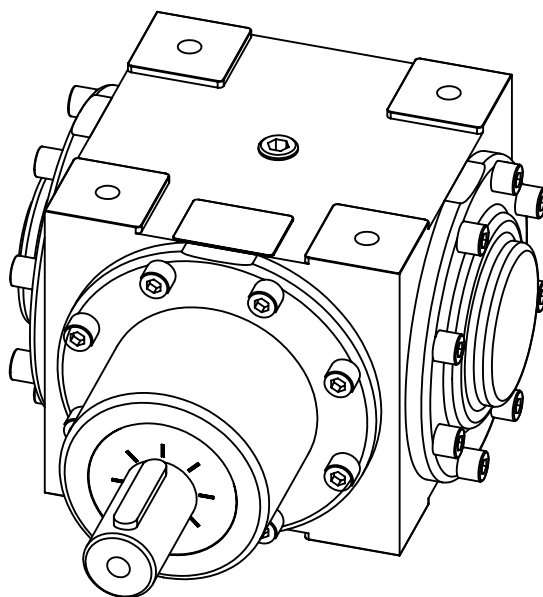
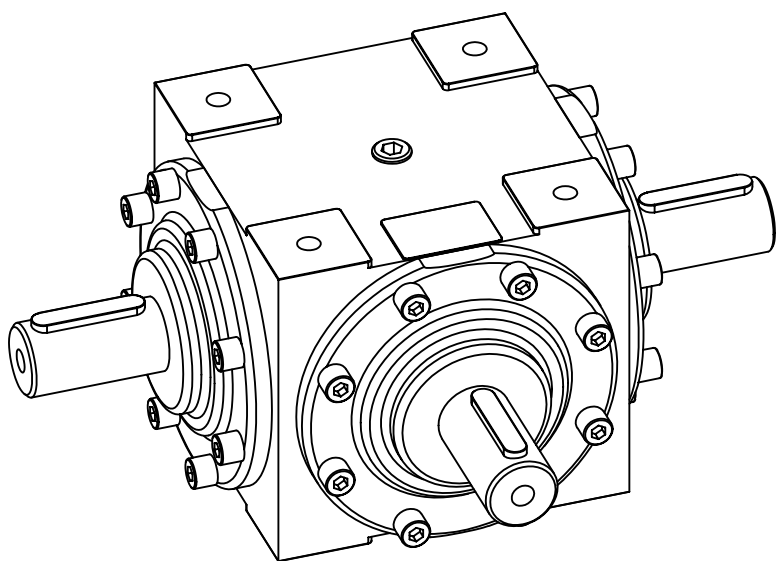


## Range-N

Ultra Compact Spiral Bevel Gearboxes

MM-SBG-N-EN-03

Operation & Maintenance Instructions with Parts List





# Contents

Range-N  
Ultra Compact Spiral Bevel Gearboxes  
SPARES LIST & MANUAL  
MM-SBG-N-EN-03

1. Introduction .....	4
2. Product Code .....	8
3. Standard Performance .....	9
4. Installation .....	10
5. Operation .....	15
6. Maintenance .....	21
7. Recommended Lubricants .....	26
8. Spare Parts .....	27
9. Storage & Warehousing .....	28
10. Disposal of Units .....	29
11. Warranty .....	30
12. General Assembly & Parts List .....	31

## 1.1 Introduction

Range-N bevel gearboxes are exclusively designed for carrying out mechanical power transmission and distribution in accordance with the specification detailed in Power Jacks product information and this maintenance manual.

Any other application other than specified or one going beyond the above mentioned capacity is unauthorised. The manufacturer is not liable for damages resulting from such applications. The user alone has to bear the risk.

Since the screw jacks can be applied in various areas, the user is responsible for the specific application of use.

The Range-N bevel gearboxes have been designed to comply with Machinery Directive 2006/42/EC and with the relevant essential health and safety requirements as applies to the equipment itself. Where fitted, Electric Motors conform with Low Voltage Directive 2006/95/EC and EMC Directive 2004/108/EC.

## 1.2 Safety Instructions in The Operating Manual



This symbol indicates potential dangers to people.  
Comply with the instructions in order to avoid injury.



This symbol indicates potential dangers to the unit.  
Comply with the instructions in order to avoid damage to the unit.



This symbol indicates special information on:

- The best possible use of the unit
- How to facilitate operation of the unit

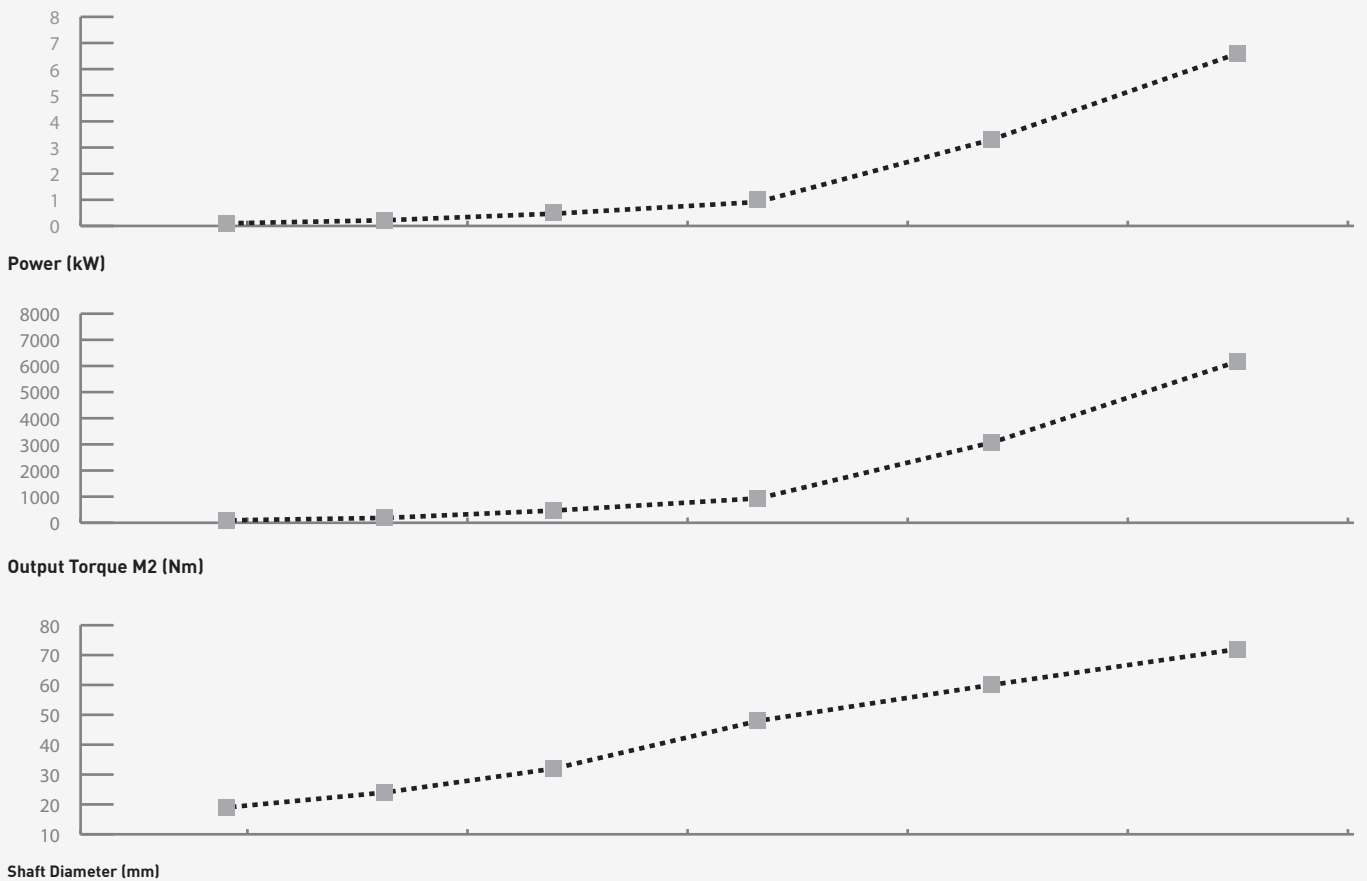
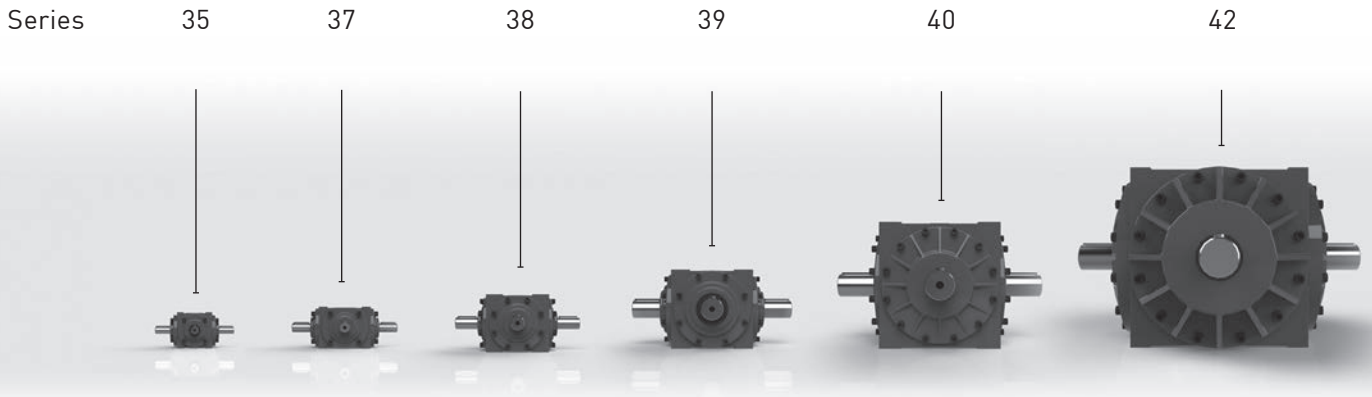
## 1.3 Residual Risk and Hazards

- 1.3.1 Should a risk of damage to material or injury to persons remain despite the structural safety of the Range-N bevel gearboxes, the user must draw attention to such hazards by means of suitable warning notices and written instructions indicating safety precautions.

## 1.4 Operating Personnel

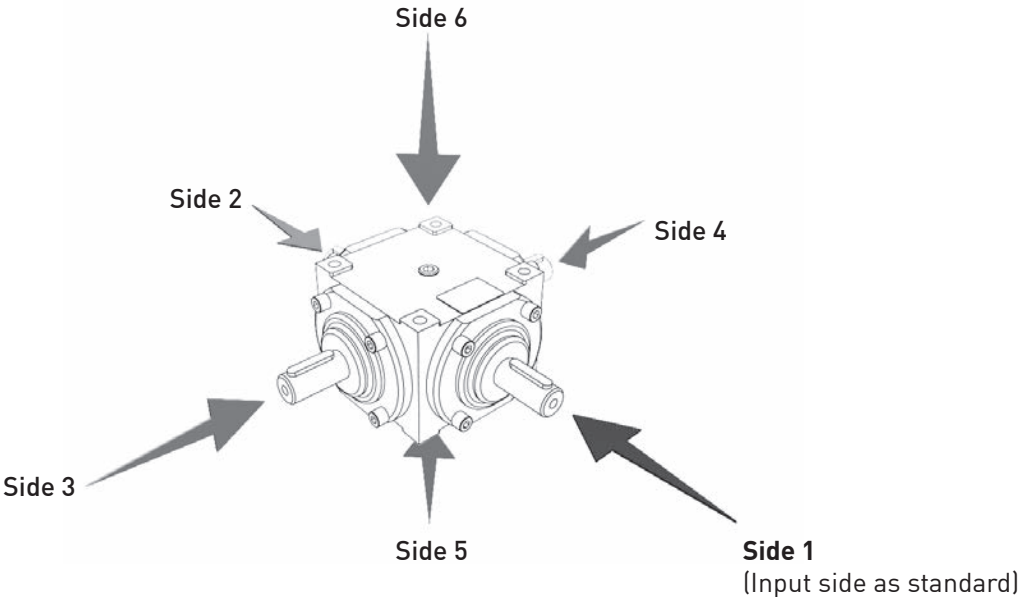
- 1.4.1 The Range-N bevel gearboxes are designed according to state-of-the-art technology and are in line with applicable safety regulations. However, the general risks of personal injury or damage to property connected with the use of such machinery cannot be completely eliminated. Therefore the units may only be assembled and operated by competent and qualified personnel and only be used for the authorised application.
- 1.4.2 Therefore a careful study of this operating manual should be made before attempting to use or service the unit and particular attention should be paid to the safety instructions.
- 1.4.3 Work to be performed on electrical parts, such as:
- Installation of limit switches
  - Mounting of the drive
  - Check of the direction of rotation
- should only be carried out by qualified electricians.
- 1.4.4 The Range-N bevel gearboxes and the installation should be inspected by the operating and supervising personnel for externally visible damage and defects at least once every shift. Any changes (including the operational conditions) which may affect the safety are to be reported immediately.

1.5 Range Overview

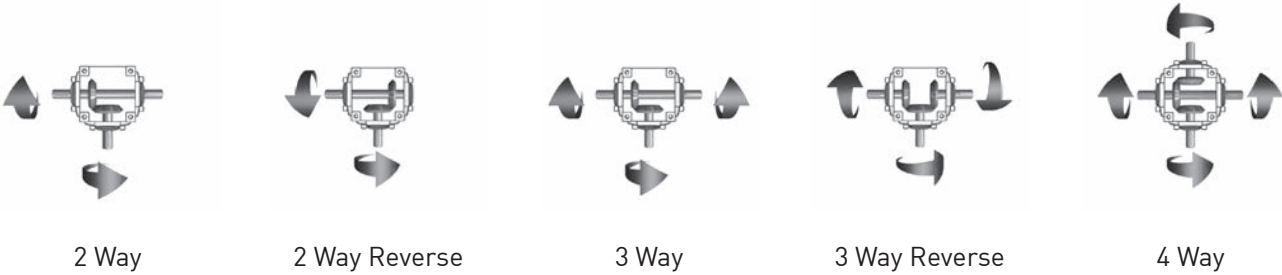


Based on Ratio 1:1, 3way solid shaft, Gear Unit Size

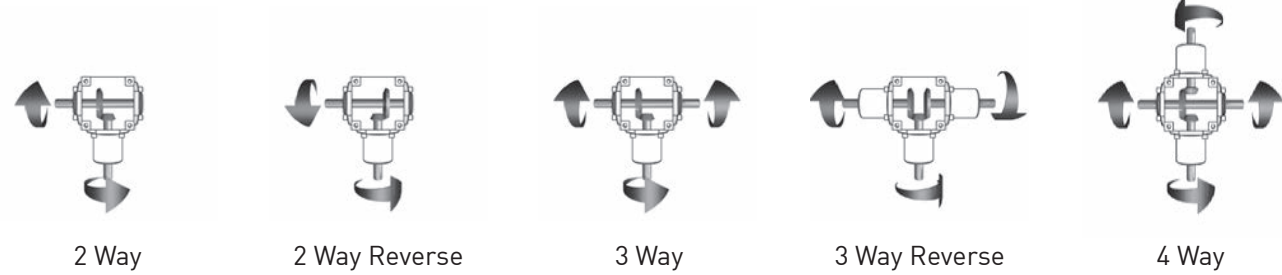
1.6 Configuration Diagrams



Ratio 1:1 & 1.5:1



Ratio 2:1 & Above



Hollow Shaft - All Ratios



## 2.1 Product Code

**N380S30-10M06-0000-0000-000000** N-Range, 38 Series, Standard, Solid Shaft, 4-Way, Standard Gear Configuration, 1:1 Gear Ratio, Metric Shaft (mm) - Spiral Bevel, Standard Material Shafts lubrication and paint.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
N	3	8	0	S	3	0	-	1	0	M	0	6	-	0	0	0	0	-	0	0	0	0	-	0	0	0	0	0	0

## GROUP-1 - Bevel Gearbox Definition

## GROUP-2 - Bevel Gearbox Features

## GROUP-3 - Accessories

## GROUP-1 - Bevel Gearbox Definition

## 1-Bevel Gearbox Range

N	Range
---	-------

2-3 - Gearbox Series	35	37	38	39	40	42
----------------------	----	----	----	----	----	----

4-Gearbox Type	
0	Standard
V	Vertical Shaft

5-Shaft Type	
S	Solid Shaft
H	Hollow Shaft

6-Shaft Number	
2	2-Way
3	3-Way
4	4-Way

7-Shaft Configuration	
0	Standard Gear Configuration
R	Reverse Gear Configuration

8 - Character Space	
---------------------	--

9-10 - Shaft Number	
10	1:1 Gear Ratio
15	1.5 Gear Ratio
20	2:1 Gear Ratio
30	3:1 Gear Ratio
40	4: 1 Gear Ratio

11-Gear & Shaft Design	
M	Metric Shaft (mm) - Spiral Bevel

12-13 - Design Revision	
XX	Internal Numbering System Only #1

16 - Character Space	
----------------------	--



## 2.1 Product Code

## GROUP-2 - Bevel Gearbox Features

15-Gearbox Housing Material	
0	Standard Material (SG Iron)
A	Aluminium
N	Nickel Plated SG Iron Housing
S	Stainless Steel Housing

16-Drive Shaft Design	
0	Standard Material
1	Reinforced for Higher Torque
C	Chrome Plated Drive Shafts
D	Chrome Plated & Reinforced for Higher Torque
N	Nickel Plated Drive Shafts
M	Nickel Plated & Reinforced for Higher Torque
S	Stainless Steel Drive Shafts
T	Stainless Steel & Reinforced for Higher Torque

17-Gearbox Housing Material	
0	Standard - 4 Tapped Holes - Side 5 & 6
5	4 Tapped Holes Side 5 Only
6	4 Tapped Holes Side 6 Only
A	Base Flange - Bolt-On - Side 5
B	Base Flange - Bolt-On - Side 6

18-Environment & Temperature Rating <sup>#8</sup>	
0	Standard
1	High Temperature
2	Low Temperature
N	Radiation Resistant
M	Radiation Resistant & Low Temperature
P	Radiation Resistant & High Temperature
R	Chemical Resistant
S	Chemical Resistant & Low Temperature
T	Chemical Resistant & High Temperature

## 19 - Character Space

20-Drive Shaft Keys - Side-1 (input)	
0	Standard (Closed Keyway) - also select if motor adapter
1	Open Keyway
2	Keyless <sup>#4</sup>

21-Drive Shaft Keys - Side-2	
0	Standard (Closed Keyway)
1	Open Keyway <sup>#2</sup>
2	Keyless <sup>#4</sup>

22-Drive Shaft Keys - Side-3	
0	Standard (Closed Keyway) - also select if hollow shaft <sup>#3</sup>
1	Open Keyway <sup>#2</sup>
2	Keyless <sup>#4</sup>

23-Drive Shaft Keys - Side-4	
0	Standard (Closed Keyway) - also select if hollow shaft <sup>#3</sup>
1	Open Keyway <sup>#2</sup>
2	Keyless <sup>#4</sup>

## 24 - Character Space

## 2.1 Product Code

## GROUP-3 - Accessories

**25-Drive Type**

0	Standard (normal shafts, no extra features)
A	Motor Adapter, Input, B14
B	Motor Adapter, Input, B5
H	Hand Wheel - Side 1 (Input)
J	Hand Wheel - Side 2
K	Hand Wheel - Side 3
L	Hand Wheel - Side 4

**26-Motor Frame Size**

0	Not Applicable
A	63
B	71
C	80
D	90
E	100
F	112
G	132
H	160
I	180
J	200

**27-Drive Shaft Protective Cover**

0	None - Standard
1	Cover- Side 1 (Input)
2	Cover - Side 2
3	Cover - Side 3
4	Cover - Side 4
A	Cover - Side 2 & 3
B	Cover - Side 2 & 4
C	Cover - Side 3 & 4
R	Rotation Indicator (Visual) - Side 1
S	Rotation Indicator (Visual) - Side 2
T	Rotation Indicator (Visual) - Side 3
U	Rotation Indicator (Visual) - Side 4

**28-Breather (Vent)**

0	None (Standard) <sup>#5</sup>
1	Breather fitted Side-1 (Input)
2	Breather fitted Side-2
3	Breather fitted Side-3
4	Breather fitted Side-4
5	Breather fitted Side-5
6	Breather fitted Side-6 <sup>#6</sup>
A	Breather 90deg Type fitted Side-1 (Input)
B	Breather 90deg Type fitted Side-2 <sup>#7</sup>
C	Breather 90deg Type fitted Side-3
D	Breather 90deg Type fitted Side-4
E	Breather 90deg Type fitted Side-5
F	Breather 90deg Type fitted Side-6

**29-Lubricant <sup>#5</sup>**

0	Standard Oil (input speed >250 rpm)
1	Standard Grease (input speed < 250rpm)
2	No Lubricant
A	Food Grade Oil
B	Food Grade Grease
C	Nuclear Grade Oil
D	Nuclear Grade Grease
E	Oil
F	Grease

**30-Paint**

0	Standard Paint (Red)
1	Standard Primer (Grey) Only
2	Standard Epoxy Paint (Red)
3	No Paint

**Notes:**

- #1 Internal design revision number leave as XX and Power Jacks will update at time of order.
- #2 Not applicable to hollow shaft gearboxes.
- #3 Select if hollow shaft gearboxes with standard shaft designs on hollow shaft.
- #4 Keyless shaft design, typically for servo couplings.
- #5 Suitable for horizontal gearbox mounting, running within allowable speed limits for lubrication.
- #6 Common side for breather on horizontally mounted gearbox (on side 5) with oil lubrication
- #7 Common side for 90deg breather on 2-way or 3-way horizontally mounted gearbox (on side 5) with oil lubrication
- #8 The environment and temperature range specified here dictates the seal type and temperature rating of the gearbox, hence temperature rating / type of lubricant as well.
- #9 Type / Grade of lubricant defined by character 29 and 18

### 3.1 Performance Values

Series		35	37	38	39	40	42
Torque (Nm)	Nominal#1	46	115	328	481	1353	6195
	Max Running#2	93	187	505	935	3088	7000
	Max Start-Up	140	281	758	1403	4632	10500
Input Speed	Max (rpm)	3000	3000	3000	3000	3000	3000
Thermal Limit	Power (kW)	3.3	9	20.5	49	90	190
Backlash	arcmin	9 to 16	9 to 16	9 to 16	7 to 10	7 to 10	7 to 10
Efficiency (%)		95% - 98%					
Service Life	(hours)	>10000	>10000	>10000	>10000	>10000	>10000
Housing Material		SG Iron	SG Iron	SG Iron	SG Iron	SG Iron	SG Iron
Oil Quantity	Litres	0.14	0.29	0.75	1.71	3.27	7
	Pints	0.24	0.5	1.32	3	5.75	12.3
Weight (kg)	2 Way - 1:1 & 1.5:1	4.5	10.5	20	38	112	190
	2 Way - 2:1 +	6.5	12	23	45	126.5	215
	3 Way - 1:1 & 1.5:1	4.75	11	20.5	46.5	116	197
	3 Way - 2:1 +	6.75	12.5	23.5	53	131	223

The above tables and other torque & power tables are on the basis of the following nominal values:

- 1 Shock-free operation
- 2 Operating time per day = 8 hours
- 3 Maximum 20 starts per hour (torque x 1.5 permissible)
- 4 Duty cycle 100%
- 5 When selecting gearboxes take the thermal capacity into consideration
- 6 Ambient temperature for operation -10° to +50°C permissible

Notes:

- #1 Nominal torque values at running speeds of 1500 rpm
- #2 Maximum running torque value at speed of 10 rpm
- #3 The oil levels stated in the table above assumes that the gearbox is positioned with all shafts in a horizontal plane. For other shaft orientation please consult Power Jacks.




		Gear	Input Speeds										
Gear Unit Size		Ratio	10	50	100	250	500	750	1000	1500	2000	2500	3000
Series 35	Power (kW)	1:1	0.1	0.4	0.8	1.7	3.1	4.3	5.4	7.4	8.9	10.3	11.6
		1.5:1	0.04	0.2	0.4	0.7	1.4	2.1	2.6	3.7	4.7	5.8	6.8
		2:1	0.03	0.12	0.2	0.5	0.9	1.2	1.6	2.2	2.9	3.6	4.3
		3:1	0.01	0.03	0.06	0.15	0.31	0.5	0.6	0.9	1.2	1.4	1.7
	Output Torque M2 (Nm)	1:1	93	74	74	63	58	53	50	46	41	38	36
		1.5:1	56	56	56	39	39	39	36	34	32	32	31
		2:1	56	44	37	37	33	29	29	27	27	26	26
		3:1	28	16	16	16	17	18	16	16	16	15	15
Series 37	Power (kW)	1:1	0.2	1	2	4.3	7.7	10.8	13.6	18.5	22.6	26.3	30.6
		1.5:1	0.1	0.5	0.8	1.9	3.5	5	6.4	9	11.5	14.3	17
		2:1	0.1	0.3	0.6	1.3	2.5	3.5	4.5	6.4	8.1	10.1	12
		3:1	0.03	0.11	0.2	0.5	0.8	1.2	1.5	2.1	2.8	3.5	4.2
	Output Torque M2 (Nm)	1:1	187	187	187	160	144	134	127	115	105	98	95
		1.5:1	140	140	112	106	98	93	89	84	80	80	79
		2:1	187	112	112	97	93	87	84	79	75	75	74
		3:1	84	61	56	56	44	44	42	39	39	39	39
		4:1	37	44	37	29	29	29	29	28	28	28	
Series 38	Power (kW)	1:1	0.54	2.7	5.3	11.7	21.2	29.9	38	52.6	65.1	76.6	-
		1.5:1	0.2	0.9	1.6	3.4	6.1	8.7	11.1	15.5	19.4	23.6	27.6
		2:1	0.27	0.6	1.2	2.6	4.8	6.9	9	12.8	16.6	20.8	25
		3:1	0.1	0.3	0.5	1.2	2.2	3.1	4	5.7	7.5	9.4	11.1
	Output Torque M2 (Nm)	4:1	0.03	0.13	0.23	0.7	0.9	1.3	1.7	2.4	3.2	4	4.8
		1:1	505	505	495	437	396	373	355	328	304	286	-
		1.5:1	280	252	224	190	171	162	155	145	136	132	129
		2:1	505	224	224	194	179	172	168	159	155	155	155
		3:1	280	168	140	134	123	116	112	106	105	105	103
		4:1	112	97	86	104	67	64	63	59	59	59	59
Series 39	Power (kW)	1:1	1	5	9.8	22.2	38.6	52	62.9	77.2	-	-	-
		1.5:1	0.4	1.8	3.6	9	16.3	23.2	29.7	41.8	52.5	63.6	-
		2:1	0.5	2	3.6	7.9	14.5	20.7	26.6	38	49.5	60.7	71.4
		3:1	0.2	0.8	1.4	3.2	5.9	8.4	10.9	15.6	20.5	25.1	29.4
	Output Torque M2 (Nm)	4:1	0.1	0.4	0.7	1.6	2.9	4.2	5.4	7.7	10.2	12.5	14.7
		1:1	935	935	917	831	722	648	588	481	-	-	-
		1.5:1	505	505	505	505	457	434	416	391	368	357	-
		2:1	935	748	673	591	542	516	497	474	463	454	445
		3:1	561	449	393	359	331	314	306	291	287	281	275
		4:1	374	299	262	239	217	209	202	192	190	187	183
Series 40	Power (kW)	1:1	3.3	16.2	31.8	74.3	126	166	194	-	-	-	-
		1.5:1	1.9	8.9	16.3	36.4	65.6	90.8	112	145	-	-	-
		2:1	1.5	6.8	12.5	28	52	74.8	96.7	139	181	221.5	-
		3:1	0.7	2.6	4.5	10.3	19.2	27.8	36.1	52	68.3	83.6	98.3
	Output Torque M2 (N m)	4:1	0.4	1.5	2.8	7	11.7	16.9	21.9	31.6	42.1	51.5	60.5
		1:1	3088	3032	2975	2781	2358	2071	1815	-	-	-	-
		1.5:1	2667	2498	2288	2043	1841	1699	1572	1356	-	-	-
		2:1	2807	2545	2339	2096	1946	1866	1809	1734	1693	1658	-
		3:1	1965	1459	1263	1156	1078	1040	1013	973	958	938	919
		4:1	1497	1122	1048	1048	875	843	819	788	787	771	754
Series 42	Power (kW)	1:1	7.5	37.4	74.8	187	374	558	-	-	-	-	-
		1.5:1	3.5	17.3	34.5	86.1	172	245	310	-	-	-	-
		2:1	3.7	17.6	32.6	73.8	138	198	255	361	-	-	-
		3:1	0.72	3.6	7.2	18	37.1	53.4	68.3	98.4	128.5	157.3	-
	Output Torque M2 (N m)	4:1	1	3.7	6.7	14.9	28	40.6	52.8	76.3	97.7	119.7	140.8
		1:1	7000	7000	7000	7000	7000	6962	-	-	-	-	-
		1.5:1	4913	4856	4842	4834	4828	4585	4351	-	-	-	-
		2:1	6925	6588	6101	5525	5165	4941	4772	4504	-	-	-
		3:1	2021	2021	2021	2021	2083	1998	1917	1841	1803	1766	-
		4:1	3743	2770	2508	2231	2096	2026	1976	1904	1828	1772	1756

Power Ratings (kW) @ given INPUT speeds (rpm)  
Output Torque M2 (Nm) @ given INPUT speeds (rpm)

Check Thermal Limit - Power

Check Thermal Limit - Torque




## 4.1 General Installation Notes

- 4.1.1 Before installing new parts, remove any rust preventative, protection grease etc.
- 4.1.2 Check before immediate installation for possible transit damage.
- 4.1.3 Components which have been stored for a long time (over 1 year) should be re-lubricated in working conditions before they are put into operation.
- 4.1.4 Before putting the Range-N bevel gearbox(es) into service, the User must ensure that the plant in which it is installed complies with all applicable directives, especially those regarding health and safety at work.
-  4.1.5 Handle the bevel gearbox with care. The Range-N bevel gearboxes should be handled with care to avoid damaging the machined drive shafts.
- 4.1.6 Before putting the units into service, check the lubricant level. If necessary top up the lubricant to the required level.
-  4.1.7 All Neeter Drive Range-N gearboxes are shipped without lubrication, except for grease filled units.
-  4.1.8 Do not mix oil or greases of different nature or specifications.
- 4.1.9 If the same type of lubricant already in use is not available, remove all of the existing lubricant completely and flush its interior thoroughly with a light solvent before refilling with a new lubricant.
- 4.1.10 The structure on which the Range-N bevel gearbox(es) are mounted must have ample strength to carry the maximum torque, and should be rigid enough to prevent undue deflection or distortion of the bevel gearbox supporting members.
- 4.1.11 It is essential that the Range-N bevel gearbox(es) be carefully aligned during installation so that the drive shafts are running true and the connecting shafts are exactly in line with each drive shafts.
- 4.1.12 When installing several bevel gearbox(es) to move a common item / structure, the gearboxes should first be connected to the structure (refer 4.4). The bevel gearbox drive shafts should then be connected taking care not to turn the drive shaft and lose the any relative position for the installation.
- 4.1.13 After the Range-N bevel gearbox(es) is installed, shafting, gearboxes, motors, etc., are coupled together it should be possible to turn the main drive by hand (no load on condition). If there are no signs of binding or misalignment, the bevel gearbox system is then ready for normal operation.
- 4.1.14 After the Range-N bevel gearbox(es) are installed, they should be operated through their full rotation ten to twenty times under minimum load conditions. If the arrangement operates satisfactorily and there are no signs of binding or misalignment the Range-N bevel gearbox(es) are ready for normal operation. Refer to section 5 for typical operating performance checks.

## 4.2 Unpacking and installation

- 4.2.1 Remove the Range-N bevel gearbox(es) from their container. Dispose of the packaging material and the desiccant in an environmentally friendly way.
- 4.2.2 If it is necessary and in order to avoid damages, please use soft straps to transport or mount the bevel gearbox.

## 4.3 Mounting

- 4.3.1 Before starting assembly work, check the directions of rotation of all, gearboxes and drive motors with regard to the required direction of rotation of each gearbox in the application.
- 4.3.2 All components must be carefully aligned, as alignment errors increase stress and power consumption and lead to overheating and premature wear.
- 4.3.3 When installing bevel gearbox(es), ensure that the mounting face is flat and square to the drive line, to within 0.4/1000 millimetres.
-  4.3.4 Before attaching the drive unit, the bevel gearbox should be turned through 10 to 20 revolutions by hand, without load. Variations in the amount of torque required and/or marks on any guides indicate alignment errors. Loosen the relevant mounting bolts and adjust positioning until the correct alignment is achieved.
- 4.3.5 All mounting bolts must be re-tightened after a short period of operation.
- 4.3.6 Mount the bevel gearbox by fixing the bevel gearbox body to the structure by either its standard base mounting points or via a mounting accessory like a base feet. The drive shaft ends should then be coupled to the associated drive line(s).
-  4.3.7 Take care when fitting couplings. A blow on a shaft end could cause gear set damage.
-  4.3.8 Shaft alignment is critical, check on installation

## 4.4 Drive Motor

- 4.4.1 Power Jacks recommend that when you purchase a bevel gearbox requiring a motor mounted directly to the bevel gearbox this is purchased as a complete item from Power Jacks. The motor is then pre-assembled to the bevel gearbox. If you have opted to fit a motor yourself below is a typical procedure for common motor types.
- 4.4.2 Before mounting the drive motor, check the direction of rotation of the bevel gearbox drive shafts relative to the motion of the drive system. Also check the operation of any limit switches fitted to the unit.
- 4.4.3 Place the motor into the mounting position next to the bevel gearbox.
- 4.4.4 Connect the motor to the power source and switch on the motor. Check the direction of rotation, in association with the safety limit switches (if necessary, change the direction of the motor shaft rotation). Once this check is complete disconnect the motor from the power source.
- 4.4.3 For standard designs the motor directly plugs into a hollow input shaft on the bevel gearbox. However for some special designs a flexible coupling with elastomeric element is used to connect the two drive shafts.
- 4.4.4 If this is the case attach one hub of the coupling half to the drive shaft of the bevel gearbox.
- 4.4.5 Push the elastomeric element (spider insert) onto the coupling hub now on the gearbox.
- 4.4.6 Mount the second coupling hub onto the drive shaft of the motor.
- 4.4.7 Attach the motor to the motor adapter flange using 4 screws. Remember to radially orientate the motor to the correct position for your application.
- 4.4.8 Gearboxes with integrated motor mounting flanges share common components with the standard gearboxes, however the motor flange and input pinion are different and vary on every unit dependant upon ratio and flange size / style. For a parts list of items in a motor-flanged unit please contact Power Jacks with the unit model number and serial number.

#### 4.5 Limit Switches – Fitted To Protective Shaft Cover

- 4.5.1 Power Jacks recommend that when you purchase a bevel gearbox requiring limit switches mounted directly to the bevel gearbox this is purchased as a complete item from Power Jacks. The limit switches are then pre-assembled to the bevel gearbox provided suitable to transport. However always reset and check limit switch operation when installing the bevel gearbox. The following procedure is for limit switches fitted to a protective cover for a drive shaft (e.g. backup manual drive).
- 4.5.2 Detach the protective shaft cover by loosening the mounting bolt.
- 4.5.3 Fit the limit switch to the cover.
- 4.5.4 Fit the cover with limit switch to the gearbox and bolt in position.
- 4.5.5 Check that the limit switch triggers at the correct point when the cover is unbolted from the gearbox.
- 4.5.6 If necessary, repeat the procedure.

#### 4.6 Limit Switches – Rotary Cam Type (RLS)

- 4.6.1 Power Jacks recommend that when you purchase a bevel gearbox requiring a Rotary cam type Limit Switch (RLS) mounted directly to the bevel gearbox this is purchased as a complete item from Power Jacks. The RLS unit is then pre-assembled to the bevel gearbox. If you have opted to fit a RLS unit yourself below is a typical procedure for common RLS unit types. However always reset and check limit switch operation when installing the bevel gearbox.
- 4.6.2 Before mounting the RLS unit, check the direction of rotation of the bevel gearbox drive shafts relative to the motion of the drive system.
- 4.6.3 Place the RLS unit into the mounting position next to the bevel gearbox.
- 4.6.4 Typically a flexible beam coupling is used to connect the two drive shafts.
- 4.6.5 Attach the beam coupling to the drive shaft of the bevel gearbox.
- 4.6.6 Attach the RLS unit to the adapter flange using 4 screws. Make sure that the drive shaft of the RLS unit fully engages in the beam coupling. Tighten the clamp screw of the beam coupling. Remember to radially orientate the RLS unit to the correct position for your application.

#### 4.7 Regulations



The following regulations must be complied with:



- The relevant local regulations for the prevention of accidents.
- Generally recognized safety regulations.
- National regulations.



## 5.1 Operational Recommendations

- 5.1.1 Select a bevel gearbox which has a rated capacity greater than the maximum input power that may be imposed on it.
-  5.1.2 The maximum input shaft speed for these bevel gearboxes should not exceed 3000 R.P.M. Refer to Power Jacks Limited for higher shaft speeds.
-  5.1.3 The lead screws should not be permitted to accumulate dust and grit on the threads. If possible, lead screws should be returned to the closed position (retracted) when not in use.
- 5.1.4 If equipped with bellows boot the boot must not be compressed below its minimum height (consult Power Jacks product literature or engineers).

## 5.2 Operational Features

- 5.2.1 Does it matter which shaft I use as my input

As standard the units are supplied with the shaft 1 or sometimes referred to as A as the input. It is also the shaft, which is housed, in an extended housing on ratios above 1.5:1 on the range N. When using a 1:1 ratio gearbox it does not matter which shaft is used as the input as the speed will remain constant. However it is important to ensure that the correct shaft is used on higher ratios other wise the unit will end up increasing the speed.

- 5.2.2 Can I use the bevel gearboxes as speed increasers

All units can be used as speed increasers, by inputting on the output side of the gearbox, however it is important to check that the unit can handle the power and speed. When using as an increaser it is usually the input speed that is important, do not exceed the catalogue recommended maximum speed. Special units are available where the pinion can be put on the through shaft so that two outputs increase the speed, please request details on this.

- 5.2.3 When I look at the bevel gearbox shaft arrangement/rotational diagrams, how should I interpret these

When looking at the bevel gearbox shaft arrangement diagrams, the gearboxes are shown in plan view, but the actual rotational arrows are representative of the output shaft rotations viewed from the end of the shaft looking directly at it. A good visualisation of the gear arrangement can also be seen on the 3D CAD models for the Range-N bevel gearboxes configurable online. You can view the model with a transparent housing just to check gear orientation.

- 5.2.4 Is there a safety margin built into the power/torque figures for the bevel gearboxes?

There are safety margins built into the figures, but the tabulated figures should not be exceeded, so that the units work for efficiently and correctly for their intended life time.

- 5.2.5 What is the best method of fitting couplings to the shafts of a bevel gearbox

It is very tempting to tap couplings onto the shafts using a hide mallet, but this is a method which is not recommend, as a sharp blow to the shaft end can damage the bearings. The preferred method of fitting is to use the tapped hole in the end of the shaft and a bar with a hole drilled through it. Put the correct size screw through the hole and wind the coupling on.

5.2.6 Does my bevel gearbox need a vent

Some of the units in the ranges are supplied with a vent, others are not.

The Range N do not have breathers fitted as standard. All other units are either supplied with breathers pre-fitted, or will be supplied with the unit to be fitted after oil fill. If the unit is to run at very high speeds, then we would suggest fitting a breather, please consult us if you intend to run a unit extremely fast.

5.2.7 Are the bevel gearboxes supplied filled with oil

Range-N is supplied dry (no lubricant).

All units will require filling with oil prior to installation. Note - For low speed applications (250 rpm input speed and below) gearboxes may be recommended to have semi-fluid or grease lubrication. Consult Power Jacks for advice.

5.2.8 How often should I change the oil in the bevel gearboxes

This depends on how often the unit is run and the type of oil that has been supplied with the unit (if pre-filled).

For all other units we recommend changing the oil every six months or 2,500 operating hours.

5.2.9 Is it possible to fill the bevel gearboxes with grease

We recommend filling the units with grease or semi-fluid grease if the units are operating at speeds of 250rpm or below.

5.2.10 What is the maximum recommended case temperature for a bevel gearbox

The case temperature must not exceed 80°C.

5.2.11 Can you manufacturer me a bevel gearbox with special shafts, case material etc?

We can adapt a unit to your specification

5.2.12 Some of the bevel gearboxes have a maximum speed, how is this calculated

The maximum pinion speed is based upon a pitch line velocity of 762M/min (2500ft/min)

5.2.13 How efficient are spiral bevel gearboxes?

The units efficiency ranges from 95 to 98%

5.2.14 I notice that the noise of the unit and case temperature reduce when the units are fully operational.





It is known that the noise and temperature levels do drop when the units are under load, this is due to the bearings and gears working rather than running idle.

5.2.15 Are spares available for the various ranges for bevel gearboxes

The Range-N can be repaired or spares fitted, although it is worth noting that if all internal components need replacing then it would be cheaper to purchase new units. If units need repairing we would recommend returning them to the factory, where they can be rebuilt with the correct backlash and alignment.

When disposing of gearboxes and lubricant please do so in an environmentally responsible manner.

### 6.1 General Maintenance Notes

-  6.1.1 Maintenance and replacement work must be done by an expert maintenance technicians trained in the observance of applicable laws on health and safety at work and the special ambient problems attendant on the installation.
-  6.1.2 Before doing any work on the unit, the operator must first switch off power to the bevel gearboxes drive system and ensure that it is out of service, as well as taking all necessary precautions against it being accidentally switched on again or its parts moving without warning.
-  6.1.3 All additional environmental safety precautions must be taken (e.g. elimination of residual gas or dust, etc.).
-  6.1.4 Before doing any maintenance work, activate all safety equipment and, if necessary, inform persons working in the vicinity. In particular, mark off the area around the unit(s) and prevent access to any equipment, which, if activated, might be the cause of unexpected health and safety hazards.
- 6.1.5 Replace worn components with original spare parts only.
- 6.1.6 Use the lubricants (oil and grease) recommended by the Manufacturer.
- 6.1.7 When working on the units, always replace gaskets and seals with new original ones.
- 6.1.8 If a bearing requires replacement, it is good practice to also replace the other bearing supporting the same shaft.
- 6.1.9 Power Jacks recommend replacing the lubricant after all maintenance work where a unit has been dismantled (completely or partially).
- 6.1.10 The above instructions are aimed at ensuring efficient and safe operation of the Range-N bevel gearbox
- 6.1.11 The Manufacturer declines all liability for injury and damage to components due to the use of non-original spare parts and non-routine work, which modifies the safety requirements without the express prior authorisation of the Manufacturer.
- 6.1.12 Refer to the specific spare parts list when ordering spare parts for products.
- 6.1.13 Do not dump polluting liquids, worn parts and maintenance waste into the environment. Dispose of all such materials as stipulated by applicable legislation.

## 6.2 Regular Maintenance

Also refer to section 6.3

### 6.2.1 Lubrication of the Bevel Gearbox



6.2.1.1 IMPORTANT NOTE – The bevel gearboxes are shipped dry and are fitted with a warning label. Before operation the gearbox must be filled with the correct lubricant type and quantity.

6.2.1.2 IMPORTANT NOTE – Lubricant suitability is dependent on duty cycle and ambient temperature. However in general recommended lubricants in section 7 are suitable for operation in an ambient temperature of -10°C to +50°C. If in doubt consult with Power Jacks prior to installation and operation.

6.2.1.3 The maintenance engineer should establish a lubrication programme based on the bevel gearboxes duty and use.

6.2.1.4 The information given below assumes that the gear unit is positioned with all shafts in a horizontal plane.

6.2.1.5 For input speeds up to 1500 RPM the oil level in the gear unit should be maintained just below the centerline of the shafts. A sight glass or level plug is provided for level indication.

6.2.1.6 A change of oil may be required for speeds of 1500 RPM or above, and Power Jacks should be consulted.

6.2.1.7 For input speeds of 250 RPM or below grease lubrication should be used.



6.2.1.8 Important Power Jacks should be advised when a gear unit is installed with a shaft positioned vertically.

6.2.1.9 If the gearbox uses a grease lubricant then excessive grease application should be avoided.

6.2.1.10 If the bevel gearbox or its system is fitted with a brake ensure that under no circumstances lubricant gets into the brake as this can cause brake failure due to loss of friction.

### 6.3 Lubrication Intervals - General

6.3.1 Regularly check and top up lubrication in the Range-N bevel gearbox(es).



6.3.2 Refer to section 7 for recommended lubricants.

Item	Operation Type	Lubrication Interval	Lubricant Type
1	Normal	Check & lubricate as required every 1 month	Input Speed > 250 rpm = Oil. Refer Section 7 Table 1 Input Speed ≤ 250 rpm = Grease. Refer Section 7 Table 3
2	Arduous	Check & lubricate as required every 1 week	Consult Power Jacks for suitable lubricant

6.3.3 A new bevel gearbox should be drained after 100 hours of operation and cleaned using a light flushing oil. After this the bevel gearbox oil should be changed every six months or 2500 operating hours.



6.3.4 Where severe operating conditions are encountered more frequent oil changes are advised.

6.3.5 The gear unit should be warm when an oil change is undertaken.

6.3.6 Check oil levels regularly.

### 6.4 Check Unit Operational Performance

6.4.1 Remove dust / dirt / debris deposits from the unit(s).

6.4.2 Check that noise at constant load does not vary. Excessive vibration or noise can indicate wear of a gear in a gearbox or failure of a bearing.

6.4.3 Check for lubricant leaks from the gaskets/seals, caps and casings.

6.4.4 Check all bolted joints/couplings for wear, deformation or corrosion and tighten them down fully without over tightening.



6.4.5 A periodic check of backlash between bevel gear set is recommended to check wear on internal threads of worm gear. Backlash in excess of 50% thread thickness indicates that a replacement will be necessary to replace the bevel gear set assembly.

6.4.6 If driven by an electric motor check the power absorption and voltage against the nominal values given on the motor's nameplate.



6.4.7 The bevel gearbox operates with a maximum case temperature of 80°C. If this temperature is exceeded Power Jacks should be consulted.

### 6.5 Repair of Power Jacks E-Series Screw Jacks



6.5.1 Power Jacks recommend that a Range-N bevel gearbox is returned to Power Jacks for repair. A full inspection and repair service is available.

## 6.6 Rebuild Procedure

Power Jacks recommend the following procedures for assembly and disassembly of a Range-N bevel gearbox.

- 6.6.1 Tag critical parts to facilitate reassembly.
- 6.6.2 Place all screws, washers and other small fixing components in a tagged bag/box with the associated product on which they are to be used referenced on the tag.
- 6.6.3 Mark mating surfaces to ensure proper meshing.
- 6.6.4 Clean and lubricate all parts as required.
- 6.6.5 All seals must be replaced when rebuilding.
- 6.6.6 All screws, washers and other small component parts must be replaced if damaged in any way.
- 6.6.7 Replace damaged or “frozen” lubrication fittings with new ones.

## 6.7 Dis-mantle & Rebuild Procedure for Gear Ratio 1:1 & 1.5:1 Units

- 6.7.1 Remove oil fill / drain plugs and drain oil from unit
- 6.7.2 Remove external shaft keys and ensure no sharp edges remain around keyways
- 6.7.3 Remove set screws from input shaft end cap
- 6.7.4 Slide off end cap , taking care not to damage oil seal – it is recommend that all oil seals and “O”-rings are replaced
- 6.7.5 Lift out input gear sub assembly
- 6.7.6 To disassemble input gear sub assembly remove circlip if fitted, and remove bearings. The gear is pressed onto the shaft and will need to be pressed off, care must be taken not to damage shaft. On some units the 1.5:1 ratio input gear and shaft are integral – this can be seen upon removal of the bearings.
- 6.7.7 Remove end caps from each side of the output shaft as detailed in 6.1.4 above
- 6.7.8 Remove gaskets, noting the amount and colours and retain for reassembly
- 6.7.9 Note which end the gear sits inside the case, as this will affect the shaft rotation.
- 6.7.10 Remove bearing from the end opposite to the one where the gear is fitted.
- 6.7.11 Slide out output gear sub assembly
- 6.7.12 To disassemble output gear sub assembly remove bearing behind gear. The gear is pressed onto the shaft and will need to be pressed off, care must be taken not to damage shaft.
- 6.7.13 If needed – remove inner bearing cup and steel shims, retain shims for later use.

- 6.7.14 Clean and check all parts for damage or excessive wear and replace where necessary, paying special attention to seals and "O" rings.
- 6.7.15 Assemble the input shaft – do not fit into gear case yet.
- 6.7.16 Assemble the gear assembly onto one end of output shaft
- 6.7.17 Put output shaft into gear case, ensuring it is in the same place as when disassembled and fit rear bearing.
- 6.7.18 Fit shaft end cap this is a blank cover for 2 way and 2 way reverse units or bored out cover for 3 ways units.
- 6.7.19 When fitting the shaft end cap replace the same amount and colour of gaskets as removed from disassembly.
- 6.7.20 Bolt on shaft end cap.
- 6.7.21 Fit other shaft end cap using the gaskets removed – as detailed above.
- 6.7.22 Bolt on shaft end cap – when fitting this cover, avoid putting extensive pre-load onto the bearings, if necessary fit extra gaskets.
- 6.7.23 Ensure the shaft assembly turns freely and smoothly.
- 6.7.24 Fit centre bearing cup, ensuring the steel shims are fitted behind it.
- 6.7.25 Place the input gear sub assembly into the case.
- 6.7.26 Fit shaft end cap replace gaskets as detailed in 6.1.20 above, do not over tighten shaft end cap damaging bearings
- 6.7.27 Rotate the shafts (1 & 2) to ensure they rotate freely and smoothly
- 6.7.28 If too tight or too much backlash then the assembly will need to be adjusted using additional gaskets under the input shaft end cap and "gear side" shaft end cap on the output and removal of gaskets from the rear cover end.
- 6.7.29 Check gear unit backlash. The backlash is measured in minutes of arc, measured on the output shaft, by locking input shaft Backlash figures are detailed in the table in 6.1.31 below.



## 6.7.30 Backlash figures

Series	35		37		38		39		40		42	
Ratio	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
1:1	12	24	16	21	13	20	12	16	9	13	9	13
1.5:1	10	20	13	22	10	17	10	13	8	11	8	11
2:1	9	18	8	15	9	16	7	10	7	10	7	10
3:1	9	18	7	13	8	14	7	10	7	10	7	10
4:1	-	-	6	12	8	14	7	10	7	10	7	10

## 6.8 Dis-mantle & Rebuild Procedure for Gear Ratio 2:1 & Above, Hollow Shaft Output & Integrated Motor units

- 6.8.1 Procedure as per section 6.5.8 for output side. Input side (extended housing / motor mounting flange) is very similar to the output side using gaskets to adjust the position of the gears. Assembling the output into the case first, followed by the input sub assembly.

## 6.9 Replacing Parts

- 6.9.1 Do not hesitate to replace parts and/or components if they are not able to guarantee safe and reliable operation.



- 6.9.2 Never improvise repairs.

- 6.9.3 The use of non-original spare parts not only voids the warranty but also can compromise unit operation.

## 6.10 Required Tools

- 6.10.1 A press, coupling puller, impact extractor and common hand tools.

## 6.11 Lifting Units

- 6.11.1 When lifting, use accessories such as eyebolts, snap hooks, screw clamps, straps, ropes, hooks etc. which are certified and adequate for the load. Use soft slings around the body of the gearbox and do not lift by placing slings, chains or hooks around the input drive shafts.
- 6.11.2 The weight of the standard product are given in this manual in section 3.

## 6.12 Cleaning

### 6.12.1 External Cleaning

6.12.2 Clean all dust and process waste off the unit. Do not use solvents or other products, which are incompatible with the construction material and do not direct high-pressure jets of water at the unit.

### 6.12.3 Internal Cleaning

6.12.4 Remove lubricant from unit and do not re-use old lubricants.

6.12.5 Flush a unit's interior thoroughly with a light solvent before refilling with new lubricant.

## 6.13 Warning



6.13.1 Provide adequate ventilation during the use of cleaning agents; avoid prolonged breathing of fumes and contact with skin.

6.13.2 Use clean hot water or a soap solution for general cleaning of painted surfaces.

6.13.3 Dry parts thoroughly after cleaning.

## 6.14 Painting

6.14.1 If a unit is to be painted, tape the nameplate, mounting surfaces and seal rings to prevent contact with solvent prior to painting.

7 Recommended Lubricants

Table 1 - Normal Operation

Ambient Temperature	Gear Oil	
Below +5°C	ISO 150	Mobilgear 629 or equivalent
+5°C to +40°C	ISO 220	Mobilgear 630 or equivalent
Above +40°C	ISO 320	Mobilgear 320 or equivalent

Table 2 - Oil Lubrication Fill Quantities (average)

Series No.	35	37	38	39	40	42
Litres	0.14	0.29	0.75	1.71	3.27	7
Pints	0.24	0.50	1.32	3.00	5.75	12.3

Note:

The oil levels stated in the table above assumes that the gearbox is positioned with all shafts in a horizontal plane. For other shaft orientations please consult Power Jacks.

Table 3 - Grease Filled (Input Speed =< 250 rpm)

Manufacturer	Lubricant
Mobil	Mobilux EP1 Grease or Equivalent

## 8.1 Spare Parts Recommendation

8.1.1 Range-N bevel gearboxes are fully supported by Power Jacks. Spare parts and repairs are available.



8.1.2 It is recommended that when a bevel gearbox is used in a production critical environment where the cost of downtime far exceeds the cost of the bevel gearbox a complete spare bevel gearbox unit is stocked by the customer. This allows the worn/damaged unit to be returned to Power Jacks for repair by trained personnel. Alternatively it allows time for a new replacement bevel gearbox to be manufactured.

8.1.3 When enquiring about replacement parts or a complete unit please send the following information to Power Jacks:

- Bevel gearbox Serial Number (found on product name plate - essential)
- Bevel gearbox Model Number (found on product name plate - essential)
- Original Purchase Order Number (if known).
- Power Jacks Sales Order Number (if known)
- Your Contact Details (essential)

## 9.1 General Storage Recommendations

Recommendations for storing the products are indicated below:

- 9.1.1 Store in a clean and dry environment, free from dirt and dust.
- 9.1.2 Bevel gearbox Storage Temperature: -10°C to +50°C.
- 9.1.3 Do not store the unit in excessively humid conditions or where it is exposed to the weather (do not store outdoors).
- 9.1.4 Do not place product directly on the ground.
- 9.1.5 Store product(s) on a stable base and make sure that it is not subjected to accidental displacement.
- 9.1.6 Store the unit(s) in the packaging provided for shipping (if allowed).
- 9.1.7 If products are to be stored for more than 6 months, the following additional precautions must be taken:
  - 9.1.7.1 Cover all machined external surfaces with a rust-proofing product.
  - 9.1.7.2 Fill the unit with appropriate lubricant if not supplied with lubricant.
- 9.1.8 All rotating parts should be turned by hand a few revolutions per month. If this is not practical, then an external drive should be used to run the unit(s) for a few revolutions.

## 9.2 Long Term Storage

In the event that a bevel gearbox(es) is to be stored for more than 6 months prior to installation/commissioning, Power Jacks Ltd should be consulted to discuss preservation requirements.

### 10.1 General Disposal Guidance

- 10.1.1 This must only be done by operators trained in the observance of applicable laws on health and safety at work.
- 10.1.2 Do not dump non-biodegradable products, lubricants and non-ferrous materials (rubber, PVC, resins, etc.) into the environment. Dispose of all such materials as stipulated by applicable environmental protection legislation.
- 10.1.3 Do not attempt to re-use parts or components which appear to be in good condition after they have been checked and/or replaced by qualified personnel and declared unsuitable for use.

## 11.1 Warranty Definitions

When used in these conditions the following words have the meanings set out opposite them below:

Company:	Power Jacks Limited
Contract:	The contract between the Company and the Customer for the supply of the Goods.
Customer:	The party to whom the Goods are to be supplied under the Contract
Goods:	The goods to be provided under the Contract
Writing:	Includes facsimile or electronic transmission and comparable means of communication

## 11.2 Warranty Statement

The Company warrants that any Goods sold by it under Power Jacks standard terms and conditions of sale will be free from defects caused by faulty materials or poor workmanship but gives no warranty and makes no representation whatsoever express or implied as to any other matters including without limitation condition merchantability or fitness for any purpose.

The Company shall incur no liability under this warranty unless:

- The Company is promptly notified in Writing upon discovery of any such defects by the Customer and the Customer forthwith ceases to use the defective Goods unless otherwise authorised by the Company; and
- The defective item is immediately returned to the Company, transportation charges being prepaid by the Customer or the Company is, at its option, given the opportunity to remedy any defect.

The Company's warranty as specified above is limited to a period of 12 months from the date of delivery (ex-works Power Jacks) and its liability shall be limited to replacing, repairing or issuing credit at its option for any Goods returned by the Customer within the aforesaid period.

The Company shall not be liable for consequential loss or damage by reason of any defect in (or failure to comply with any written estimate of performance of) Goods supplied by the Company whether original or substituted.

The Customer will indemnify the Company against all third party claims made in respect of the Goods.

# 12 General Assembly & Parts List

## 12.1 Parts List

Item	Type	Description
1		Gearbox Housing
2	A	Input Shaft - 1:1 Gear Ratio
	B	Input Shaft - 2:1 & Above Gear Ratio (includes primary gear)
3	A	Output Shaft - 2-Way - 1:1 & 1.5:1 Gear Ratio
	B	Output Shaft - Through Shaft- 1:1 & 1.5:1 Gear Ratio
	C	Output Shaft - 2-Way - 2:1 & Above Gear Ratio
	D	Output Shaft - Through Shaft - 2:1 & Above Gear Ratio
	E	Output Shaft - Stub Shaft - 1:1 & 1.5:1 Gear Ratio
	F	Output Shaft - Stub Shaft - 2:1 & Above Gear Ratio
	G	Output Shaft - Hollow Shaft
4	A	Primary Gear - 1:1 & 1.5:1 Gear Ratio
5	A	Secondary Gear - 1:1 & 1.5:1 Gear Ratio
	B	Secondary Gear - 2:1 & Above Gear Ratio
	C	Secondary Gear - Hollow Shaft
6	A	Drive Shaft Hub - 1:1 & 1.5:1 Gear Ratio
	B	Blank Drive Shaft Hub
	C	Drive Shaft Hub - 2:1 & Above Gear Ratio
	D	Drive Shaft Hub - Hollow Shaft
7	A	Drive Shaft Bearing - Solid Shaft
	B	Drive Shaft Bearing - Hollow Shaft
8		Central Bearing - 1:1 & 1.5:1 Gear Ratio
9	A	Spacer - Output Shaft
	B	Spacer - Output Hollow Shaft
10	A	Key - Drive Shaft - External
	B	Key - Drive Shaft - Gear 1:1 & 1.5:1 Gear Ratio
	C	Key - Drive Shaft - Gear 2:1 & Above Gear Ratio
	D	Key - Hollow Shaft - Gear

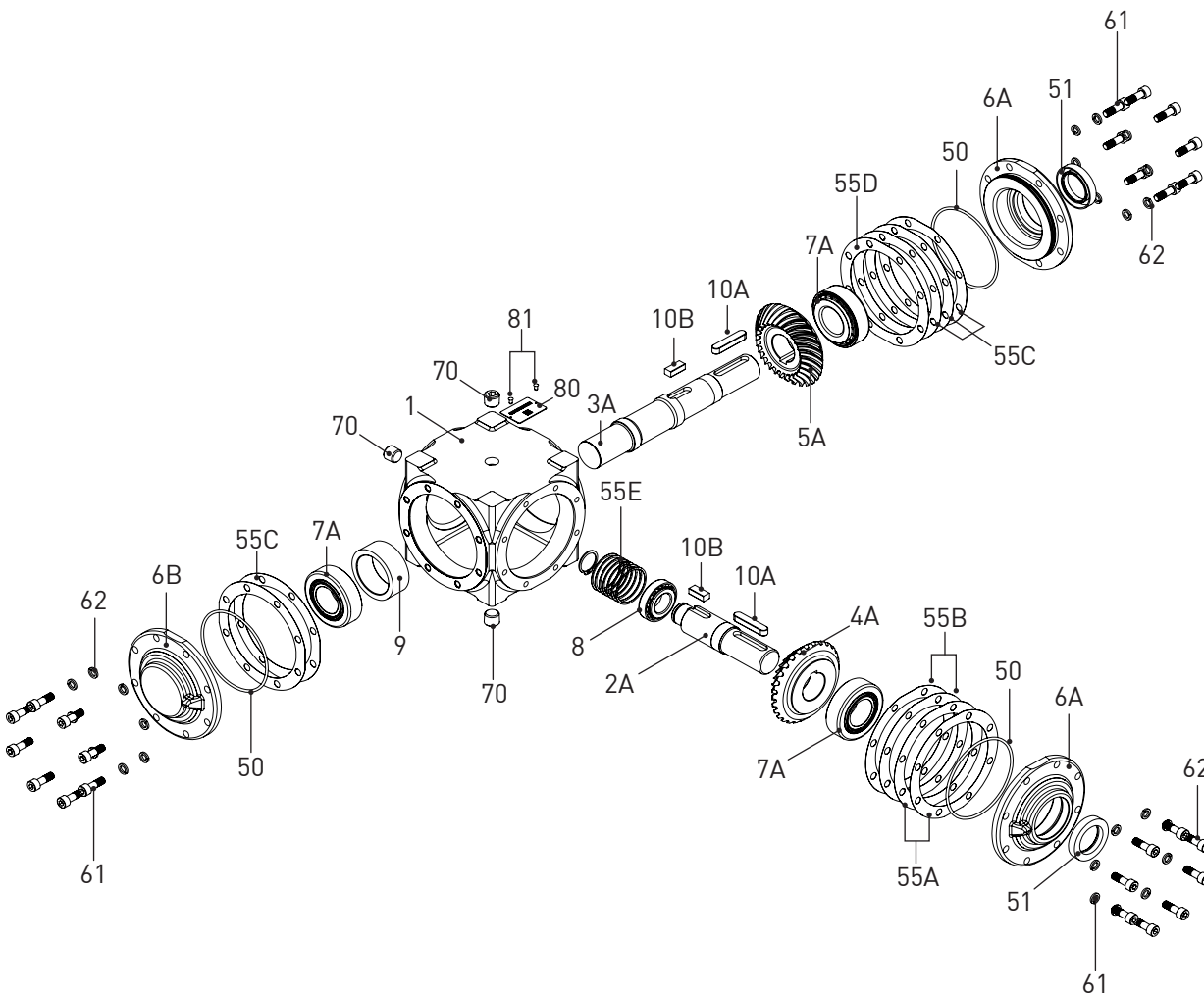
Item	Type	Description
50		O-Rring - Drive Shaft Hub
51		Shaft Seal - Solid Shaft
52		Shaft Seal - Hollow Shaft
55	A	Hub Gasket - Blue (0.05mm / 0.002")
	B	Hub Gasket - Amber (0.1mm / 0.004")
	C	Hub Gasket - White (0.25mm / 0.01")
	D	Hub Gasket - Peacock Blue (0.18mm / 0.007")
	E	Central Bearing Shim
60	A	Circlip - Gear Retaining - Gear Ratio 1:1 & 1.5:1
	B	Circlip - Gear Retaining - Gear Ratio 2:1 & Above
	C	Circlip - Gear Retaining - Hollow Shaft
61		Bolts - Shaft Hub
62		Spring Washer - Shaft Hub
66	A	Washer - Gear Retaining - Gear Ratio 2:1 & Above
	B	Washer - Gear Retaining - Hollow Shaft
67		Locknut - Gear
70		Oil Plug
80		Name Plate
81		Name Plate Drive Screw

Notes:

Not all parts are required for each screw jack, refer to general arrangement drawing corresponding with the model of screw jack.

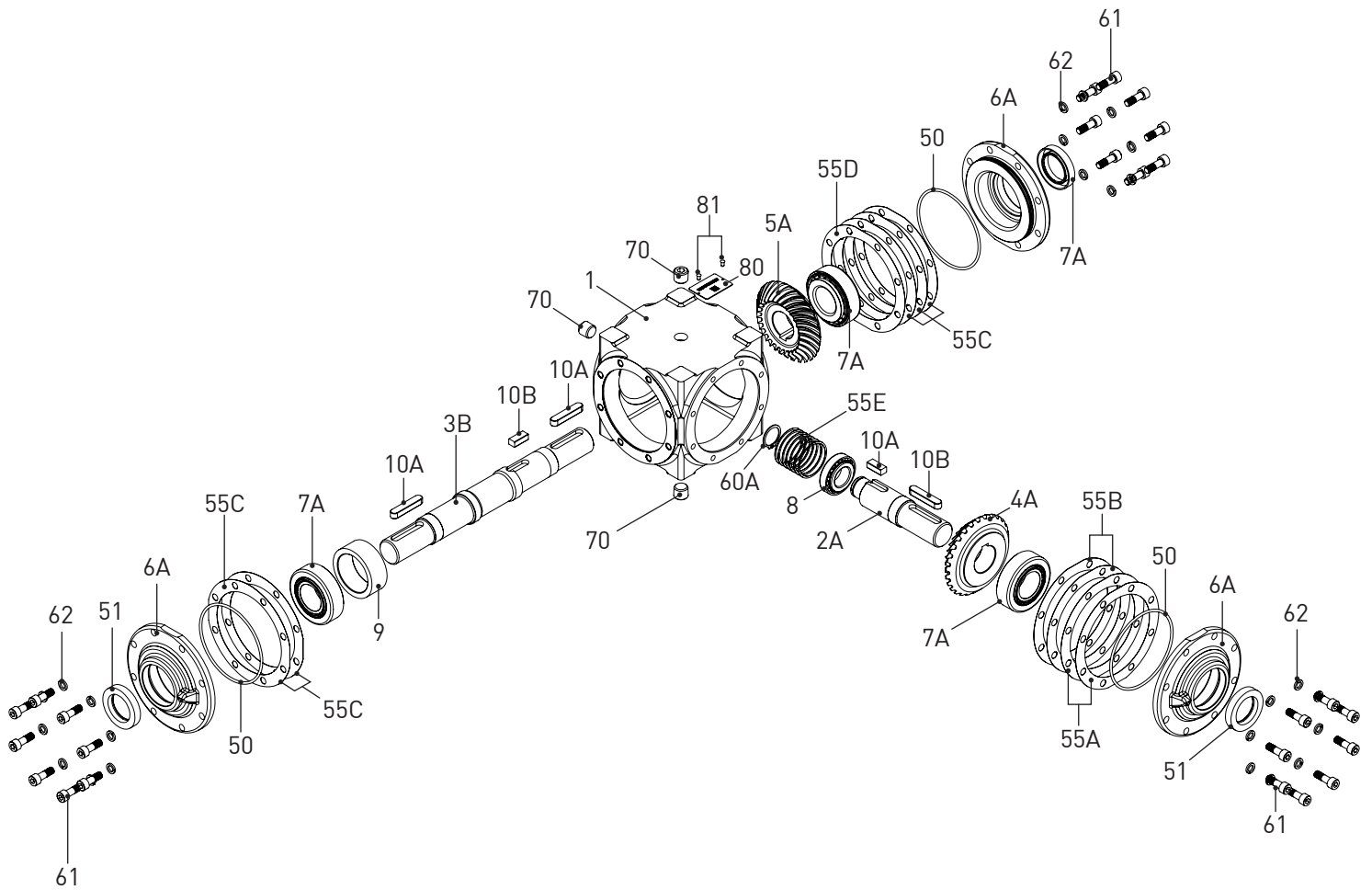


12.2 38-Series-Solid Shaft - 1:1 & 1.5:1 - 2 Way

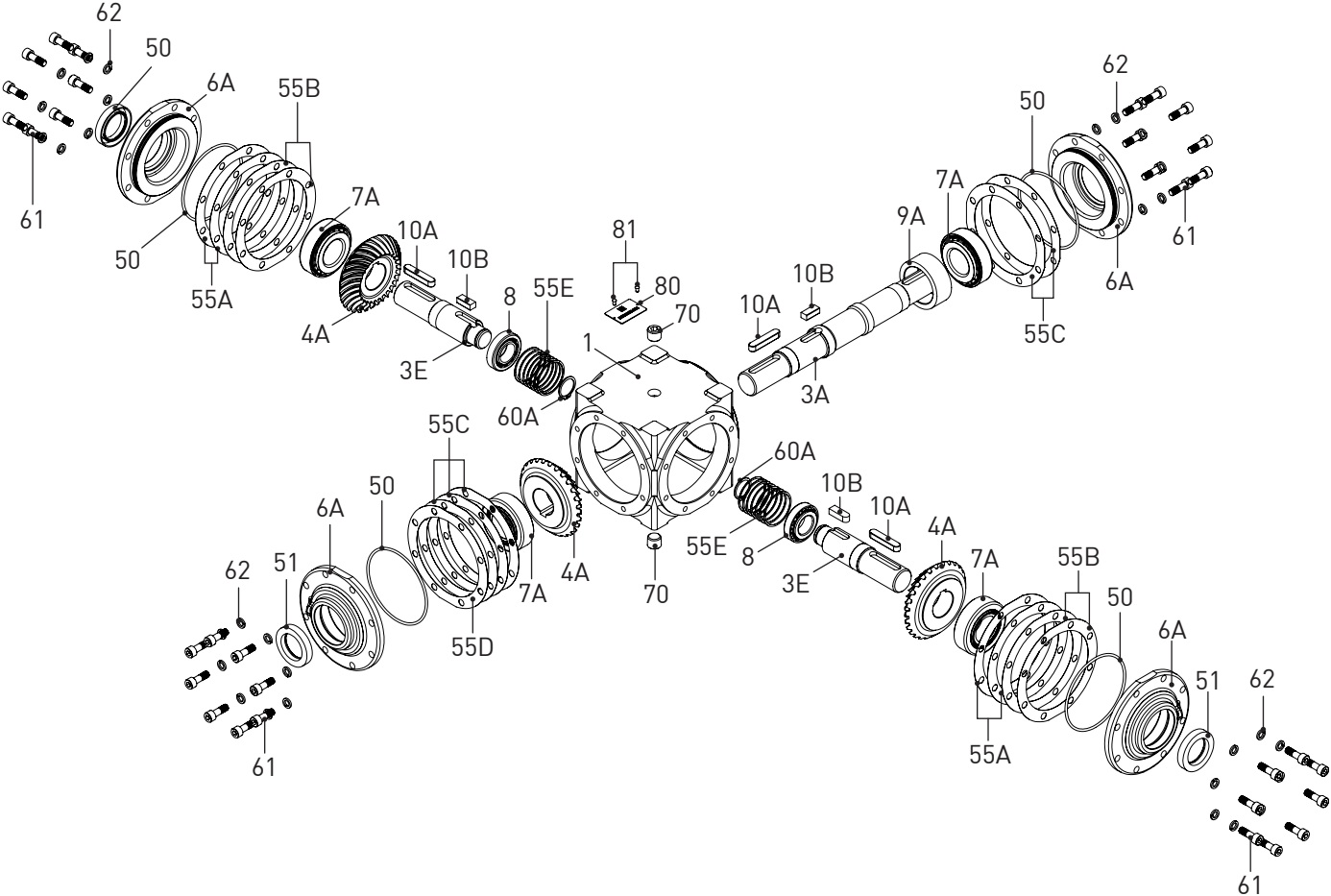


# 12 General Assembly & Parts List

## 12.3 38-Series - Solid Shaft - 1:1 & 1.5:1 - 3 Way

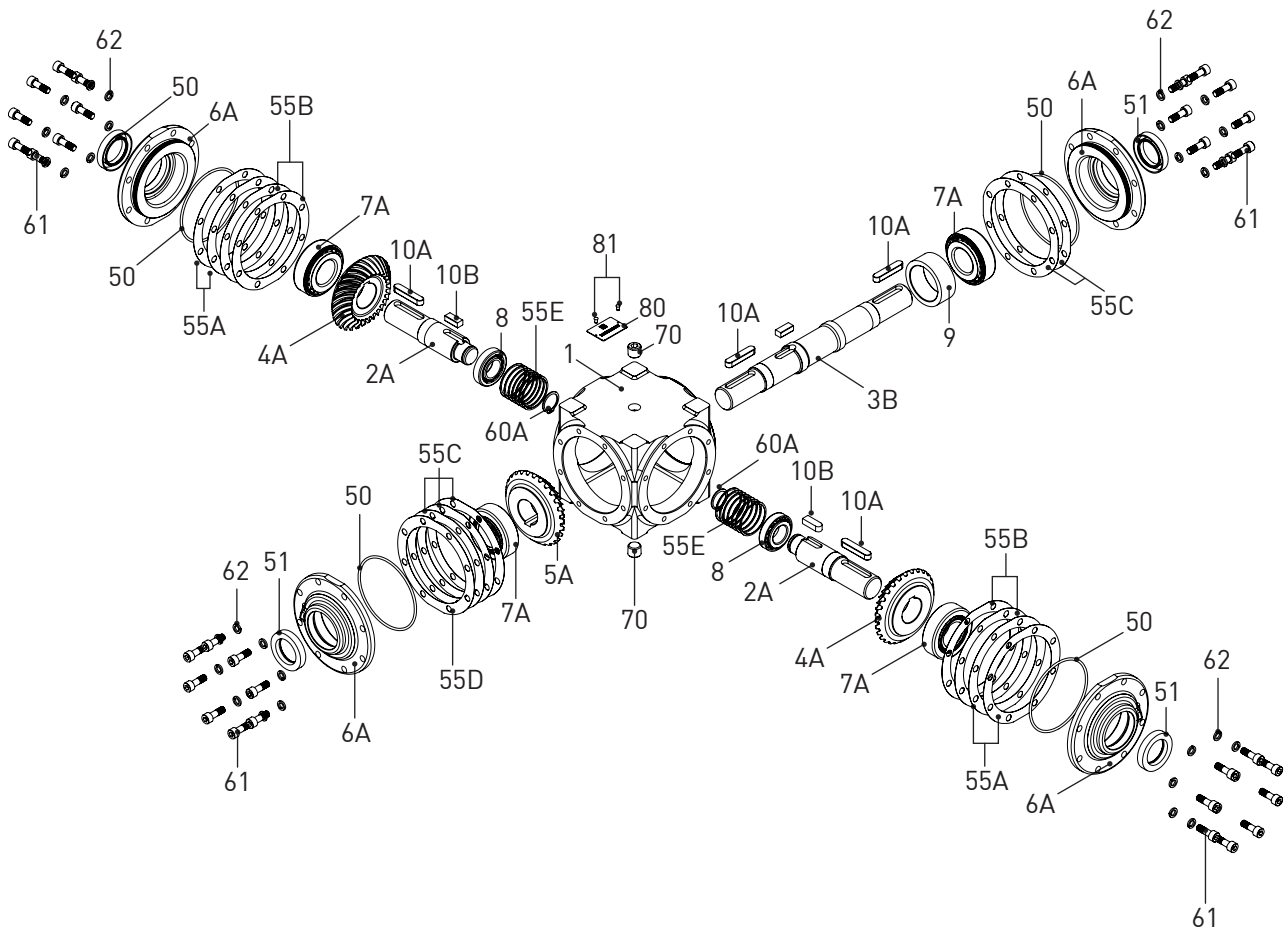


12.4 38-Series - Solid Shaft - 1:1 & 1.5:1 - 3 Way Reverse

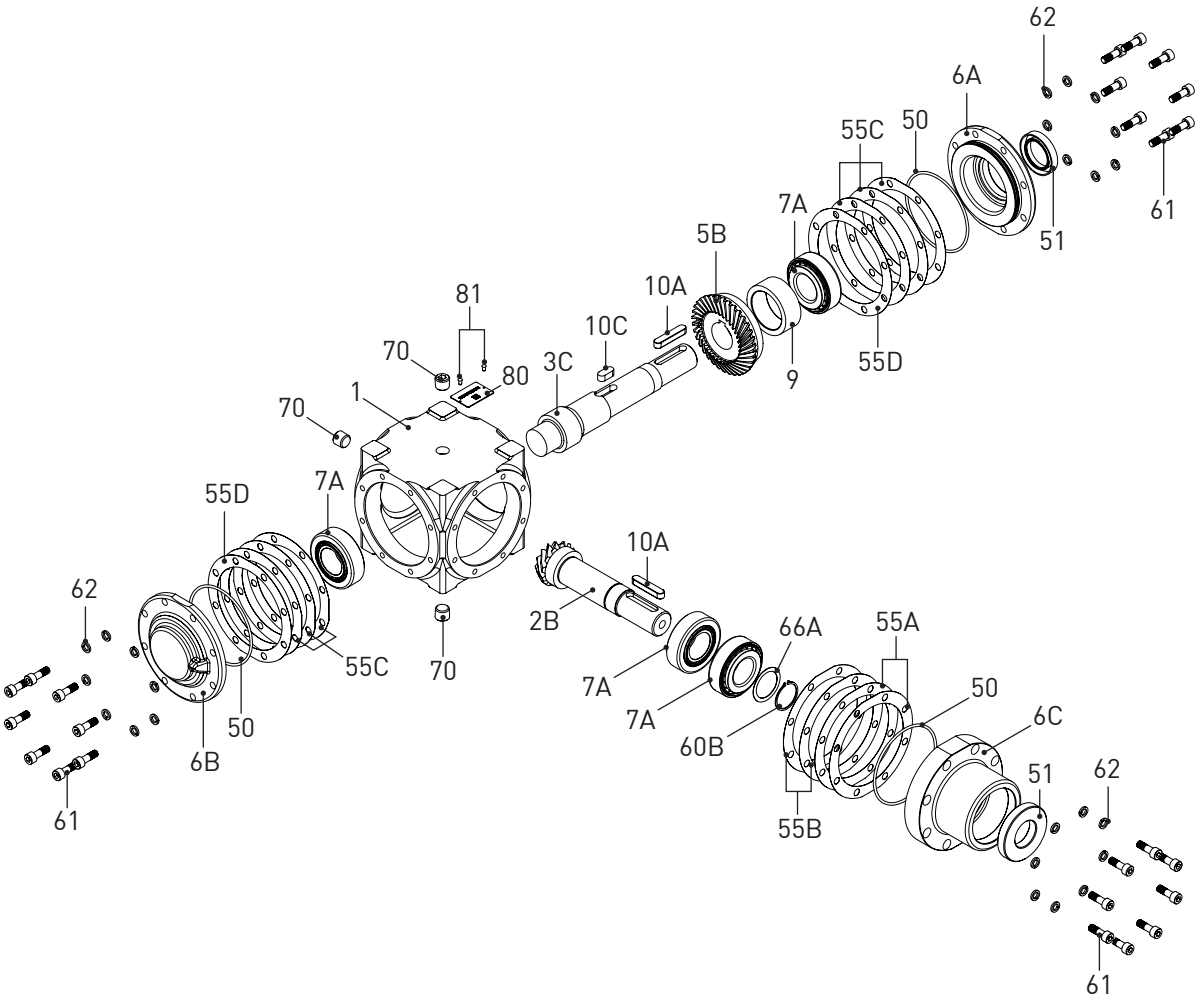


# 12 General Assembly & Parts List

## 12.5 38-Series - Solid Shaft - 1:1 & 1.5:1 - 4 Way

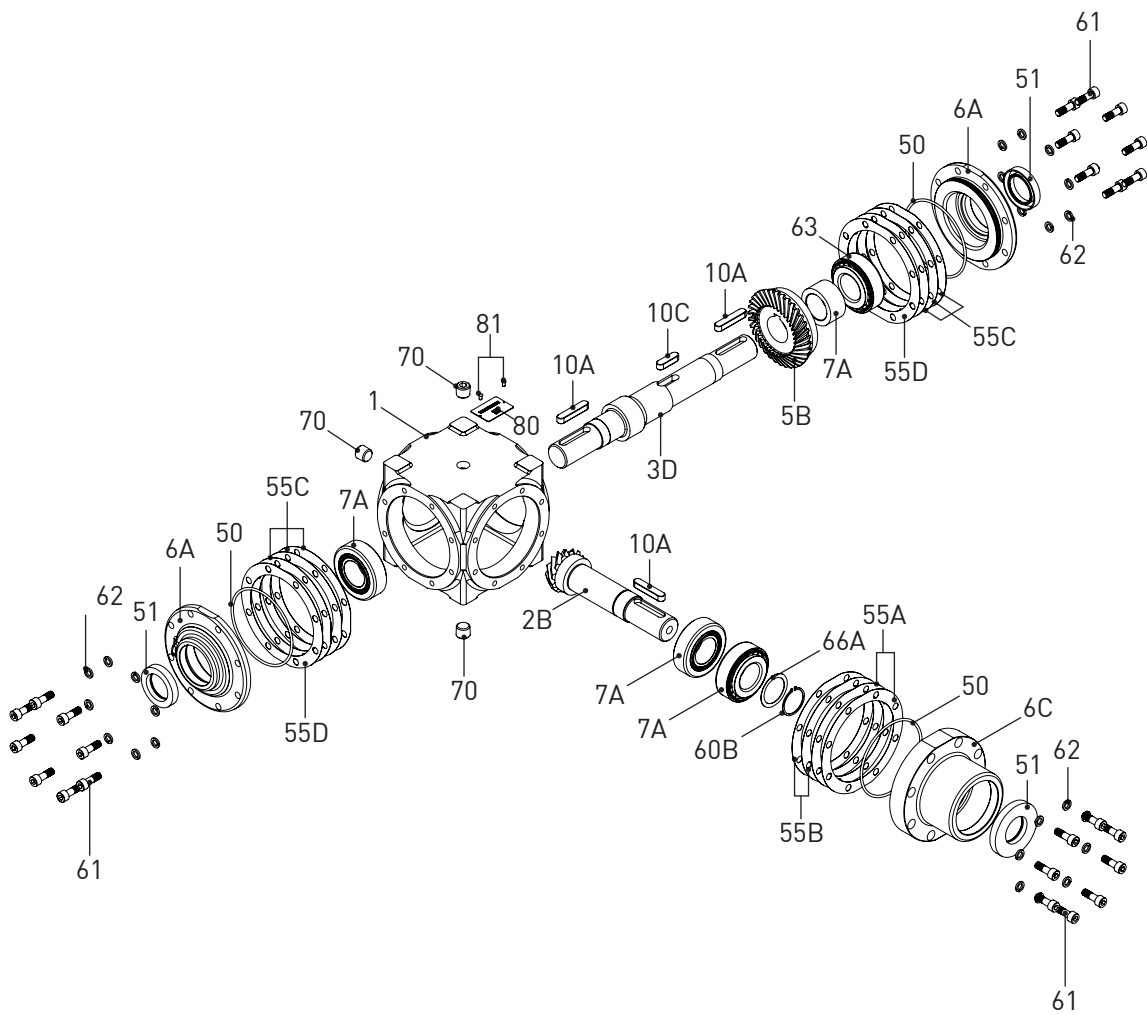


12.6 38-Series - Solid Shaft - 2:1 & Above - 2 Way

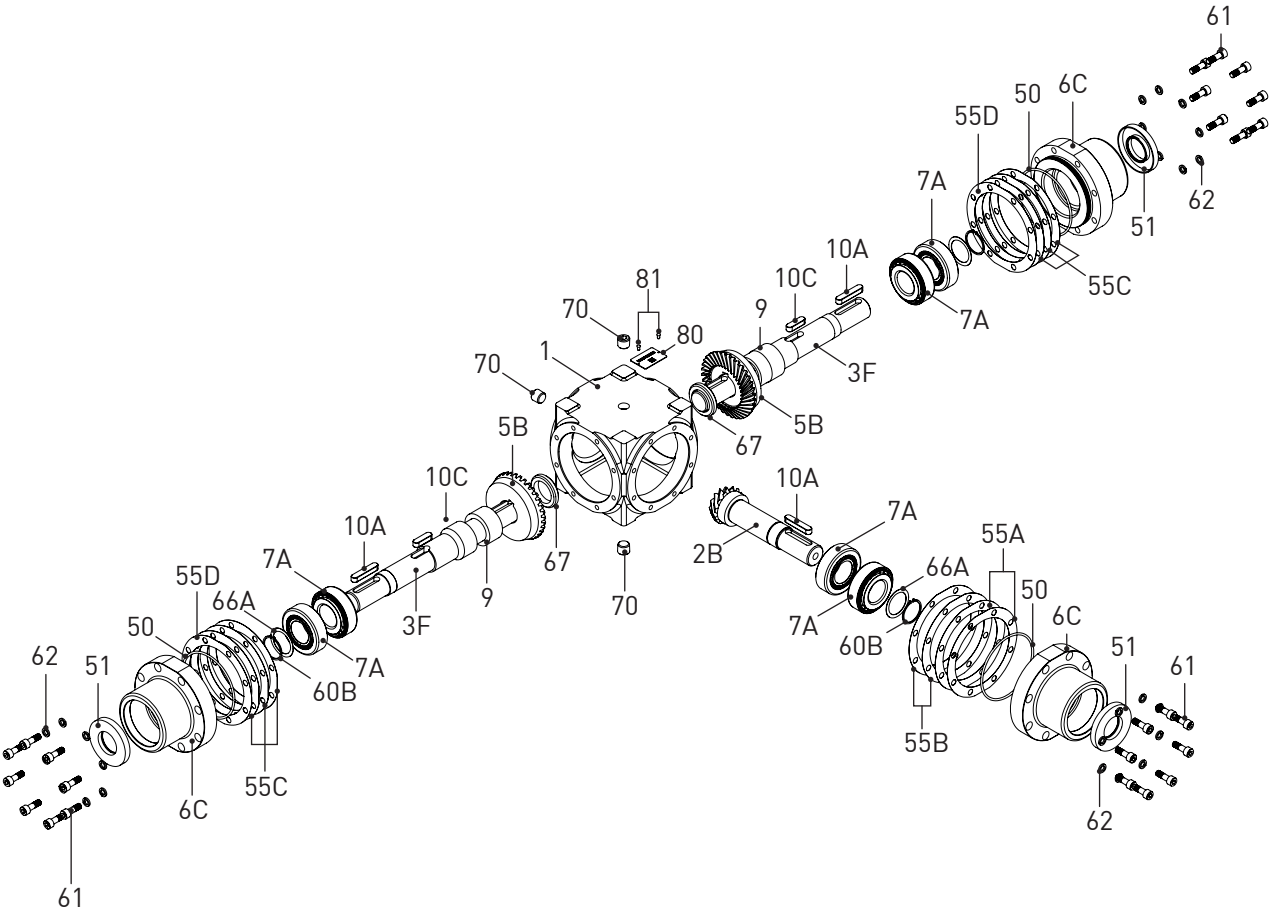


# 12 General Assembly & Parts List

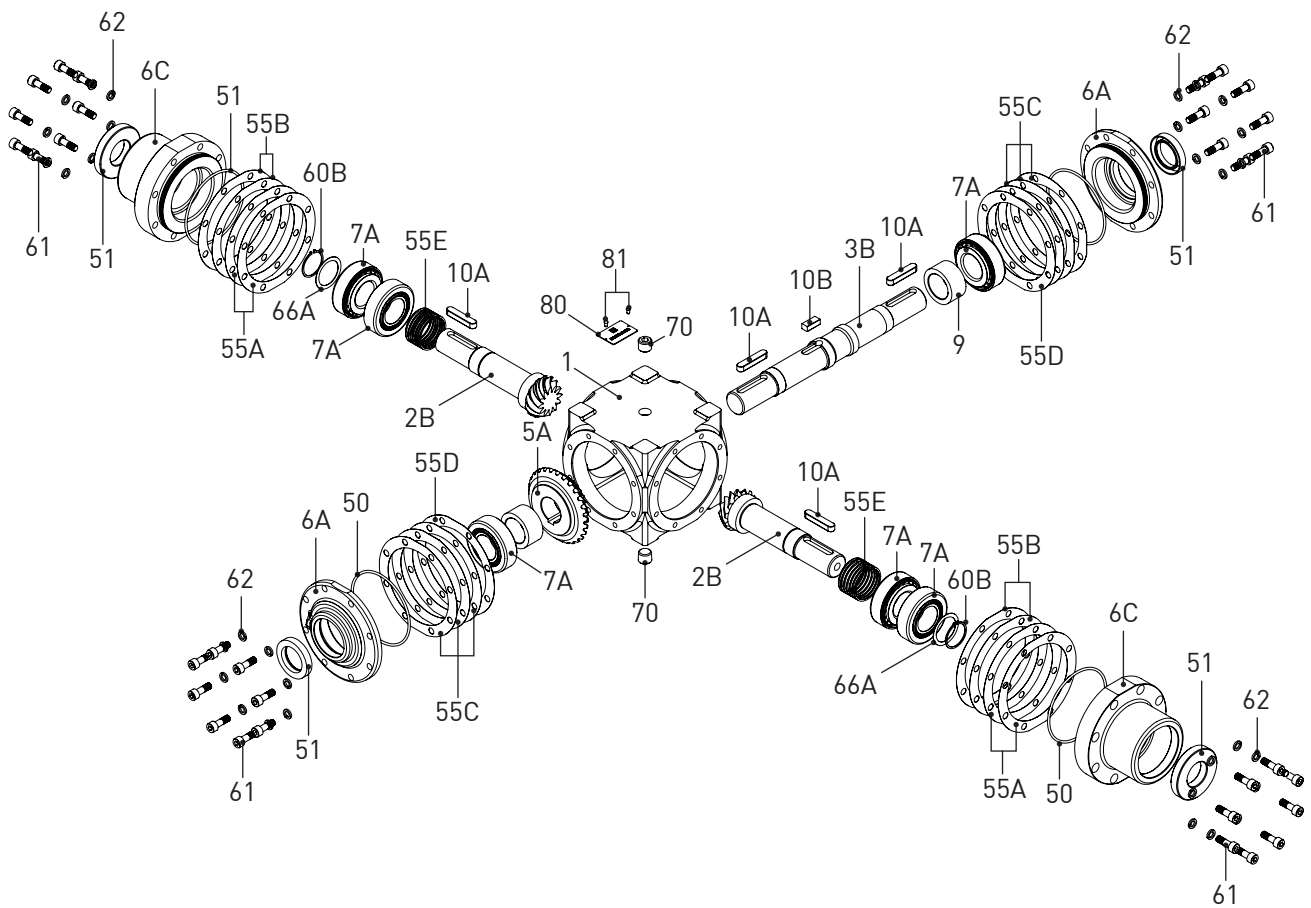
## 12.7 38-Series - Solid Shaft - 2:1 & Above - 3 Way



12.8 38-Series - Solid Shaft - 2:1 & Above - 3 Way - Reverse

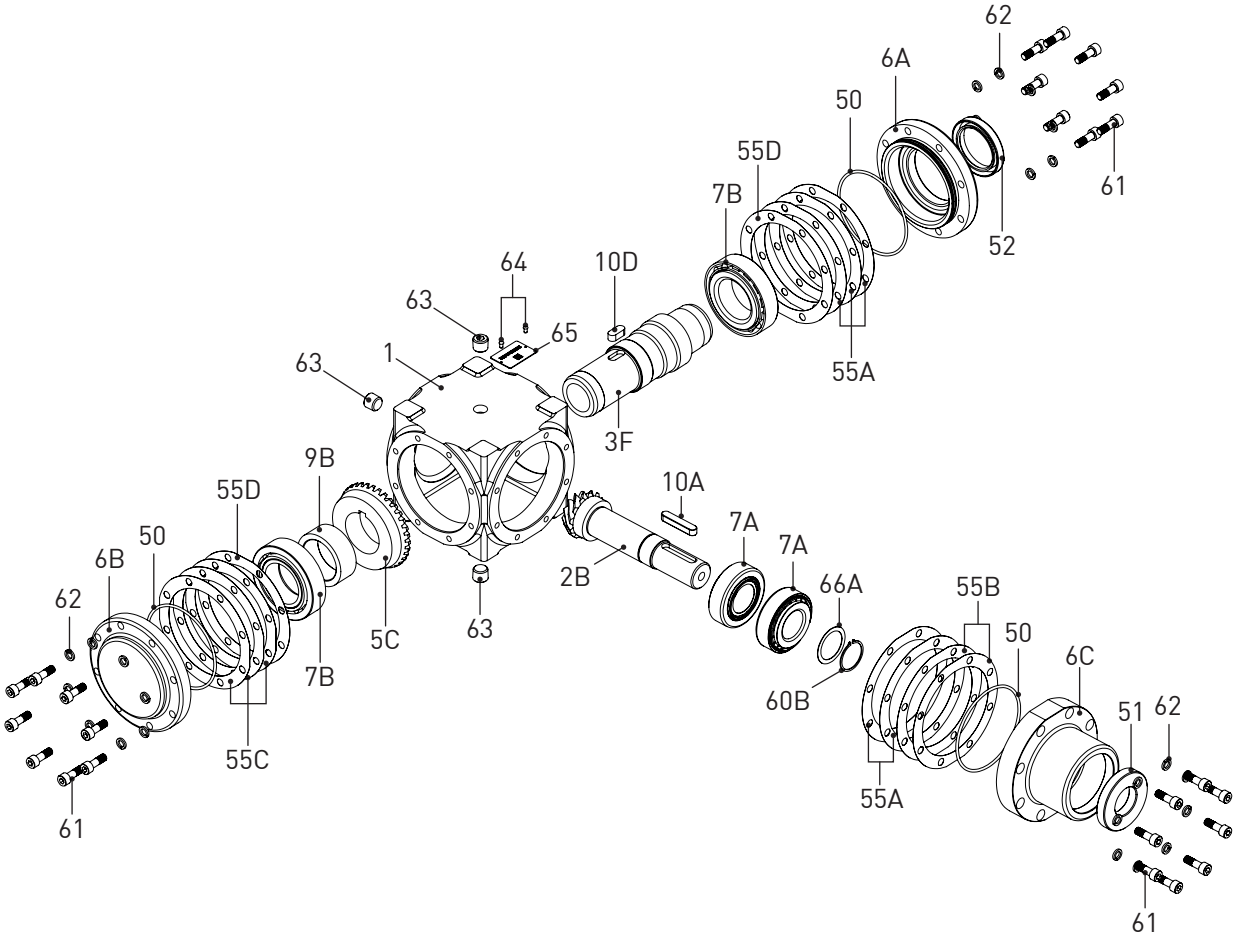


### 12.9 38-Series - Solid Shaft - Gear Ratio 2:1 & Above - 4 Way

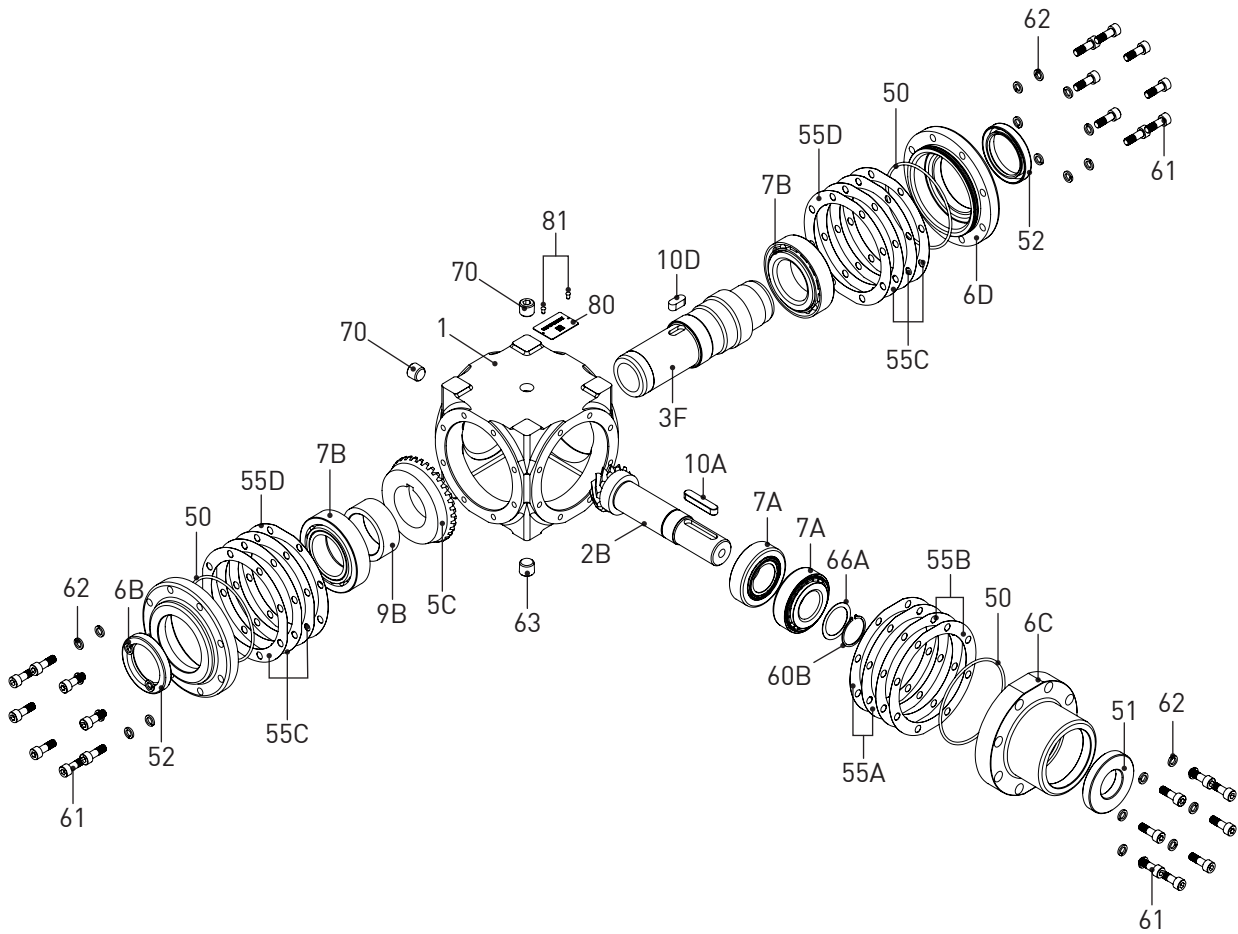




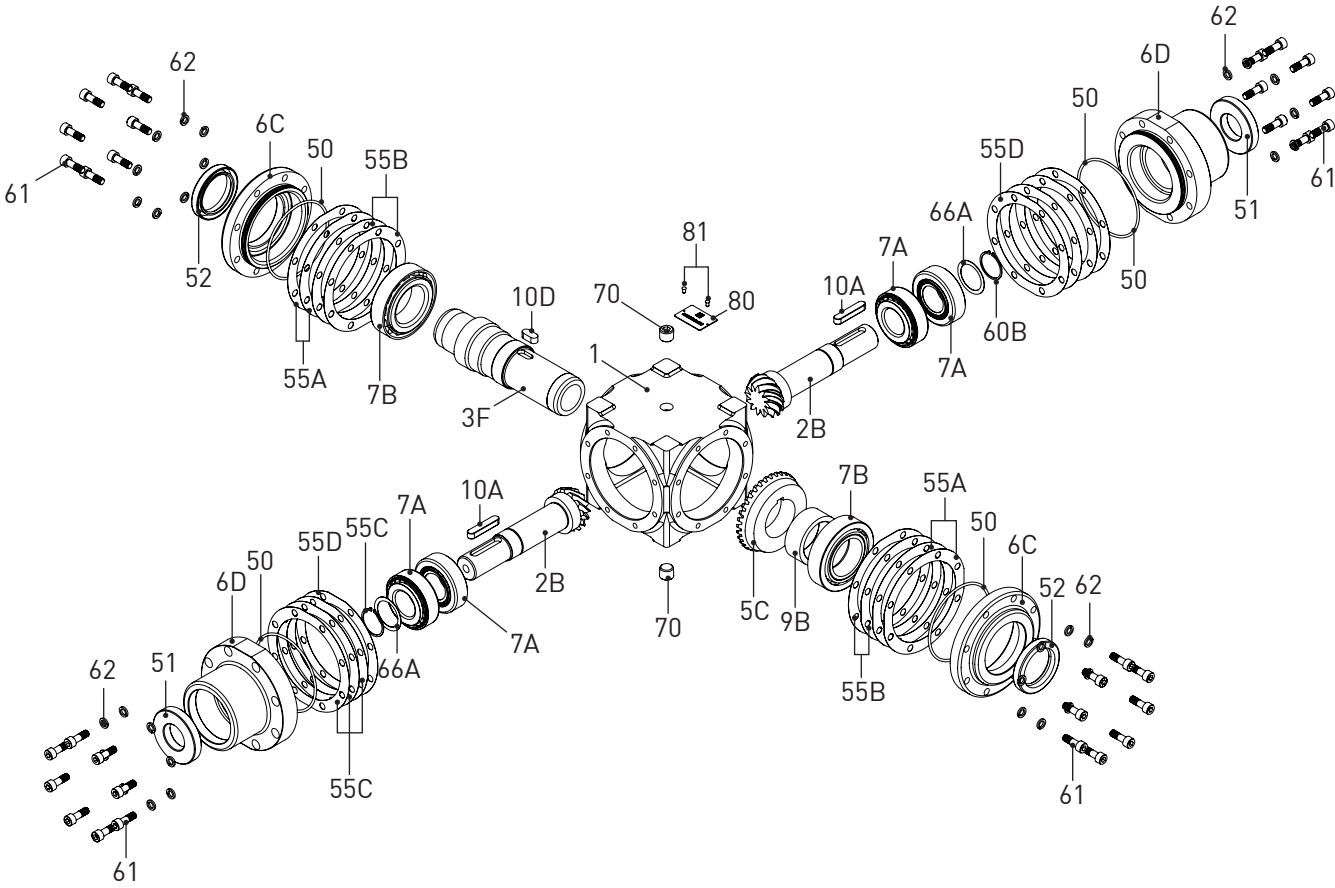
12.10 38-Series - Hollow Shaft - All Gear Ratios - 2-way



### 12.11 38-Series - Hollow Shaft - All Gear Ratios - 3-way



12.12 38-Series - Hollow Shaft - All Gear Ratios - 4-way





## Lifting & Positioning Solutions

Power Jacks are specialist industrial engineers who design and manufacture quality industrial lifting, positioning and power transmission equipment. Our products are supplied globally across many sectors including Industrial Automation, Energy, Transport, Defence and Civil.

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