58	65	59	65	59	66	60	68	61	-	-	-	-	-	-	-	-
PL0330	72	66	70	64	70	64	72	66	72	66	73	66	74	68	-	-	-	-	-	-	-	-
PL0340	78	72	76	70	77	70	78	72	78	72	79	73	80	74	-	-	-	-	-	-	-	-
PL0510	69	63	64	58	65	58	66	60	66	60	67	61	68	62	72	66	71	65	-	-	-	-
PL0520	74	68	72	66	73	66	74	68	74	68	75	69	76	70	-	-	-	-	-	-	-	-
PL0530	80	74	78	72	79	73	80	74	80	74	81	75	82	76	-	-	-	-	-	-	-	-
PL0540	86	80	84	78	85	79	86	80	86	80	87	81	89	82	-	-	-	-	-	-	-	-
PL0810	111	100	-	-	-	-	109	98	109	98	110	99	111	100	115	104	115	104	117	106	-	-
PL0820	117	106	112	101	112	101	114	103	114	103	115	104	116	105	119	108	119	108	-	-	-	-
PL0830	118	107	116	105	116	106	118	107	118	107	119	107	120	109	-	-	-	-	-	-	-	-
PL0840	124	113	122	111	123	111	124	113	124	113	125	114	126	115	-	-	-	-	-	-	-	-
PL1210	118	107	-	-	-	-	116	105	116	105	118	106	118	107	123	112	123	111	125	113	-	-
PL1220	129	118	124	113	125	113	126	115	126	115	127	116	128	117	132	120	131	120	-	-	-	-
PL1230	134	123	132	121	133	121	134	123	134	123	135	124	136	125	-	-	-	-	-	-	-	-
PL1240	140	129	138	127	139	127	140	129	140	129	141	130	142	131	-	-	-	-	-	-	-	-
PL1610	199	175	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	189	165	191	168
PL1620	195	171	-	-	-	-	-	-	-	-	-	-	194	170	197	174	197	173	-	-	-	-
PL1630	199	176	197	174	197	174	199	176	199	176	200	177	201	178	-	-	-	-	-	-	-	-
PL1640	205	182	203	180	204	181	205	182	205	182	206	183	208	184	-	-	-	-	-	-	-	-
PL2510	261	222	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	240	200	242	203
PL2520	261	222	-	-	-	-	-	-	-	-	-	-	-	-	266	226	265	226	267	228	-	-
PL2530	267	228	-	-	-	-	-	-	-	-	-	-	266	227	270	231	269	230	-	-	-	-
PL2540	269	230	267	228	268	229	269	230	269	230	270	231	272	232	-	-	-	-	-	-	-	-
PL4020	372	335	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	362	325	365	304
PL4030	368	331	-	-	-	-	-	-	-	-	-	-	367	330	371	333	371	333	-	-	-	-
PL4040	373	335	371	334	371	334	373	336	373	336	374	336	375	338	-	-	-	-	-	-	-	-
PL6520	627	553	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	606	532	609	534
PL6530	627	553	-	-	-	-	-	-	-	-	-	-	-	-	632	557	632	557	634	559	-	-
PL6540	634	559	-	-	-	-	-	-	-	-	-	-	633	558	636	562	636	561	-	-	-	-

	BR	FR	63		71		80		90		100 / 112		132		160		180	
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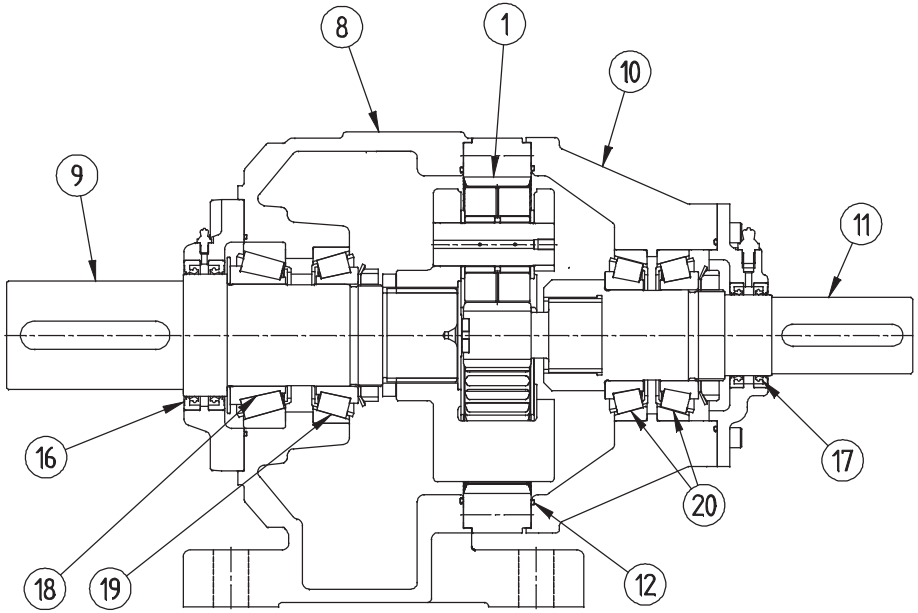
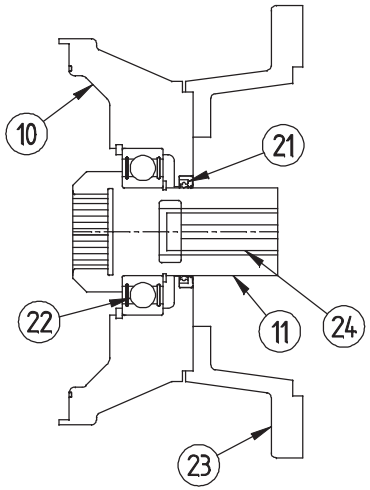
PR0240	64	67	62	65	62	65	64	67	64	67	65	68	66	69	-	-	-	-
PR0320	95	101	93	99	93	99	95	101	95	101	96	102	97	103	-	-	-	-
PR0330	84	91	82	89	82	89	84	91	84	91	85	92	86	93	-	-	-	-
PR0340	88	94	86	92	86	92	88	94	88	94	89	95	90	96	-	-	-	-
PR0520	99	105	97	103	97	103	99	105	99	105	100	106	101	107	-	-	-	-
PR0530	93	99	91	97	91	97	93	99	93	99	94	100	95	101	-	-	-	-
PR0540	99	105	97	103	97	103	99	105	99	105	100	106	101	107	-	-	-	-
PR0820	171	182	165	176	166	177	167	178	167	178	168	179	170	181	173	184	173	184
PR0830	147	158	145	156	145	156	147	158	147	158	148	159	149	160	-	-	-	-
PR0840	137	148	135	146	135	146	137	148	137	148	138	149	139	150	-	-	-	-
PR1220	178	189	172	183	173	184	174	185	174	185	175	186	177	188	180	191	180	191
PR1230	159	171	157	169	157	169	159	171	159	171	160	172	161	173	-	-	-	-
PR1240	153	164	151	162	151	162	153	164	153	164	154	165	155	166	-	-	-	-
PR1620	282	306	-	-	-	-	-	-	-	-	-	-	281	305	284	308	284	308
PR1630	225	249	223	247	223	247	225	249	225	249	226	250	227	251	-	-	-	-
PR1640	218	241	216	239	216	239	218	241	218	241	219	242	220	243	-	-	-	-
PR2530	321	360	-	-	-	-	-	-	-	-	-	-	320	359	323	362	323	362
PR2540	297	336	295	334	295	334	297	336	297	336	298	337	299	338	-	-	-	-
PR4030	451	488	-	-	-	-	-	-	-	-	-	-	450	487	453	490	453	490
PR4040	403	441	401	439	401	439	403	441	403	441	404	442	405	443	-	-	-	-
PR6540	717	792	-	-	-	-	-	-	-	-	-	-	716	791	719	794	719	794





INPUT OPTION
MOTORISED UNIT

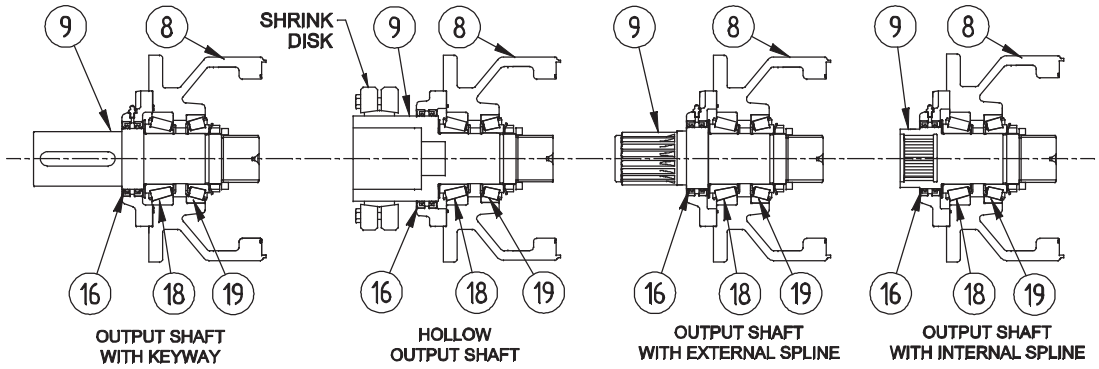
PARTS LIST

ITEM	DESCRIPTION	QUAN
1	STAGE 1- PLANETARY GEAR CELL	1
8	OUTPUT HOUSING KIT	1
9	OUTPUT SHAFT	1
10	INPUT HOUSING KIT	1
11	INPUT SHAFT	1
24	BUSH (ONLY FOR 63, 80, 90, 160 & 200 FRAME)	1

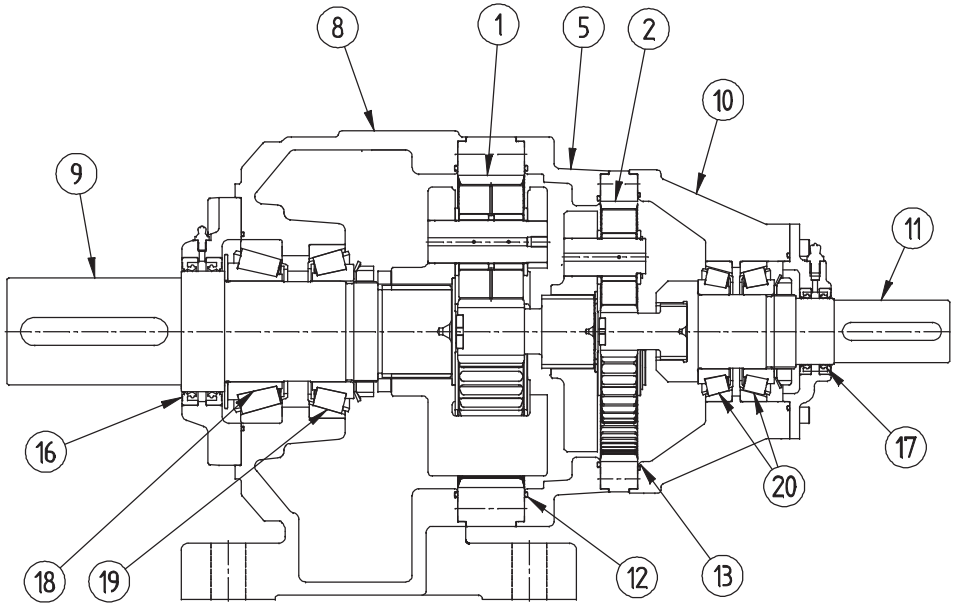
BEARINGS AND OIL SEALS

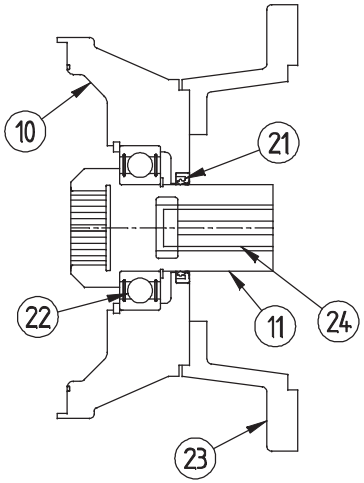
ITEM	DESCRIPTION	QUAN
12	STAGE 1 - ANNULUS O-RING	2
16	OUTPUT SHAFT OIL SEAL	2
17	INPUT SHAFT OIL SEAL	2
18	OUTPUT SHAFT BEARING 1	1
19	OUTPUT SHAFT BEARING 2	1
20	INPUT SHAFT BEARING	2
21	INPUT SHAFT OIL SEAL (MOTORISED UNIT)	1
22	INPUT SHAFT BEARING (MOTORISED UNIT)	1
23	MOTOR FLANGE	1

OUTPUT OPTIONS



PARTS LISTS: Type PL
SINGLE STAGE PLANETARY UNITS





INPUT OPTION
MOTORISED UNIT

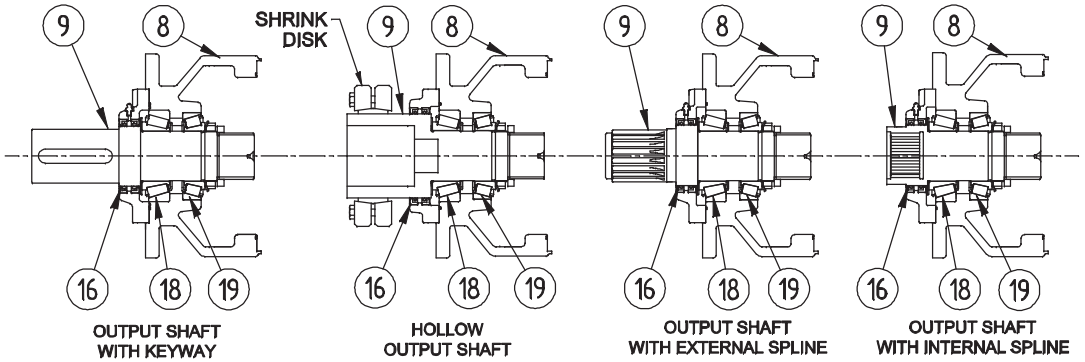
PARTS LIST

ITEM	DESCRIPTION	QUAN
1	STAGE 1- PLANETARY GEAR CELL	1
2	STAGE 2- PLANETARY GEAR CELL	1
5	STAGE 2- INTER CONNECTING FLANGE	1
8	OUTPUT HOUSING KIT	1
9	OUTPUT SHAFT	1
10	INPUT HOUSING KIT	1
11	INPUT SHAFT	1
24	BUSH (ONLY FOR 63, 80, 90, 160 & 200 FRAME)	1

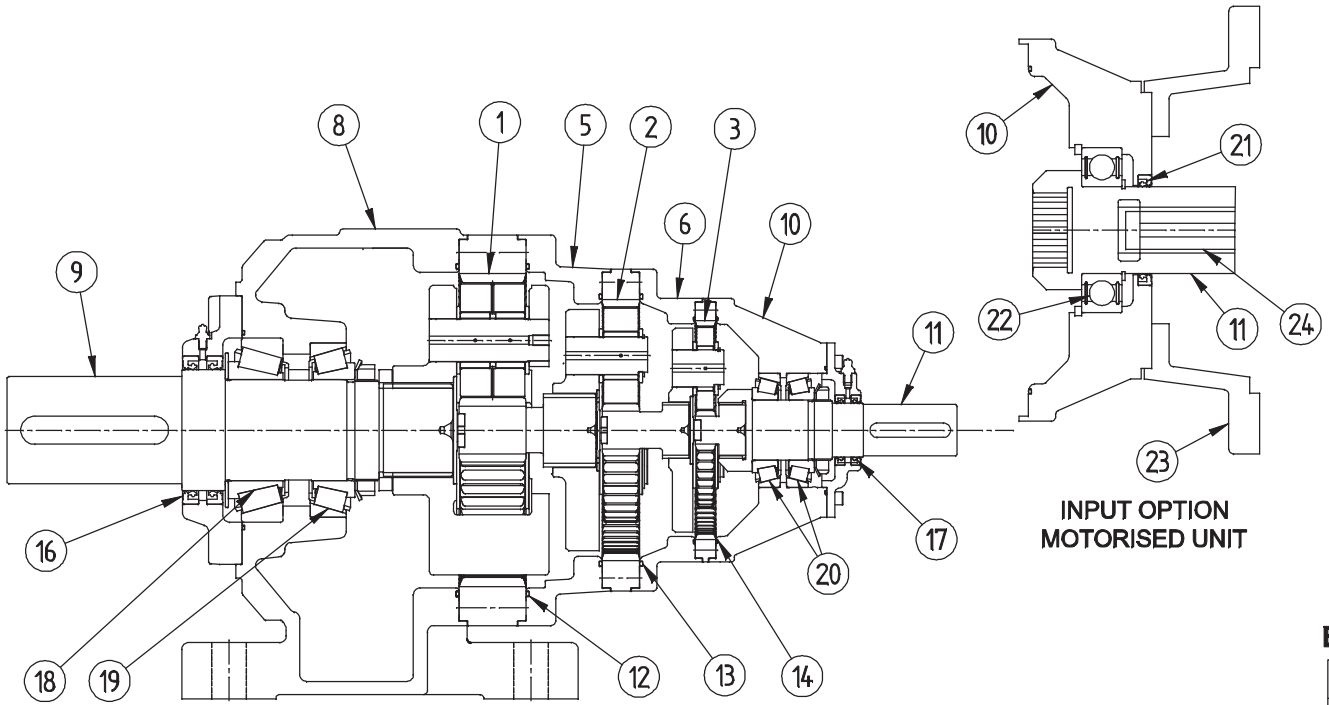
BEARINGS AND OIL SEALS

ITEM	DESCRIPTION	QUAN
12	STAGE 1 - ANNULUS O-RING	2
13	STAGE 2 - ANNULUS O-RING	2
16	OUTPUT SHAFT OIL SEAL	2
17	INPUT SHAFT OIL SEAL	2
18	OUTPUT SHAFT BEARING 1	1
19	OUTPUT SHAFT BEARING 2	1
20	INPUT SHAFT BEARING	2
21	INPUT SHAFT OIL SEAL (MOTORISED UNIT)	1
22	INPUT SHAFT BEARING (MOTORISED UNIT)	1
23	MOTOR FLANGE	1

OUTPUT OPTIONS



PARTS LISTS: Type PL
2 STAGE PLANETARY UNITS



INPUT OPTION
MOTORISED UNIT

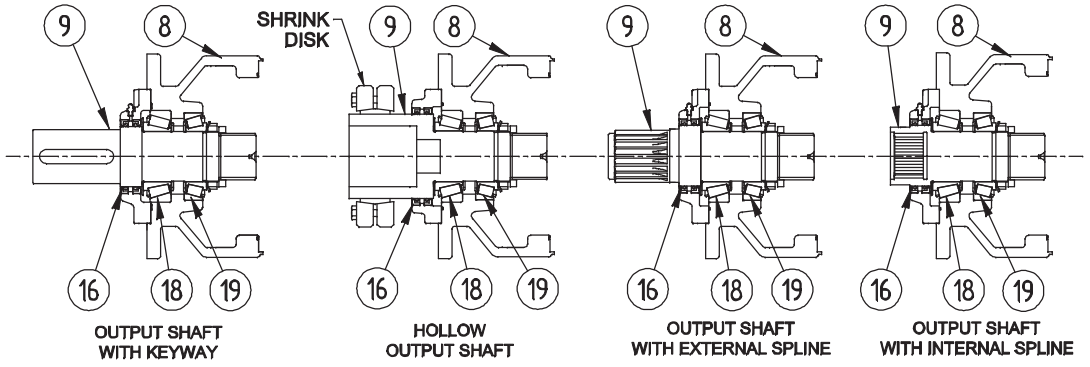
PARTS LIST

ITEM	DESCRIPTION	QUAN
1	STAGE 1- PLANETARY GEAR CELL	1
2	STAGE 2 - PLANETARY GEAR CELL	1
3	STAGE 3 - PLANETARY GEAR CELL	1
5	STAGE 2 - INTER CONNECTING FLANGE	1
6	STAGE 3 - INTER CONNECTING FLANGE	1
8	OUTPUT HOUSING KIT	1
9	OUTPUT SHAFT	1
10	INPUT HOUSING KIT	1
11	INPUT SHAFT	1
24	BUSH (ONLY FOR 63, 80, 90, 160 & 200 FRAME)	1

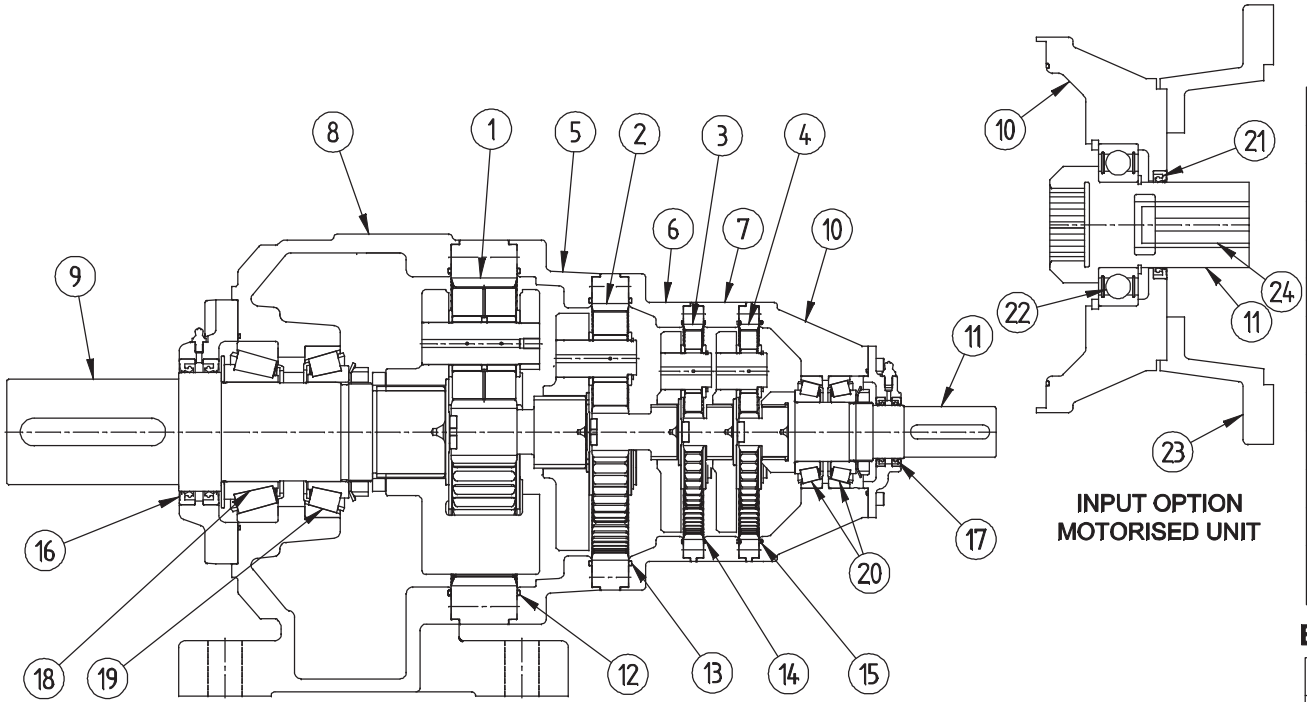
BEARINGS AND OIL SEALS

ITEM	DESCRIPTION	QUAN
12	STAGE 1 - ANNULUS O-RING	2
13	STAGE 2 - ANNULUS O-RING	2
14	STAGE 3 - ANNULUS O-RING	2
16	OUTPUT SHAFT OIL SEAL	2
17	INPUT SHAFT OIL SEAL	2
18	OUTPUT SHAFT BEARING 1	1
19	OUTPUT SHAFT BEARING 2	1
20	INPUT SHAFT BEARING	2
21	INPUT SHAFT OIL SEAL (MOTORISED UNIT)	1
22	INPUT SHAFT BEARING (MOTORISED UNIT)	1
23	MOTOR FLANGE	1

OUTPUT OPTIONS



PARTS LISTS: Type PL
3 STAGE PLANETARY UNITS



INPUT OPTION
MOTORISED UNIT

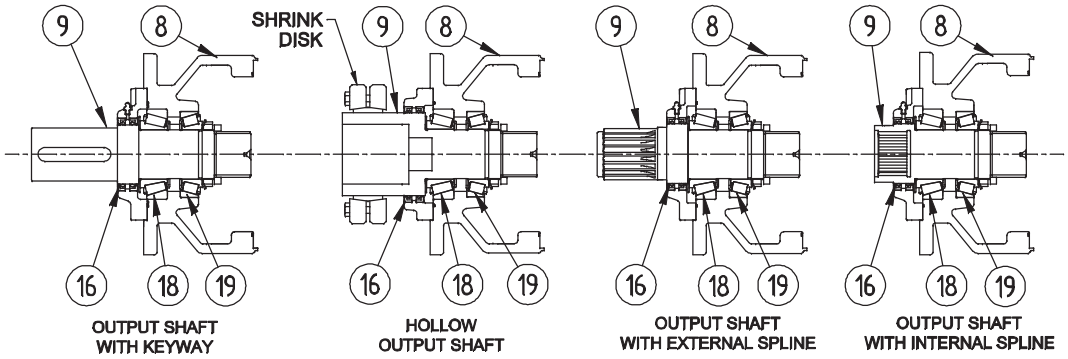
PARTS LIST

ITEM	DESCRIPTION	QUAN
1	STAGE 1- PLANETARY GEAR CELL	1
2	STAGE 2 - PLANETARY GEAR CELL	1
3	STAGE 3 - PLANETARY GEAR CELL	1
4	STAGE 4 - PLANETARY GEAR CELL	1
5	STAGE 2 - INTER CONNECTING FLANGE	1
6	STAGE 3 - INTER CONNECTING FLANGE	1
7	STAGE 4 - INTER CONNECTING FLANGE	1
8	OUTPUT HOUSING KIT	1
9	OUTPUT SHAFT	1
10	INPUT HOUSING KIT	1
11	INPUT SHAFT	1
24	BUSH (ONLY FOR 63, 80, 90, 160 & 200 FRAME)	1

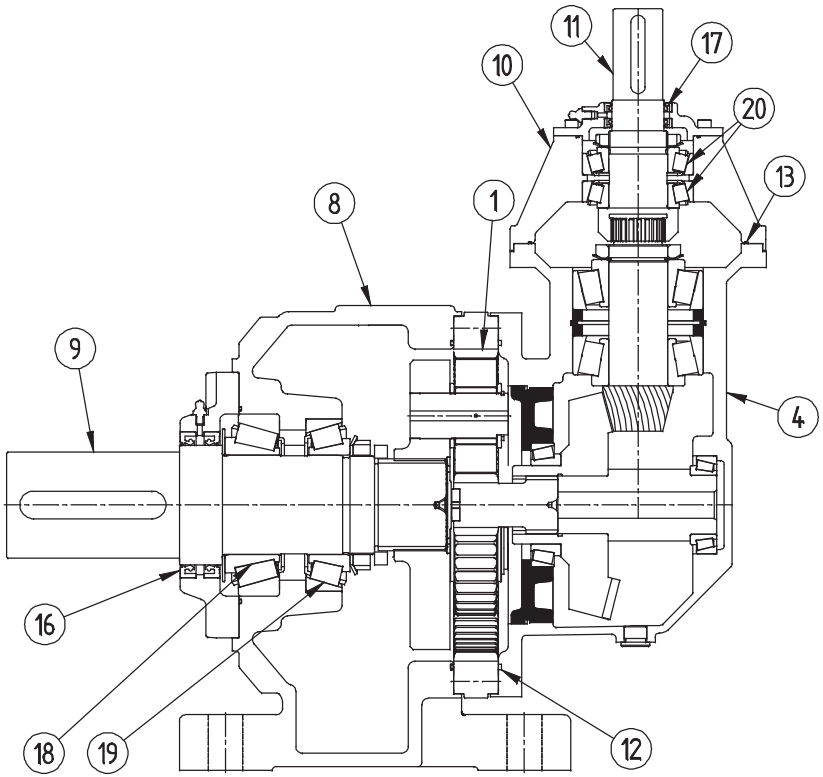
BEARINGS AND OIL SEALS

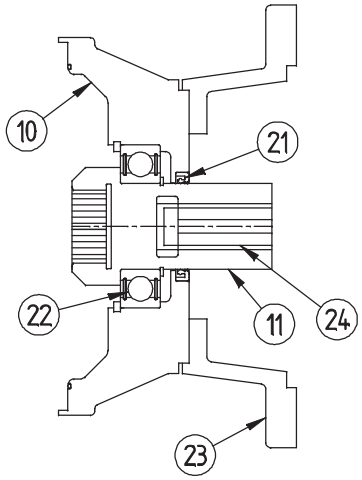
ITEM	DESCRIPTION	QUAN
12	STAGE 1 - ANNULUS O-RING	2
13	STAGE 2 - ANNULUS O-RING	2
14	STAGE 3 - ANNULUS O-RING	2
15	STAGE 4 - ANNULUS O-RING	2
16	OUTPUT SHAFT OIL SEAL	2
17	INPUT SHAFT OIL SEAL	2
18	OUTPUT SHAFT BEARING 1	1
19	OUTPUT SHAFT BEARING 2	1
20	INPUT SHAFT BEARING	2
21	INPUT SHAFT OIL SEAL (MOTORISED UNIT)	1
22	INPUT SHAFT BEARING (MOTORISED UNIT)	1
23	MOTOR FLANGE	1

OUTPUT OPTIONS



PARTS LISTS: Type PL
4 STAGE PLANETARY UNITS





INPUT OPTION
MOTORISED UNIT

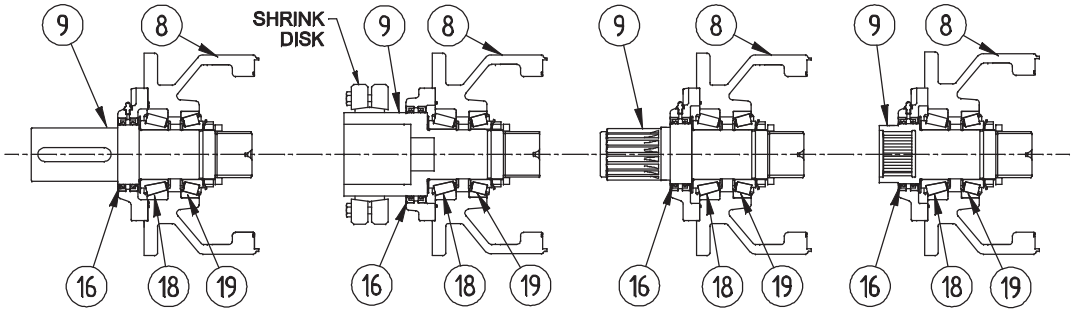
PARTS LIST

ITEM	DESCRIPTION	QUAN
1	STAGE 1- PLANETARY GEAR CELL	1
4	STAGE 3 - BEVEL GEAR MODULE	1
8	OUTPUT HOUSING KIT	1
9	OUTPUT SHAFT	1
10	INPUT HOUSING KIT	1
11	INPUT SHAFT	1
24	BUSH (ONLY FOR 63, 80, 90, 160, & 200 FRAME)	1

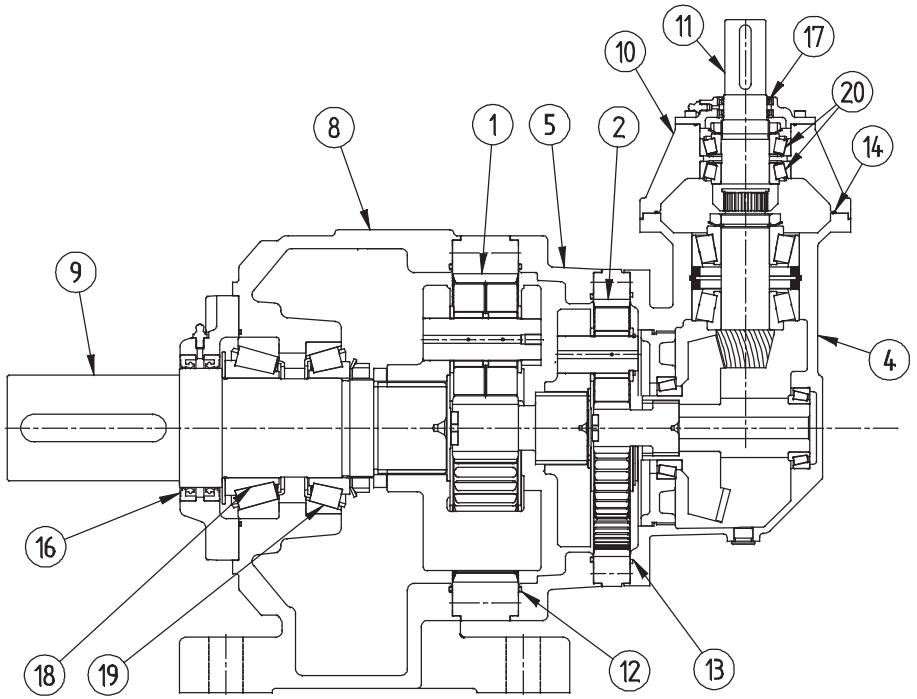
BEARINGS AND OIL SEALS

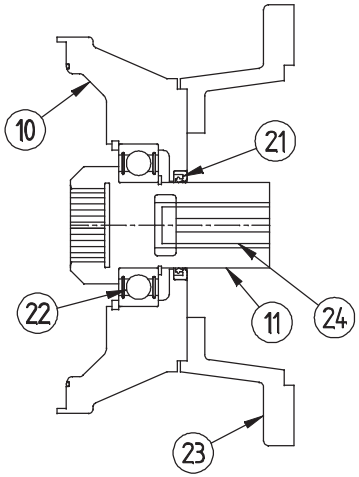
ITEM	DESCRIPTION	QUAN
12	STAGE 1 - ANNULUS O-RING	2
13	STAGE 2 - ANNULUS O-RING	2
16	OUTPUT SHAFT OIL SEAL	2
17	INPUT SHAFT OIL SEAL	2
18	OUTPUT SHAFT BEARING 1	1
19	OUTPUT SHAFT BEARING 2	1
20	INPUT SHAFT BEARING	2
21	INPUT SHAFT OIL SEAL (MOTORISED UNIT)	1
22	INPUT SHAFT BEARING (MOTORISED UNIT)	1
23	MOTOR FLANGE	1

OUTPUT OPTIONS



PARTS LISTS: Type PR
2 STAGE PLANETARY UNITS





INPUT OPTION
MOTORISED UNIT

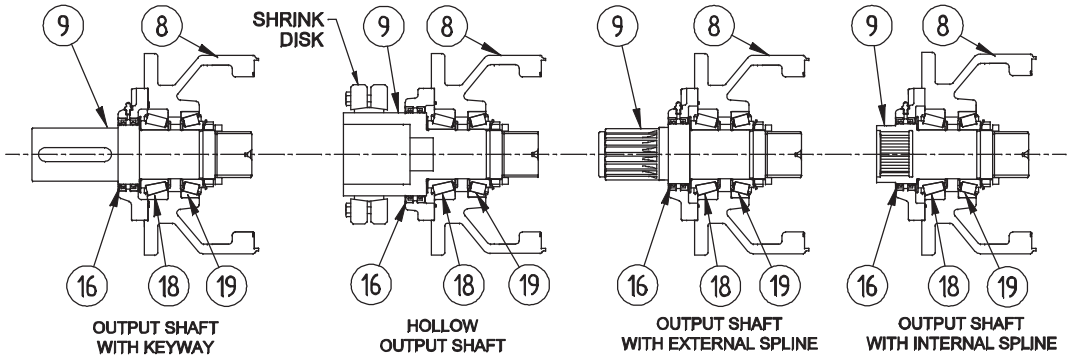
PARTS LIST

ITEM	DESCRIPTION	QUAN
1	STAGE 1- PLANETARY GEAR CELL	1
8	OUTPUT HOUSING KIT	1
9	OUTPUT SHAFT	1
10	INPUT HOUSING KIT	1
11	INPUT SHAFT	1
24	BUSH (ONLY FOR 63, 80, 90, 160 & 200 FRAME)	1

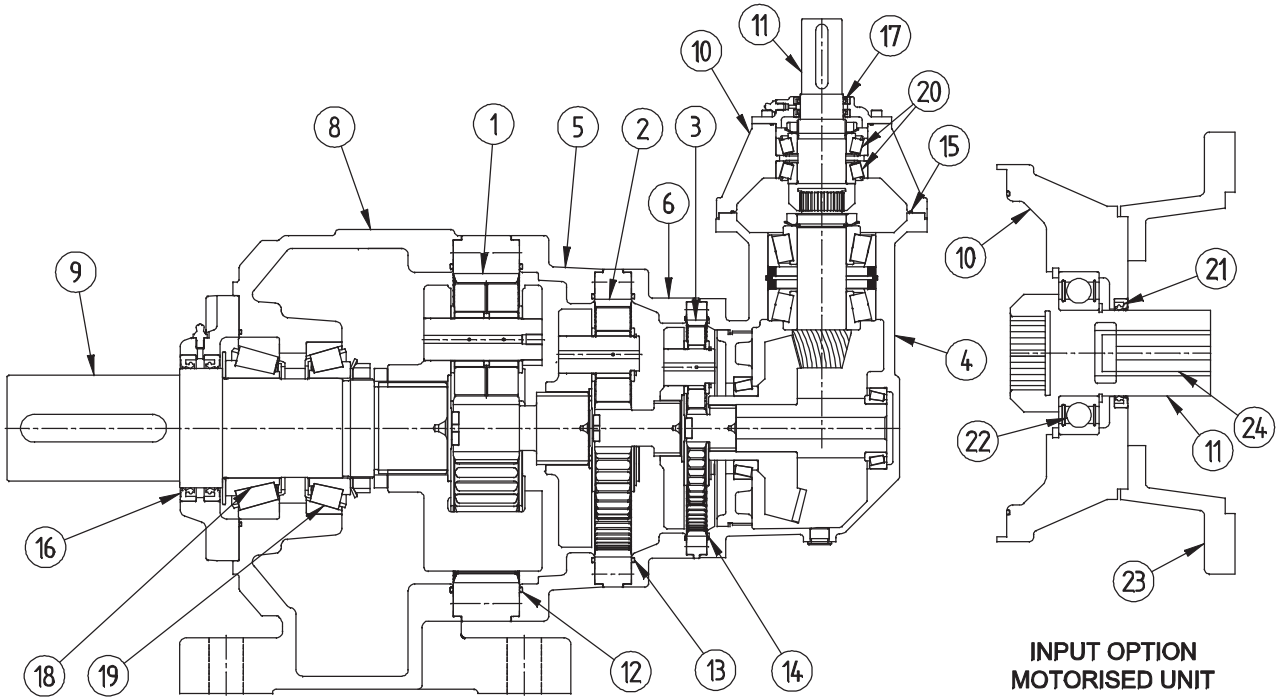
BEARINGS AND OIL SEALS

ITEM	DESCRIPTION	QUAN
12	STAGE 1 - ANNULUS O-RING	2
13	STAGE 2 - ANNULUS O-RING	2
14	STAGE 3 - ANNULUS O-RING	2
16	OUTPUT SHAFT OIL SEAL	2
17	INPUT SHAFT OIL SEAL	2
18	OUTPUT SHAFT BEARING 1	1
19	OUTPUT SHAFT BEARING 2	1
20	INPUT SHAFT BEARING	2
21	INPUT SHAFT OIL SEAL (MOTORISED UNIT)	1
22	INPUT SHAFT BEARING (MOTORISED UNIT)	1
23	MOTOR FLANGE	1

OUTPUT OPTIONS



PARTS LISTS: Type PR
3 STAGE PLANETARY UNITS



INPUT OPTION
MOTORISED UNIT

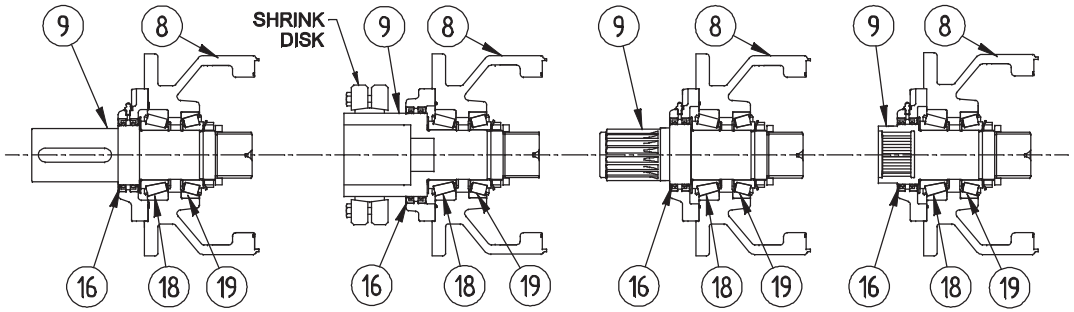
PARTS LIST

ITEM	DESCRIPTION	QUAN
1	STAGE 1- PLANETARY GEAR CELL	1
2	STAGE 2 - PLANETARY GEAR CELL	1
3	STAGE 3 - PLANETARY GEAR CELL	1
4	STAGE 4 - BEVEL GEAR MODULE	1
5	STAGE 2 - INTER CONNECTING FLANGE	1
6	STAGE 3 - INTER CONNECTING FLANGE	1
8	OUTPUT HOUSING KIT	1
9	OUTPUT SHAFT	1
10	INPUT HOUSING KIT	1
11	INPUT SHAFT	1
24	BUSH (ONLY FOR 63, 80, 90, 160 & 200 FRAME)	1

BEARINGS AND OIL SEALS

ITEM	DESCRIPTION	QUAN
12	STAGE 1 - ANNULUS O-RING	2
13	STAGE 2 - ANNULUS O-RING	2
14	STAGE 3 - ANNULUS O-RING	2
15	STAGE 4 - ANNULUS O-RING	2
16	OUTPUT SHAFT OIL SEAL	2
17	INPUT SHAFT OIL SEAL	2
18	OUTPUT SHAFT BEARING 1	1
19	OUTPUT SHAFT BEARING 2	1
20	INPUT SHAFT BEARING	2
21	INPUT SHAFT OIL SEAL (MOTORISED UNIT)	1
22	INPUT SHAFT BEARING (MOTORISED UNIT)	1
23	MOTOR FLANGE	1

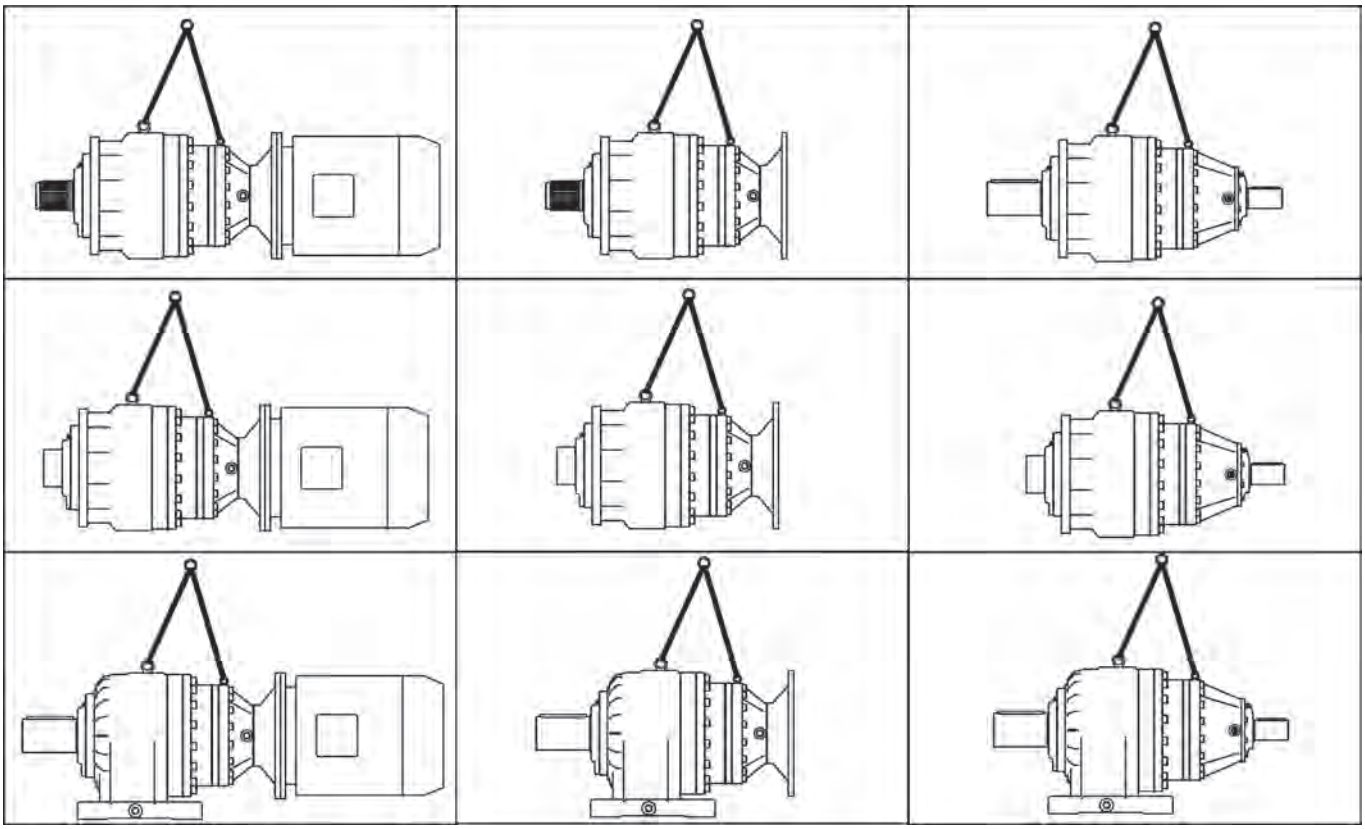
OUTPUT OPTIONS



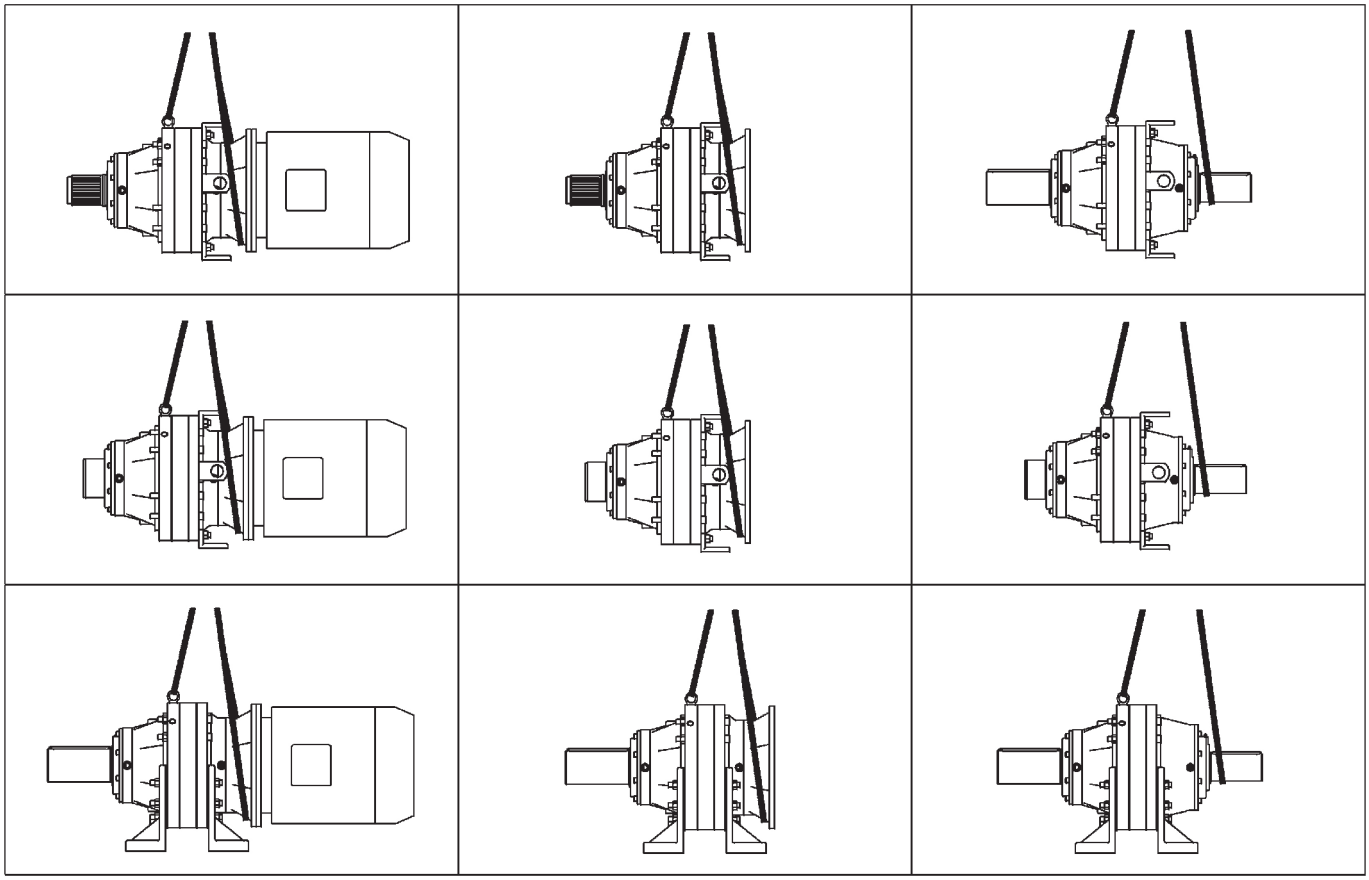
PARTS LISTS: Type PR
4 STAGE PLANETARY UNITS

Different Lifting points on Gear Box

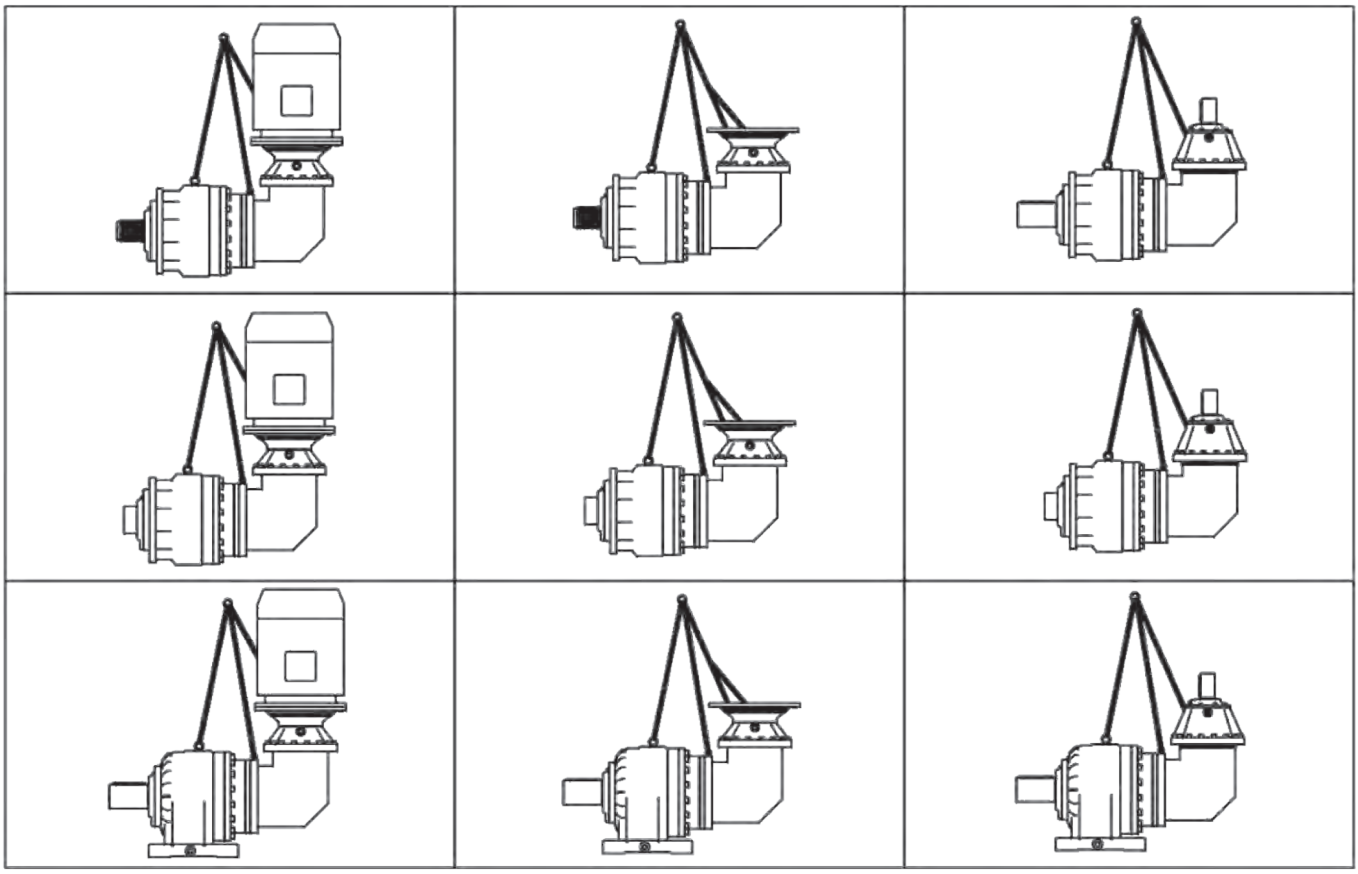
Inline Planetary Gear Box : Model PL01 – PL16



Inline Planetary Gear Box : Model PL25 – PL65

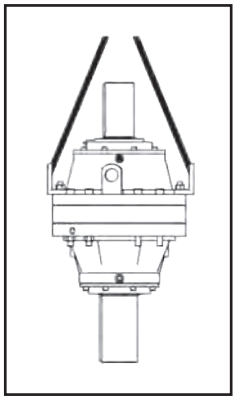


Right Angle Planetary Gear Box : PR



Vertical Mounting

Lifting points will be as per below.



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