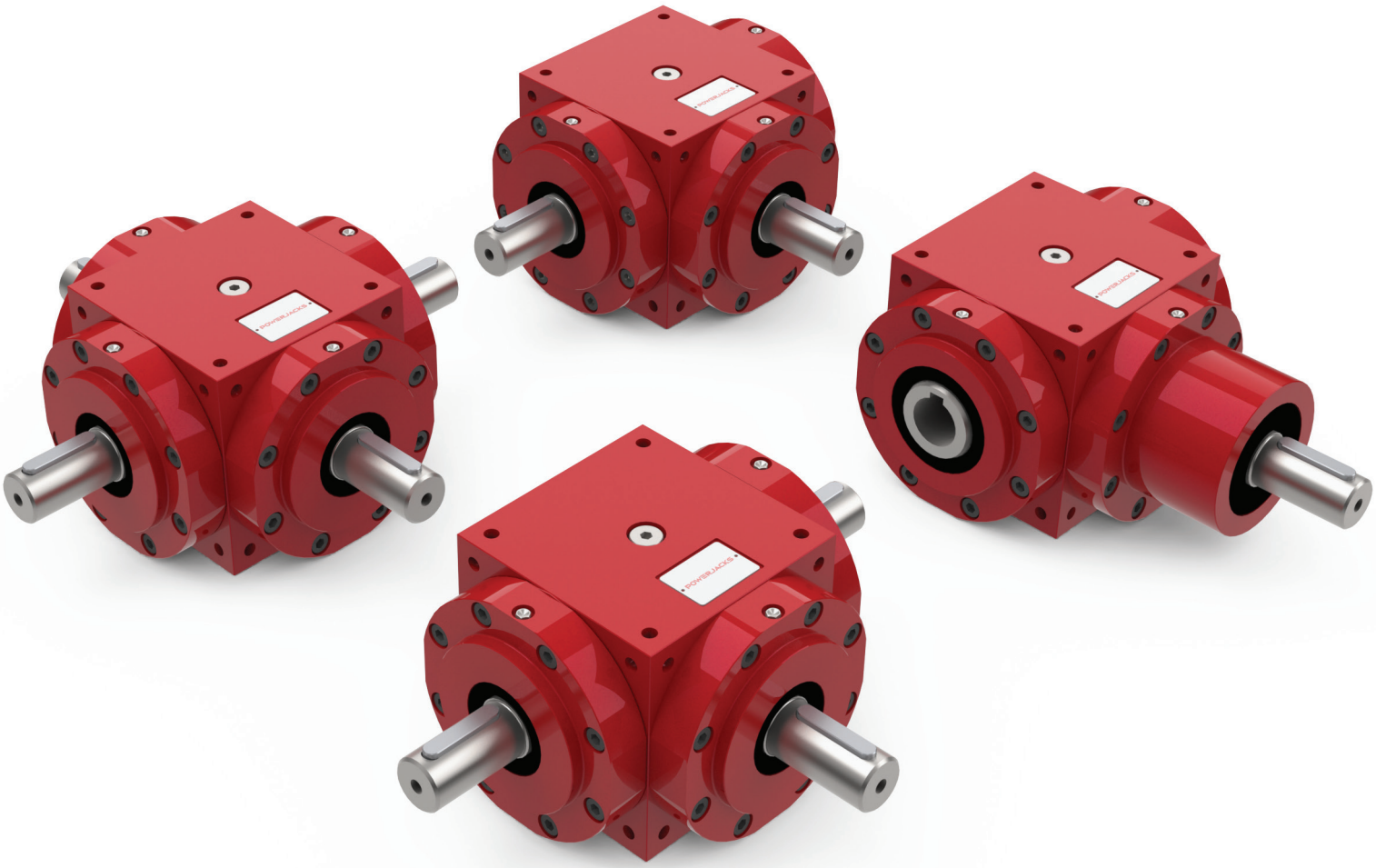
Range-C Bevel Gearboxes

ULTRA COMPACT & VERSATILE SPIRAL BEVEL GEARBOXES



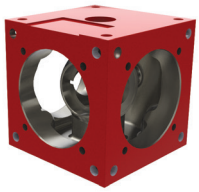
Introducing the Range-C bevel gearbox range from Power Jacks, a compact and versatile design in a cubic housing.

Created by a team of experienced design engineers, the focus was to provide our customers with a compact bevel gearbox in a "cubic" housing that offers versatility in design. In addition to this, we wanted to design a bevel gearbox that had the perfect combination of excellent performance, a long lasting service life, durability and the flexibility to be engineered for the most demanding applications.

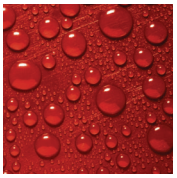
Perfect for industrial applications or the extreme such as subsea, defence or nuclear.

Standard Gearbox

- 6 Gearbox Sizes
  35, 37, 38, 39, 40, 42* Series
  *42-Series in Range-N design only
- 16 Gearbox Configurations
- Gear Ratios:
  1:1, 1.5:1, 2:1, 3:1 and 4:1*
  *No 4:1 on 35-Series
- Special gear ratios available on request
  e.g. 1.25:1
- Power Ratings: 0.1 - 226 kW
- Torque Ratings: 15 Nm - 7000Nm
- Mounting Points on Every Gearbox Side (35 - 40 Series)



Gearbox Housing
A rugged Cubic Compact design made from a highly durable SG Iron.
This provides a strong housing that firmly and accurately holds the gear set in a reservoir of quality lubricant suited to the most industrial demands.



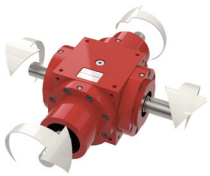
Corrosion Protection
To suit all economic needs.

- Standard Industrial Paint Finish
- Arduous Environment Paint Finish
- Customer Specified Paint
- Plated Finish
- Stainless Steel

Reliable Spiral Bevel Gear
With a proven design already used in millions of gearboxes, the Precision Spiral Bevel Gears with accurate gear mesh delivers high torque with smooth and quiet transmission.

Superior Gear and Shaft Support
For gear ratios 1:1 and 1.5:1 where each gear has a bearing support on both sides. This gives optimum gear support and minimises bearing hub sizes for non-through shaft configurations.

Shaft Configurations



- 2, 3 or 4-way
- Solid or hollow shaft
- Special configurations available
- Motor Adapter to bolt an IEC motor directly to the gearbox input
- Service life of 10,000 hours for all gearbox sizes
- Input Speed up to 3000 rpm maximum
- Breather / vents available for high speed designs

Special Designs
We can fully customise our bevel gearboxes so that your application can be the best.
Customisation can be anything from a small modification such as an extra bolt hole on a mounting face to a completely new design of bevel gearbox based on our class leading technology.
Specialised Application Designs Include:


Special Gear Ratio


Extended Drive Shaft


Reinforced Shaft OR High Torque


Stainless Steel


U-Series Submersible Bevel Gearboxes



ATEX Bevel Gearboxes for Explosive Environments


Defence Rated

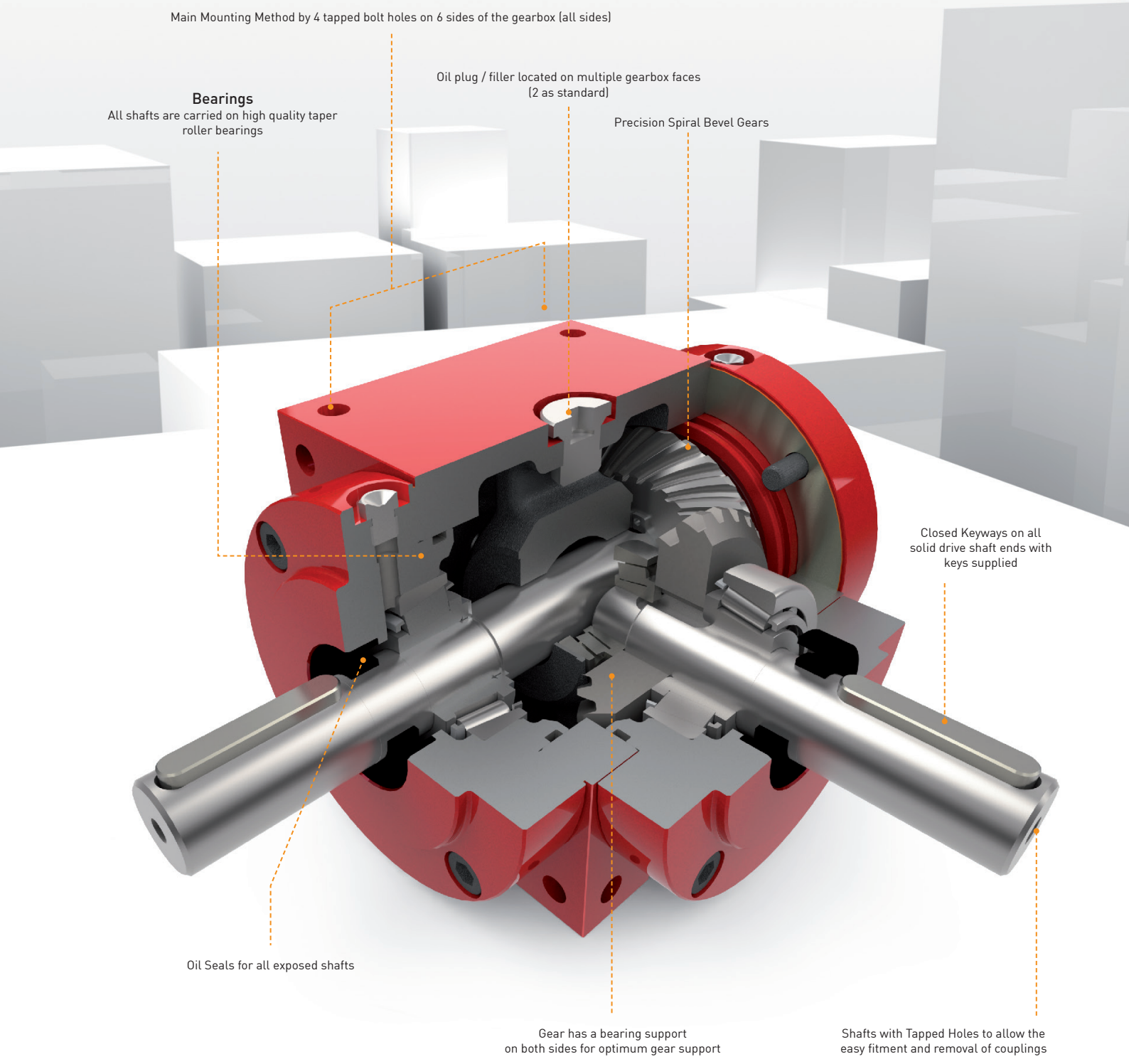

Light Weight Design

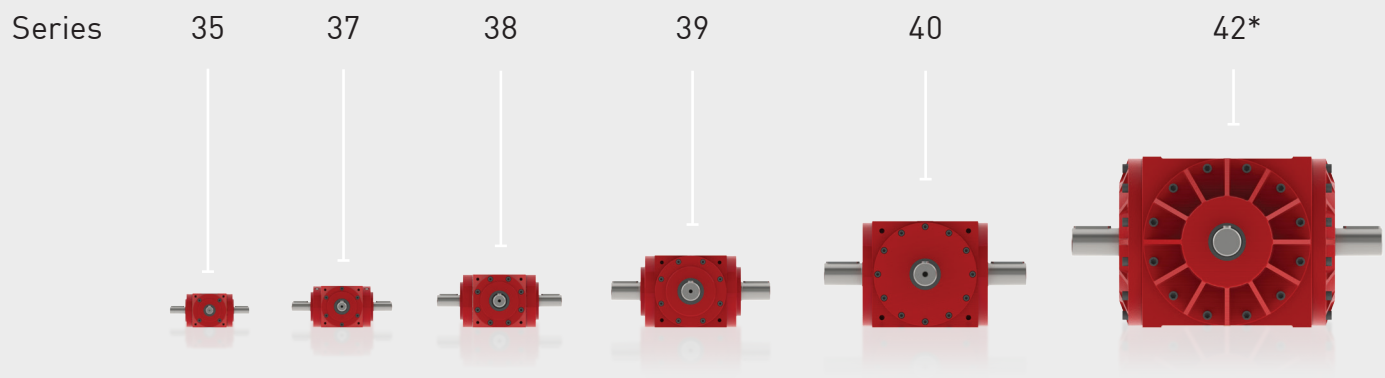

Nuclear Rated

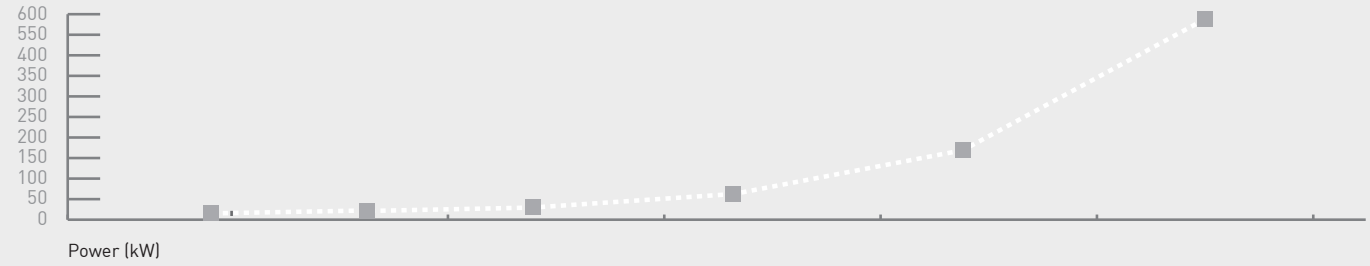

Food Grade

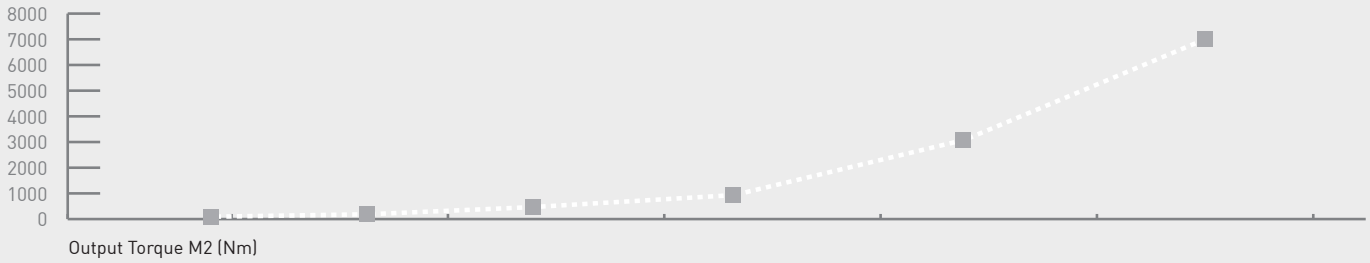

Low Temperature

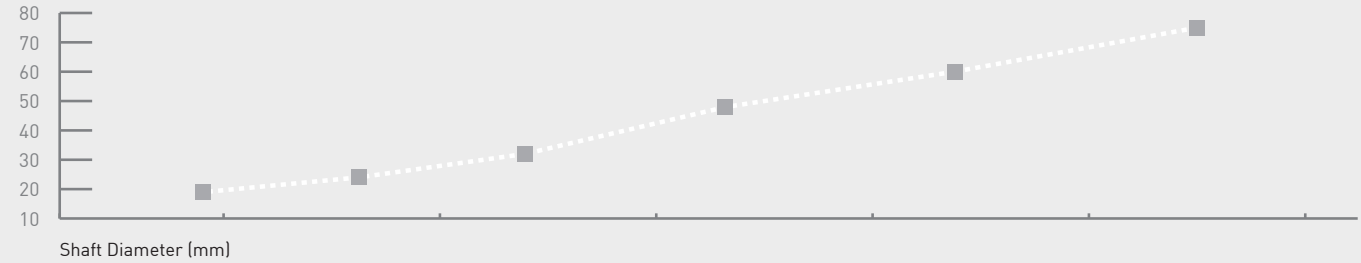

High Temperature


Main Mounting Method by 4 tapped bolt holes on 6 sides of the gearbox (all sides)
Oil plug / filler located on multiple gearbox faces (2 as standard)
Bearings
All shafts are carried on high quality taper roller bearings
Precision Spiral Bevel Gears
Closed Keyways on all solid drive shaft ends with keys supplied
Oil Seals for all exposed shafts
Gear has a bearing support on both sides for optimum gear support
Shafts with Tapped Holes to allow the easy fitment and removal of couplings









Based on Ratio 1:1, 3way solid shaft, Gear Unit Size
*42 Series is Range-N design

Example

C380S30-10M06-0000-0000-000000 C-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
C	3	8	0	S	3	0	-	1	0	M	0	6	-	0	0	1	0	-	0	0	0	0	-	0	0	0	0	0	0

1 GROUP-1 - Bevel Gearbox Definition

2 GROUP-2 - Bevel Gearbox Features

3 GROUP-3 - Accessories

1 GROUP-1 - Bevel Gearbox Definition

1-Bevel Gearbox Range	
C	Compact Cubic, Versatile Design with mounting bolt holes on every gearbox side
N	Ultra Compact, Versatile Design

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	1.5:1 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

14 - Character Space

2 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 Through Shaft for Higher Torque Transmission #10
C	Chrome Plated Drive Shafts
D	Chrome Plated & Reinforced for Through Shaft #10
N	Nickel Plated Drive Shafts
M	Nickel Plated & Reinforced for Through Shaft #10
S	Stainless Steel Drive Shafts
T	Stainless Steel & Reinforced for Through Shaft #10

17-Mounting	
0	Standard Range-N - 4 Tapped Holes - Side 5 & 6
1	Standard Range-C - ALL Sides Tapped Holes
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 #8	
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 #4

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

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

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

24 - Character Space

3 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) #5
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 #6
A	Breather 90deg Type fitted Side-1 (Input)
B	Breather 90deg Type fitted Side-2 #7
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 #9	
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	Biodegradable Oil
F	Biodegradable Grease

30-Paint	
0	Standard Paint (Red)
1	Standard Primer (Grey) Only
2	Standard Epoxy Paint (Red)
3	Subsea Paint (Yellow)
4	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

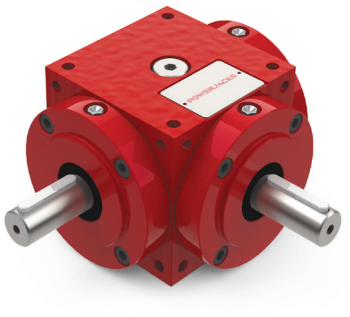
#10 The gearboxes "Through Shaft" is reinforced to transmit higher torque. It does not increase the torque transmitted through the gear set.

When selecting a gearbox, there are a number of factors which can influence the final size of unit selected. The information contained in the selections gearbox characteristics and Technical data provide details of these factors for use in the selection process.

The following Selection Procedure provides a step-by-step guide to gearbox selection for those not fully familiar with the procedures. An example has been used in the selection procedure to assist in following through the procedure.

Specified information	Example Information
1. Gearbox Input Speed (rpm)	1000
2. Gearbox Output Speed (rpm)	500
3. Gearbox Configuration (page 219)	2 Way
4. Required Output Torque (Nm)	150
5. Operating Hours per Day (HRS)	10
6. Input Power Source (page 216)	Electric Motor
7. Gearbox Application (page 216)	Stacking Machine
8. Number of Starts per Hour (page 216)	8
9. Transmission Methods (page 216)	Clutch
10. Duty Cycle per Hour (% Running time)	45/60 = 75%
11. Operating Ambient Temperature °C (page 217)	20

Selection of Design Factors	Example Design Factors
Step 1 - Shock Load Factor (f_1) Using the Specified Information in Points 5, 6 and 7 above, select the Shock Load Factor from the Page 216.	1.25
Step 2 - Starting Frequency Factor (f_2) Using the Specified Information in Point 8 above, select the Starting Frequency Factor from the page 216.	1.00
Step 3 - Transmission Load Factor (f_3) Using the Specified Information in Point 9 above, select the Transmission Load Factor from the Page 216.	1.00
Step 4 - Thermal Limit - Duty Cycle - Factor (f_4) Using the Specified Information in Point 10 above, select the Thermal Limit - Duty Cycle - Factor from the Page 217.	1.25
Step 5 - Thermal Limit- Ambient Temperature - Factor (f_5) Using the Specified Information in Point 11 above, select the Thermal Limit - Ambient Temperature -Factor from the Page 217.	1.00



A gearbox is required for an Input Speed of 1000 rpm, an Output Speed of 500 rpm, an Output Torque of 150Nm and one Output Shaft. The Drive is by electric motor through a clutch mechanism and the gearbox is on the main drive of a heavy duty stacking machine. The machine operates for 10 hours per day, starts 8 times per hour and operates for 45 minutes in every hour, the other 15 minutes being taken up in loading the machine. The ambient temperature of the premises is 20°C.

Calculated data	Example Data
Step 6 - Calculate the Gear Ratio Input Speed ÷ Output Speed Note: If the gear ratio does not correspond to one of the STANDARD ratios contained in this technical manual, one of the speeds, normally the output speed, must be changed to bring the ratio to standard. Non-standard ratios can be supplied, if required, but such special selections must be referred to Power Jacks.	1000/500 = 2 Therefore 2:1 Reduction
Step 7 - Calculate the Corrected Output Torque Required Output Torque x f_1 x f_2 x f_3 Note: Where there is more than one output shaft, the Required Output Torque for the gearbox is the summation of the individual Output Torques from the output shafts.	150 x 1.25 x 1.00 x 1.00 x = 187.5 Nm
Step 8 - Calculate the Corrected Output Power Required Output Torque x Output Speed / 9550	(187.5 x 500) / 9550 = 9.82 kW
Step 9 - Calculate the Required Input Power = Output Power / Efficiency (Gearbox efficiency is between 95% and 98% after initial running in).	9.82 / 0.98 = 10.02 kW

Gearbox Selection	Example Gearbox Selection
Step 10 - From the GEARBOX TORQUE x POWER RATING TABLE (page 215), select the gearbox with the closest adequate rated power.	From the Selection Table on page 215, for Input Power 10.02 kW, gear ratio 2:1 and Input Speed 1000 rpm, select Series 39.
Step 11 - When selecting a gearbox, the Thermal Capacity of the gearbox chosen must be considered. For the Limiting Thermal Capacity (page 217), expressed as a Power Rating. For the selected gearbox, calculate the Thermal Capacity = Limiting Thermal Capacity x f_4 x f_5. The Calculated Input Power must not exceed this Calculated Thermal Capacity. A larger gearbox must be selected if the Calculated Input Power is higher and a check run on the other parameters.	From the table in page 217, Limiting Thermal Capacity for Series 39 is 49kW. Calculate the gearbox, Thermal Capacity = 49 x 1.25 x 1.00 = 61.25 kW The Input Power is within this limit. Selected gearbox is OK.
Step 12 - As a final check on the capacity of the chosen gearbox, the effect of the connected drive systems must be considered. The section headed Permissible Shaft Loading (page 218) describes the calculation to be undertaken where the transmission mechanism can give rise to radial and/or axial forces on the gear shafts. This occurs, particularly, where chain and belt drives are employed.	Power transmission is by clutch. From the Transmission Load Factor table (page 216 (f_3)), there are no additional loads to be considered and the selection of gearbox is acceptable.

Series		35	37	38	39	40	42#3
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	5.25	11	21.75	53.25	125	190
	2 Way - 2:1 +	5.5	11	22	54.5	125	215
	3 Way - 1:1 & 1.5:1	5.5	11.5	22	54.5	128	197
	3 Way - 2:1 +	6	11.5	22.5	55.75	128	223
	4 Way - 1:1 & 1.5:1	6	13	25	64	150	204
	4 Way - 2:1 +	7	14	27	69.5	153	231

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 42-Series is Range-N design.

Lubrication

The oil levels stated in the table above assumes that the gearbox is positioned with all shafts in a horizontal plane. To get the correct lubrication recommendation please supply shaft orientation and operating speeds required as part of the application details provided to Power Jacks with an enquiry.

! All Range-C gearboxes are shipped without lubrication, except for grease filled units.

Input Speeds: 250 rpm < n < 1500 rpm

For input speeds up to 1500 rpm the oil level in the gearbox should be maintained just below the centre line of the shafts.

Input Speeds: n > 1500 rpm

For input speeds above 1500 rpm a change in oil level may be required in combination with a breather (vent). Consult Power Jacks for specific application advice.

Input Speeds: 250 rpm < n

For input speeds below 250 rpm then a grease filled gearbox is recommended.

Oil Specification

Ambient Temperature	Gear Oil
Below +5C	ISO 150
+5C to +40C	ISO 220
Above +40C	ISO 320

Grease Specification

Use an EP1 rated grease.

Gear Unit Size		Gear Ratio	Input Speeds 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
		4:1	0.01	0.06	0.1	0.2	0.4	0.6	0.8	1.2	1.5	1.9	2.3
	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	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
		4:1	0.03	0.13	0.23	0.7	0.9	1.3	1.7	2.4	3.2	4	4.8
	Output Torque M2 (Nm)	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
		4:1	0.1	0.4	0.7	1.6	2.9	4.2	5.4	7.7	10.2	12.5	14.7
	Output Torque M2 (Nm)	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
		4:1	0.4	1.5	2.8	7	11.7	16.9	21.9	31.6	42.1	51.5	60.5
	Output Torque M2 (N m)	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	-
		4:1	1	3.7	6.7	14.9	28	40.6	52.8	76.3	97.7	119.7	140.8
	Output Torque M2 (N m)	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	1972	1756

Check Thermal Limit - Power

Check Thermal Limit - Torque

Power Ratings (kW) @ given INPUT speeds (rpm)

Output Torque M2 (Nm) @ given INPUT speeds (rpm)

Shock Load Factor (f_1)

Shock Load Category		
I	II	III
Conveyor Belts	Heavy Duty Lifts	Punching Machine
Generators	Hoists	Shears
Ventilators	Mixers	Forging Presses
Light Textile Machinery	Cranes	Vibrators
Rotating Machine Tools	Heavy Duty Textile Machinery	Rolling Mills
	Woodworking Machinery	Extremely Heavy Lifts
	Paper Machinery	Heavy Duty Roller Conveyors

Input Power Source									
Shock Load Category	Electric Motor			Piston Machine Hydro Motor			Single Cylinder Piston Machine		
	Operating Time per Day (hrs)			Operating Time per Day (hrs)			Operating Time per Day (hrs)		
	≤2	10	>10	≤2	10	>10	≤2	10	>10
I	0.9	1	1.25	1	1.25	1.5	1.25	1.5	1.75
II	1	1.25	1.5	1.25	1.5	1.75	1.5	1.75	2
III	1.5	1.5	1.75	1.75	2	2.25	2	2.25	2.5

Starting Frequency Factor (f_2)

up to 20 starts per hour $f_2 = 1.0$
up to 60 starts per hour $f_2 = 1.1$
up to 200 starts per hour $f_2 = 1.3$
up to 600 starts per hour $f_2 = 1.5$
more than 600 starts per hour (on request)

Transmission Load Factor (f_3)

The total load on the drive shafts and their bearing is the result of:

a. The loads arising from the gear teeth
b. The axial and radial loads arising from the transmission mechanisms attached to the drive shafts. It is this load which must be considered when selecting the gearbox and shaft sizes.

Depending upon the type of transmission mechanism used in connecting the gear shafts to the driving and driven loads, axial and / or radial loads can be applied to the gearbox shafts and their bearings.

These loads can arise from:

either preload, due for example, to tension loading in belts
or dynamic forces, due for example, to out-of-balance in the transmission element
or shock load, due for example, to snatching in a chain drive.

The following table gives the factors which should be used to correct the Output Torque when sizing the gearbox.

Transmission Load Factor (f_3)		
Transmission Mechanism	Preload	Dynamic
Clutches	-	1
Gears of all Types	-	1.00 to 1.25
Chains	1.00 to 1.25	1.25 to 1.50
Flat Belts	2.00 to 2.50	1.00 to 1.25
V-Belts, Toothed Belts	1.50 to 2.00	1.00 to 1.25

Due to the compact design of this range of spiral bevel gear units the ratings are controlled by the thermal capacity at some speeds. A maximum case temperature of 80°C is specified and temperatures in excess of this figure normally indicate either incorrect oil levels or too much power being handled by the unit. If this temperature is exceeded Power Jacks should be consulted.

Thermal Limit - Duty Cycle - Factor (f_4)

Duty cycle per hour is the percentage of the time per hour during which the gearbox will be on-load.

Duty Cycle per Hour (%)	100	80	60	40	20
Thermal Limit Factor, f_4	1	1.25	1.5	1.75	2

Thermal Limit - Ambient Temperature - Factor (f_5)

Ambient Temperature °C	10	20	30	40	50
Thermal Limit Factor, f_5	1.2	1	0.87	0.75	0.62

Limiting Thermal Capacity

The capacity of some gears is limited by the maximum permissible temperature of the oil bath. The charts below show the limiting thermal capacities, which can be transferred without cooling at an ambient temperature of 20°C and duty cycle of 100% per hour.

Series	35	37	38	39	40	42
Power (kW)	3.3	9	20.5	49	90	190

WARNING: The case temperature must not exceed 80°C, (see thermal limits).
Power Jacks should be consulted if a gear unit is to be installed with a shaft positioned vertically.

After selecting the gearbox for the required duty it is necessary to check that the axial and radial loading arising from the transmission mechanism is acceptable for the gear shaft diameters on the selected gearbox (gear shaft diameters are given on the Dimensions page for the chosen design).
The bearing configuration on the shafting, the shaft diameter and the shaft speed determine the permissible external loading which can be carried by the shaft without bearing or shaft failure. The graph showing permissible radial forces on shafts has been drawn for a typical Output Shaft. In this arrangement the bearing centres are mounted at either end of the through shaft and there is a significant span which allows higher radial loads to be accepted, see sketch below. For typical Input Shafts and Output Shafts, which are overhung from the gearbox face, the bearing centres are closer together and the radial load carrying capacity is reduced, see sketch below.
To calculate the Permissible Loading on the gearbox shafts, use the gearbox output and input speeds and diameters respectively.

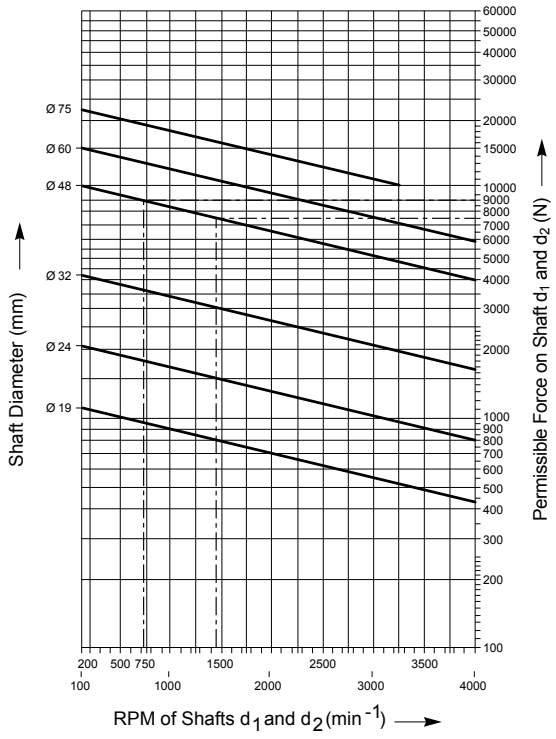
1. Read off the Permissible radial Force for the nearest diameter shafts from the graph below.
2. Use the Correction Factors, below, to calculate the Permissible Radial and Axial Loads for each of the gearbox shafts.

Correction Factors

	Output Shaft (Bearings on through shaft)	Input Shaft (Bearings on overhung shaft)	Output Shaft (Bearings on overhung shaft)	Gearboxes with Centre bearing
Permissible Radial Forces	1.00	0.66	0.66	0.40
Permissible Axial Forces	0.50	0.50	0.50	0.50

The calculated loads should be checked against the radial and axial loads provided by the manufacturer of the transmission mechanism. If the loading created by the transmission mechanism exceeds the permissible level, a gearbox with a larger diameter shaft is required. At this point Power Jacks should be consulted as it is often possible to fit a special shaft arrangement into a standard gearbox.

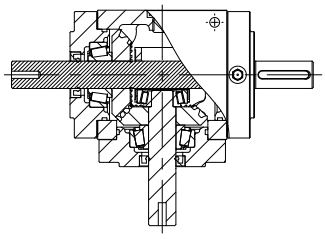
Permissible Shaft Loading Curves



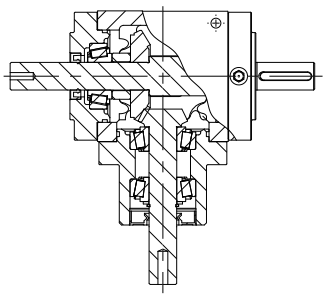
Permissible Shaft Loading Curves

Example: Series 39, Ratio 2:1, 1440 rpm Input

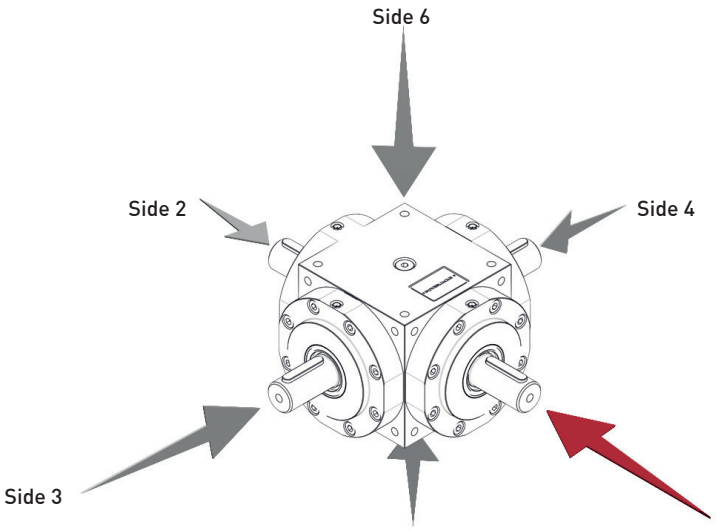
Ød1	=	48	permissible radial force 7500 N x 0.66 = 4950 N permissible axial force 4950 N x 0.50 = 2475 N
Ød2	=	48	permissible radial force 9000 N x 1.00 = 9000 N permissible axial force 9000 N x 0.50 = 4500 N



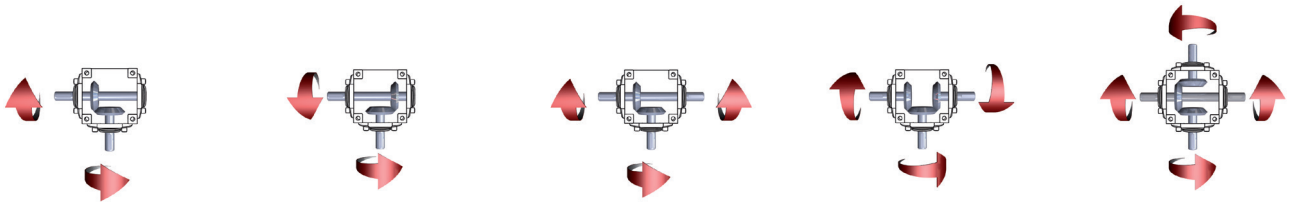
Ratios 1:1 & 1.5:1



Ratios 2:1 & above

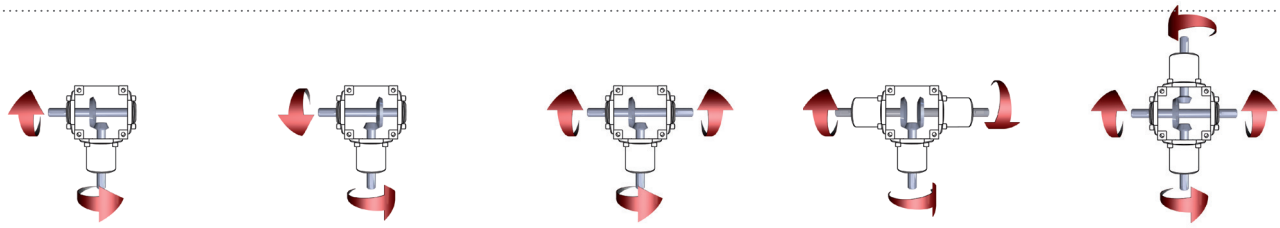


Ratio 1:1 & 1.5:1



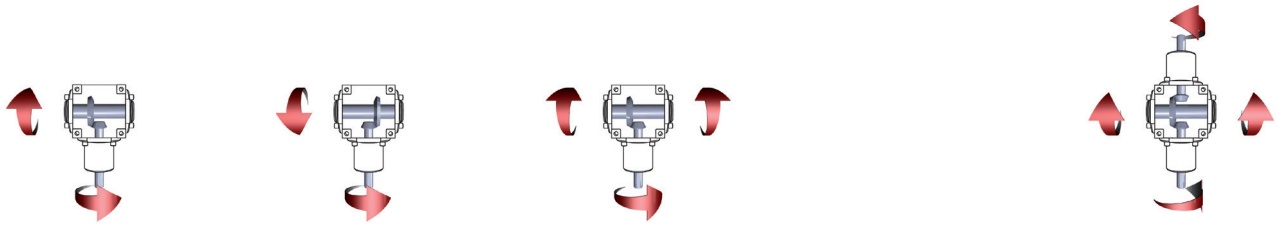
2 Way | 2 Way Reverse | 3 Way | 3 Way Reverse | 4 Way

Ratio 2:1 & Above



2 Way | 2 Way Reverse | 3 Way | 3 Way Reverse | 4 Way

Hollow Shaft - All Ratios



2 Way | 2 Way Reverse | 3 Way | 4 Way

Performance

Series 35		
Torque (Nm)	Nominal#1	46
	Max Running#2	93
	Max Start-Up	140
Input Speed	Max (rpm)	3000
Thermal Limit	Power (kW)	3.3
Backlash	arcmin	9 to 16
Efficiency	(%)	95% - 98%
Service Life	(hours)	>10000
Housing Material		SG Iron
Oil Quantity	Litres	0.14
	Pints	0.24
Weight (kg)	2 Way - 1:1 & 1.5:1	5.25
	3 Way - 1:1 & 1.5:1	5.5
	4 Way - 1:1 & 1.5:1	6

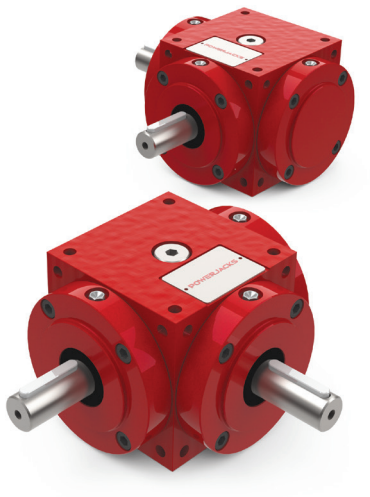
#1 Nominal torque values at running speeds of 1500 rpm
#2 Maximum running torque value at speed of 10 rpm
Full detailed performance for each unit refer to page 16 & 17

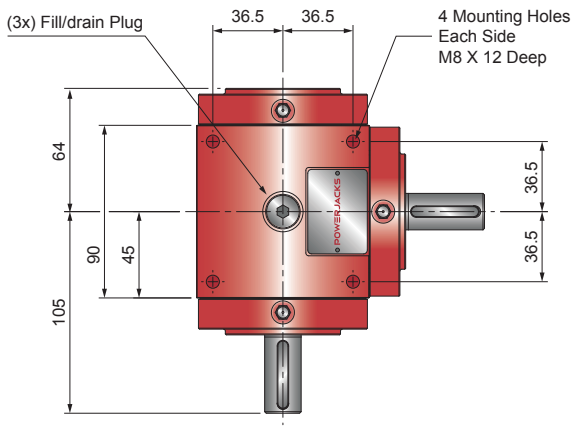
Accessories & Options

- Special Gear Ratio
- Motor Flange
- Extended Drive Shaft
- Limit Switches
- Drives
- Light Weight Design
- Reinforced Shaft OR High Torque
- Breather
- 90° Breather
- Mounting Feet
- Shaft Cover
- Stainless Steel
- Submersible
- Corrosion Protection
- Defence Rated
- ATEX Bevel Gearboxes for Explosive Environments
- Nuclear Rated
- Food Grade
- Low Temperature
- High Temperature

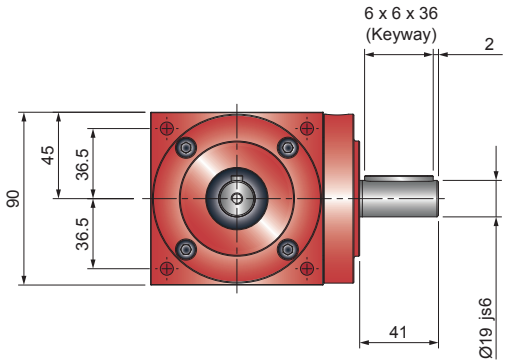
2 Way Solid Shaft

C350S20-10





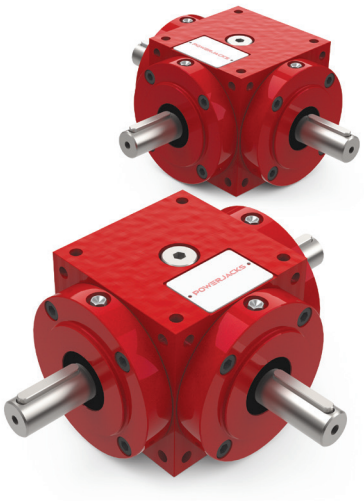
Tapped hole in end of each solid drive shaft - M6 x 16mm Deep

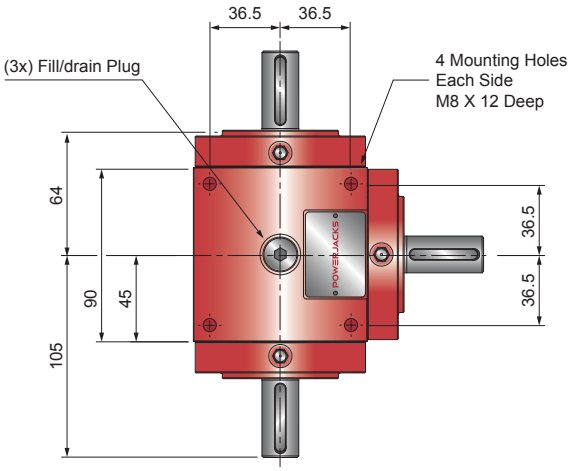


Notes:
1. All dimensions in mm unless otherwise stated
2. Dimensions subject to change without notice
3. All colours for illustrative purposes only

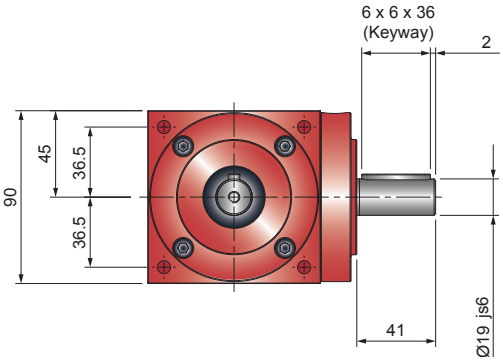
3 Way Solid Shaft

C350S30-10





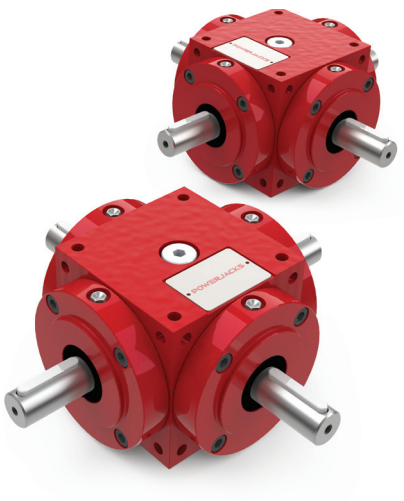
Tapped hole in end of each solid drive shaft - M6 x 16mm Deep

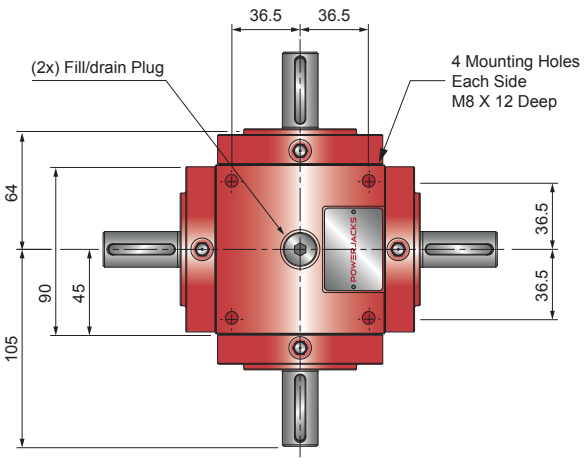


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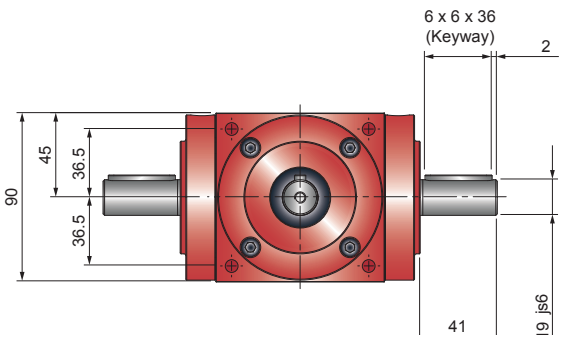
4 Way Solid Shaft

C350S40-10





Tapped hole in end of each solid drive shaft - M6 x 16mm Deep



Notes:
1. All dimensions in mm unless otherwise stated
2. Dimensions subject to change without notice
3. All colours for illustrative purposes only

Performance

Series 35		
Torque (Nm)	Nominal#1	46
	Max Running#2	93
	Max Start-Up	140
Input Speed	Max (rpm)	3000
Thermal Limit	Power (kW)	3.3
Backlash	arcmin	9 to 16
Efficiency	(%)	95% - 98%
Service Life	(hours)	>10000
Housing Material		SG Iron
Oil Quantity	Litres	0.14
	Pints	0.24
Weight (kg)	2 Way - 2:1 +	5.5
	3 Way - 2:1 +	6
	4 Way - 2:1 +	7

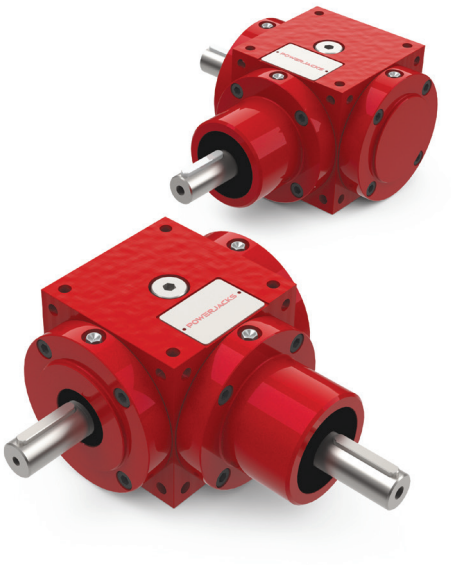
#1 Nominal torque values at running speeds of 1500 rpm
#2 Maximum running torque value at speed of 10 rpm
Full detailed performance for each unit refer to page 214 & 215

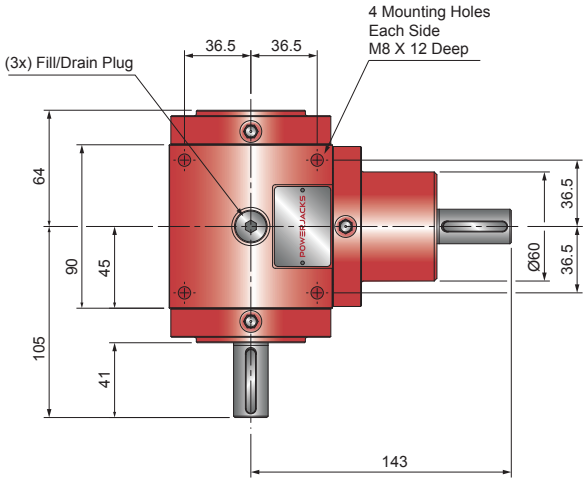
Accessories & Options

- Special Gear Ratio
- Motor Flange
- Extended Drive Shaft
- Limit Switches
- Drives
- Light Weight Design
- Reinforced Shaft OR High Torque
- Breather
- 90° Breather
- Mounting Feet
- Shaft Cover
- Stainless Steel
- Submersible
- Corrosion Protection
- Defence Rated
- ATEX Bevel Gearboxes for Explosive Environments
- Nuclear Rated
- Food Grade
- Low Temperature
- High Temperature

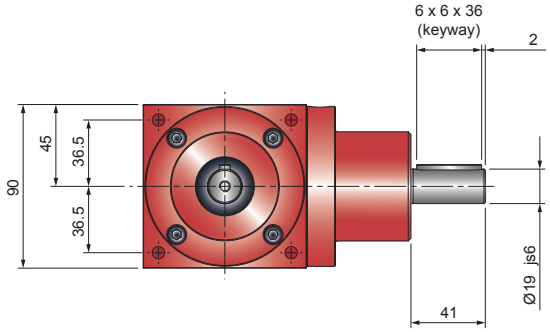
2 Way Solid Shaft

C350S20-20





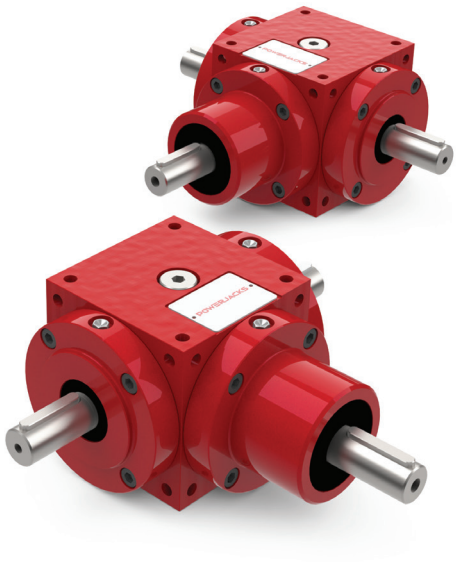
Tapped hole in end of each solid drive shaft - M6 x 16mm Deep

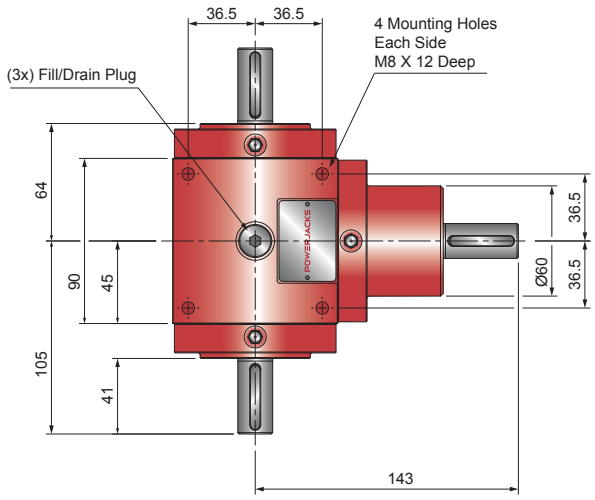


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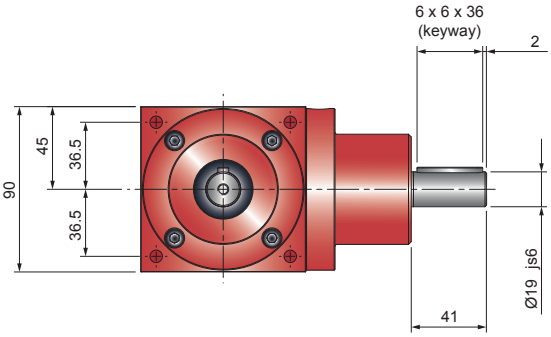
3 Way Solid Shaft

C350S30-20





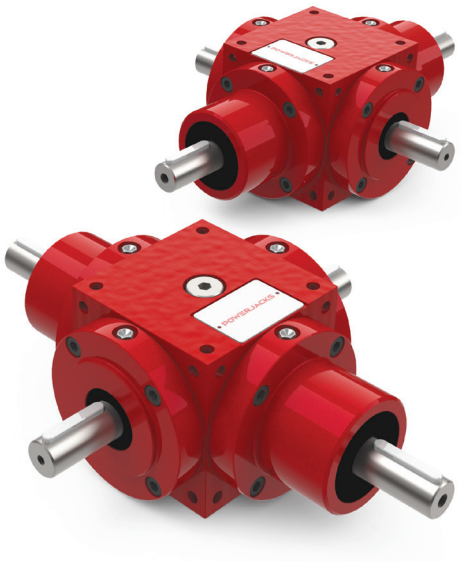
Tapped hole in end of each solid drive shaft - M6 x 16mm Deep

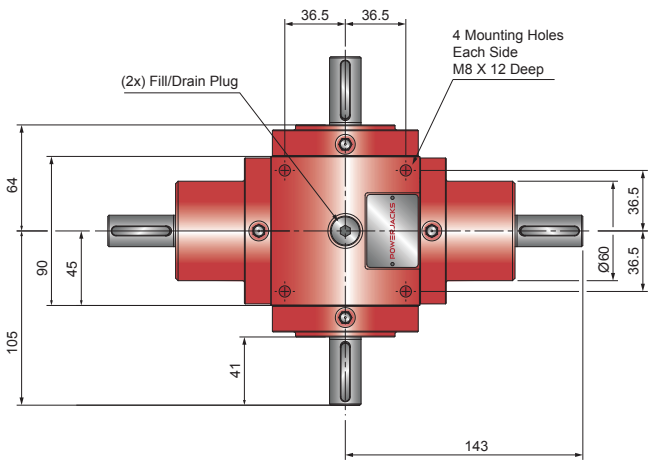


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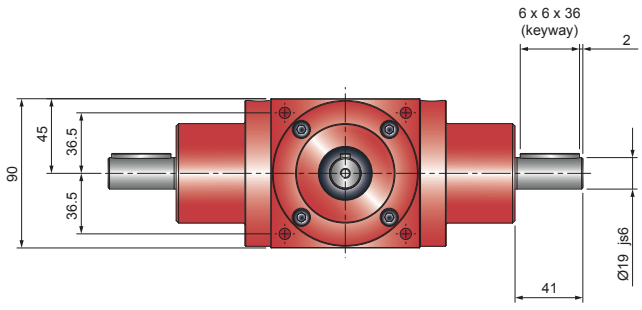
4 Way Solid Shaft

C350S40-20





Tapped hole in end of each solid drive shaft - M6 x 16mm Deep



Notes:
1. All dimensions in mm unless otherwise stated
2. Dimensions subject to change without notice
3. All colours for illustrative purposes only

Performance

Series 35		
Torque (Nm)	Nominal#1	46
	Max Running#2	93
	Max Start-Up	140
Input Speed	Max (rpm)	3000
Thermal Limit	Power (kW)	3.3
Backlash	arcmin	9 to 16
Efficiency	(%)	95% - 98%
Service Life	(hours)	>10000
Housing Material		SG Iron
Oil Quantity	Litres	0.14
	Pints	0.24
Weight (kg)	2 Way - 1:1 & 1.5:1	5.25
	2 Way - 2:1 +	5.5
	3 Way - 1:1 & 1.5:1	5.5
	3 Way - 2:1 +	6
	4 Way - 1:1 & 1.5:1	6
	4 Way - 2:1 +	7

#1 Nominal torque values at running speeds of 1500 rpm
#2 Maximum running torque value at speed of 10 rpm

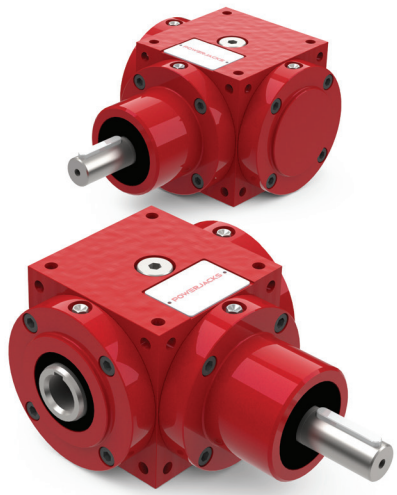
Full detailed performance for each unit refer to page 214 & 215

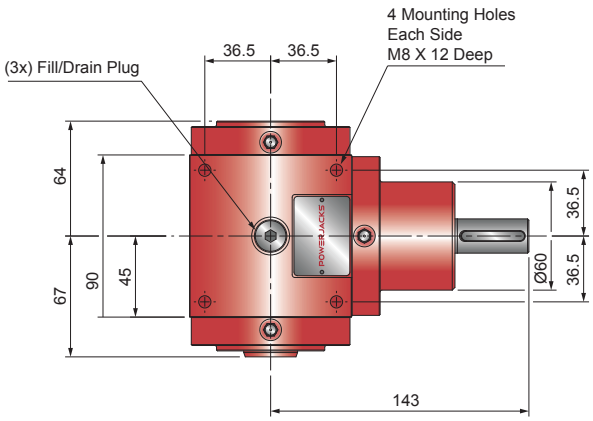
Accessories & Options

- Special Gear Ratio
- Motor Flange
- Extended Drive Shaft
- Limit Switches
- Drives
- Light Weight Design
- Reinforced Shaft OR High Torque
- Breather
- 90° Breather
- Mounting Feet
- Shaft Cover
- Stainless Steel
- Submersible
- Corrosion Protection
- Defence Rated
- ATEX Bevel Gearboxes for Explosive Environments
- Nuclear Rated
- Food Grade
- Low Temperature
- High Temperature

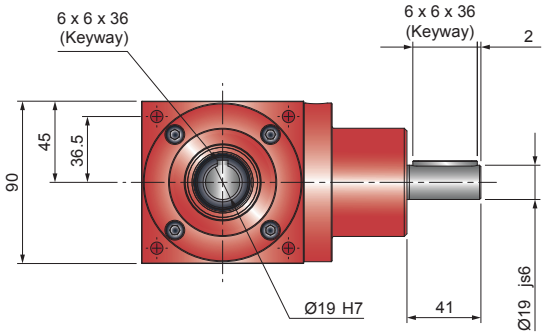
2 Way Hollow Shaft

C350H20-10





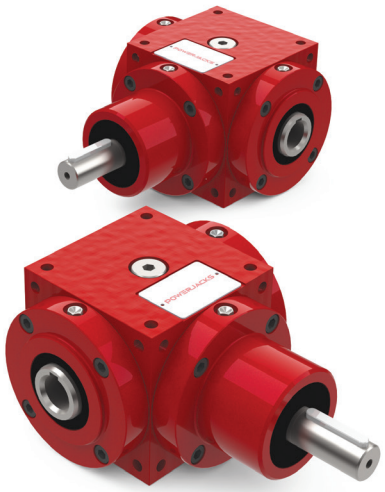
Tapped hole in end of each solid drive shaft - M6 x 16mm Deep

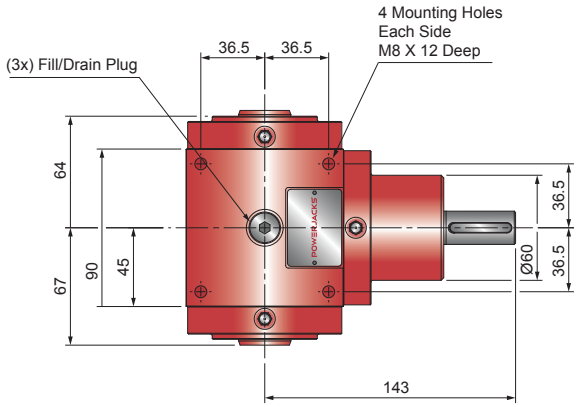


Notes:
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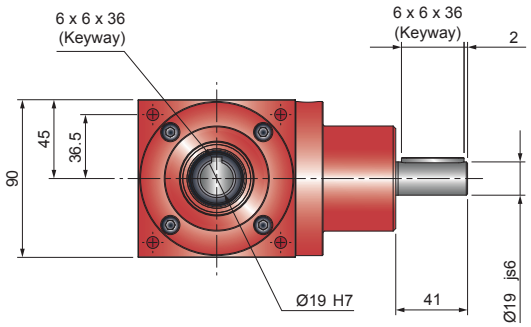
3 Way Hollow Shaft

C350H30-10





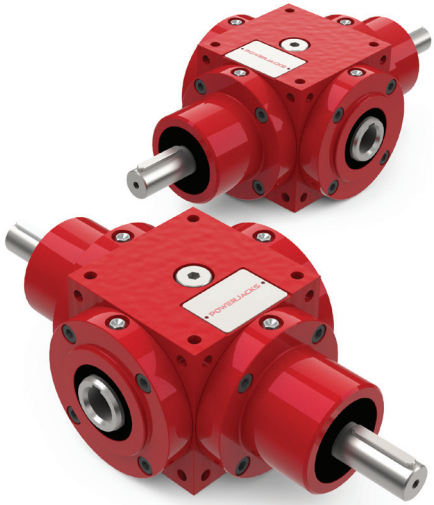
Tapped hole in end of each solid drive shaft - M6 x 16mm Deep

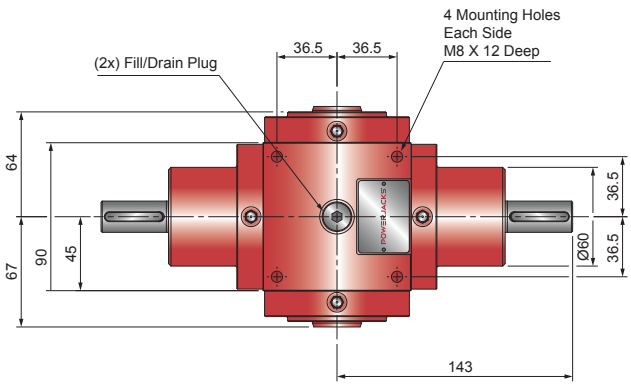


Notes:
1. All dimensions in mm unless otherwise stated
2. Dimensions subject to change without notice
3. All colours for illustrative purposes only

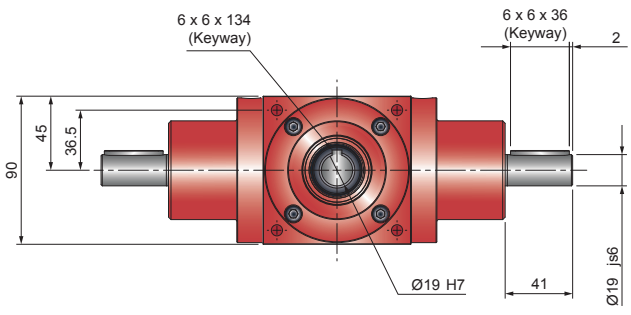
4 Way Hollow Shaft

C350H40-10





Tapped hole in end of each solid drive shaft - M6 x 16mm Deep



Notes:
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2. Dimensions subject to change without notice
3. All colours for illustrative purposes only

Performance

Series 37		
Torque (Nm)	Nominal#1	115
	Max Running#2	187
	Max Start-Up	281
Input Speed	Max (rpm)	3000
Thermal Limit	Power (kW)	9
Backlash	arcmin	9 to 16
Efficiency	(%)	95% - 98%
Service Life	(hours)	>10000
Housing Material		SG Iron
Oil Quantity	Litres	0.29
	Pints	0.5
Weight (kg)	2 Way - 1:1 & 1.5:1	11
	3 Way - 1:1 & 1.5:1	11.5
	4 Way - 1:1 & 1.5:1	13

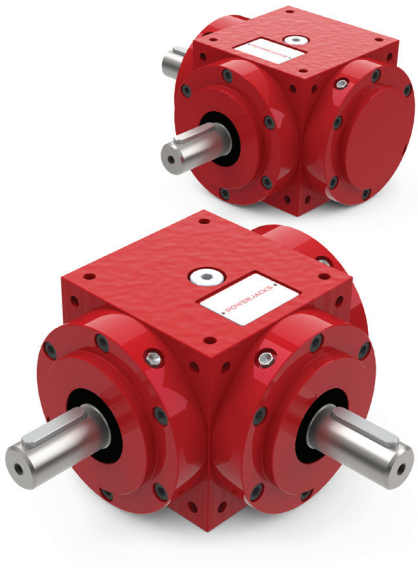
#1 Nominal torque values at running speeds of 1500 rpm
#2 Maximum running torque value at speed of 10 rpm
Full detailed performance for each unit refer to page 214 & 215

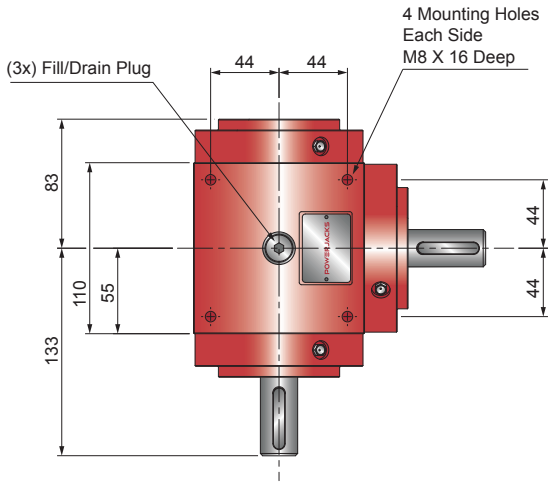
Accessories & Options

- Special Gear Ratio
- Motor Flange
- Extended Drive Shaft
- Limit Switches
- Drives
- Light Weight Design
- Reinforced Shaft OR High Torque
- Breather
- 90° Breather
- Mounting Feet
- Shaft Cover
- Stainless Steel
- Submersible
- Corrosion Protection
- Defence Rated
- ATEX Bevel Gearboxes for Explosive Environments
- Nuclear Rated
- Food Grade
- Low Temperature
- High Temperature

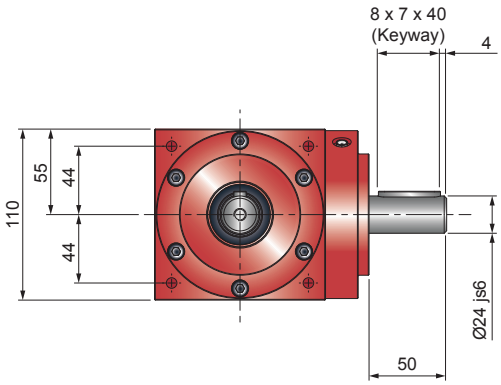
2 Way Solid Shaft

C370S20-10





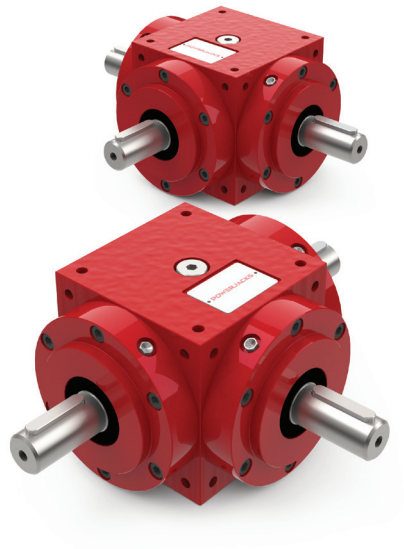
Tapped hole in end of each solid drive shaft - M8 x 25mm Deep

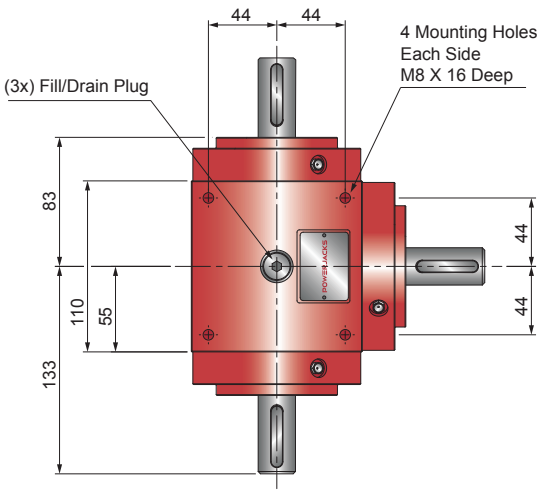


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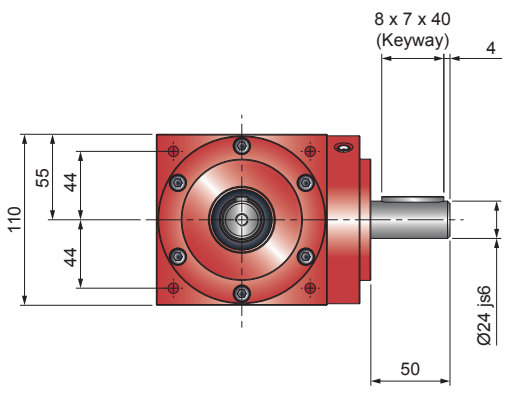
3 Way Solid Shaft

C370S30-10





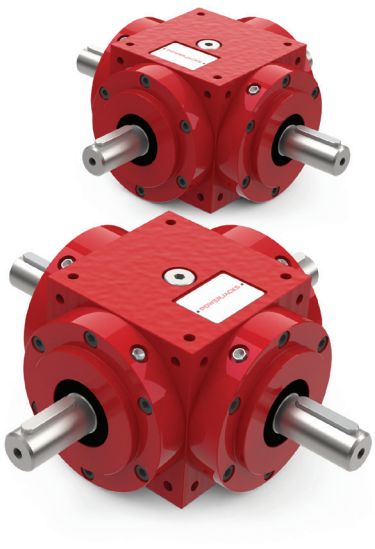
Tapped hole in end of each solid drive shaft - M8 x 25mm Deep

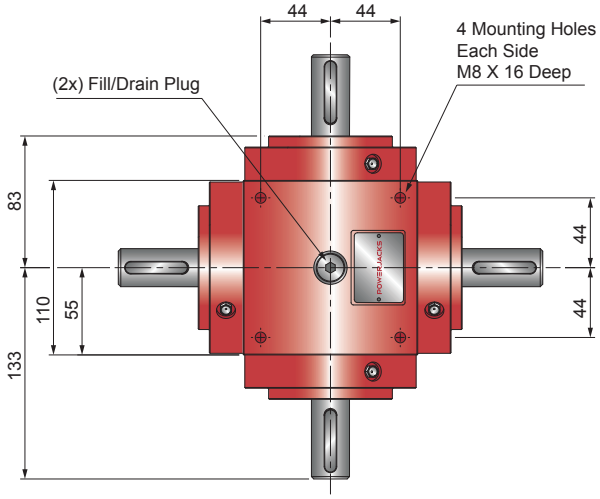


Notes:
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3. All colours for illustrative purposes only

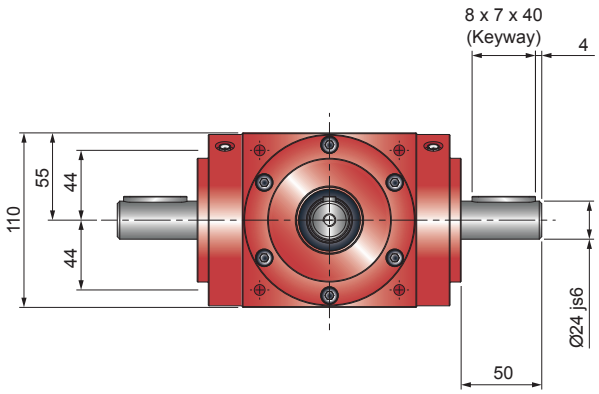
4 Way Solid Shaft

C370S40-10





Tapped hole in end of each solid drive shaft - M8 x 25mm Deep



Notes:
1. All dimensions in mm unless otherwise stated
2. Dimensions subject to change without notice
3. All colours for illustrative purposes only

Performance

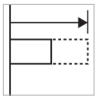
Series 37		
Torque (Nm)	Nominal#1	115
	Max Running#2	187
	Max Start-Up	281
Input Speed	Max (rpm)	3000
Thermal Limit	Power (kW)	9
Backlash	arcmin	9 to 16
Efficiency	(%)	95% - 98%
Service Life	(hours)	>10000
Housing Material		SG Iron
Oil Quantity	Litres	0.29
	Pints	0.5
Weight (kg)	2 Way - 2:1 +	11
	3 Way - 2:1 +	11.5
	4 Way - 2:1 +	14

#1 Nominal torque values at running speeds of 1500 rpm
#2 Maximum running torque value at speed of 10 rpm
Full detailed performance for each unit refer to page 214 & 215

Accessories & Options


Special Gear Ratio


Motor Flange


Extended Drive Shaft


Limit Switches


Drives

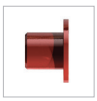

Light Weight Design


Reinforced Shaft OR High Torque


Breather

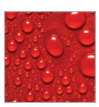

90° Breather


Mounting Feet


Shaft Cover


Stainless Steel

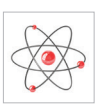

Submersible


Corrosion Protection


Defence Rated



ATEX Bevel Gearboxes for Explosive Environments


Nuclear Rated

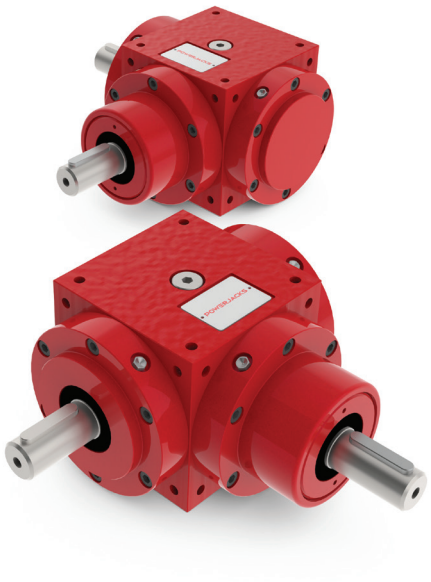

Food Grade

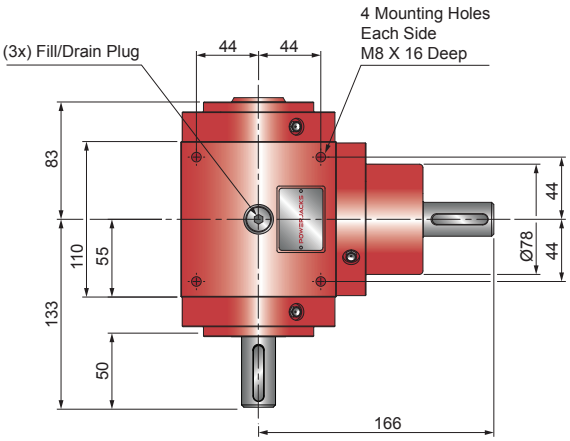

Low Temperature


High Temperature

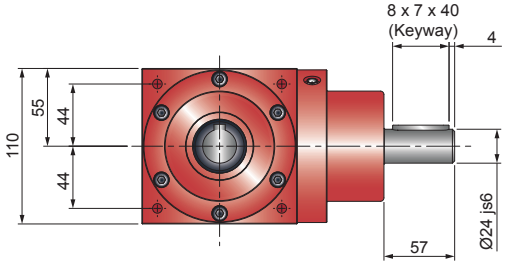
2 Way Solid Shaft

C370S20-20





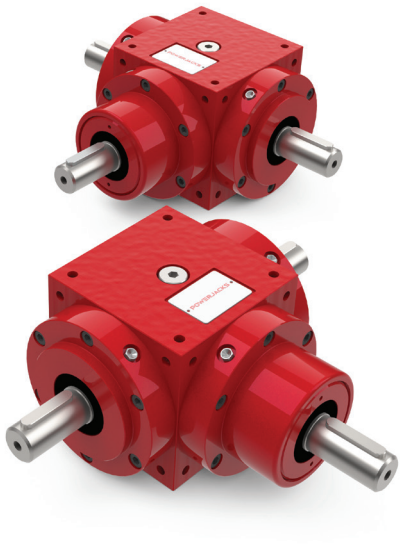
Tapped hole in end of each solid drive shaft - M8 x 25mm Deep

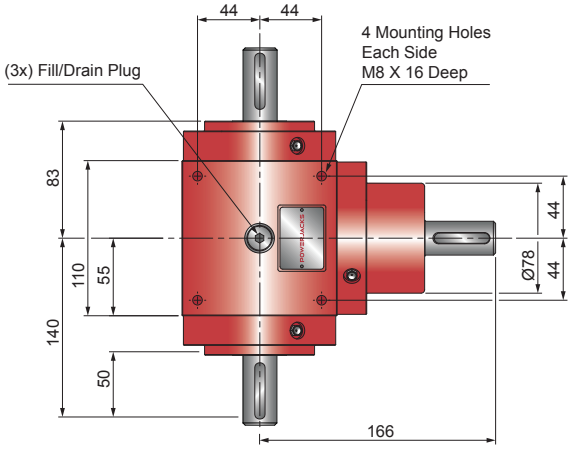


Notes:
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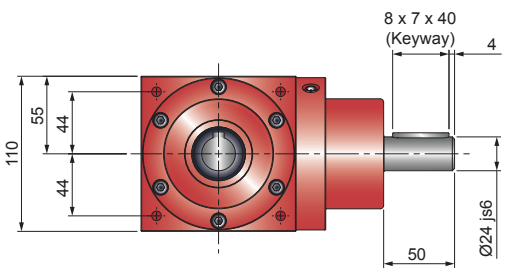
3 Way Solid Shaft

C370S30-20





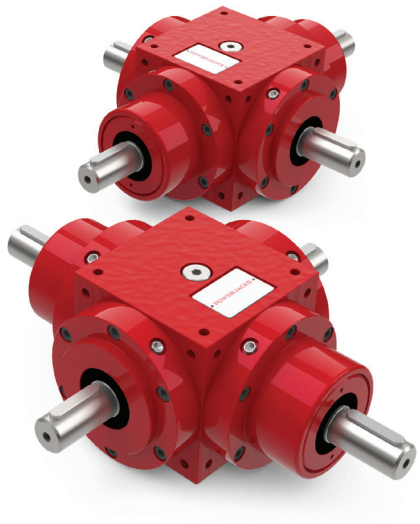
Tapped hole in end of each solid drive shaft - M8 x 25mm Deep

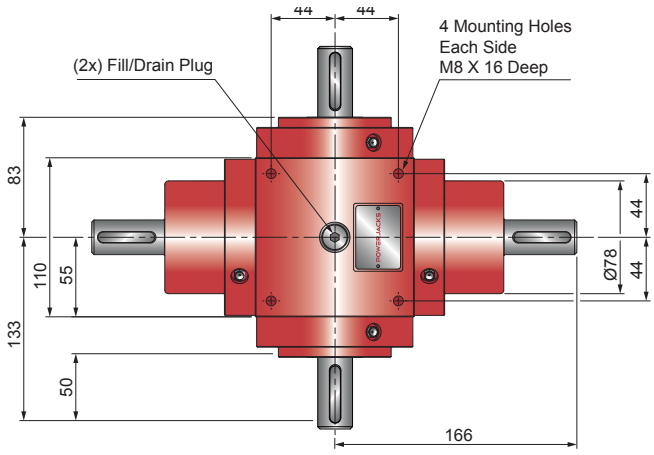


Notes:
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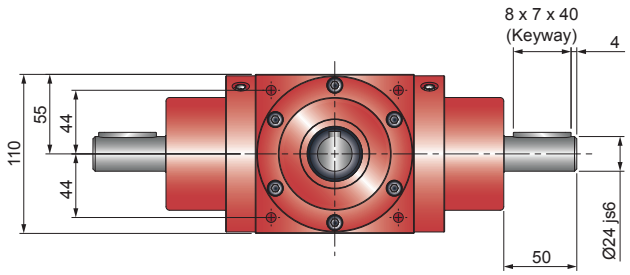
4 Way Solid Shaft

C370S40-20





Tapped hole in end of each solid drive shaft - M8 x 25mm Deep



Notes:
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Performance

Series 37		
Torque (Nm)	Nominal#1	115
	Max Running#2	187
	Max Start-Up	281
Input Speed	Max (rpm)	3000
Thermal Limit	Power (kW)	9
Backlash	arcmin	9 to 16
Efficiency	(%)	95% - 98%
Service Life	(hours)	>10000
Housing Material		SG Iron
Oil Quantity	Litres	0.29
	Pints	0.5
Weight (kg)	2 Way - 1:1 & 1.5:1	11
	2 Way - 2:1 +	11
	3 Way - 1:1 & 1.5:1	11.5
	3 Way - 2:1 +	11.5
	4 Way - 1:1 & 1.5:1	13
	4 Way - 2:1 +	14

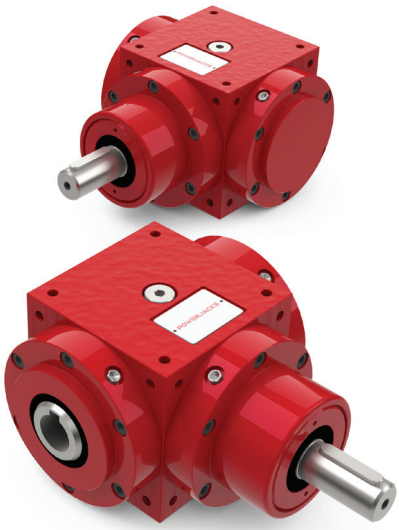
#1 Nominal torque values at running speeds of 1500 rpm
#2 Maximum running torque value at speed of 10 rpm
Full detailed performance for each unit refer to page 214 & 215

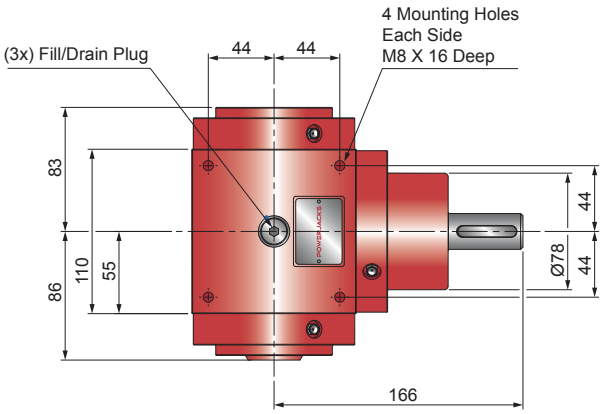
Accessories & Options

- Special Gear Ratio
- Motor Flange
- Extended Drive Shaft
- Limit Switches
- Drives
- Light Weight Design
- Reinforced Shaft OR High Torque
- Breather
- 90° Breather
- Mounting Feet
- Shaft Cover
- Stainless Steel
- Submersible
- Corrosion Protection
- Defence Rated
- ATEX Bevel Gearboxes for Explosive Environments
- Nuclear Rated
- Food Grade
- Low Temperature
- High Temperature

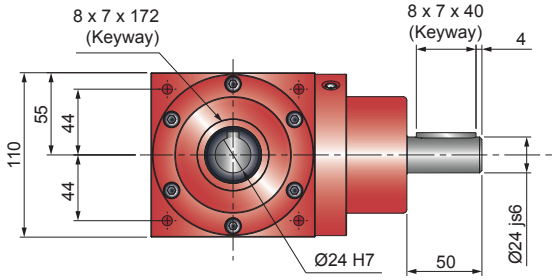
2 Way Hollow Shaft

C370H20-10





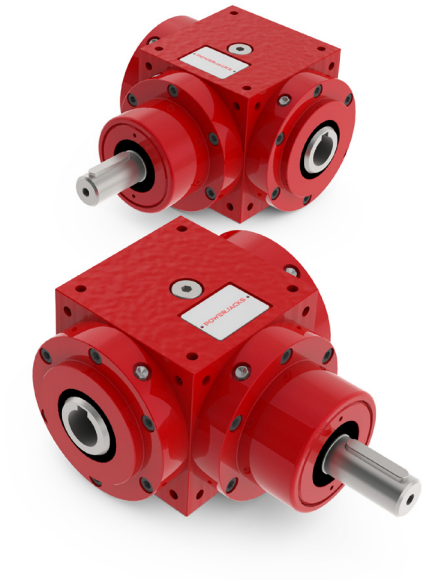
Tapped hole in end of each solid drive shaft - M8 x 25mm Deep

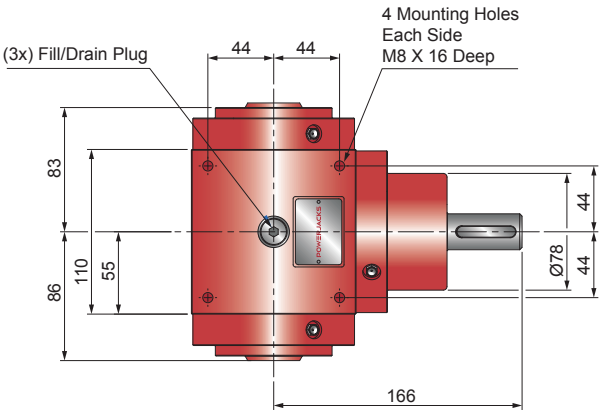


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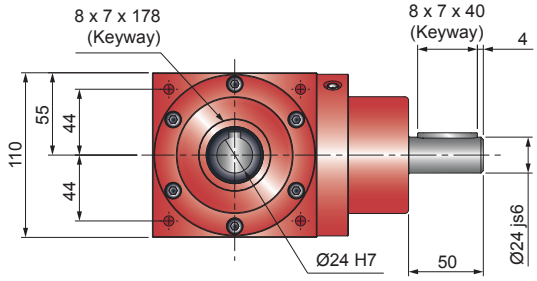
3 Way Hollow Shaft

C370H30-10





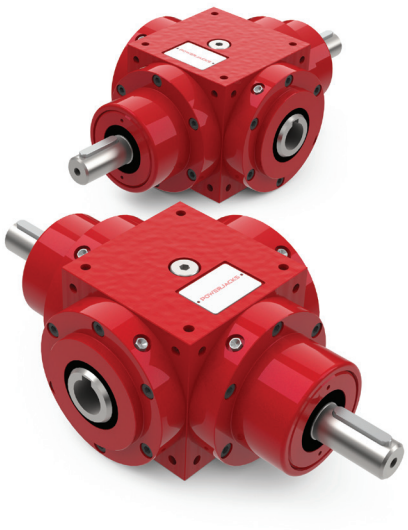
Tapped hole in end of each solid drive shaft - M8 x 25mm Deep

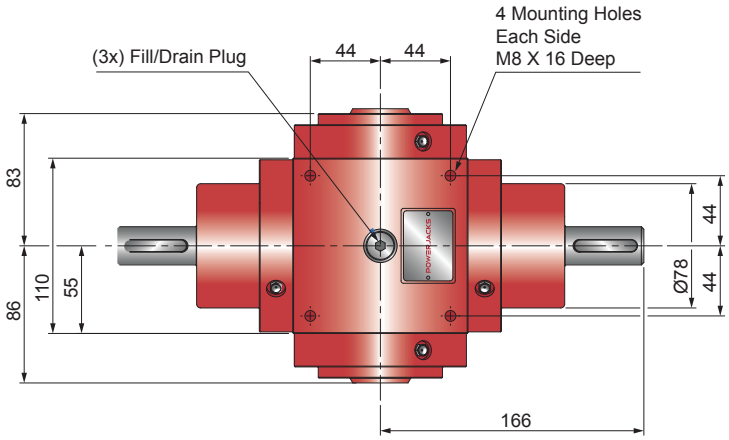


Notes:
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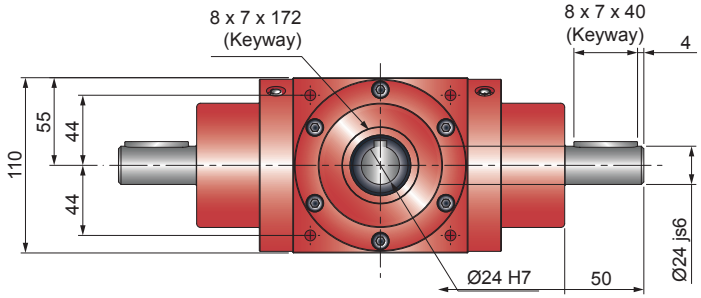
4 Way Hollow Shaft

C370H40-10





Tapped hole in end of each solid drive shaft - M8 x 25mm Deep



Notes:
1. All dimensions in mm unless otherwise stated
2. Dimensions subject to change without notice
3. All colours for illustrative purposes only

Performance

Series 38		
Torque (Nm)	Nominal#1	328
	Max Running#2	505
	Max Start-Up	758
Input Speed	Max (rpm)	3000
Thermal Limit	Power (kW)	20.5
Backlash	arcmin	9 to 16
Efficiency	(%)	95% - 98%
Service Life	(hours)	>10000
Housing Material		SG Iron
Oil Quantity	Litres	0.75
	Pints	1.32
Weight (kg)	2 Way - 1:1 & 1.5:1	21.75
	3 Way - 1:1 & 1.5:1	22
	4 Way - 1:1 & 1.5:1	25

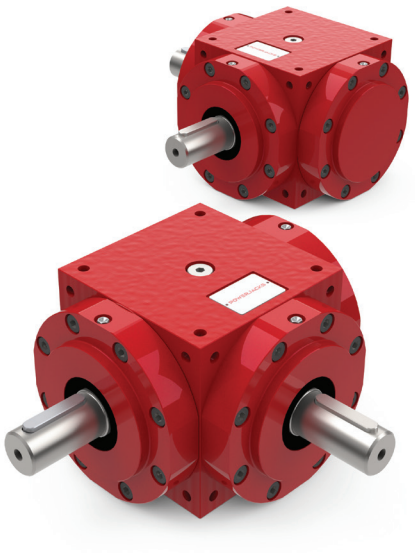
#1 Nominal torque values at running speeds of 1500 rpm
#2 Maximum running torque value at speed of 10 rpm
Full detailed performance for each unit refer to page 214 & 215

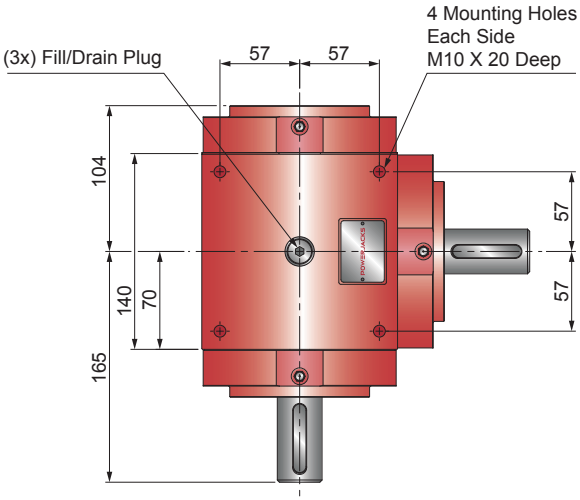
Accessories & Options

- Special Gear Ratio
- Motor Flange
- Extended Drive Shaft
- Limit Switches
- Drives
- Light Weight Design
- Reinforced Shaft OR High Torque
- Breather
- 90° Breather
- Mounting Feet
- Shaft Cover
- Stainless Steel
- Submersible
- Corrosion Protection
- Defence Rated
- ATEX Bevel Gearboxes for Explosive Environments
- Nuclear Rated
- Food Grade
- Low Temperature
- High Temperature

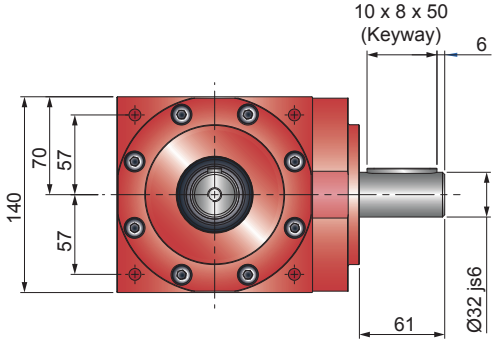
2 Way Solid Shaft

C380S20-10





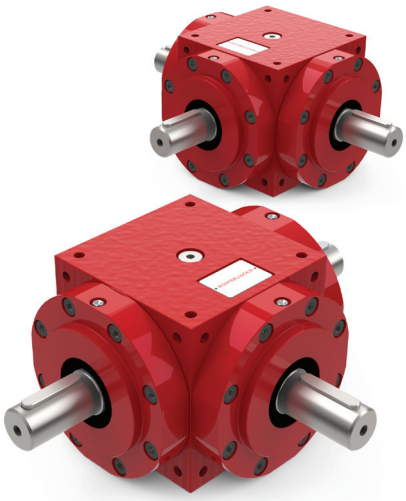
Tapped hole in end of each solid drive shaft - M10 x 25mm Deep

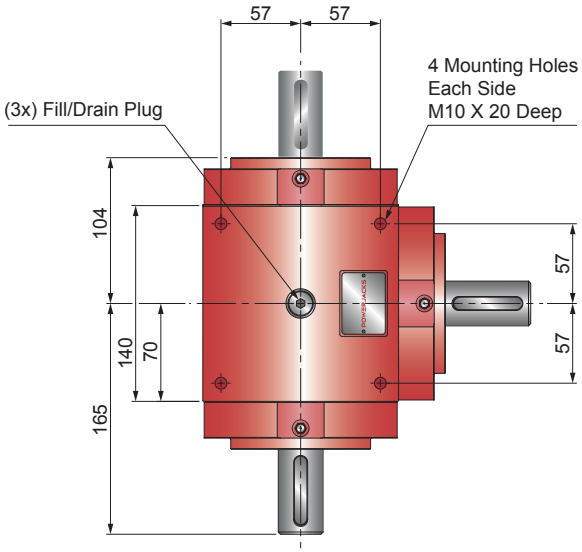


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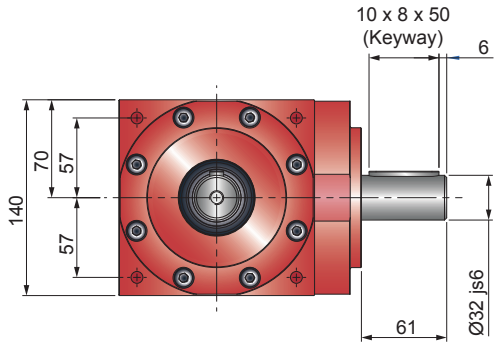
3 Way Solid Shaft

C380S30-10





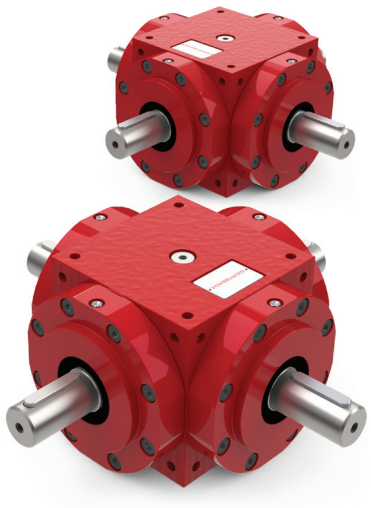
Tapped hole in end of each solid drive shaft - M10 x 25mm Deep

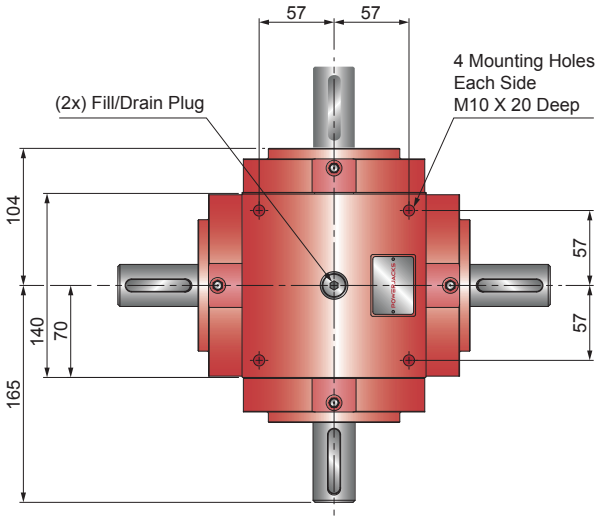


Notes:
1. All dimensions in mm unless otherwise stated
2. Dimensions subject to change without notice
3. All colours for illustrative purposes only

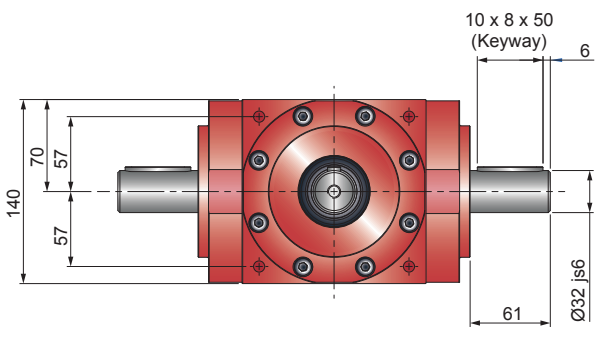
4 Way Solid Shaft

C380S40-10





Tapped hole in end of each solid drive shaft - M10 x 25mm Deep



Notes:
1. All dimensions in mm unless otherwise stated
2. Dimensions subject to change without notice
3. All colours for illustrative purposes only

Performance

Series 38		
Torque (Nm)	Nominal#1	328
	Max Running#2	505
	Max Start-Up	758
Input Speed	Max (rpm)	3000
Thermal Limit	Power (kW)	20.5
Backlash	arcmin	9 to 16
Efficiency	(%)	95% - 98%
Service Life	(hours)	>10000
Housing Material		SG Iron
Oil Quantity	Litres	0.75
	Pints	1.32
Weight (kg)	2 Way - 2:1 +	21
	3 Way - 2:1 +	22.5
	4 Way - 2:1 +	27

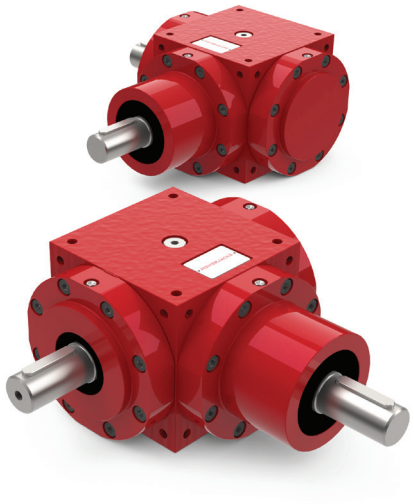
#1 Nominal torque values at running speeds of 1500 rpm
#2 Maximum running torque value at speed of 10 rpm
Full detailed performance for each unit refer to page 214 & 215

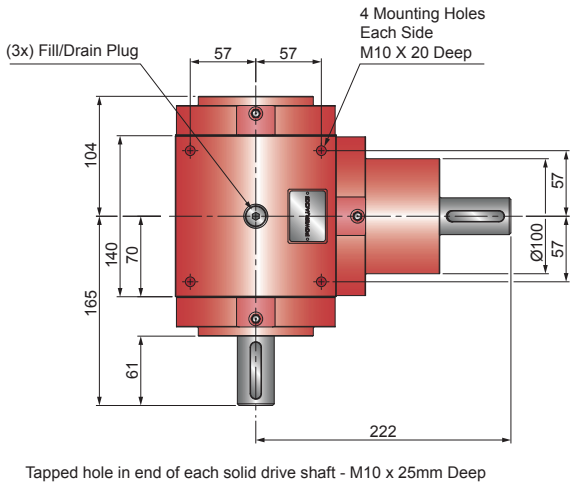
Accessories & Options

- Special Gear Ratio
- Motor Flange
- Extended Drive Shaft
- Limit Switches
- Drives
- Light Weight Design
- Reinforced Shaft OR High Torque
- Breather
- 90° Breather
- Mounting Feet
- Shaft Cover
- Stainless Steel
- Submersible
- Corrosion Protection
- Defence Rated
- ATEX Bevel Gearboxes for Explosive Environments
- Nuclear Rated
- Food Grade
- Low Temperature
- High Temperature

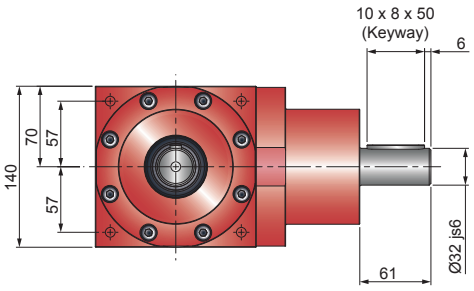
2 Way Solid Shaft

C380S20-20





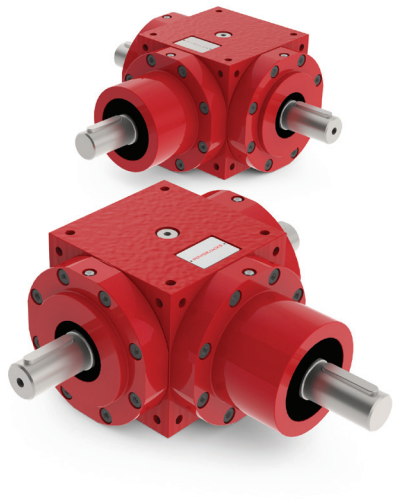
Tapped hole in end of each solid drive shaft - M10 x 25mm Deep

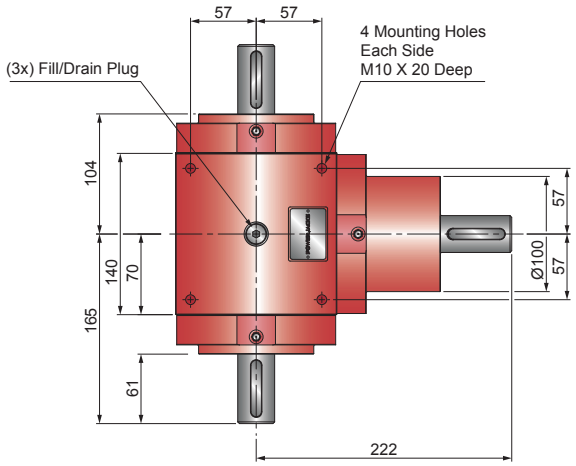


Notes:
1. All dimensions in mm unless otherwise stated
2. Dimensions subject to change without notice
3. All colours for illustrative purposes only

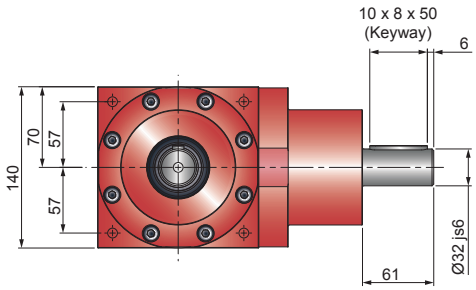
3 Way Solid Shaft

C380S30-20





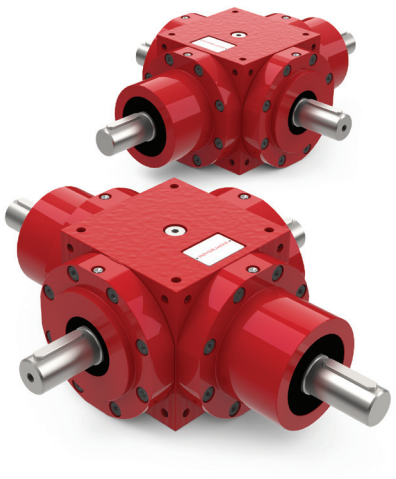
Tapped hole in end of each solid drive shaft - M10 x 25mm Deep

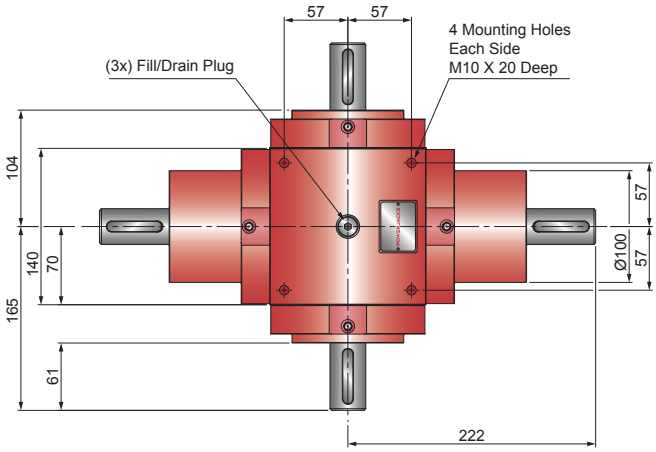


Notes:
1. All dimensions in mm unless otherwise stated
2. Dimensions subject to change without notice
3. All colours for illustrative purposes only

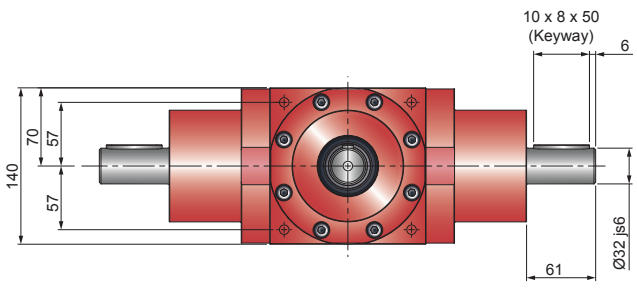
4 Way Solid Shaft

C380S40-20





Tapped hole in end of each solid drive shaft - M10 x 25mm Deep



Notes:
1. All dimensions in mm unless otherwise stated
2. Dimensions subject to change without notice
3. All colours for illustrative purposes only

Performance

Series 38		
Torque (Nm)	Nominal#1	328
	Max Running#2	505
	Max Start-Up	758
Input Speed	Max (rpm)	3000
Thermal Limit	Power (kW)	20.5
Backlash	arcmin	9 to 16
Efficiency	(%)	95% - 98%
Service Life	(hours)	>10000
Housing Material		SG Iron
Oil Quantity	Litres	0.75
	Pints	1.32
Weight (kg)	2 Way - 1:1 & 1.5:1	21.75
	2 Way - 2:1 +	22
	3 Way - 1:1 & 1.5:1	22
	3 Way - 2:1 +	22.5
	4 Way - 1:1 & 1.5:1	25
	4 Way - 2:1 +	27

#1 Nominal torque values at running speeds of 1500 rpm
#2 Maximum running torque value at speed of 10 rpm

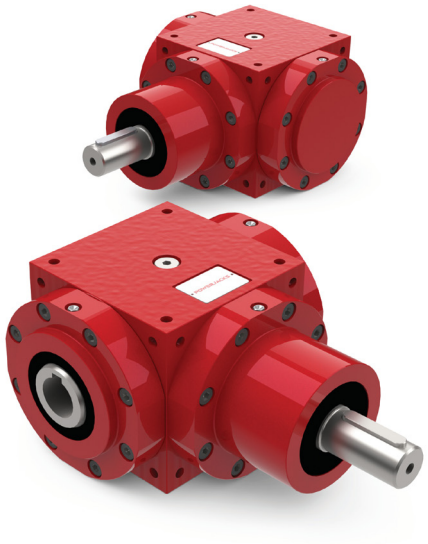
Full detailed performance for each unit refer to page 214 & 215

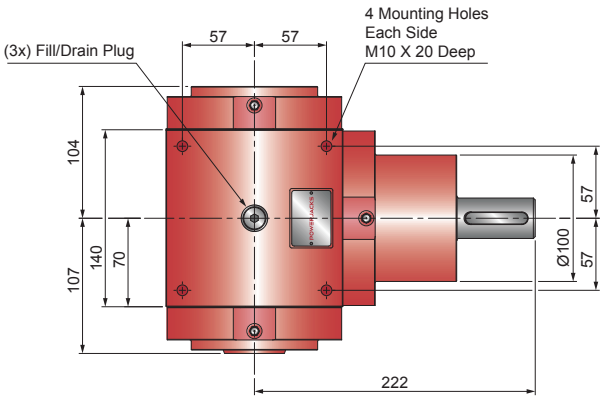
Accessories & Options

- Special Gear Ratio
- Motor Flange
- Extended Drive Shaft
- Limit Switches
- Drives
- Light Weight Design
- Reinforced Shaft OR High Torque
- Breather
- 90° Breather
- Mounting Feet
- Shaft Cover
- Stainless Steel
- Submersible
- Corrosion Protection
- Defence Rated
- ATEX Bevel Gearboxes for Explosive Environments
- Nuclear Rated
- Food Grade
- Low Temperature
- High Temperature

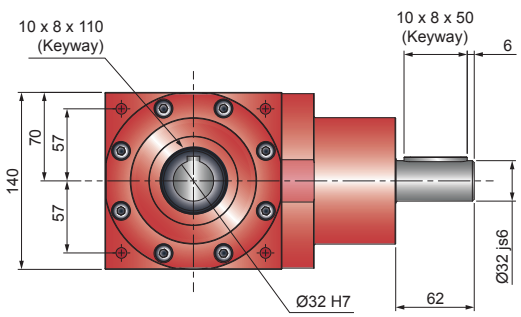
2 Way Hollow Shaft

C380H20-10





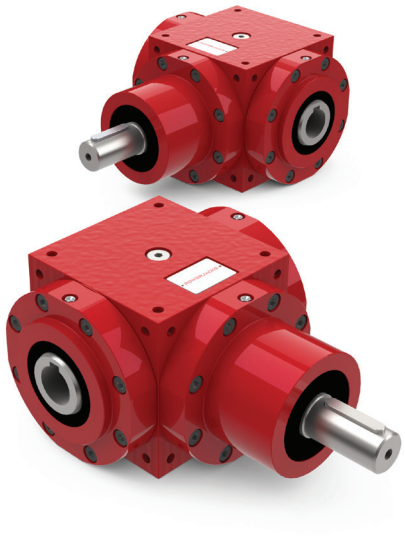
Tapped hole in end of each solid drive shaft - M10 x 25mm Deep

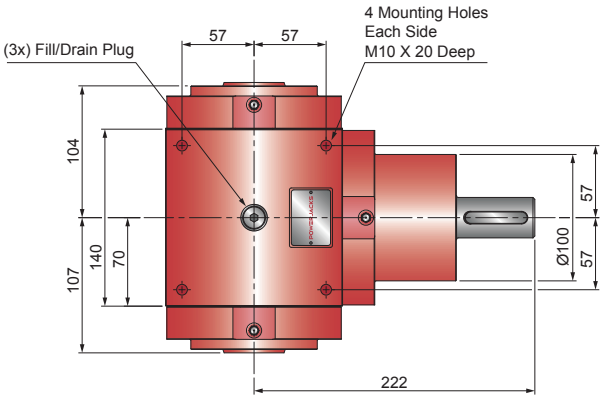


Notes:
1. All dimensions in mm unless otherwise stated
2. Dimensions subject to change without notice
3. All colours for illustrative purposes only

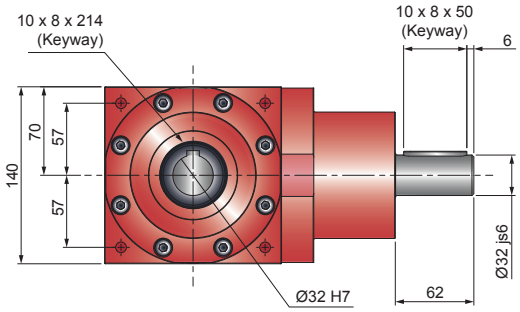
3 Way Hollow Shaft

C380H30-10





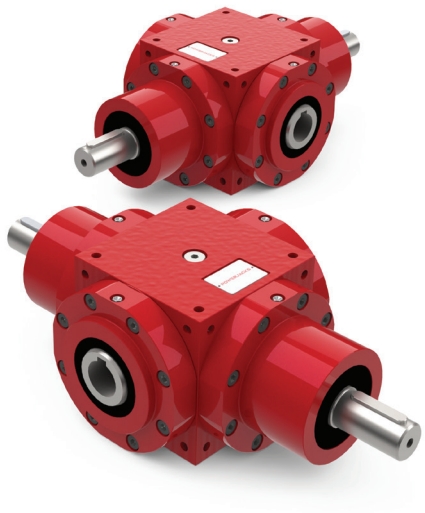
Tapped hole in end of each solid drive shaft - M10 x 25mm Deep

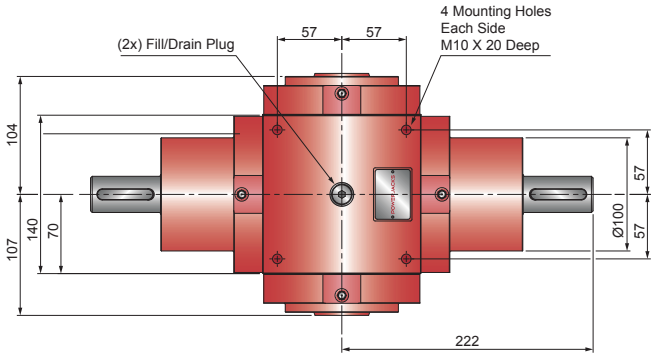


Notes:
1. All dimensions in mm unless otherwise stated
2. Dimensions subject to change without notice
3. All colours for illustrative purposes only

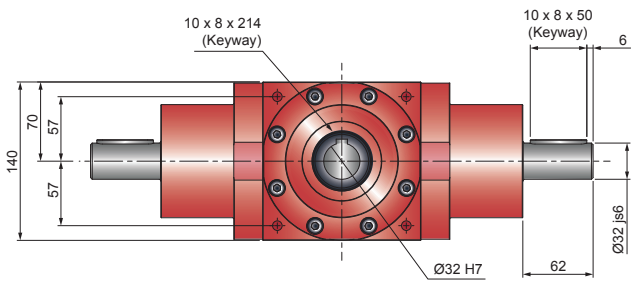
4 Way Hollow Shaft

C380H40





Tapped hole in end of each solid drive shaft - M10 x 25mm Deep



Notes:
1. All dimensions in mm unless otherwise stated
2. Dimensions subject to change without notice
3. All colours for illustrative purposes only

Performance

Series 39		
Torque (Nm)	Nominal#1	481
	Max Running#2	935
	Max Start-Up	1403
Input Speed	Max (rpm)	3000
Thermal Limit	Power (kW)	49
Backlash	arcmin	7 to 10
Efficiency	(%)	95% - 98%
Service Life	(hours)	>10000
Housing Material		SG Iron
Oil Quantity	Litres	1.71
	Pints	3
Weight (kg)	2 Way - 1:1 & 1.5:1	53.25
	3 Way - 1:1 & 1.5:1	54.5
	4 Way - 1:1 & 1.5:1	64

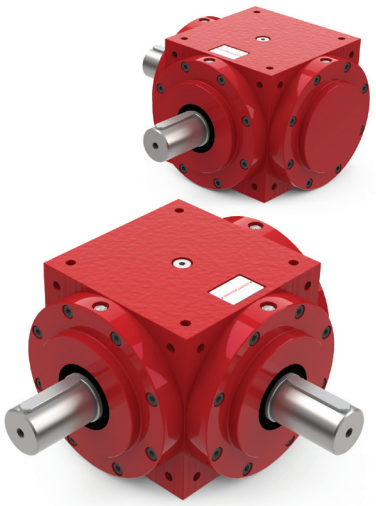
#1 Nominal torque values at running speeds of 1500 rpm
#2 Maximum running torque value at speed of 10 rpm
Full detailed performance for each unit refer to page 214 & 215

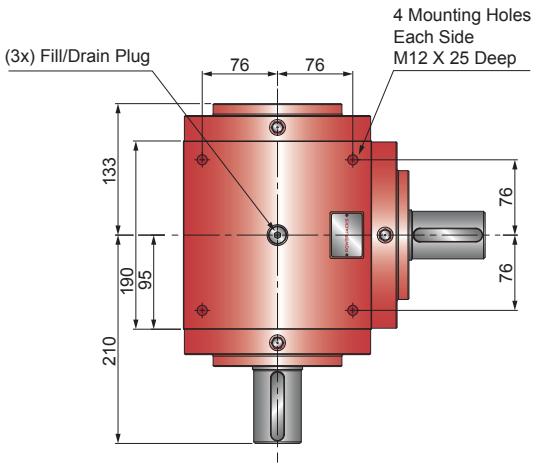
Accessories & Options

- Special Gear Ratio
- Motor Flange
- Extended Drive Shaft
- Limit Switches
- Drives
- Light Weight Design
- Reinforced Shaft OR High Torque
- Breather
- 90° Breather
- Mounting Feet
- Shaft Cover
- Stainless Steel
- Submersible
- Corrosion Protection
- Defence Rated
- ATEX Bevel Gearboxes for Explosive Environments
- Nuclear Rated
- Food Grade
- Low Temperature
- High Temperature

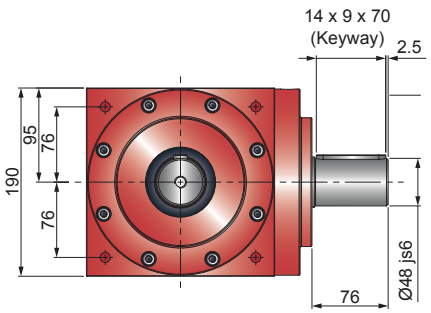
2 Way Solid Shaft

C390S20-10





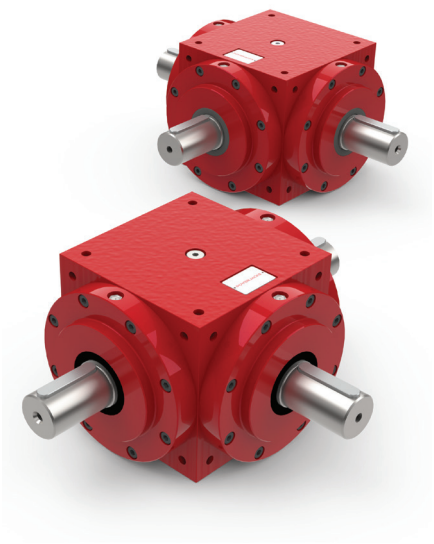
Tapped hole in end of each solid drive shaft - M12 x 30mm Deep

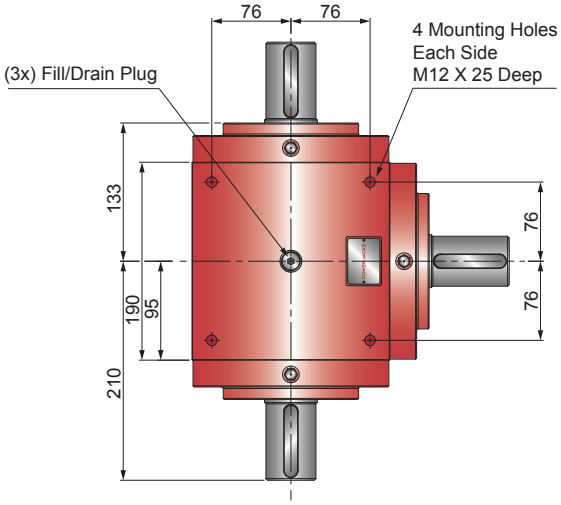


Notes:
1. All dimensions in mm unless otherwise stated
2. Dimensions subject to change without notice
3. All colours for illustrative purposes only

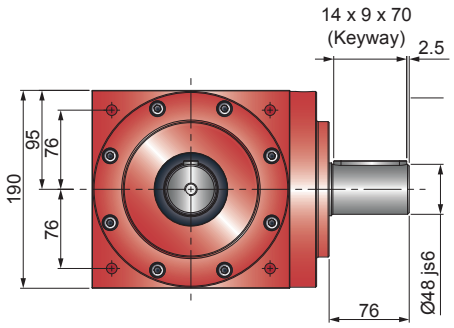
3 Way Solid Shaft

C390S30-10





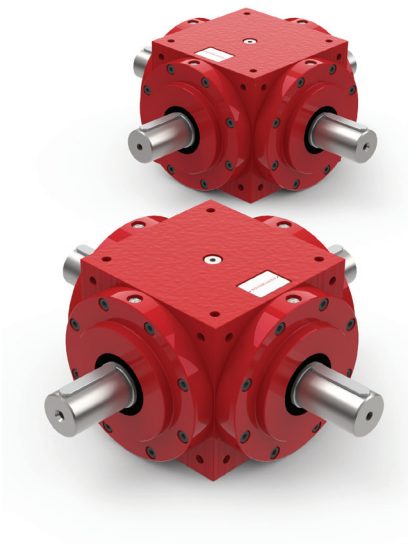
Tapped hole in end of each solid drive shaft - M12 x 30mm Deep

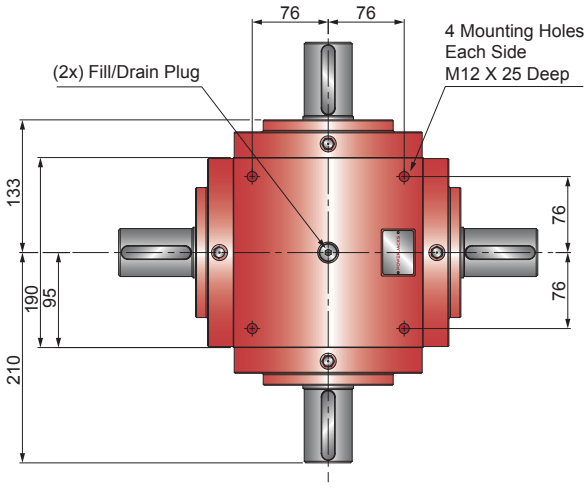


Notes:
1. All dimensions in mm unless otherwise stated
2. Dimensions subject to change without notice
3. All colours for illustrative purposes only

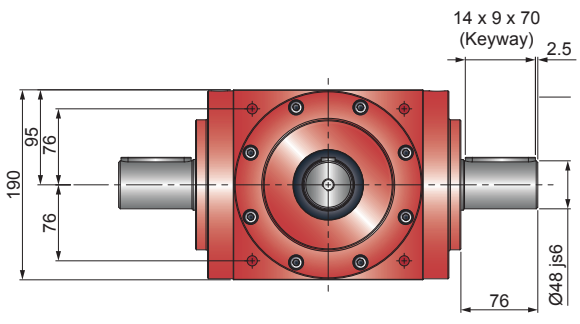
4 Way Solid Shaft

C390S40-10





Tapped hole in end of each solid drive shaft - M12 x 30mm Deep



Notes:
1. All dimensions in mm unless otherwise stated
2. Dimensions subject to change without notice
3. All colours for illustrative purposes only

Performance

Series 39		
Torque (Nm)	Nominal#1	481
	Max Running#2	935
	Max Start-Up	1403
Input Speed	Max (rpm)	3000
Thermal Limit	Power (kW)	49
Backlash	arcmin	7 to 10
Efficiency	(%)	95% - 98%
Service Life	(hours)	>10000
Housing Material		SG Iron
Oil Quantity	Litres	1.71
	Pints	3
Weight (kg)	2 Way - 2:1 +	54.5
	3 Way - 2:1 +	55.75
	4 Way - 2:1 +	69.5

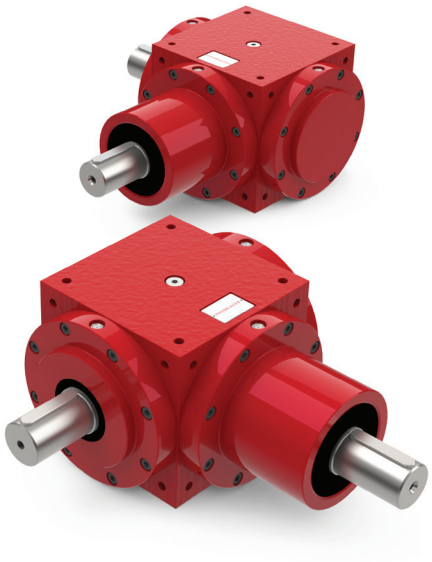
#1 Nominal torque values at running speeds of 1500 rpm
#2 Maximum running torque value at speed of 10 rpm
Full detailed performance for each unit refer to page 214 & 215

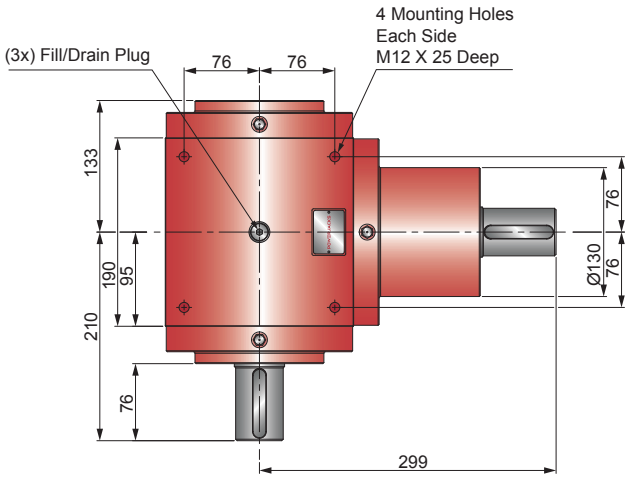
Accessories & Options

- Special Gear Ratio
- Motor Flange
- Extended Drive Shaft
- Limit Switches
- Drives
- Light Weight Design
- Reinforced Shaft OR High Torque
- Breather
- 90° Breather
- Mounting Feet
- Shaft Cover
- Stainless Steel
- Submersible
- Corrosion Protection
- Defence Rated
- ATEX Bevel Gearboxes for Explosive Environments
- Nuclear Rated
- Food Grade
- Low Temperature
- High Temperature

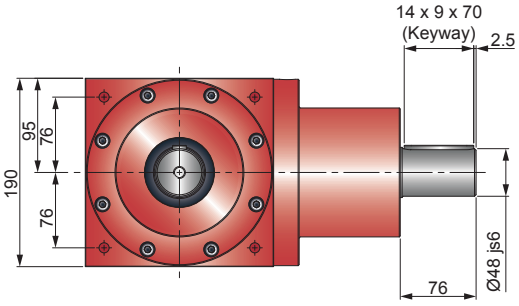
2 Way Solid Shaft

C390S20-20





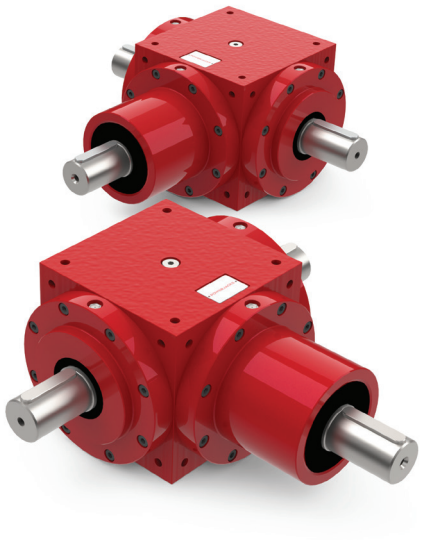
Tapped hole in end of each solid drive shaft - M12 x 30mm Deep

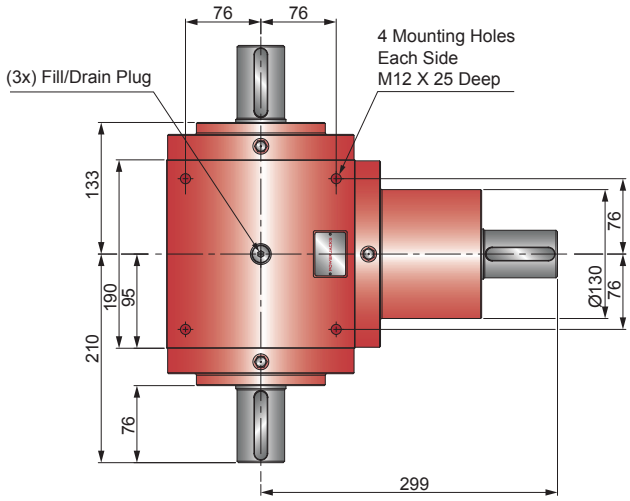


Notes:
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3. All colours for illustrative purposes only

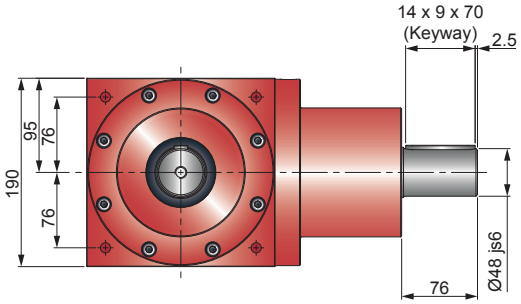
3 Way Solid Shaft

C390S30-20





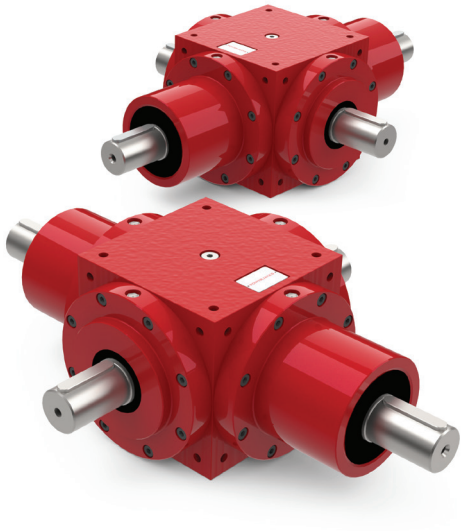
Tapped hole in end of each solid drive shaft - M12 x 30mm Deep

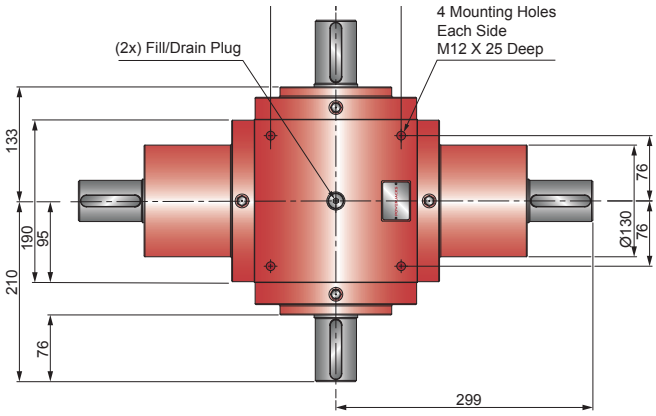


Notes:
1. All dimensions in mm unless otherwise stated
2. Dimensions subject to change without notice
3. All colours for illustrative purposes only

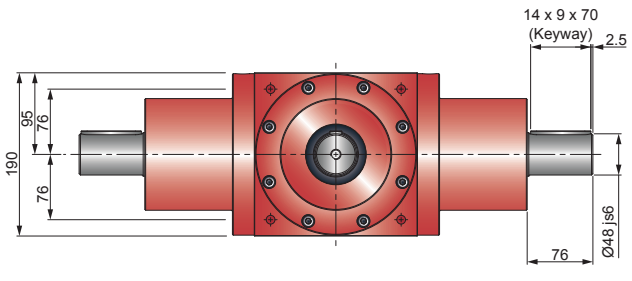
4 Way Solid Shaft

C390S40-20





Tapped hole in end of each solid drive shaft - M12 x 30mm Deep



Notes:
1. All dimensions in mm unless otherwise stated
2. Dimensions subject to change without notice
3. All colours for illustrative purposes only

Performance

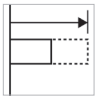
Series 39		
Torque (Nm)	Nominal#1	481
	Max Running#2	935
	Max Start-Up	1403
Input Speed	Max (rpm)	3000
Thermal Limit	Power (kW)	49
Backlash	arcmin	7 to 10
Efficiency	(%)	95% - 98%
Service Life	(hours)	>10000
Housing Material		SG Iron
Oil Quantity	Litres	1.71
	Pints	3
Weight (kg)	2 Way - 1:1 & 1.5:1	53.25
	2 Way - 2:1 +	54.5
	3 Way - 1:1 & 1.5:1	54.5
	3 Way - 2:1 +	55.75
	4 Way - 1:1 & 1.5:1	64
	4 Way - 2:1 +	69.5

#1 Nominal torque values at running speeds of 1500 rpm
#2 Maximum running torque value at speed of 10 rpm
Full detailed performance for each unit refer to page 214 & 215

Accessories & Options


Special Gear Ratio


Motor Flange


Extended Drive Shaft


Limit Switches


Drives

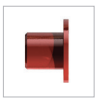

Light Weight Design


Reinforced Shaft OR High Torque


Breather

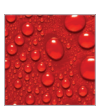

90° Breather


Mounting Feet


Shaft Cover


Stainless Steel

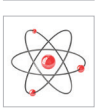

Submersible


Corrosion Protection


Defence Rated



ATEX Bevel Gearboxes for Explosive Environments


Nuclear Rated

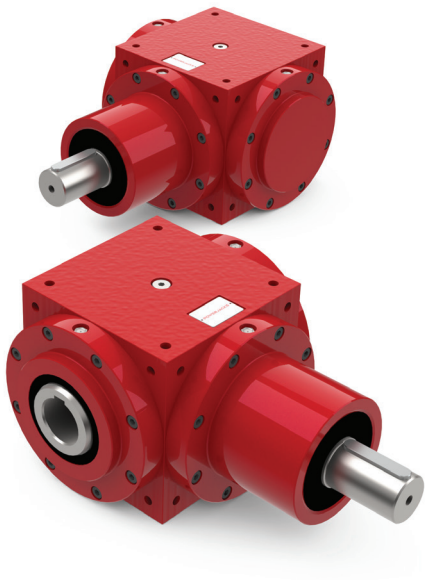

Food Grade

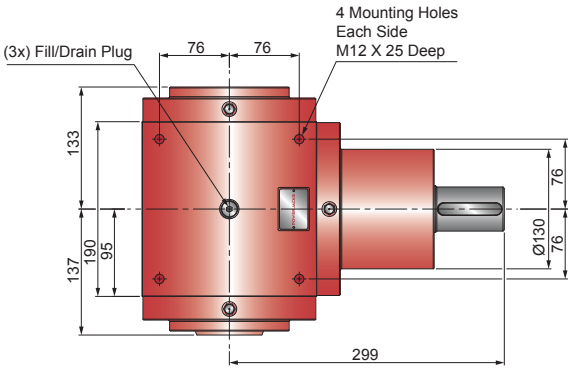

Low Temperature


High Temperature

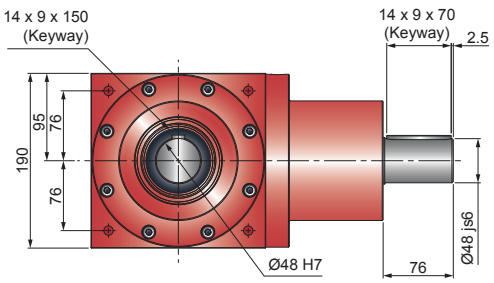
2 Way Hollow Shaft

C390H20-10





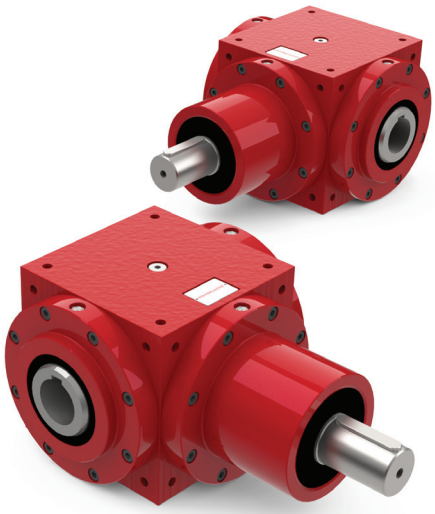
Tapped hole in end of each solid drive shaft - M12 x 30mm Deep

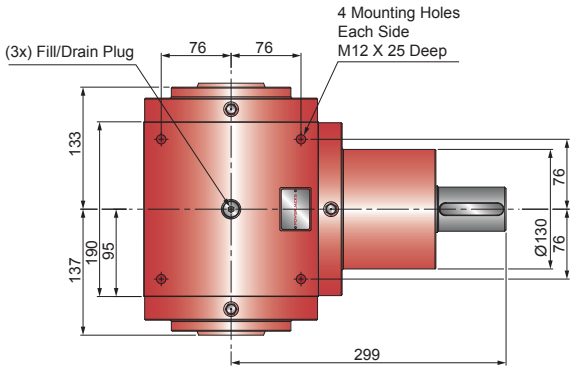


Notes:
1. All dimensions in mm unless otherwise stated
2. Dimensions subject to change without notice
3. All colours for illustrative purposes only

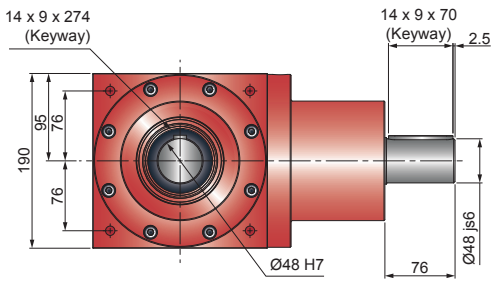
3 Way Hollow Shaft

C390H30-10





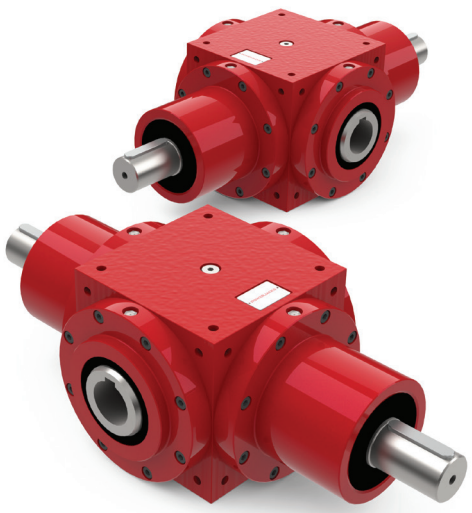
Tapped hole in end of each solid drive shaft - M12 x 30mm Deep

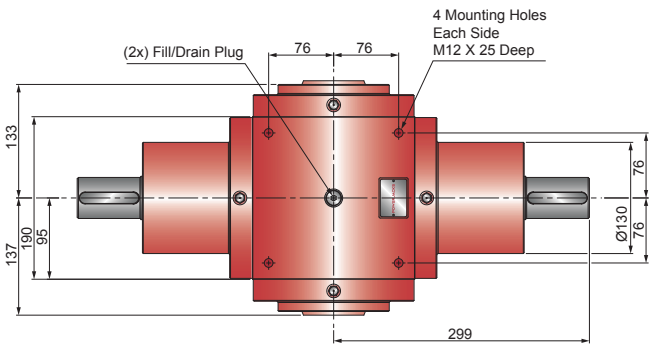


Notes:
1. All dimensions in mm unless otherwise stated
2. Dimensions subject to change without notice
3. All colours for illustrative purposes only

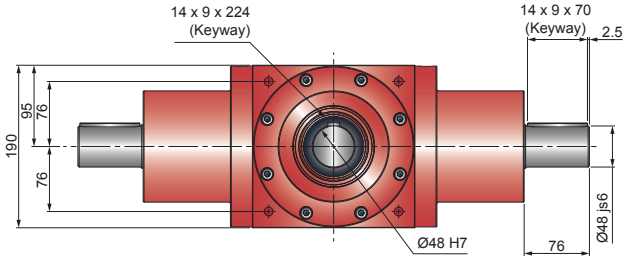
4 Way Hollow Shaft

C390H40-10





Tapped hole in end of each solid drive shaft - M12 x 30mm Deep



Notes:
1. All dimensions in mm unless otherwise stated
2. Dimensions subject to change without notice
3. All colours for illustrative purposes only

Performance

Series 40		
Torque (Nm)	Nominal#1	1353
	Max Running#2	3088
	Max Start-Up	4632
Input Speed	Max (rpm)	3000
Thermal Limit	Power (kW)	90
Backlash	arcmin	7 to 10
Efficiency	(%)	95% - 98%
Service Life	(hours)	>10000
Housing Material		SG Iron
Oil Quantity	Litres	3.27
	Pints	5.75
Weight (kg)	2 Way - 1:1 & 1.5:1	125
	3 Way - 1:1 & 1.5:1	128
	4 Way - 1:1 & 1.5:1	150

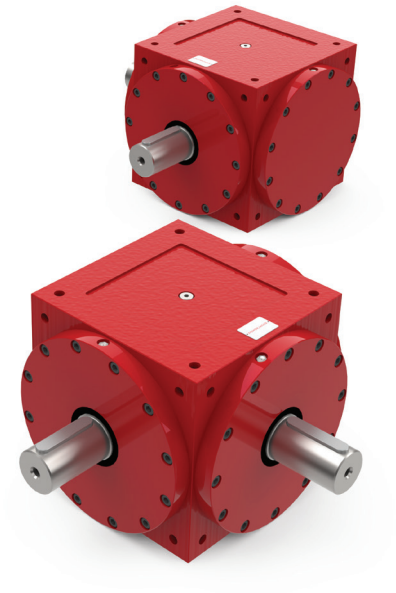
#1 Nominal torque values at running speeds of 1500 rpm
#2 Maximum running torque value at speed of 10 rpm
Full detailed performance for each unit refer to page 214 & 215

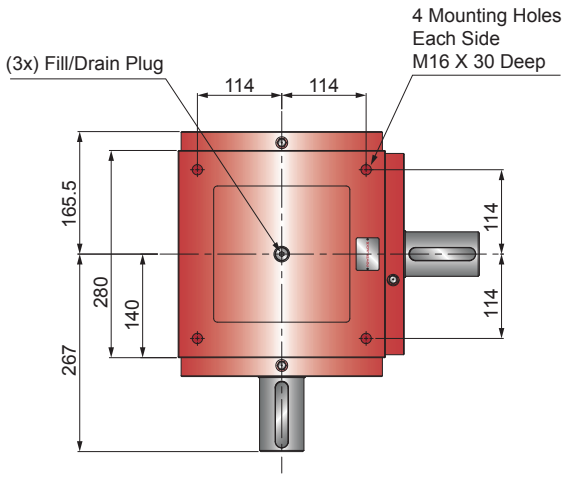
Accessories & Options

- Special Gear Ratio
- Motor Flange
- Extended Drive Shaft
- Limit Switches
- Drives
- Light Weight Design
- Reinforced Shaft OR High Torque
- Breather
- 90° Breather
- Mounting Feet
- Shaft Cover
- Stainless Steel
- Submersible
- Corrosion Protection
- Defence Rated
- ATEX Bevel Gearboxes for Explosive Environments
- Nuclear Rated
- Food Grade
- Low Temperature
- High Temperature

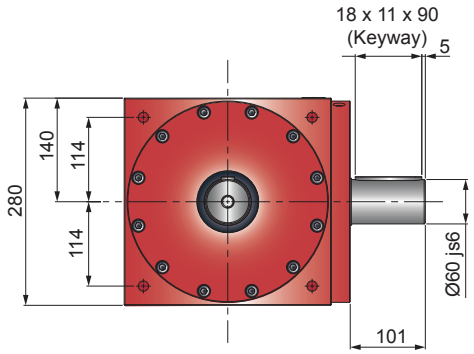
2 Way Solid Shaft

C400S20-10





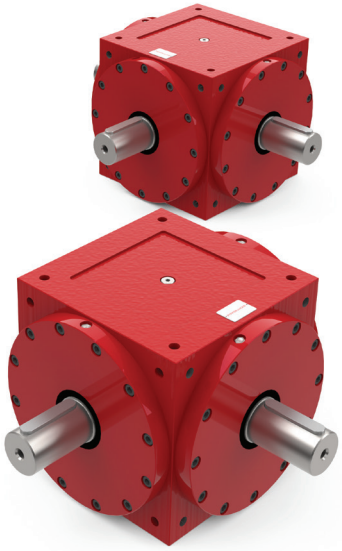
Tapped hole in end of each solid drive shaft - M16 x 38mm Deep

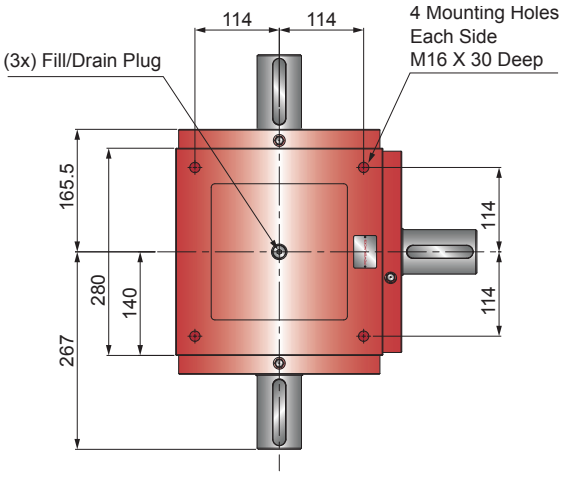


Notes:
1. All dimensions in mm unless otherwise stated
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3. All colours for illustrative purposes only

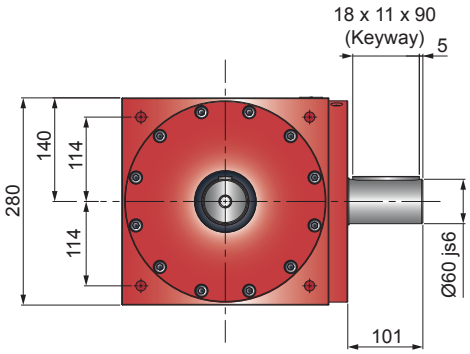
3 Way Solid Shaft

C400S30-10





Tapped hole in end of each solid drive shaft - M16 x 38mm Deep

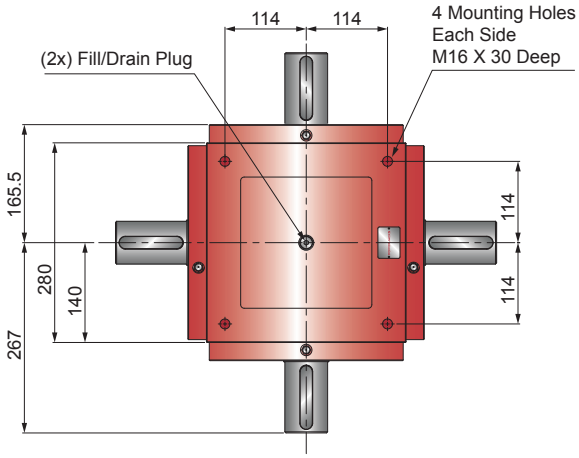


Notes:
1. All dimensions in mm unless otherwise stated
2. Dimensions subject to change without notice
3. All colours for illustrative purposes only

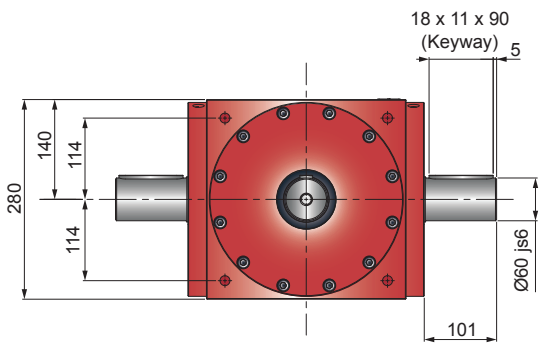
4 Way Solid Shaft

C400S40-10





Tapped hole in end of each solid drive shaft - M16 x 38mm Deep



Notes:
1. All dimensions in mm unless otherwise stated
2. Dimensions subject to change without notice
3. All colours for illustrative purposes only

Performance

Series 40		
Torque (Nm)	Nominal#1	1353
	Max Running#2	3088
	Max Start-Up	4632
Input Speed	Max (rpm)	3000
Thermal Limit	Power (kW)	90
Backlash	arcmin	7 to 10
Efficiency	(%)	95% - 98%
Service Life	(hours)	>10000
Housing Material		SG Iron
Oil Quantity	Litres	3.27
	Pints	5.75
Weight (kg)	2 Way - 2:1 +	125
	3 Way - 2:1 +	128
	4 Way - 2:1 +	153

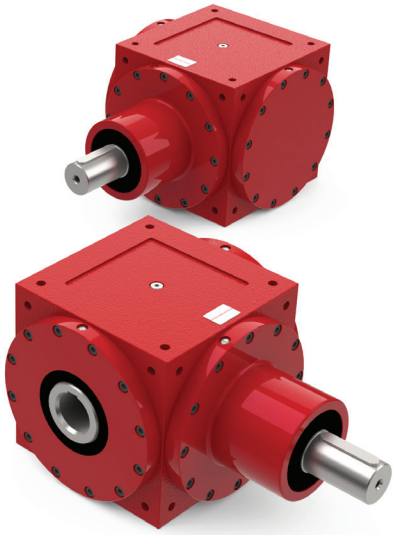
#1 Nominal torque values at running speeds of 1500 rpm
#2 Maximum running torque value at speed of 10 rpm
Full detailed performance for each unit refer to page 214 & 215

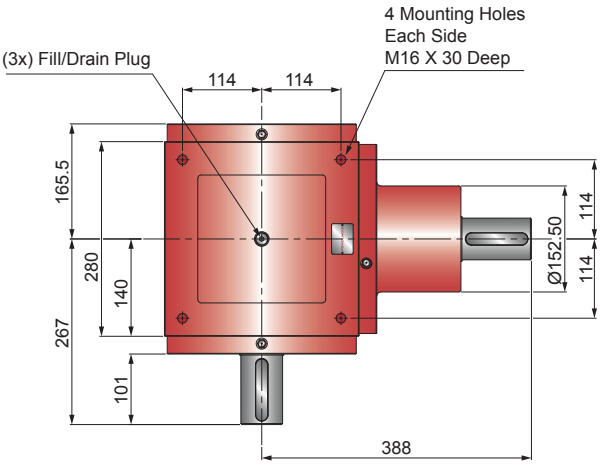
Accessories & Options

- Special Gear Ratio
- Motor Flange
- Extended Drive Shaft
- Limit Switches
- Drives
- Light Weight Design
- Reinforced Shaft OR High Torque
- Breather
- 90° Breather
- Mounting Feet
- Shaft Cover
- Stainless Steel
- Submersible
- Corrosion Protection
- Defence Rated
- ATEX Bevel Gearboxes for Explosive Environments
- Nuclear Rated
- Food Grade
- Low Temperature
- High Temperature

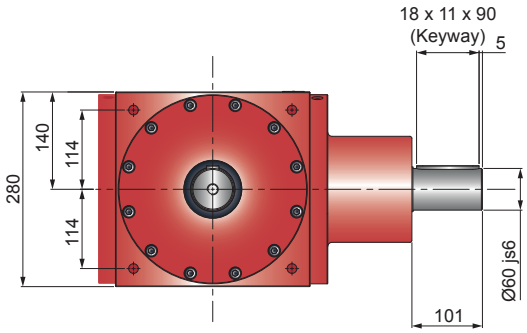
2 Way Solid Shaft

C400S20-20





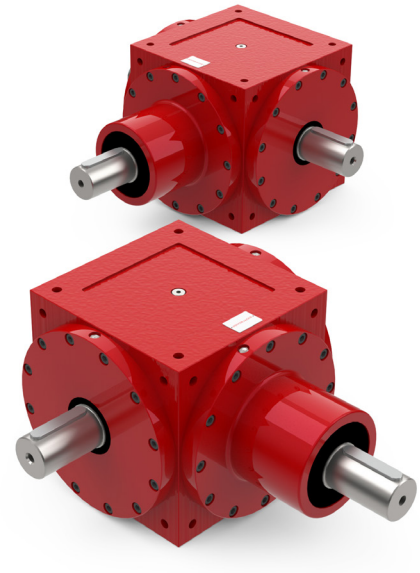
Tapped hole in end of each solid drive shaft - M16 x 38mm Deep

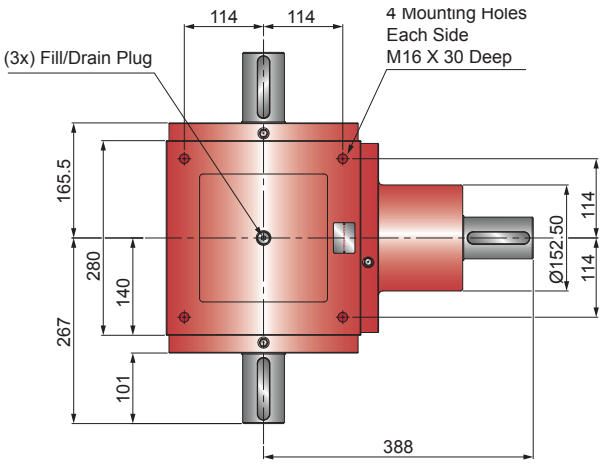


Notes:
1. All dimensions in mm unless otherwise stated
2. Dimensions subject to change without notice
3. All colours for illustrative purposes only

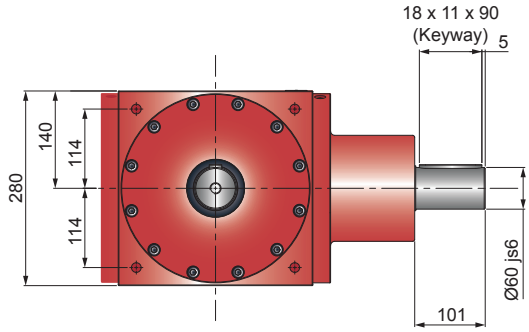
3 Way Solid Shaft

C400S30-20





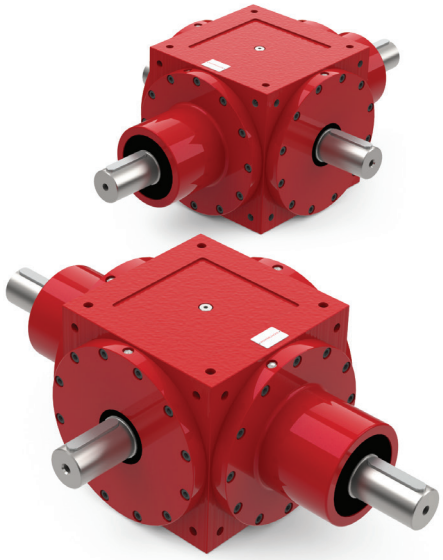
Tapped hole in end of each solid drive shaft - M16 x 38mm Deep

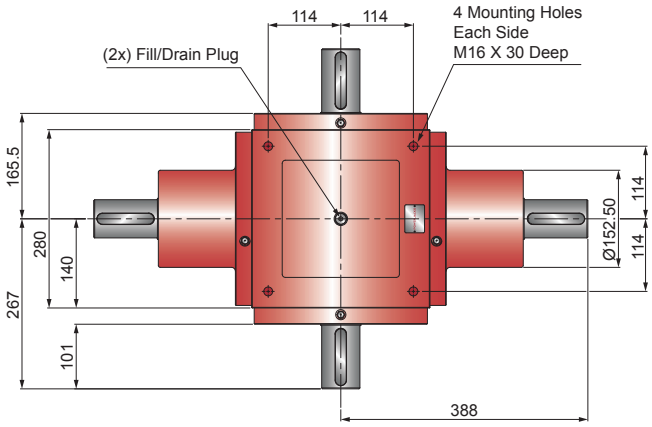


Notes:
1. All dimensions in mm unless otherwise stated
2. Dimensions subject to change without notice
3. All colours for illustrative purposes only

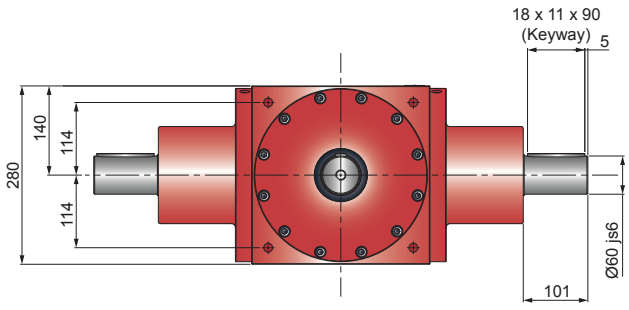
4 Way Solid Shaft

C400S40-20





Tapped hole in end of each solid drive shaft - M16 x 38mm Deep



Notes:
1. All dimensions in mm unless otherwise stated
2. Dimensions subject to change without notice
3. All colours for illustrative purposes only

Performance

Series 40		
Torque (Nm)	Nominal#1	1353
	Max Running#2	3088
	Max Start-Up	4632
Input Speed	Max (rpm)	3000
Thermal Limit	Power (kW)	90
Backlash	arcmin	7 to 10
Efficiency	(%)	95% - 98%
Service Life	(hours)	>10000
Housing Material		SG Iron
Oil Quantity	Litres	3.27
	Pints	5.75
Weight (kg)	2 Way - 1:1 & 1.5:1	125
	2 Way - 2:1 +	125
	3 Way - 1:1 & 1.5:1	128
	3 Way - 2:1 +	128
	4 Way - 1:1 & 1.5:1	150
	4 Way - 2:1 +	153

#1 Nominal torque values at running speeds of 1500 rpm
#2 Maximum running torque value at speed of 10 rpm

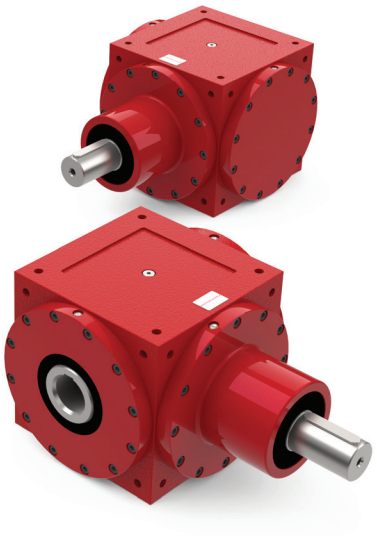
Full detailed performance for each unit refer to page 214 & 215

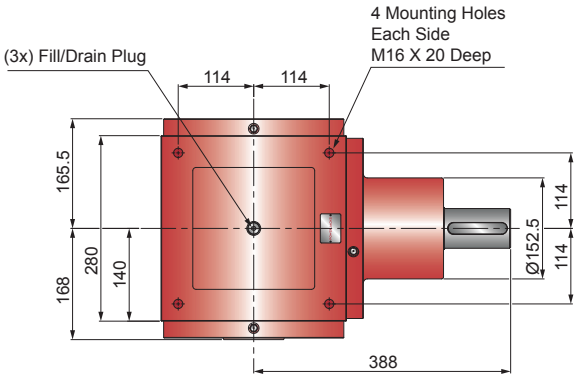
Accessories & Options

- Special Gear Ratio
- Motor Flange
- Extended Drive Shaft
- Limit Switches
- Drives
- Light Weight Design
- Reinforced Shaft OR High Torque
- Breather
- 90° Breather
- Mounting Feet
- Shaft Cover
- Stainless Steel
- Submersible
- Corrosion Protection
- Defence Rated
- ATEX Bevel Gearboxes for Explosive Environments
- Nuclear Rated
- Food Grade
- Low Temperature
- High Temperature

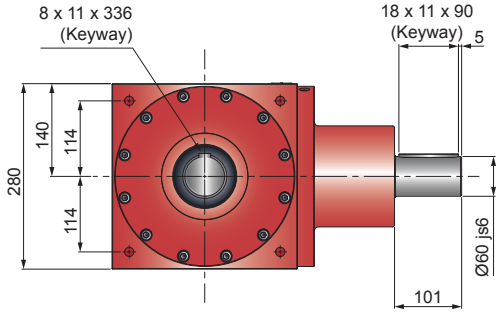
2 Way Hollow Shaft

C400H20-10





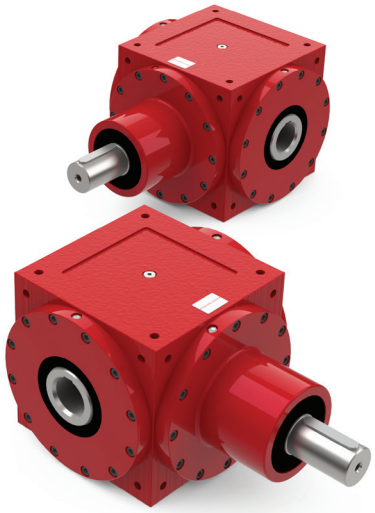
Tapped hole in end of each solid drive shaft - M16 x 38mm Deep

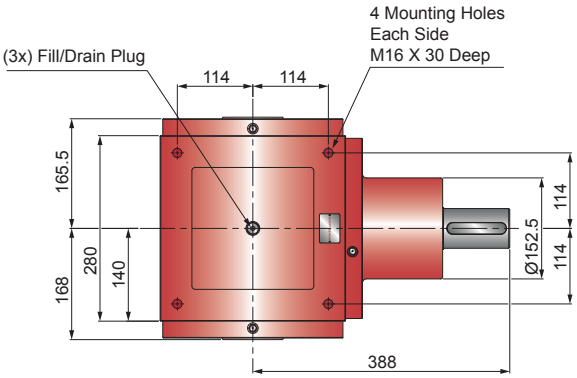


Notes:
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3. All colours for illustrative purposes only

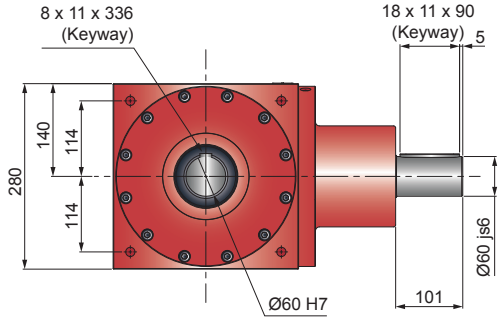
3 Way Hollow Shaft

C400H30-10





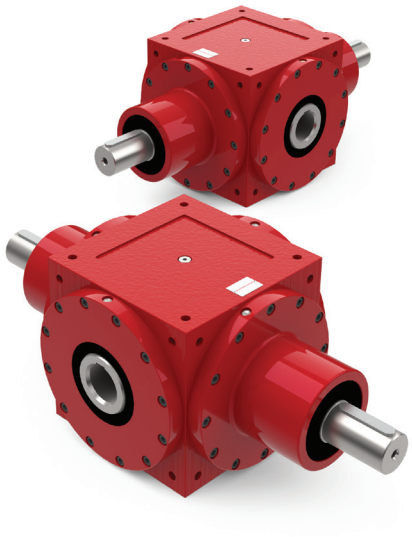
Tapped hole in end of each solid drive shaft - M16 x 38mm Deep

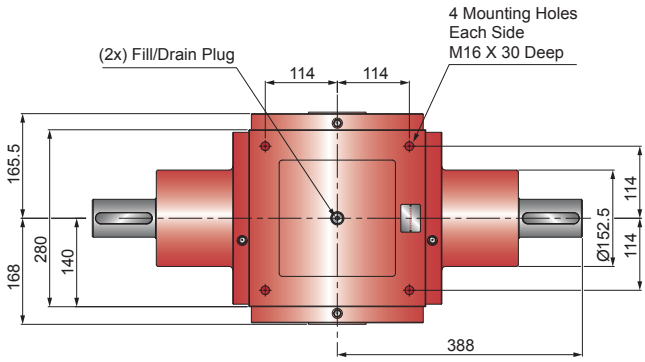


Notes:
1. All dimensions in mm unless otherwise stated
2. Dimensions subject to change without notice
3. All colours for illustrative purposes only

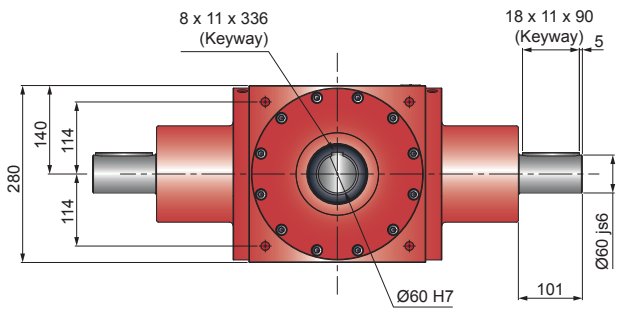
4 Way Hollow Shaft

C400H40-10





Tapped hole in end of each solid drive shaft - M16 x 38mm Deep



Notes:
1. All dimensions in mm unless otherwise stated
2. Dimensions subject to change without notice
3. All colours for illustrative purposes only

Performance

Series 42		
Torque (Nm)	Nominal#1	6195
	Max Running#2	7000
	Max Start-Up	10500
Input Speed	Max (rpm)	3000
Thermal Limit	Power (kW)	190
Backlash	arcmin	7 to 10
Efficiency	(%)	95% - 98%
Service Life	(hours)	>10000
Housing Material		SG Iron
Oil Quantity	Litres	7
	Pints	12.3
Weight (kg)	2 Way - 1:1 & 1.5:1	190
	3 Way - 1:1 & 1.5:1	197
	4 Way - 1:1 & 1.5:1	204

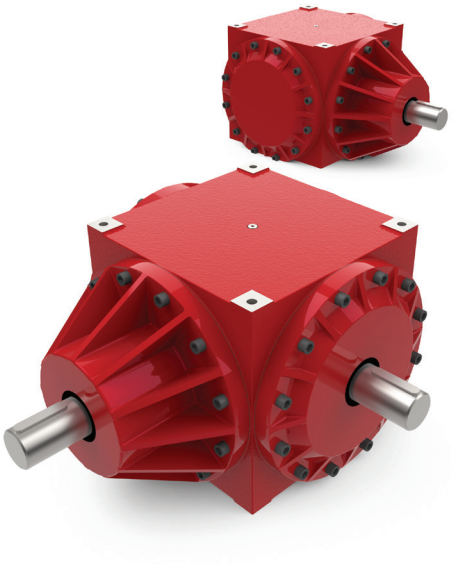
#1 Nominal torque values at running speeds of 1500 rpm
#2 Maximum running torque value at speed of 10 rpm
Full detailed performance for each unit refer to page 214 & 215

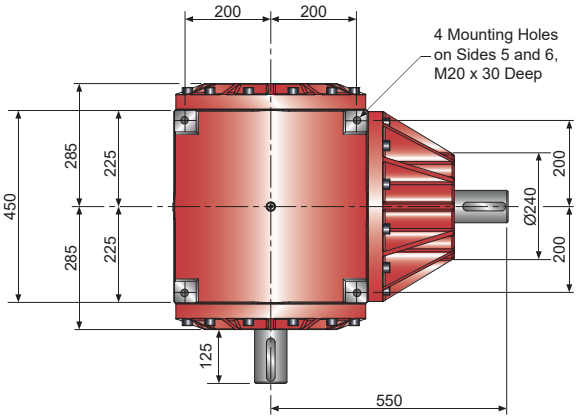
Accessories & Options

- Special Gear Ratio
- Motor Flange
- Extended Drive Shaft
- Limit Switches
- Drives
- Light Weight Design
- Reinforced Shaft OR High Torque
- Breather
- 90° Breather
- Mounting Feet
- Shaft Cover
- Stainless Steel
- Submersible
- Corrosion Protection
- Defence Rated
- ATEX Bevel Gearboxes for Explosive Environments
- Nuclear Rated
- Food Grade
- Low Temperature
- High Temperature

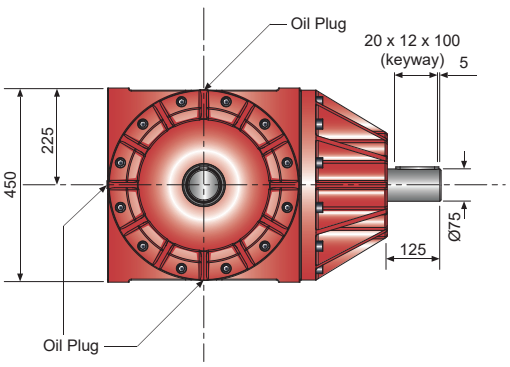
2 Way Solid Shaft

N420S20-10





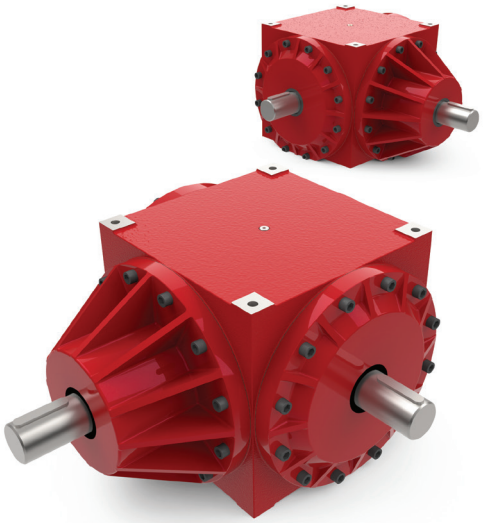
Tapped hole in end of each solid drive shaft - M16 x 38mm Deep

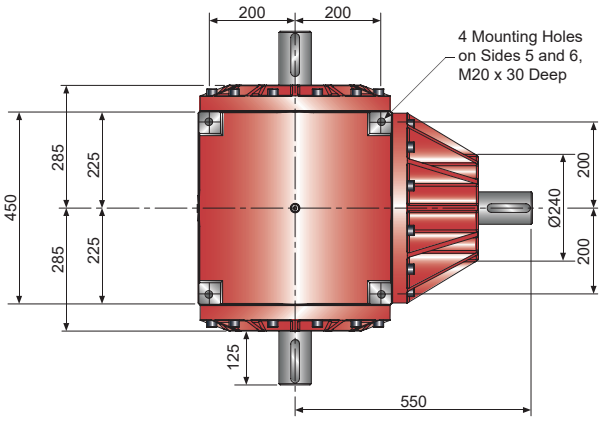


Notes:
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2. Dimensions subject to change without notice
3. All colours for illustrative purposes only

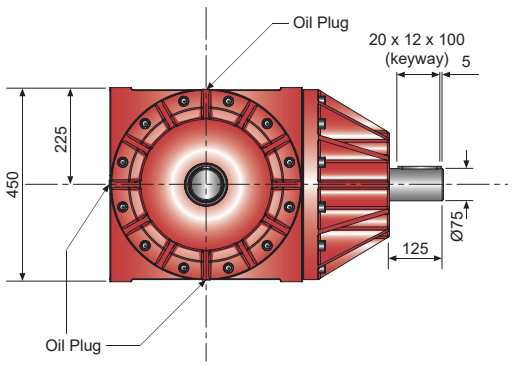
3 Way Solid Shaft

N420S30-10





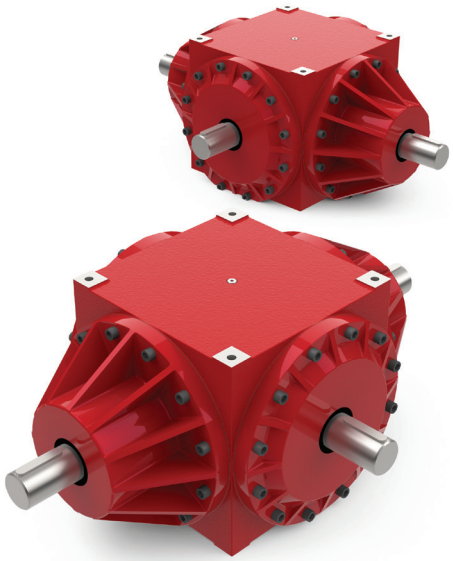
Tapped hole in end of each solid drive shaft - M16 x 38mm Deep

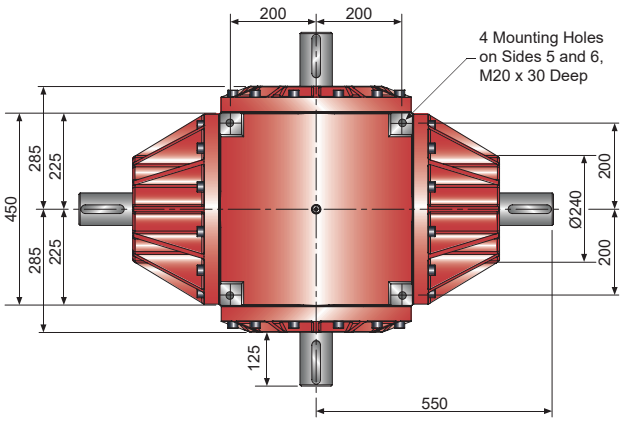


Notes:
1. All dimensions in mm unless otherwise stated
2. Dimensions subject to change without notice
3. All colours for illustrative purposes only

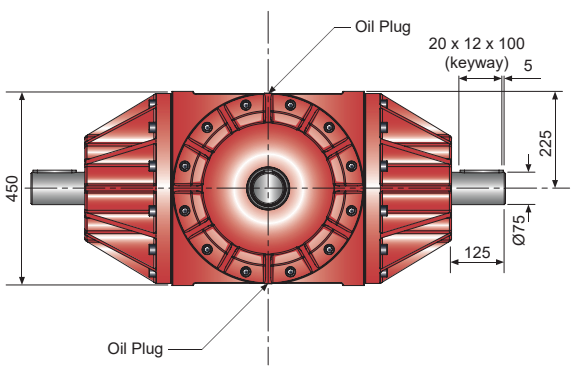
4 Way Solid Shaft

N420S40-10





Tapped hole in end of each solid drive shaft - M16 x 38mm Deep



Notes:
1. All dimensions in mm unless otherwise stated
2. Dimensions subject to change without notice
3. All colours for illustrative purposes only

Performance

Series 42		
Torque (Nm)	Nominal#1	6195
	Max Running#2	7000
	Max Start-Up	10500
Input Speed	Max (rpm)	3000
Thermal Limit	Power (kW)	190
Backlash	arcmin	7 to 10
Efficiency	(%)	95% - 98%
Service Life	(hours)	>10000
Housing Material		SG Iron
Oil Quantity	Litres	7
	Pints	12.3
Weight (kg)	2 Way - 2:1 +	215
	3 Way - 2:1 +	223
	4 Way - 2:1 +	231

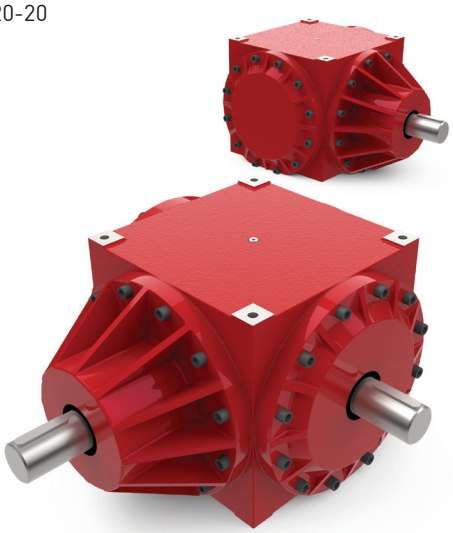
#1 Nominal torque values at running speeds of 1500 rpm
#2 Maximum running torque value at speed of 10 rpm
Full detailed performance for each unit refer to page 214 & 215

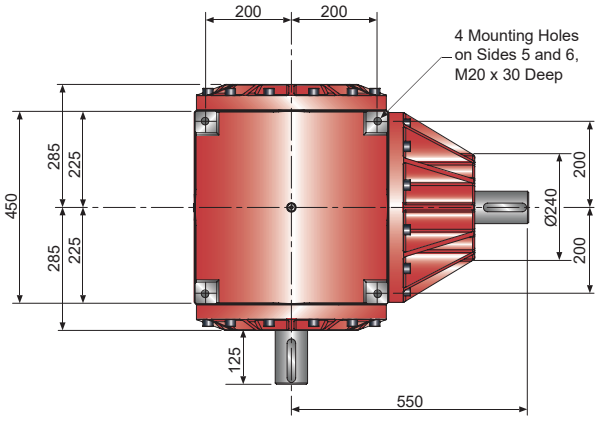
Accessories & Options

- Special Gear Ratio
- Motor Flange
- Extended Drive Shaft
- Limit Switches
- Drives
- Light Weight Design
- Reinforced Shaft OR High Torque
- Breather
- 90° Breather
- Mounting Feet
- Shaft Cover
- Stainless Steel
- Submersible
- Corrosion Protection
- Defence Rated
- ATEX Bevel Gearboxes for Explosive Environments
- Nuclear Rated
- Food Grade
- Low Temperature
- High Temperature

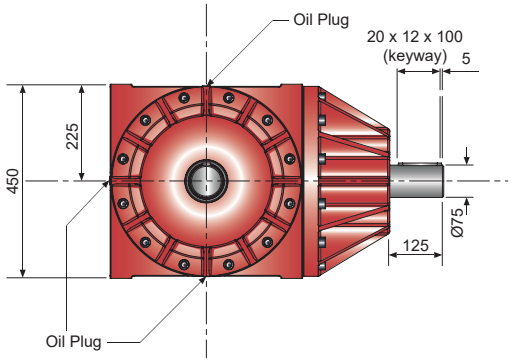
2 Way Solid Shaft

N420S20-20





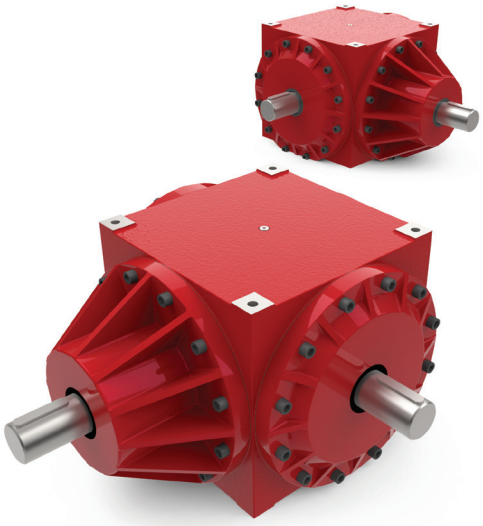
Tapped hole in end of each solid drive shaft - M16 x 38mm Deep

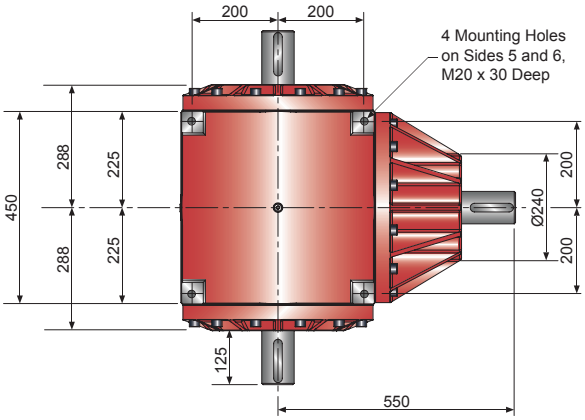


Notes:
1. All dimensions in mm unless otherwise stated
2. Dimensions subject to change without notice
3. All colours for illustrative purposes only

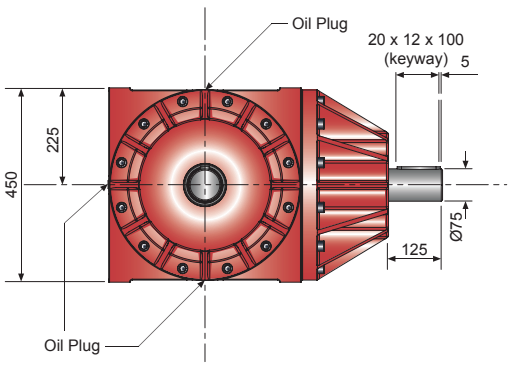
3 Way Solid Shaft

N420S30-20





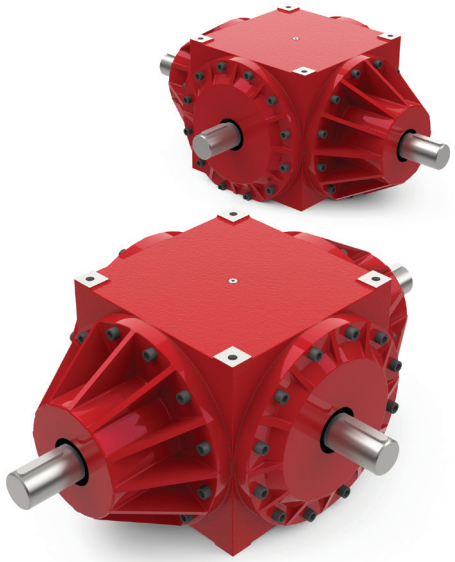
Tapped hole in end of each solid drive shaft - M16 x 38mm Deep

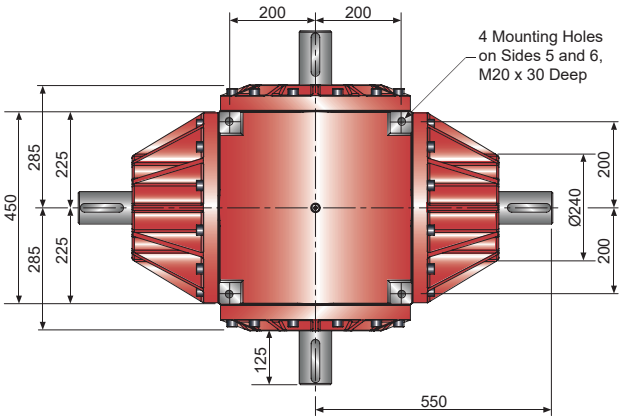


Notes:
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3. All colours for illustrative purposes only

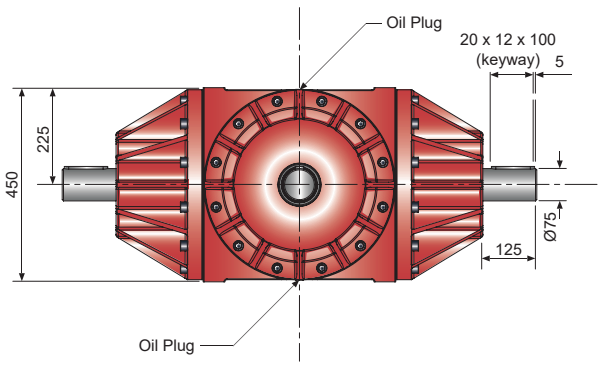
4 Way Solid Shaft

N420S40-20





Tapped hole in end of each solid drive shaft - M16 x 38mm Deep



Notes:
1. All dimensions in mm unless otherwise stated
2. Dimensions subject to change without notice
3. All colours for illustrative purposes only

Performance

Series 42		
Torque (Nm)	Nominal#1	6195
	Max Running#2	7000
	Max Start-Up	10500
Input Speed	Max (rpm)	3000
Thermal Limit	Power (kW)	190
Backlash	arcmin	7 to 10
Efficiency	(%)	95% - 98%
Service Life	(hours)	>10000
Housing Material		SG Iron
Oil Quantity	Litres	7
	Pints	12.3
Weight (kg)	2 Way - 1:1 & 1.5:1	190
	2 Way - 2:1 +	215
	3 Way - 1:1 & 1.5:1	197
	3 Way - 2:1 +	223
	4 Way - 1:1 & 1.5:1	204
	4 Way - 2:1 +	231

#1 Nominal torque values at running speeds of 1500 rpm
#2 Maximum running torque value at speed of 10 rpm

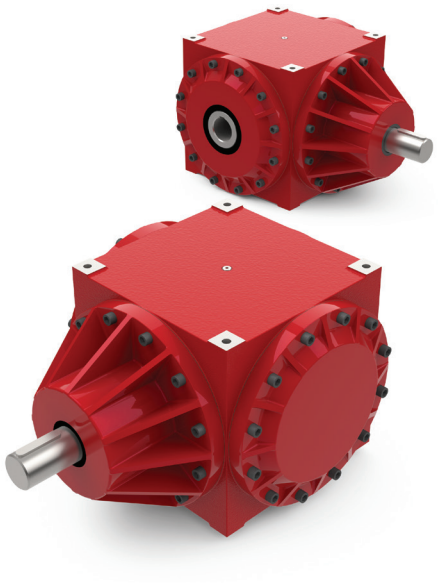
Full detailed performance for each unit refer to page 214 & 215

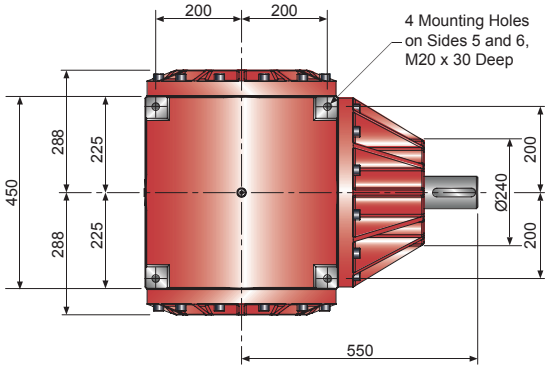
Accessories & Options

- Special Gear Ratio
- Motor Flange
- Extended Drive Shaft
- Limit Switches
- Drives
- Light Weight Design
- Reinforced Shaft OR High Torque
- Breather
- 90° Breather
- Mounting Feet
- Shaft Cover
- Stainless Steel
- Submersible
- Corrosion Protection
- Defence Rated
- ATEX Bevel Gearboxes for Explosive Environments
- Nuclear Rated
- Food Grade
- Low Temperature
- High Temperature

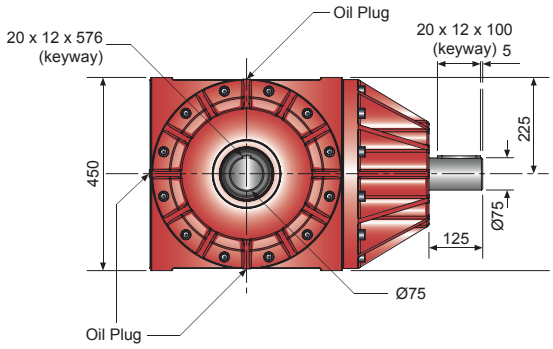
2 Way Hollow Shaft

N420H020-10





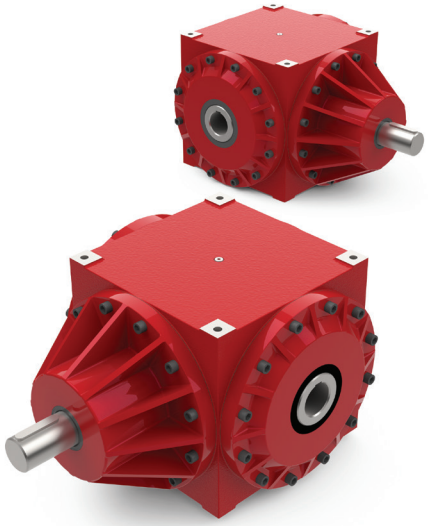
Tapped hole in end of each solid drive shaft - M16 x 38mm Deep

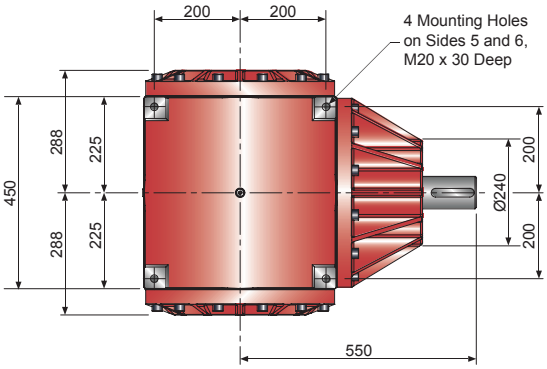


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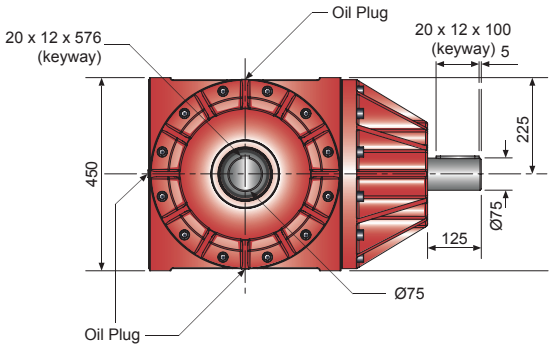
3 Way Hollow Shaft

N420H030-10





Tapped hole in end of each solid drive shaft - M16 x 38mm Deep

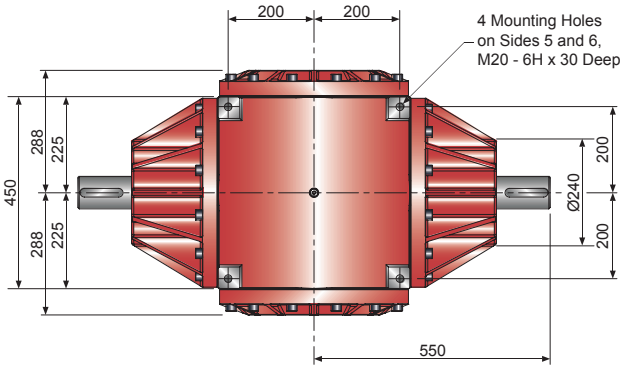


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3. All colours for illustrative purposes only

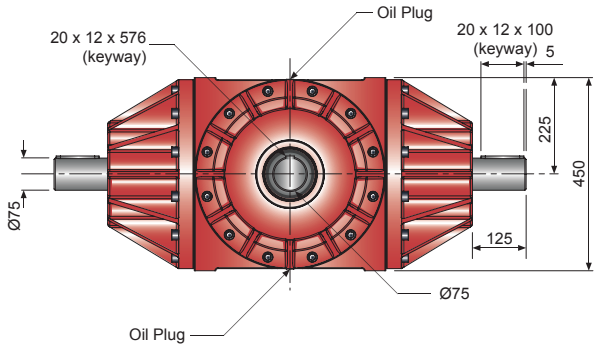
4 Way Hollow Shaft

N420H040-10

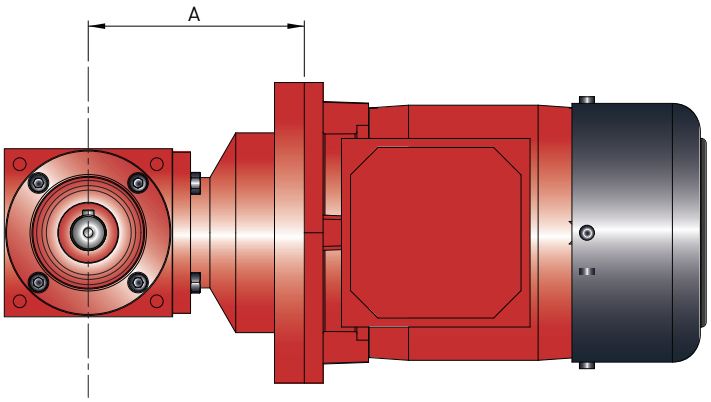


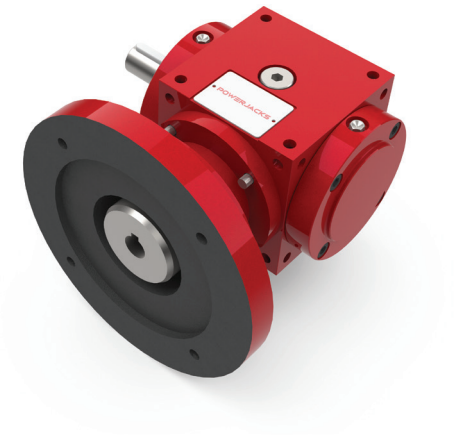


Tapped hole in end of each solid drive shaft - M16 x 38mm Deep



Notes:
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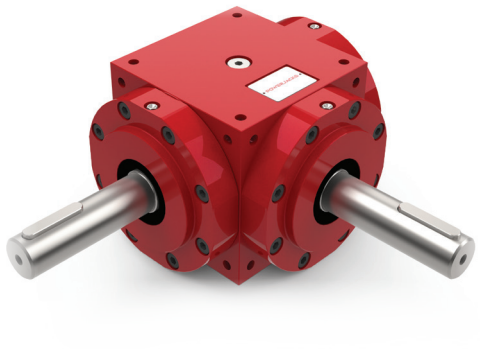




Motor frame Size B5 Flange	Gear unit Series	Gear Ratio	Dimension 'A'	Gear Unit Prefix for Product Code
71	35	All	115	A
80	35	All	115	B
90	37	All	130	C
100	37	1:1 & 1.5:1	130	D
100	37	2:1	140	D
112	37	1:1 & 1.5:1	130	D
112	37	2:1	140	D
112	38	All	190	D
132	38	All	190	E
132	39	All	220	E
160	38	1:1, 1.5:1 & 2:1	190	F
160	38	3:1 & 4:1	210	F
160	39	1:1, 1.5:1 & 2:1	220	F
160	39	3:1 & 4:1	240	F
180	39	1:1, 1.5:1 & 2:1	220	G
180	39	3:1 & 4:1	240	G
180	40	All	280	G
200	40	All	280	H
225 : 2 Pole	40	All	280	J
225 : 4-8 Pole	40	All	310	K
250 : 2 Pole	40	All	310	L

Notes:
1. All standard motor adapters use a B5 IEC flange.
2. All Flange dimensions conform to standard IEC electric motor details.
3. NEMA flanges available on request.

Extended Drive Shafts

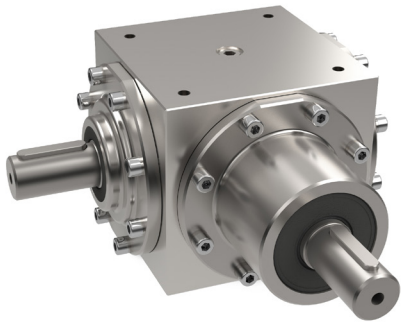


For each gearbox size the drive shafts (input or output) can be extended in length for solid shaft or hollow shaft designs.

For an application these designs can:

- Eliminate the need for extra drives shafts.
- Reduce the number of couplings.
- Reduce the overall installation cost.
- Reduce the associated maintenance and spare parts inventory and cost.
- Allow the machine design to be fully optimised.

Stainless Steel Bevel Gearboxes



Stainless steel gearboxes are recommended for use in applications which require one or more of the following properties:

- High corrosion resistance.
- Hygienic for food processing.
- Good chemical resistance.
- Resistance to fire & high temperatures.
- Strength at low temperatures.
- Stainless steel has good recycling options.
- Easy to clean surfaces.
- Non-magnetic options available.

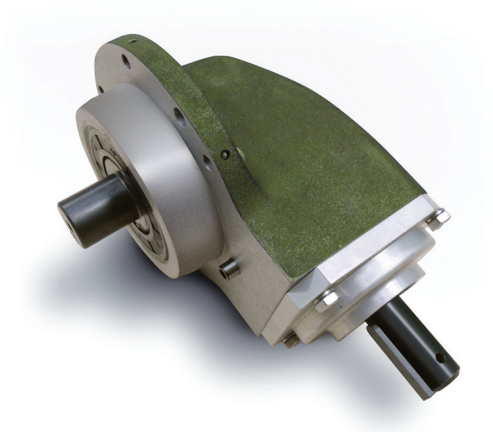
All of which makes stainless steel gearboxes ideally suitable for industries such as marine, paper, chemical, food, beverage, nuclear, oil and gas.

Design Possibilities / Designed For You

The Range-C bevel gearboxes are provided as a range of standard bevel gearboxes and as a range of engineered gearboxes. Each gearbox design can be altered to suit exact application requirements such as:

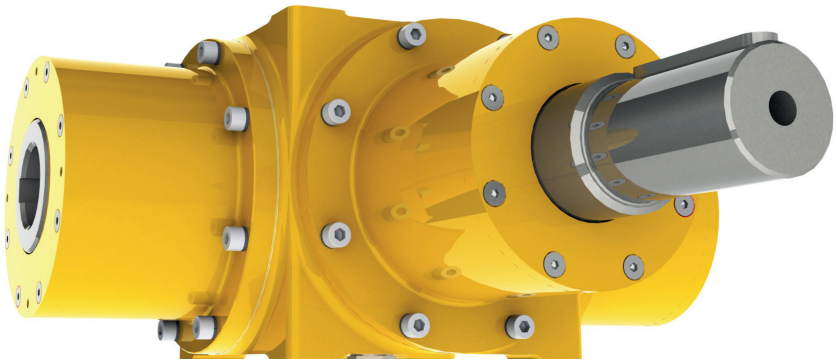
- Low weight designs.
- Long or short drive shafts.
- Keyless shafts.
- Shafts with threaded sections.
- Alternative shaft profiles e.g. hexagonal.
- Nuclear rated gearboxes.
- Food & beverage processing grade gearboxes.
- Special shaft sealing.
- Integrated or bolt on base flange.
- Extra mounting holes.
- Motor adapters for servo, hydraulic or air motors.
- Integrated limit switches.
- Protective shaft covers.
- High & low temperature rated designs.
- Alternative housing designs e.g. curved.
- High corrosion & chemical resistant designs.

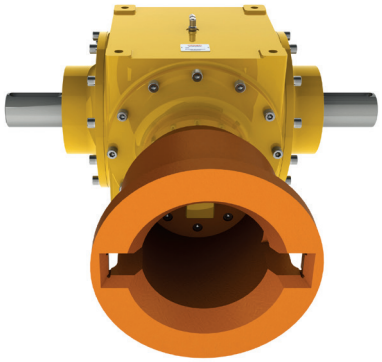
Use Power Jacks engineering technology to bring your concept to reality.



U-Series Underwater / Subsea Gearbox

The U-Series subsea bevel gearboxes are a proven and reliable technology for subsea drive solutions down to a depth of 3000m. They are used in a wide variety of underwater applications in the oil & gas and even the nuclear sector. Each submersible variant is tailored exactly to the customer application.





Subsea Design Features

- Proven depth ratings up to 3000m subsea (deeper on request)
- Pressure compensated or flooded designs available
- Full stainless steel designs available
- Reinforced sealing
- Full range of anti-corrosion options
- ROV drive interfaces
- Low (-65°C) to High (+250°C) temperature solutions available
- Vibration and shock load resistant designs
- Full range of feedback devices for speed, position and rotation
- Special custom designs available to meet your exact requirements

Standard Gearbox

- Six gearbox sizes
- 35, 37, 38, 39, 40, 42 Series
- Nine gearbox configurations
- Gear ratios: 1:1, 1.5:1, 2:1, 3:1, 4:1 as standard
- Special gear ratios available on request, e.g. 1.25:1
- Torque ratings up to 20000 Nm
- Option for reinforced shaft design for up to 300% higher torque transmission

Reliable Spiral Bevel Gear

With a proven design already used in millions of gearboxes, the Precision Spiral Bevel Gears, with accurate gear mesh, deliver high torque with smooth and quiet transmission.



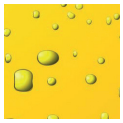
Shaft Configurations

- 2, 3 or 4-way
- Solid or hollow shaft
- Special configurations available
- ROV torque receptacle integrated to gearbox drive
- ROV paddle adapter fitted to input drive shaft
- Motor adapter for direct connection of subsea motor to gearbox input
- Service life of 10,000 hours for all gearbox sizes
- Input speed up to 3,000 rpm maximum

Gearbox Housing

A rugged compact design made from a highly durable SG iron as standard or stainless steel on request.
It provides a strong housing that firmly and accurately holds the gear set in a reservoir of quality lubricant suited to the demands of subsea work.

Corrosion Protection





- To suit all economic needs
- Standard subsea paint finish
- Customer specified paint
- Plated finish
- Stainless steel

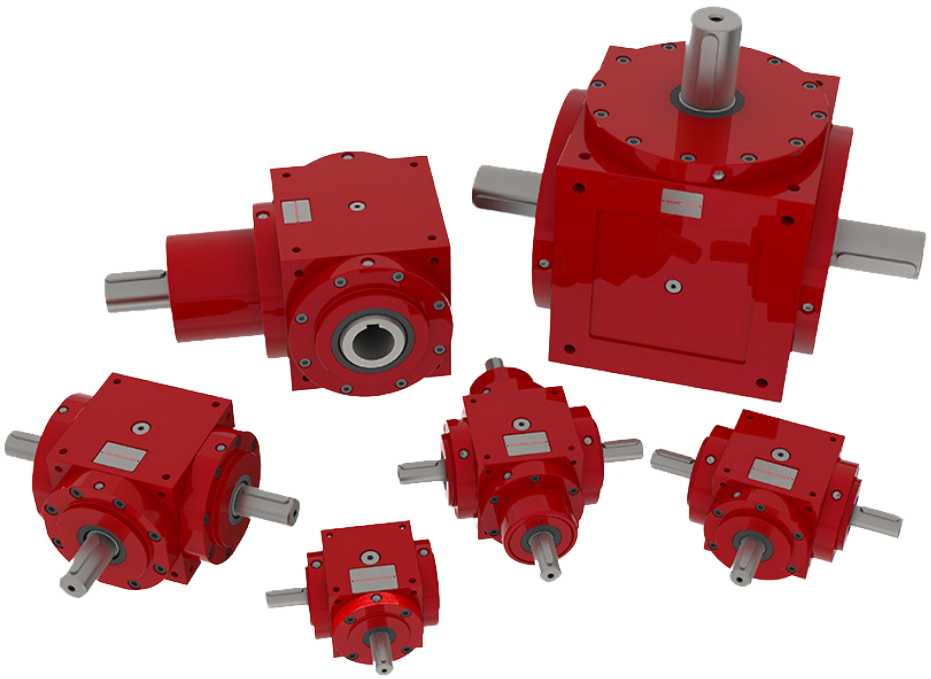
For more details request the U-Series brochure from Power Jacks or download a copy from www.powerjacks.com

ATEX Bevel Gearboxes

Explosion-proof ATEX rated bevel gearboxes are designed and manufactured for safe operation in hazardous, potentially explosive environments due to the presence of flammable liquids, gases, vapours, dust or other substances that could ignite or explode. Power Jacks ATEX rated bevel gearboxes are engineered with extensive safety features that prevent arcs or sparks from igniting explosive or flammable substances, by restricting the amount of available energy for ignition.

- Bevel Gearboxes designed for each ATEX applications exact requirements.
- Prevent ignition in hazardous environments by design.
- Compliant with ATEX directive for reliable safe operation in hazardous areas.
- Available in mechanical and electro-mechanical configurations, with a full range of drive and feedback options including electric motors, encoders and sensors.
- High-quality manufacture in an ISO compliant environment using the optimum materials, coatings and lubricants required for operation in hazardous environments.
- Stainless steel version available for high corrosion resistance.
- Operate in highly demanding environments with enclosure ratings up to IP68 (submersible).
- All accessories are ATEX rated and can integrate into suitable systems for full automation solutions in hazardous areas.

The full range of Power Jacks bevel gearboxes are available for explosion-proof rating to a defined zone and specification. .



Compliant Standard

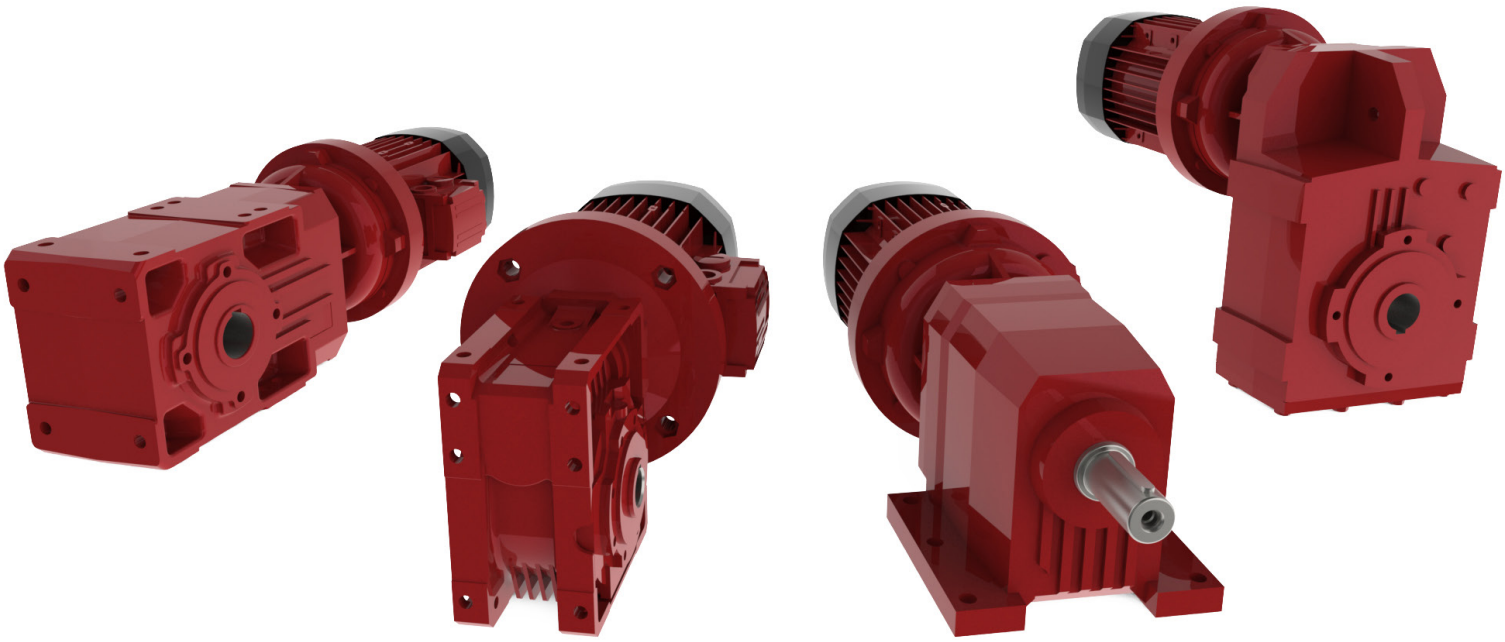
Standard	Description
2014/34/EU	EU ATEX Equipment Directive
SI 2016/1107	UK ATEX Equipment Directive
BS EN 1127-1:2019	Explosive atmospheres. Explosion prevention and protection - Basic concepts and methodology
ISO 80079-36:2016	Non-electrical equipment for explosive atmospheres: Basic method and requirements
ISO 80079-37:2016	Non-electrical equipment for explosive atmospheres: Non-electrical type of protection constructional safety ''c'', control of ignition sources ''b'', liquid immersion ''k'

ATEX Zones Available

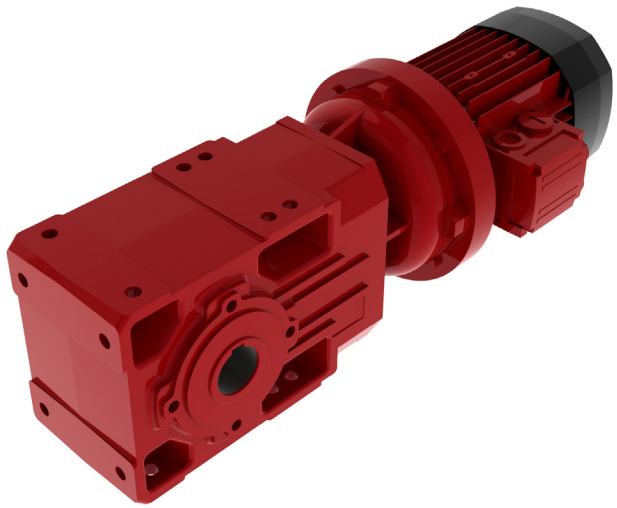
Zone	Type	Category	Description
Zone 1	Gas / Vapour	Category 2G	Explosive atmosphere likely in normal operation
Zone 2	Gas / Vapour	Category 3G	Explosive atmosphere not likely; if it occurs, it is brief
Zone 21	Combustible Dust	Category 2D	Explosive dust cloud likely in normal operation
Zone 22	Combustible Dust	Category 3D	Explosive dust cloud not likely; if it occurs, it is brief

Contact Power Jacks highly experienced engineering team today to discuss your ATEX project
For more details request the U-Series brochure from Power Jacks or download a copy from www.powerjacks.comor submit an ATEX application analysis form available from www.powerjacks.com

POWER JACKS OFFERS A WIDE RANGE OF REDUCTION GEARBOXES FOR SCREW JACK SYSTEM BUILDING



A-series - Right Angled Helical Bevel Gearbox



Size	Torque [Nm]
A 05	100
A 10	150
A 20	250
A 30	410
A 35	600
A 41	850
A 50	1500
A 55	2000
A 60	2800
A 70	5000
A 80	8000
A 90	14000

Torque Range
100 Nm to 14000 Nm

Power Rating
0.22 kW to 150 kW (at 1400 rpm input)

Gear Ratios
5.4:1 to 1715:1

Output
Foot and shaft mount - two bore options size
Keyless shrink disc fitting
Metric or Inch series solid output shaft
Taper bushing
Splined Hollow shaft to DIN 5480

Input
IEC and NEMA motor adaptors
Servo motor adapters
Metric or inch series solid input shaft

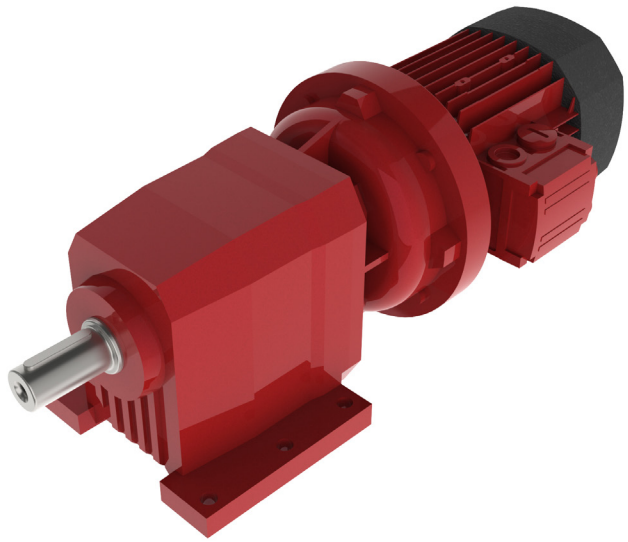
Main gear options
Backstop
Reinforced bearings for higher overhung load capacity
Reduced backlash
Taconite seals

AC Motors
Integral motors and brake motors
IEC motors and brake motors
Single and dual speed motors

Main brake features
DC and AC supply
Fast brake engage/disengage through
electronically controlled AC/DC rectifiers.

Main motor options
Thermistors and thermostat sensors
Separate supply forced ventilation
Line driver and push-pull incremental encoder

C-series - In-Line Helical Gearbox



Size	Torque [Nm]
C 05	45
C 12	100
C 22	200
C 32	300
C 36	450
C 41	600
C 51	1000
C 61	1600
C 70	2300
C 80	4000
C 90	7200
C 100	12000

Torque Range
45 Nm to 12000 Nm

Power Rating
0.08 kW to 213 kW (at 1400 rpm input)

Gear Ratios
2.6:1 to 1481:1

Output
Foot and Flange mount
Metric or inch series solid output shaft

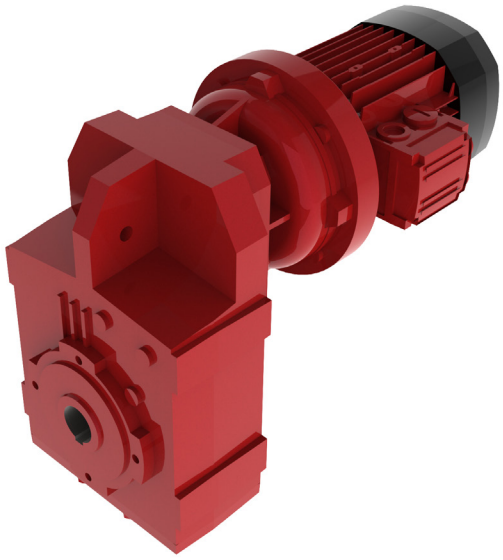
Input
IEC and NEMA motor adaptors
Servo motor adapters
Metric or inch series solid input shaft

AC Motors
Integral motors and brake motors
IEC motors and brake motors
Single and dual speed motors

Main brake features
DC and AC supply
Fast brake engage/disengage through electronically controlled AC/DC rectifiers.

Main motor options
Thermistors and thermostat sensors
Separate supply forced ventilation
Line driver and push-pull incremental encoder

F-series - Parallel Shaft Helical Gearbox



Size	Torque [Nm]
F 10	140
F 20	250
F 25	400
F 31	600
F 41	1100
F 51	1800
F 60	2900
F 70	5000
F 80	8000
F 90	14000

Torque Range
140 Nm to 14000 Nm

Power Rating
0.17 kW to 125 kW (at 1400 rpm input)

Gear Ratios
6.4:1 to 2099:1

Output
Keyed hollow shaft - two bore options per size
Keyless shrink disc fitting
Plug-in solid output shaft as an option

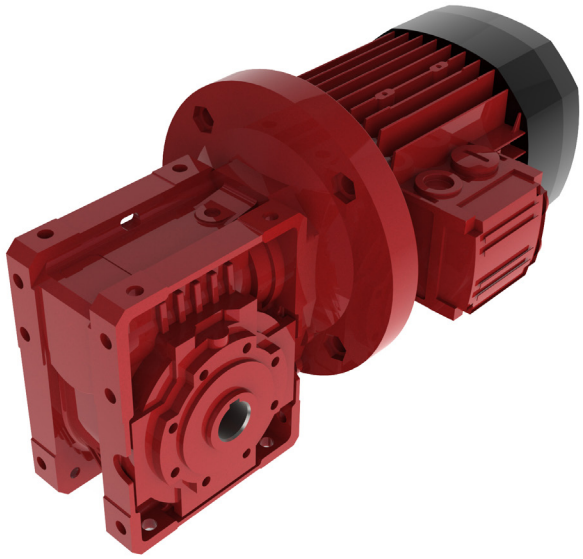
Input
IEC and NEMA motor adaptors
Servo motor adapters
Metric or inch series solid input shaft

AC Motors
Integral motors and brake motors
IEC motors and brake motors
Single and dual speed motors

Main brake features
DC and AC supply
Fast brake engage/disengage through
electronically controlled AC/DC rectifiers.

Main motor options
Thermistors and thermostat sensors
Separate supply forced ventilation
Line driver and push-pull incremental encoder

VF & W - Series - Worm Gearbox



Size	Torque [Nm]
VF 27	13
VF 30	24
VF 44	55
VF 49	88
VF 63	190
VF 75	320
VF 86	440
VF 110	830
VF 130	1500
VF 150	2000
VF 185	3600
VF 210	5000
VF 250	7100

Torque Range
13 Nm to 71000 Nm

Power Rating
0.04 kW to 75 kW (at 1400 rpm input)

Gear Ratios
7:1 to 10000:1

Output
Keyed hollow shaft
Plug-in solid output shaft
Torque limiter as an option

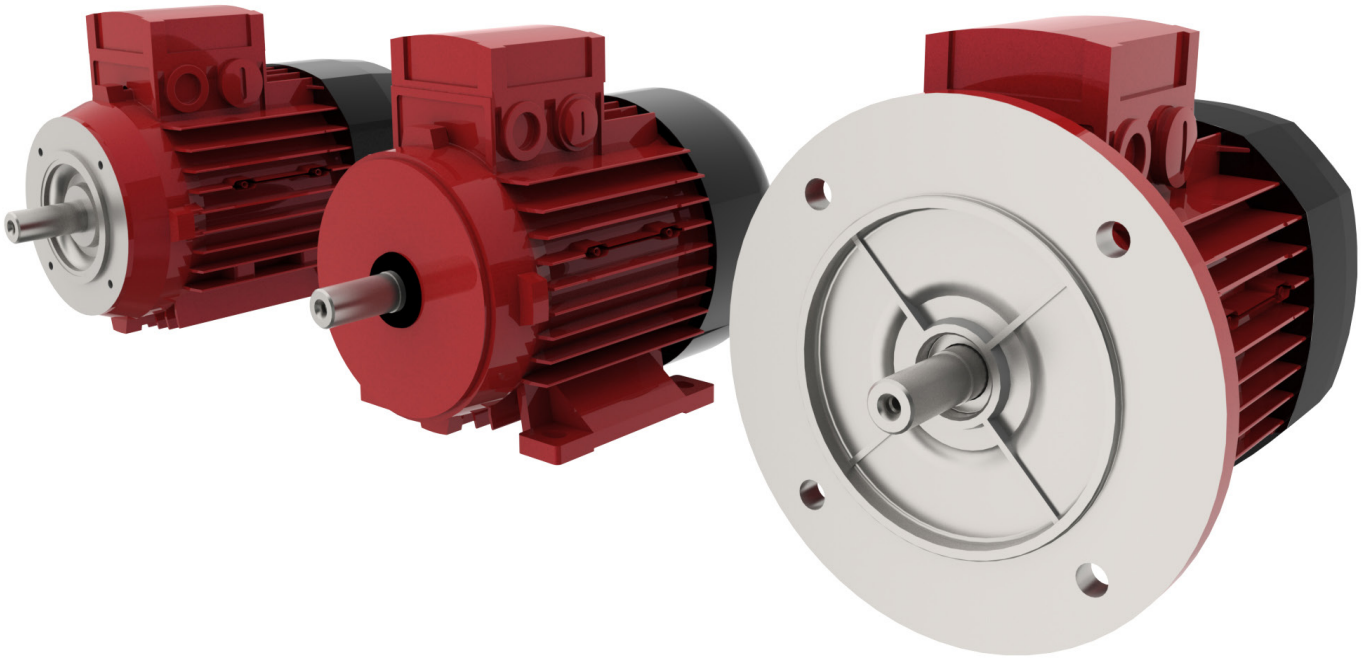
Input
IEC motor adaptors
Solid input shaft

AC Motors
Integral motors and brake motors
IEC motors and brake motors
Single and dual speed motors

Main brake features
DC and AC supply
Fast brake engage/disengage through electronically controlled AC/DC rectifiers.

Main motor options
Thermistors and thermostat sensors
Separate supply forced ventilation
Line driver and push-pull incremental encoder

POWER JACKS CAN SUPPLY ELECTRIC MOTORS FOR ALL APPLICATIONS WHETHER AC OR DC MOTORS ARE REQUIRED.



Power Jacks can supply electric motors for all applications whether AC or DC motors are required. Detailed in this section of the Design Guide are some of the most popular motors used in industrial applications.

Ac Induction Motors

Standard Specification

- 3 Phase, 50 Hz / 60Hz.
- Voltages:
  IEC Frame 56 - 132
  230 / 400 V - Δ / Y - 50 Hz (standard)
  400 / 690 V - Δ / Y - 50 Hz (on request)
  460 V - Y - 60 Hz (standard)
  IEC Frame 160 - 200
  400 / 690 V - Δ / Y - 50 Hz (standard)
  460 V - Δ - 60 Hz (standard
- B3 Foot, B5 Flange and B14 Face Mounting. (or a combination).
- 2 Pole (3000 rpm)
- 4 Pole (1500 rpm)
- 6 Pole (1000 rpm)
- 8 Pole (750 rpm)
- IEC Frame Sizes 63 to 200.
- Enclosure IP55, TEFV.
- S1 Continuous rating.

Optional

- Brake motors - AC or DC units.
- 2 and 8 Pole 3 phase AC motors.
- Single phase AC motors.
- DC motors - permanent magnet or servo.
- Cast Iron or Steel construction motors.
- High altitude and high temperature options.
- Integral AC inverter.
- Integral Incremental or Absolute encoder.
- Forced ventilation.
- Enclosures IP56 to IP68.
- Tropicalised motors.
- NEMA and Japanese standard units.
- Marine motors.
- Explosion proof motors, including ATEX motors.
- Anti-Condensation Heaters
- Thermistors
- H-Class Insulation
- Brake hand release
- Plug-in connectors
- Second output shaft.

Features

- Standard Efficiency of IE1. Other efficiency ratings of IE2, IE3 and IE4 are available on request.
- Low noise levels.
- High power factors.
- High torque with smooth acceleration and low current.
- Aluminium construction for light weight and corrosion resistance.

Brake Motor

The brake units are a single disc type mounted on the non-drive end-shield of the motor and can be either DC or AC types. They are spring applied electrically released units, which provide fail to safe operating characteristics such that on interruption, or failure of power supply, the brake will engage and arrest the load.

With DC brakes, the brake coil is fed via a rectifier in the motor terminal box and is automatically switched with the AC motor supply. AC brakes are connected directly to the motor terminals. They can however be separately energised form their own AC supply, in the case of inverter drives and/or where very fast brake operation is required.

The enclosure ratings for brake motors are IP54 as standard and IP55 on request. More enclosure ratings are available on request e.g. IP56.

Symbols	Units of Measure	Description
$\cos\phi$	-	Power Factor
η	-	Efficiency
f_m	-	Power adjusting factor
I	-	Cyclic duration factor
I_N	(A)	Rated current
I_S	(A)	Locked rotor current
Jc	(Kgm^2)	Load moment of inertia
J_M	(Kgm^2)	Moment of inertia
K_c	-	Torque factor
K_d	-	Load factor
K_J	-	Inertia factor
M_A	(Nm)	Mean breakaway torque
M_B	(Nm)	Brake torque
M_N	(Nm)	Rated torque
M_L	(Nm)	Counter-torque during acceleration
M_s	(Nm)	Starting torque

Symbols	Units of Measure	Description
n	(min^{-1})	Rated Speed
P_B	(W)	Power drawn by the brake at 20°C
P_N	(kW)	Motor rated power
P_r	(kW)	Required power
t_1	(ms)	Brake response time with one-way rectifier
t_{1S}	(ms)	Brake response time with electronic-controlled rectifier
t_2	(ms)	Brake reaction time with a.c. disconnect
t_{2C}	(ms)	Brake reaction time with a.c. disconnect
t_a	°C	Ambient temperature
t_f	(min)	Work time constant load
t_r	(min)	Rest Time
W	(J)	Braking work between service interval
W_{MAX}	(J)	Maximum brake work for each braking
Z	(1/h)	Permissible starting frequency, loaded
Z_0	(1/h)	Max. permissible unloaded starting frequency (I=50%)

Motor Rating - 2 Pole Motors (3000 rpm)

2P			3000 min^{-1} - S1																					50Hz				
															d.c. brake						a.c. brake						
															FD						FA						
P_n kW			n min^{-1}	M_n Nm	IE1	η (100%) %	η (75%) %	η (50%) %	cosφp	In 400V A	Is / In	Ms / Mn	Ma / Mn	J_m x 10^{-4} kgm^2	1M B5 Kg	Type	Mb Nm	Z_o 1/h NB	Z_o 1/h SB	J_m x 10^{-4} kgm^2	1M B5 Kg	Type	Mb Nm	Z_o 1/h	J_m x 10^{-4} kgm^2	1M B5 Kg
0.18	BN 63A	2	2730	0.63	N/A	59.9	56.9	51.9	0.77	0.56	3.0	2.1	2.0	2.0	3.5	FD-02	1.75	3900	4800	2.6	5.2	FA-02	1.75	4800	2.6	5.0
0.25	BN 63B	2	2740	0.87	N/A	66.0	64.8	64.8	0.76	0.72	3.3	2.3	2.3	2.3	3.9	FD-02	1.75	3900	4800	3.0	5.6	FA-02	1.75	4800	3.0	5.4
0.37	BN 63C	2	2800	1.26	N/A	69.1	66.8	66.8	0.78	0.99	3.9	2.6	2.6	3.3	5.1	FD-02	3.5	3600	4500	3.9	6.8	FA-02	3.5	4500	3.9	6.6
0.37	BN 71A	2	2820	1.25	N/A	73.8	73.0	70.6	0.76	0.95	4.8	2.8	2.6	3.5	5.4	FD-03	3.5	3000	4100	4.6	8.1	FA-03	3.5	4200	4.6	7.8
0.55	BN 71B	2	2820	1.86	N/A	76.0	75.8	74.8	0.76	1.37	5.0	2.9	2.8	4.1	6.2	FD-03	5	2900	4200	5.3	8.9	FA-03	5	4200	5.3	8.6
0.75	BN 71C	2	2810	2.6	N/A	76.6	76.2	76.2	0.76	1.86	5.1	3.1	2.8	5.0	7.3	FD-03	5	1900	3300	6.1	10.0	FA-03	5	3600	6.1	9.7
0.75	BN 80A	2	2810	2.6	✓	76.2	75.5	68.3	0.81	1.75	4.8	2.6	2.6	7.8	8.6	FD-04	5	1700	3200	9.4	12.5	FA-04	5	3200	9.4	12.4
1.1	BN 80B	2	2800	3.8	✓	76.4	76.2	75.0	0.81	2.57	4.8	2.8	2.8	9.0	9.5	FD-04	10	1500	3000	13.4	13.4	FA-04	10	3000	10.6	13.3
1.5	BN S0C	2	2800	5.1	✓	79.1	79.5	77.2	0.81	3.4	4.9	2.7	2.8	11.4	11.3	FD-04	15	1300	2600	15.2	15.2	FA-04	15	2600	13.0	15.1
1.5	BN 90SA	2	2870	5.0	✓	82.0	81.5	78.1	0.80	3.4	5.9	2.7	2.6	12.5	12.3	FD-14	15	900	2200	14.1	16.5	FA-14	15	2200	14.1	16.4
1.85	BN 90SB	2	2880	6.1	✓	82.5	82.0	75.4	0.80	4.0	6.2	2.9	2.6	16.7	14	FD-14	15	900	2200	18.3	18.2	FA-14	15	2200	18.3	18.1
2.2	BN 90L	2	2880	7.3	✓	82.7	82.1	80.8	0.80	4.8	6.3	2.9	2.7	16.7	14	FD-05	26	900	2200	21	20	FA-05	26	2200	21	20.7
3	BN 100L	2	2860	10.0	✓	81.5	81.3	77.4	0.79	6.7	5.6	2.6	2.6	31	20	FD-15	26	700	1600	35	26	FA-15	26	1600	35	27
4	BN 100LB	2	2870	13.3	✓	83.1	83.0	77.8	0.80	6.7	5.8	2.7	2.5	39	23	FD-15	40	450	900	43	29	FA-15	40	1000	43	30
4	BN 112M	2	2900	13.2	✓	85.5	84.5	83.0	0.82	8.2	6.9	3.0	2.9	57	28	FD-06S	40	-	950	66	39	FA-06S	40	950	66	40
5.5	BN 132SA	2	2890	18.2	✓	84.7	84.5	81.2	0.84	11.2	5.9	2.6	2.2	101	35	FD-06	50	-	600	112	48	FA-06	50	600	112	49
7.5	BN 132SB	2	2900	25	✓	86.5	86.3	84.4	0.85	14.7	6.4	2.6	2.2	145	42	FD-06	50	-	550	154	55	FA-06	50	550	154	56
9.2	BN 132M	2	2930	30	✓	87.0	86.5	83.6	0.86	17.7	6.7	2.8	2.3	178	53	FD-56	75	-	430	189	66	FA-06	75	430	189	67
11	BN 160MR	2	2920	36	✓	87.6	87.0	86.0	0.88	20.6	6.9	2.9	2.5	210	65											
15	BN 160MB	2	2930	49	✓	89.6	89.4	88.0	86.0	28.1	7.1	2.6	2.3	340	84											
18.5	BN 160L	2	2930	60	✓	90.4	90.1	89.0	86.0	34	7.6	2.7	2.3	420	97											
22	BN 180M	2	2930	72	✓	89.9	89.7	89.5	0.88	40	7.8	2.6	2.4	490	109											
30	BN 200LA	2	2930	98	✓	90.7	90.1	87.6	0.89	54	7.8	2.7	2.9	770	140											

Motor Rating - 4 Pole Motors (1500 rpm)

4P			1500 min^{-1} - S1													50Hz										
															d.c. brake						a.c. brake				
															FD						FA				
P_n kW			n min^{-1}	M_n Nm	IE1	η (100%) %	η (75%) %	η (50%) %	cosφ	In 400V A	Is / In	Ms / Mn	Ma / Mn	J_m x 10^{-4} kgm^2	1M B5 Kg	Type	Mb Nm	Z_o 1/h NB	Z_o 1/h SB	J_m x 10^{-4} kgm^2	1M B5 Kg	Type	Mb Nm	Z_o 1/h	J_m x 10^{-4} kgm^2	1M B5 Kg
0.06	BN 56A	4	1340	0.43	N/A	46.8	44.2	41.3	0.65	0.28	2.6	2.3	2.0	1.5	3.1											
0.09	BN 568	4	1350	0.64	N/A	51.7	47.6	42.9	0.60	0.42	2.6	2.5	2.4	1.5	3.1											
0.12	BN 63A	4	1350	0.85	N/A	59.8	56.2	47.0	0.62	0.47	2.6	1.9	1.8	2.0	3.5	FD-02	1.75	10000	13000	2.6	5.2	FD-02	1.75	13000	2.6	5.0
0.18	BN 638	4	1320	1.30	N/A	54.8	52.9	52.5	0.67	0.71	2.6	2.2	2.0	2.3	3.9	FD-02	3.5	10000	13000	3.0	5.6	FD-02	3.5	13000	3.0	5.4
0.25	BN 63C	4	1340	1.78	N/A	65.3	65.0	57.9	0.69	0.80	2.7	2.1	1.9	3.3	5.1	FD-02	3.5	7800	10000	3.9	6.8	FD-02	3.5	10000	3.9	6.6
0.25	BN 71A	4	1380	1.73	N/A	63.7	62.2	59.1	0.73	0.78	3.3	1.9	1.7	5.8	5.1	FD-03	3.5	7700	11000	6.9	7.8	FD-03	3.5	11000	6.9	7.5
0.37	BN 71B	4	1370	2.6	N/A	66.8	66.7	63.0	0.76	1.05	3.7	2.0	1.9	6.9	5.9	FD-03	5	6000	9400	8.0	8.6	FD-03	5.0	9400	8.0	8.3
0.55	BN 71C	4	1380	3.8	N/A	69.0	68.9	68.8	0.74	1.55	4.1	2.3	2.3	9.1	7.3	FD-53	7.5	4300	8700	10.2	10.0	FD-03	7.5	8700	10.2	9.7
0.55	BN 80A	4	1390	3.8	N/A	72.0	71.3	69.7	0.77	1.43	4.1	2.3	2.0	15	8.2	FD-04	10	4100	8000	16.6	12.1	FD-04	10	8000	16.6	12.0
0.75	BN 80B	4	1400	5.1	✓	75.0	74.5	69.3	0.78	1.85	4.9	2.7	2.5	20	9.9	FD-04	15	4100	7800	22	13.8	FD-04	15	7800	22	13.7
1.1	BN 80C	4	1400	7.5	✓	75.5	76.2	70.4	0.78	2.7	5.1	2.8	2.5	25	11.3	FD-04	15	2600	5300	27	15.2	FD-04	15	5300	27	15.1
1.1	BN 90S	4	1390	7.6	✓	76.5	76.2	72.2	0.77	2.70	4.6	2.6	2.2	21	12.2	FD-14	15	4800	8000	23	16.4	FD-14	15	8000	23	16.3
1.5	BN 90LA	4	1410	10.2	✓	78.7	78.5	74.9	0.77	3.6	5.3	2.8	2.4	28	13.6	FD-05	26	3400	6000	32	19.6	FD-05	26	6000	32	20.3
1.85	BN 90LB	4	1390	12.7	✓	78.6	78.9	77.2	0.79	4.3	5.1	2.8	2.6	30	15.1	FD-05	26	3200	5900	34	21.1	FD-05	26	5900	34	21.8
2.2	BN 100LA	4	1410	14.9	✓	81.1	81.4	79.9	0.75	5.2	4.5	2.2	2.0	40	18	FD-15	40	2600	4700	44	25	FD-15	40	4700	44	25
3	BN 100LB	4	1410	20	✓	82.6	83.8	83.7	0.77	6.8	5.0	2.3	2.2	54	22	FD-15	40	2400	4400	58	28	FD-15	40	4400	58	29
4	BN 112M	4	1430	27	✓	84.4	84.2	81.6	0.81	8.4	5.6	2.7	2.5	98	30	FD-06S	60	-	1400	107	40	FD-06S	60	2100	107	42
5.5	BN 132S	4	1440	36	✓	84.7	84.8	82.5	0.81	11.6	5.5	2.3	2.2	213	44	FD-56	75	-	1050	223	57	FD-06	75	1200	223	58
7.5	BN 132MA	4	1440	50	✓	86.0	86.3	85.3	0.81	15.5	5.7	2.5	2.4	270	53	FD-06	100	-	950	280	66	FD-07	100	1000	280	71
9.2	BN 132MB	4	1440	61	✓	88.4	88.6	87.5	0.81	18.8	5.9	2.7	2.5	319	59	FD-07	150	-	900	342	75	FD-07	150	900	342	77
11	BN 160MR	4	1440	73	✓	87.6	87.8	86.0	0.81	22.4	6.0	2.7	2.5	360	70	FD-07	150	-	800	382	86	FD-07	150	850	382	88
15	BN 160L	4	1460	98	✓	88.7	88.5	88.4	0.81	30	6.0	2.3	2.1	650	99	FD-08	200	-	750	725	129	FD-08	200	750	710	128
18.5	BN 180M	4	1460	121	✓	89.3	89.5	89.2	0.81	37	6.2	2.6	2.5	790	115	FD-08	250	-	700	865	145	FD-08	250	700	850	144
22	BN 180L	4	1460	144	✓	89.9	90.0	90.0	0.80	44	6.4	2.5	2.5	1250	135	FD-09	300	-	400	1450	175					
30	BN 200L	4	1460	196	✓	91.4	91.7	91.0	0.80	59	7.1	2.7	2.8	1650	157	FD-09	400	-	300	1850	197					

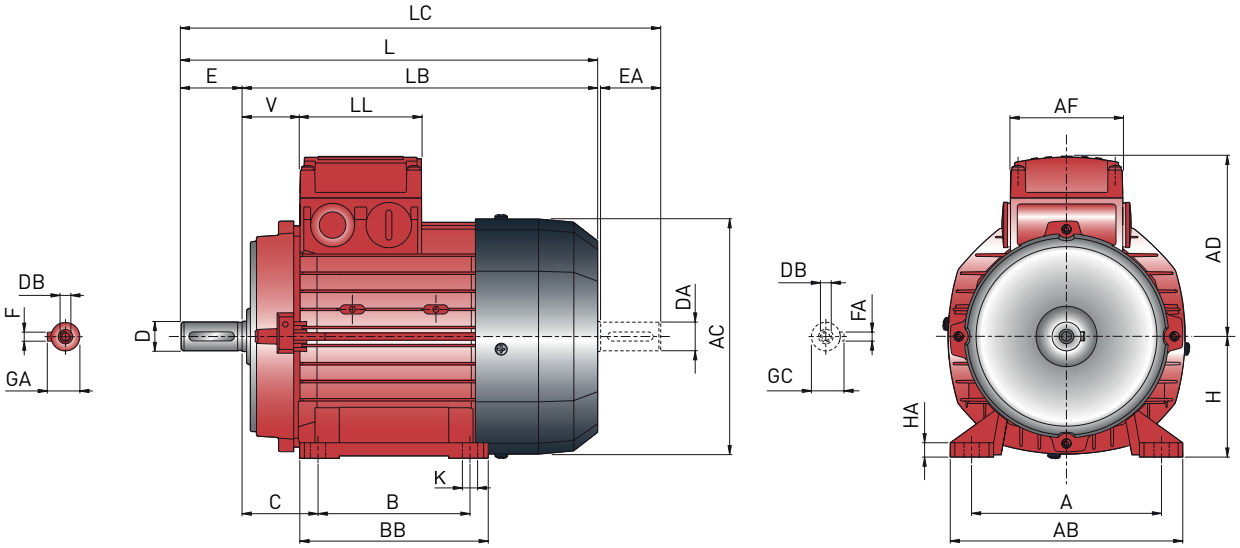
Motor Rating - 6 Pole Motors (1000 rpm)

6P			1000 min-1 - S1														50Hz									
																	d.c. brake						a.c. brake				
																	FD						FA				
P_n kW			n min-1	M_n Nm	IE1	η (100%) %	η (75%) %	η (50%) %	cosφp	In 400V A	Is/In	Ms/Mn	Ma/Mn	J_m x 10^{-4} kgm²	1M B5 Kg	Type	Mb Nm	Z_o 1/h NB	Z_o 1/h SB	J_m x 10^{-4} kgm²	1M B5 Kg	Type	Mb Nm	Z_o 1/h	J_m x 10^{-4} kgm²	1M B5 Kg
0.09	BN 63A	6	880	0.98	N/A	41.0	41.0	32.9	0.53	0.60	2.1	2.1	1.8	3.4	4.6	FD-02	3.5	9000	14000	4.0	6.3	FD-02	3.5	14000	4.0	6.1
0.12	BN 63B	6	870	1.32	N/A	45.0	44.0	41.8	0.53	0.64	2.1	1.9	1.7	3.7	4.9	FD-02	3.5	9000	14000	4.3	6.6	FD-02	3.5	14000	4.3	6.4
0.18	BN 71A	6	900	1.91	N/A	55.0	55.5	51.0	0.69	0.68	2.6	1.9	1.7	8.4	5.5	FD-03	5	8100	13500	9.5	8.2	FD-03	5.0	13500	9.5	7.9
0.25	BN 71B	6	900	2.70	N/A	62.0	58.5	51.4	0.71	0.82	2.6	1.9	1.7	10.9	6.7	FD-03	5	7800	13000	12	9.4	FD-03	5.0	13000	12	9.1
0.37	BN 71C	6	910	3.9	N/A	66.0	60.0	53.3	0.69	1.17	3.0	2.4	2.0	12.9	7.7	FD-53	7.5	5100	9500	14	10.4	FD-03	7.5	9500	14	10.1
0.37	BN 80A	6	910	3.9	N/A	68.0	67.4	63.3	0.68	1.15	3.2	2.2	2.0	21	9.9	FD-04	10	5200	8500	23	13.8	FD-04	10	8500	23	13.7
0.55	BN 80B	6	920	5.7	N/A	70.0	69.8	64.3	0.68	1.67	3.9	26	2.2	25	11.3	FD-04	15	4800	7200	27	15.2	FD-04	15	7200	27	15.1
0.75	BN 80C	6	920	7.8	✓	70.0	70.0	64.4	0.65	2.38	3.8	2.5	2.2	28	12.2	FD-04	15	3400	6400	30	16.1	FD-04	15	6400	30	16.0
0.75	BN 90S	6	920	7.8	✓	70.0	69.0	64.2	0.68	2.27	3.8	2.4	2.2	26	12.6	FD-14	15	3400	6500	28	16.8	FD-14	15	6500	28	16.7
1.1	BN 80B	6	920	11.4	✓	72.9	72.6	69.1	0.69		3.9	2.3	2.0	33	15	FD-05	26	2700	5000	37	21	FD-01	26	7800	37	22
1.5	BN 100LA	6	940	15.2	✓	75.2	74.2	70.3	0.72	4.0	4.1	2.1	2.0	82	22	FD-15	40	1900	4100	86	28	FD-15	40	4100	86	29
1.85	BN 100LB	6	930	19.0	✓	76.6	72.8	62.6	0.73	4.8	4.6	2.1	2.0	95	24	FD-15	40	1700	3600	99	30	FD-15	40	3600	99	31
2.2	BN 112M	6	940	22	✓	78.5	79.0	76.5	0.81	5.5	4.8	2.2	2.0	168	32	FD-06S	60	-	2100	177	42	FD-06S	60	2100	177	44
3	BN 132S	6	940	30	✓	79.7	77.0	75.1	0.76	7.1	5.1	1.9	1.8	216	36	FD-56	75	-	1400	226	49	FD-06	75	1400	226	50
4	BN 132MA	6	950	40	✓	81.4	81.5	79.5	0.77	9.2	5.5	2.0	1.8	295	45	FD-06	100	-	1200	305	58	FD-07	100	1200	318	63
5.5	BN 132MB	6	945	56	✓	83.1	80.9	79.1	0.78	12.2	6.1	2.1	1.9	383	56	FD-07	150	-	1050	406	72	FD-07	150	1050	406	74
11	BN 160M	6	955	75	✓	85.0	85.0	84.8	0.81	15.7	5.9	2.2	2.0	740	83	FD-08	170	-	900	815	112	FD-08	170	900	815	113
15	BN 160L	6	960	109	✓	86.4	86.5	85.9	0.81	22.7	6.6	2.5	2.3	970	103	FD-08	200	-	800	1045	133	FD-08	200	800	1045	133
18.5	BN 180L	6	970	148	✓	87.7	88.0	87.3	0.82	30	6.2	2.0	2.4	1550	130	FD-09	300	-	600	1750	170					
30	BN 200LA	6	960	184	✓	88.6	88.0	87.3	0.81	37	5.9	2.0	2.3	1700	145	FD-09	400	-	450	1900	185					

Motor Rating - 8 Pole Motors (750 rpm)

8P			750 min^{-1} - S1																				50Hz			
														d.c. brake						a.c. brake					
														FD						FA					
P_n kW			n min^{-1}	M_n Nm	η %	cosφp	In 400V A	Is / In	Ms / Mn	Ma / Mn	$J_m \times 10^{-4}$ kgm^2	1M B5 Kg	Type	Mb Nm	Z_o 1/h NB	Z_o 1/h SB	$J_m \times 10^{-4}$ kgm^2	1M B5 Kg	Type	Mb Nm	Z_o 1/h	$J_m \times 10^{-4}$ kgm^2	1M B5 Kg
0.09	BN 71A	8	680	1.26	47	0.59	0.47	2.3	2.4	2.3	10.9	6.7	FD-03	3.5	9000	16000	12.0	9.4	FD-03	3.5	16000	12.0	9.1
0.12	BN 71B	8	680	1.69	51	0.59	0.58	2.1	2.3	2.2	12.9	7.7	FD-03	5.0	9000	16000	14.0	10.4	FD-03	5.0	16000	14.0	10.1
0.18	BN 80A	8	690	2.49	51	0.60	0.85	2.4	2.2	2.2	15	8.2	FD-04	5.0	6500	11000	16.6	12.1	FD-04	5.0	11000	16.6	12.0
0.25	BN 80B	8	680	3.51	54	0.63	1.06	2.4	2.0	1.9	20	9.9	FD-04	10.0	6000	10000	22	13.8	FD-04	10.0	10000	23	13.7
0.37	BN 90S	8	675	5.2	58	0.60	1.53	2.6	2.3	2.1	26	12.6	FD-14	15.0	4800	7500	28	16.8	FD-14	15.0	7500	28	16.7
0.55	BN 90L	8	670	7.8	62	0.60	2.13	2.6	2.2	2.0	33	15	FD-05	26	4000	6400	37	21	FD-05	26	6400	37	22
0.75	BN 100LA	8	700	10.2	68	0.63	2.53	3.4	1.9	1.7	82	22	FD-15	26	2800	4800	86	28	FD-15	26	4800	86	29
1.1	BN 100LB	8	700	15.0	68	0.64	3.65	3.2	1.7	1.7	95	24	FD-15	40	2500	4000	99	30	FD-15	40	4000	99	31
1.5	BN 112M	8	710	20.2	71	0.66	4.6	3.7	1.8	1.9	168	32	FD-06S	60	-	3000	177	42	FD-06S	60	3000	177	44
2.2	BN 132S	8	710	29.6	75	0.66	6.4	3.8	1.8	2.0	295	45	FD-56	75	-	2300	305	58	FD-06	75	2300	305	56
3	BN 132MA	8	710	40.4	76	0.69	8.3	3.9	1.6	1.8	370	53	FD-06	100	-	1900	394	69	FD-07	100	1900	406	74

Motor Dimensions - Standard - B3 Foot Mount

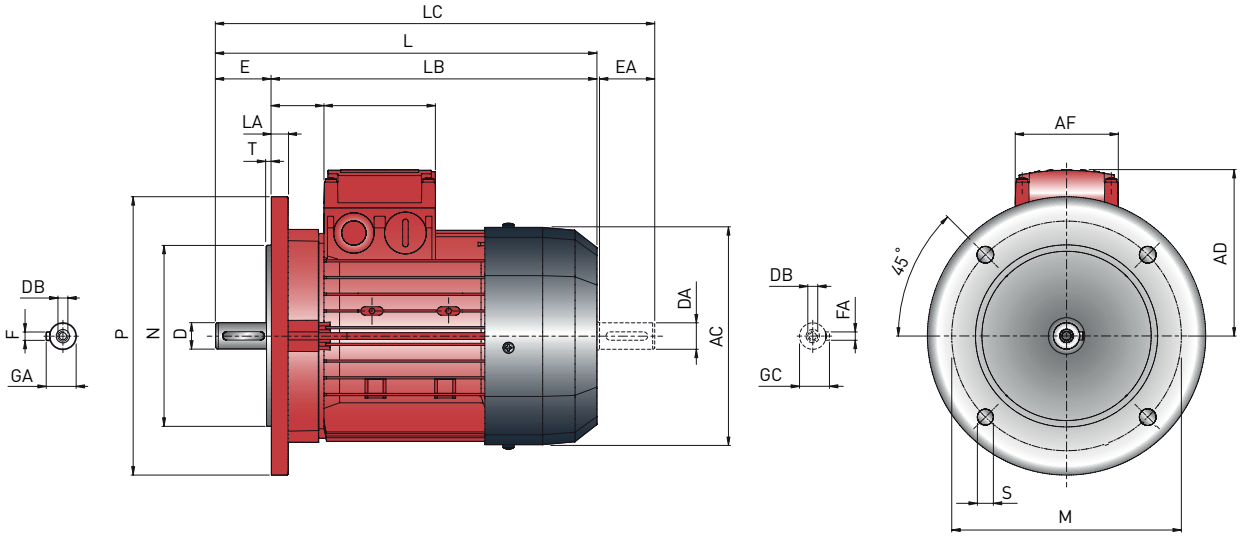


FRAME SIZE	SHAFT					HOUSING						MOTOR									
	D DA	E EA	DB	GA GC	F FA	B	A	HA	BB	AB	K	C	HC	AC	L	LB	LC	AD	AF	LL	V
BN 63	11	23	M4	12	4	80	100	8	96	120	7	40	63	121	207	184	232	95	74	80	30
BN 71	14	30	M5	16	5	90	112	8	112	135		45	71	138	249	219	281	108			37
BN 80	19	40	M6	21.5	6	100	125	8	124	153	10	50	80	156	273	233	315	119			38
BN 90S	24	50	M8	27	8		140	8	155	174		56	90	176	326	276	378	133	98	98	44
BN 90L						125															
BN 100	28	60	M10	31	8	140	160	10	175	192	12	63	100	195	366	306	429	142			50
BN 112							190			224		70	112	219	385	325	448	157			52
BN 132S	38	80	M12	41	10		216	12	218	254		89	132	260	493	413	576	193	118	118	58
BN 132M						178															
BN 160M	42 38 (1)	110 80 (1)	M16 M12 (1)	45 41 (1)	12 10 (1)	210	254	25	264	319	14.5	108	160	310	596	486	680	245	187	187	51
BN 160L						254			304						640	530	724				
BN 180L	48 42 (1)	110 110 (1)	M16 M16 (1)	51.5 45 (1)	14 12 (1)	279	279	26	329	359	14	121	180	348	708	598	823	261			52
BN 200L	55 42 (1)		M20 M16 (1)	59 45 (1)	16 12 (1)	305	318		355	398	18	133	200		722	612	837				64

Note

1. These values refer to the rear shaft end.

Motor Dimensions - Standard - B5 Flange Mount

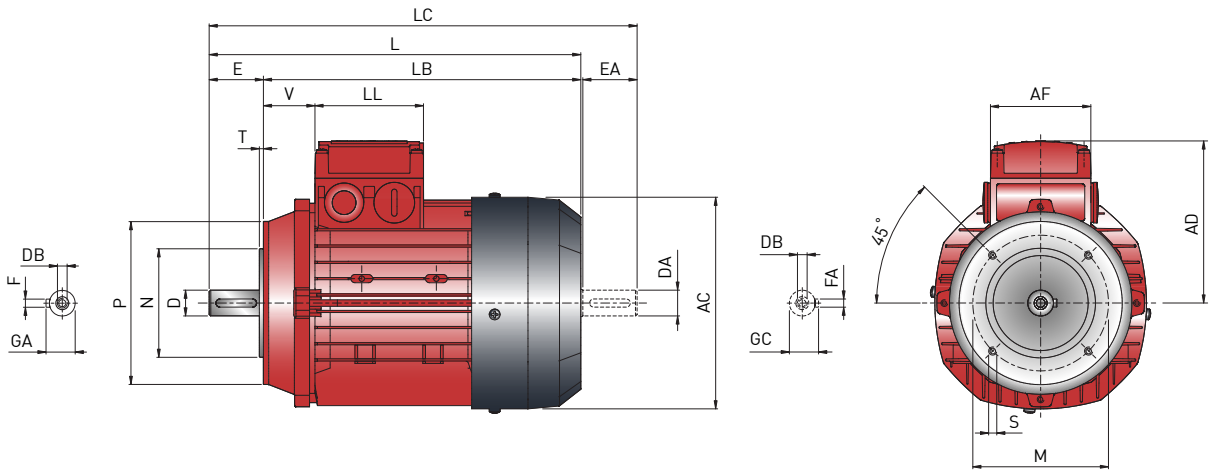


FRAME SIZE	SHAFT					FLANGE						MOTOR							
	D DA	E EA	DB	GA GC	F FA	M	N	P	S	T	LA	AC	L	LB	LC	AD	AF	LL	V
BN 56	9	20	M3	10.2	3	100	80	120	7	3	8	110	185	165	207	91	74	80	34
BN 63	11	23	M4	12.5	4	115	95	140	9.5		10	121	207	184	232	95			26
BN 71	14	30	M5	16	5	130	110	160		3.5		138	249	219	281	108			37
BN 80	19	40	M6	21.5	6	165	130	200	11.5		11.5	156	274	234	315	119			38
BN 90	24	50	M8	27	8							176	326	276	378	133	98	98	44
BN 100	28	60	M10	31		125	180	250	14	4	14	63	367	307	429	142			50
BN 112											15	219	385	325	448	157			52
BN 132	38	80	M12	41	10	265	230	300			20	258	493	413	576	193	118	118	58
BN 160 MR	42 38 (1)	110 80 (1)	M16 M12 (1)	45 41 (1)	12 10 (1)	300	250	350	18.5	5	15		562	452	645				218
BN 160 M												310	596	486	680	245	187	187	51
BN 160 L																			
BN 180 M	48 38 (1)	110 110 (1)	M16 M12 (1)	51.5 41 (1)	14 10 (1)							310	640	530	724				
BN 180 L	48 42 (1)		M16 M16 (1)	51.5 45 (1)	14 12 (1)						18	348	708	598	823	261			52
BN 200 L	55 42 (1)		M20 M16 (1)	59 45 (1)	16 12 (1)	350	300	400					722	612	837				66

Note

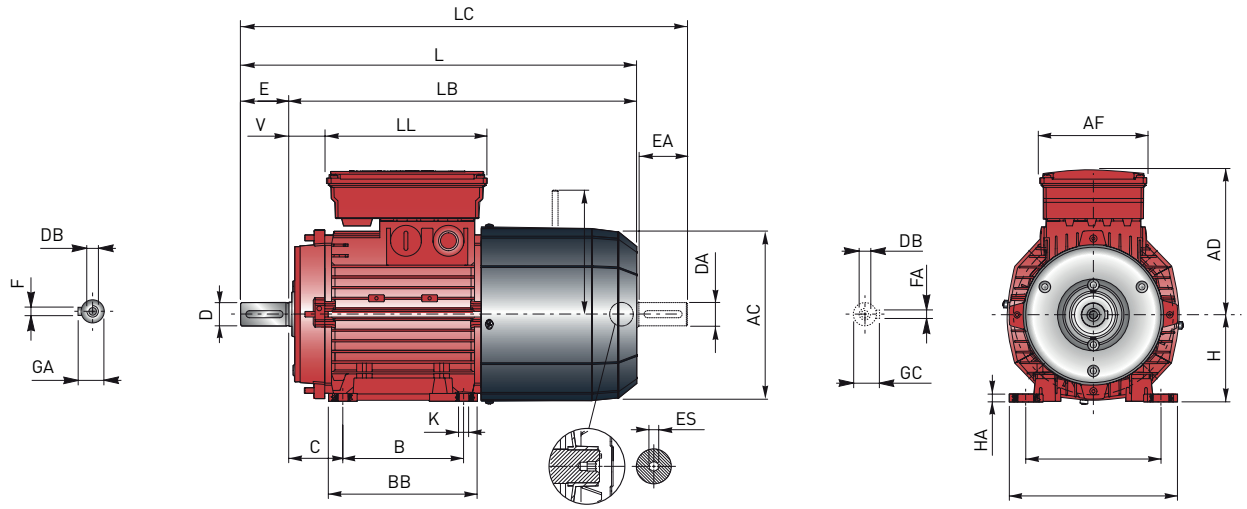
1. These values refer to the rear shaft end.

Motor Dimensions - Standard - B14 Face Mount



FRAME SIZE	SHAFT					FLANGE					MOTOR							
	D DA	E EA	DB	GA GC	F FA	M	N	P	S	T	AC	L	LB	LC	AD	AF	LL	V
BN 56	9	20	M3	10.2	3	65	50	80	M5	2.5	110	185	165	207	91	74	80	34
BN 63	11	23	M4	12.5	4	75	60	90			121	207	184	232	95			26
BN 71	14	30	M5	16	5	85	70	105	M6		138	249	219	281	108			37
BN 80	19	40	M6	21.5	6	100	105	120		3	156	274	234	315	119			38
BN 90	24	50	M8	27	8	115	120	140	M8		176	326	276	378	133	98	98	44
BN 100	28	60	M10	31		130	110	160		3.5	195	367	307	429	142			50
BN 112											219	385	325	448	157			52
BN 132	38	80	M12	41	10	165	130	200	M10	4	258	493	413	576	193	118	118	58

Motor Dimensions - Brake Motor - DC Brake - B3 Foot Mount

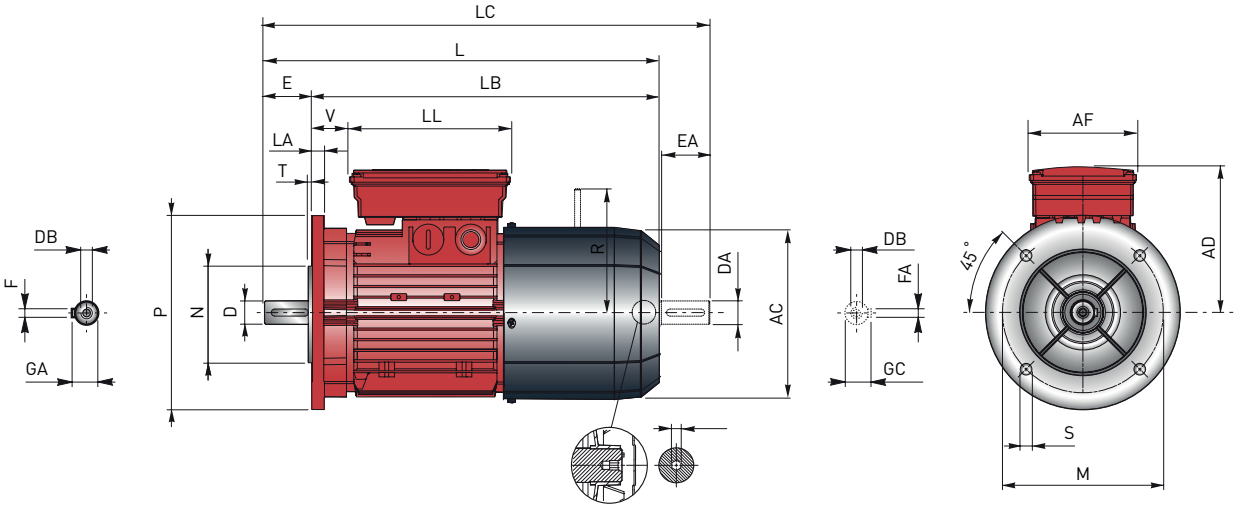


FRAME SIZE	SHAFT					HOUSING						MOTOR											
	D DA	E EA	DB	GA GC	F FA	B	A	HA	BB	AB	K	C	H	AC	L	LB	LC	AD	AF	LL	V	R	S
BN 63	11	23	M4	12	4	80	100	8	96	120	7	40	63	121	272	249	297	122	98	133	14	96	5
BN 71	14	30	M5	16	5	90	112	8	112	135		45	71	138	310	280	342	135			25	103	
BN 80	19	40	M6	21.5	6	100	125	8	124	153	10	50	80	156	346	306	388	146			41	129	
BN 90S	24	50	M8	27	8		140	8	155	174		56	90	176	409	359	461	149	110	165	15		6
BN 90L						125															39	160	
BN 100	28	60	M10	31	8	140	160	10	175	192	12	63	100	195	458	398	521	158			62		
BN 112							190			224		70	112	219	484	424	547	173			73	199	
BN 132S	38	80	M12	41	10		216	12	218	254		89	132	260	603	523	686	210	140	188	46	204 (2)	
BN 132M						178																	
BN 160M	42 38 (1)	110 80 (1)	M16 M12 (1)	45 41 (1)	12 10 (1)	210	254	25	264	319	14.5	108	160	310	736	626	820	245	187	187	51	266	–
BN 160L						254			304						780	670	884						
BN 180L	48 42 (1)	110 110 (1)	M16 M16 (1)	51.5 45 (1)	14 12 (1)	279	279	26	329	359	14	121	180	348	886	756	981	261			52	305	
BN 200L	55 42 (1)		M20 M16 (1)	59 45 (1)	16 12 (1)	305	318		355	398	18	133	200		878	768	993				64		

Note

1. These values refer to the rear shaft end.
2. For FD07 high torque brake value R=226 (consult Power Jacks for more details).

Motor Dimensions - Brake Motor - DC Brake - B5 Flange Mount

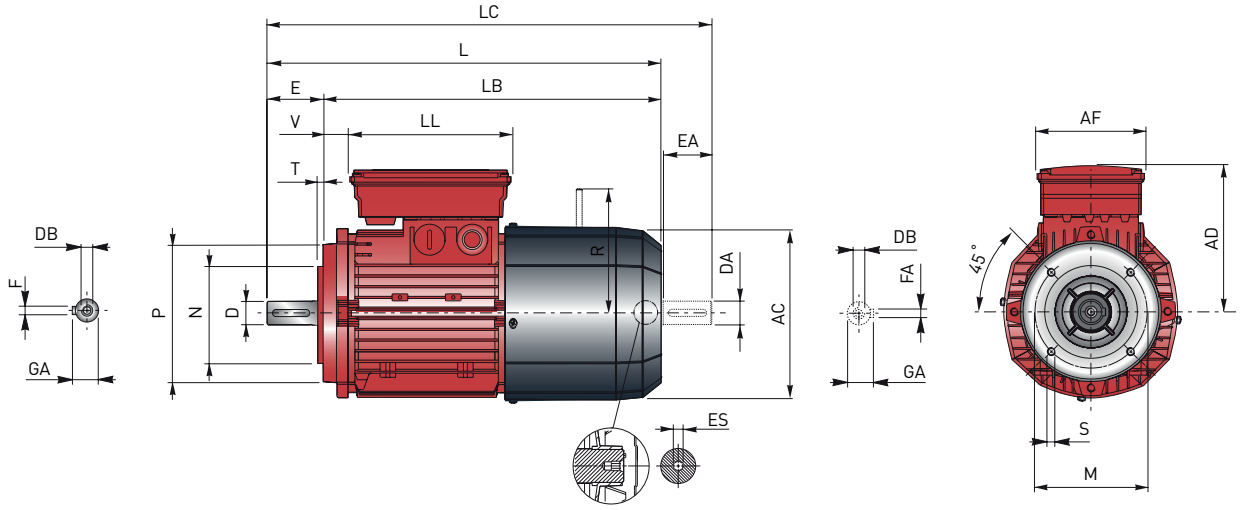


FRAME SIZE	SHAFT					FLANGE						MOTOR									
	D DA	E EA	DB	GA GC	F FA	M	N	P	S	T	LA	AC	L	LB	LC	AD	AF	LL	V	R	ES
BN 63	11	23	M4	12	4	115	95	140	9.5	3	10	121	272	249	297	122	98	133	14	96	5
BN 71	14	30	M5	16	5	130	110	160	9.5	3.5		138	310	280	342	135			25	103	
BN 80	19	40	M6	21.5	6	165	130	200	11.5		11.5	156	346	156	388	146			41	129	
BN 90S	24	50	M8	27	8							176	409	176	461	149	110	165	39		6
BN 90L																146				160	
BN 100	28	60	M10	31		215	215	215	14	4	14	195	458	195	521	158		165	62		
BN 112											15	219	484	219	547	173		165	73	199	
BN 132	38	80	M12	41	10	265	230	300			20	258	603	523	686	210	140	188	46	204 (2)	
BN 160MR	42 38 (1)	110 80 (1)	M16 M12 (1)	45 M41 (1)	12 10 (1)	300	250	350	18.5	5	15		672	562	755				161	226	
BN 160M												310	736	626	820	245	187	187	51	266	–
BN 160L	42 38 (1)	110 80 (1)	M16 M12 (1)	45 41 (1)	12 10 (1)																
BN 180M	48 38 (1)			51.5 41 (1)	14 10 (1)								780	670	864						
BN 180L	48 42 (1)	110 110 (1)	M16 M16 (1)	51.5 45 (1)	14 12 (1)						18	348	866	756	981	261			52	305	
BN 200L	55 42 (1)		M20 M16 (1)	59 45 (1)	16 12 (1)	350	300	400	18.5				878	768	722				64		

Note

1. These values refer to the rear shaft end.
2. For FD07 high torque brake value R=226 (consult Power Jacks for more details).

Motor Dimensions - Brake Motor - DC Brake - B14 Face Mount

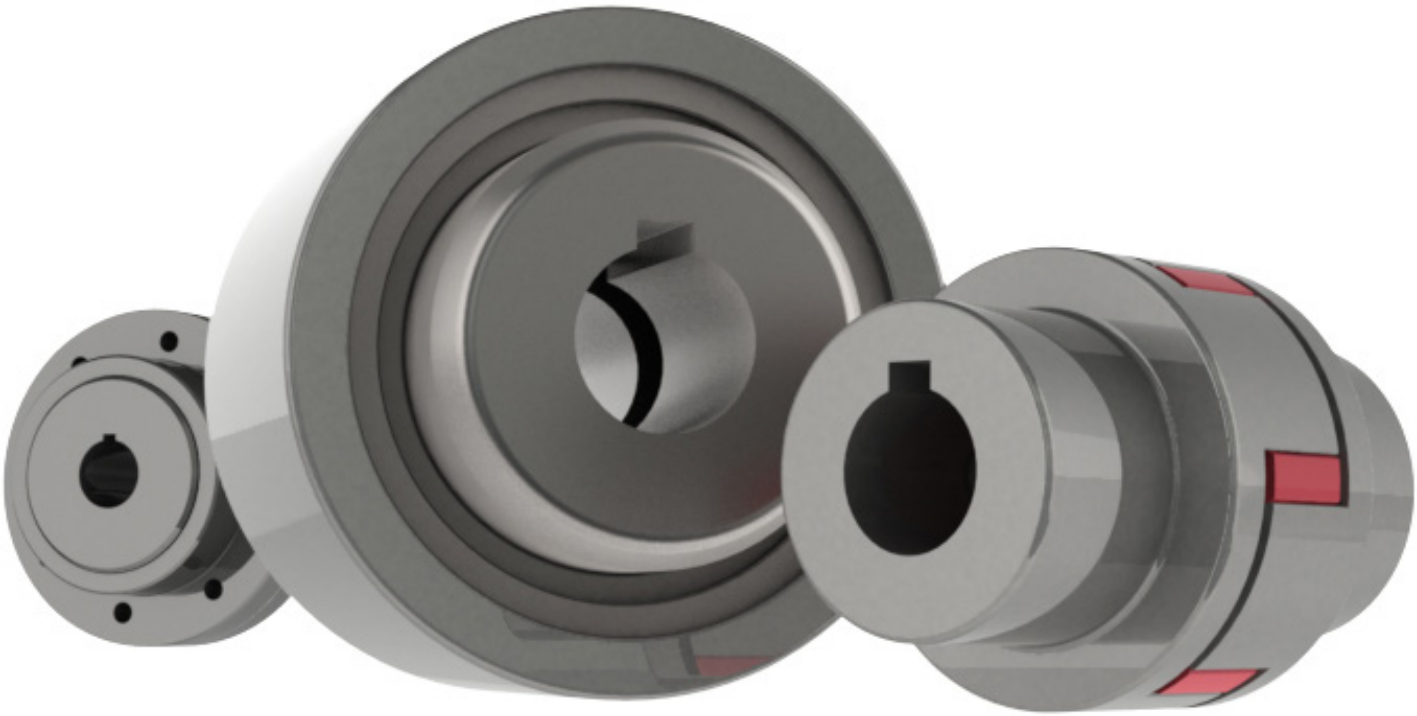


FRAME SIZE	SHAFT					FLANGE					MOTOR									
	D DA	E EA	DB	GA GC	F FA	M	N	P	S	T	AC	L	LB	LC	AD	AF	LL	V	R	ES
BN 63	11	23	M4	12.5	4	75	60	90	M5	2.5	121	272	249	297	122	98	133	14	96	5
BN 71	14	30	M5	16	5	85	70	105	M6		138	310	280	342	135			25	103	
BN 80	19	40	M6	21.5	6	100	105	120		3	156	346	306	388	146			41	129	
BN 90 S	24	50	M8	27	8	115	120	140	M8		176	409	359	461	149	110	165	39	129	6
BN 90 L															146				160	
BN 100	28	60	M10	31		130	110	160		3.5	195	458	398	521	158			62		
BN 112											219	484	424	547	173			73	199	
BN 132	38	80	M12	41	10	165	130	200	M10	4	258	603	523	686	210	140	188	46	204 (1)	

Note

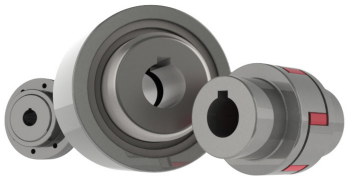
1. For FD07 high torque brake value R=226 (consult Power Jacks for more details).

FULL RANGE OF COUPLINGS AND DRIVE SHAFTS SO YOU CAN BUILD COMPLETE JACKING SYSTEMS.



Flexible Couplings

Selection of Coupling Type



The selection of coupling type depends on the installation and the type of misalignment. The three main types of misalignment encountered are:-

1. Angular Misalignment is usually present to some extent on all applications, typical values 1° - 2°. Sometimes higher values are necessary.
2. Parallel (Radial) Misalignment is also nearly always present. A well aligned installation might have values below 0.25 mm.
3. Axial Misalignment (End Float) sometimes caused by thermal expansion or as a result of machine design.

Other considerations include:

- Backlash Free Couplings are either one part couplings or have bolted joints. These are effective for precise positioning and to avoid wear on reversing drives.
- Torsional rigidity of couplings depends on the joining method. Types with rubber or plastic elements can be considered as torsionally soft and will have an amount of twist at rated torque.

Procedure:

1. Decide if the coupling should be torsionally soft or rigid.
2. Consider whether a small amount of backlash is acceptable.
3. Calculate the required coupling torque.
4. Make a provisional selection.
5. Check that the coupling's maximum speed is sufficient.
6. Check that the coupling's dimensions are acceptable.
7. Contact Power Jacks with your order or technical enquiry

Selection of Coupling Size:

$$\textbf{Coupling Torque, T(Nm)} = \frac{9550 * \text{Power Transmitted (kW)} * S}{\text{RPM}}$$

where S = Service Factor - dependant on drive conditions (refer to each coupling) Select the coupling which is rated above the calculated torque. If a brake is present in the system the coupling should be based on either the brake torque or the transmitted torque whichever is greater.

Note

1. Maximum misalignment values are extremes and should not be combined. As operating misalignment approaches the maximum, torque and power ratings should be reduced to maintain life.
2. Gear couplings accommodate parallel misalignment by converting it to angular misalignment at the gear meshes in the flexible halves of the coupling.
3. The maximum axial misalignment values apply when the coupling is aligned. If axial misalignment greater than the listed maximum is required, consult Power Jacks.
4. The inertia values includes shafts through the bores.
5. When ordering please quote the coupling size and type, specify the bore and keyway sizes, and advise if puller holes or set-screws are required.
6. For maximum performance, the actuators, shafts, Gearboxes and motor should be carefully aligned.
7. Imperial couplings on request.

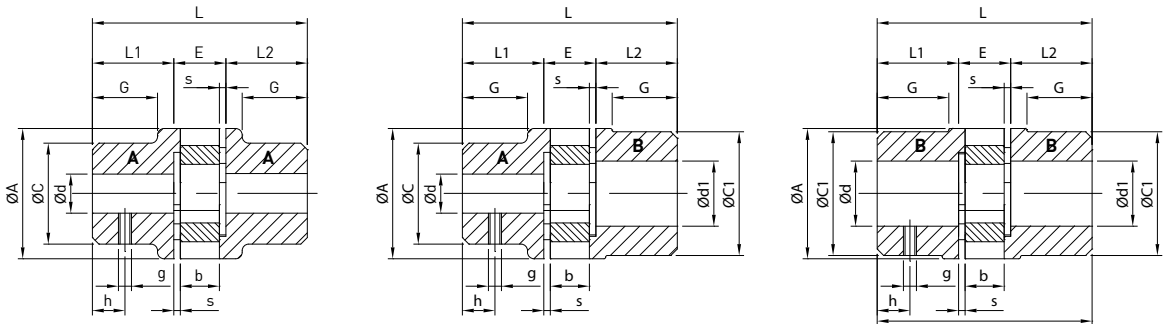
Keyways	Metric	Imperial
Standard Bores	B.S. 4500 1969 H7	B.S. 1916 Part 1 1953 K7
Standard Keyways	B.S. 4235 Part 1 1967 P9	B.S. 46 Part 1 1958

Jaw Type Flexible Coupling

- Curved jaw design.
- No need for lubrication.
- Quick and simple to install.
- Reliable, rugged and compact.
- Smooth, silent action.
- High power transmission density.
- 4 Standard spider types available.
- Elastomeric element resistant to heat (-40°C to +90°C), grease, oil and chemical agents.
- Hubs in aluminium and sintered iron.

Size		14	19/24	24/30	28/38	38/45	42/55	48/60	55/70	65/75	75/90	90/100	100/110
Torque (Nm)	Nominal, T_{kn}	P	10	35	95	190	265	310	375	425	975	2400	3300
	Max T_{kmax}	P	20	70	190	380	530	620	750	850	1950	4800	6600
	Vibrating T_{kw} (10Hz)	P	2.6	9	25	49	69	81	93	111	254	624	858
Misalignment Valves	Axial (mm)	P	1.2	1.4	1.5	1.8	2	2.1	2.2	2.6	3	3.4	3.8
	Angular (deg)	P	0.9	0.9	0.9	1	1	1.1	1.1	1.2	1.2	1.2	1.2
	Radial (mm)	P	0.2	0.22	0.25	0.28	0.32	0.36	0.38	0.42	0.48	0.5	0.52
Speed	Max (rpm)	P	14000	10600	8500	7100	6000	5600	4750	4250	3550	2800	2500

Note All couplings use 92 Shore elastomeric element (white) as standard. 80, 98 and 95 available on request.
Maximum torque must not be exceeded during start-up operation.
More accurate alignment will increase coupling life and reduce vibration. Dimensions "E" and "L" must be observed.
P = Consult Power Jacks for more details.



Type	Hub 'A'			Hub 'B'			Dimensions (mm)												
	Pre Bore	Min Bore	Max Bore	Pre Bore	Min Bore	Max Bore	A	C	C1	L	L1& L2	E	s	b	G	F	g	h	Weight kg
Aluminium Hub Couplings																			
19/24	6	6	19	18	20	24	40	31	38	66	25	16	2	12	20	18	M5	10	0.11
24/30	6	8	24	22	25	30	55	39	48	78	30	18	2	14	24	27	M5	10	0.24
28/38	9	10	28	26	30	38	65	46	61	90	35	20	2.5	15	28	30	M6	15	0.42
38/45	12	14	38	36	40	45	80	64	75	114	45	24	3	18	38	38	M6	15	0.86
Cast Iron Hub Couplings																			
19/24	-	-	-	-	6	24	40	-	40	66	25	16	2	12	-	18	M5	10	0.34
24/30	-	-	-	-	8	32	55	-	55	78	30	18	2	14	-	27	M5	10	0.9
28/38	-	-	-	-	10	38	65	-	65	90	35	20	2.5	15	-	30	M6	15	1.5
38/45	-	14	38	-	40	45	80	66	78	114	45	24	3	18	37	38	M8	15	2.35
42/55	-	16	42	-	45	55	95	75	93	126	50	26	3	20	40	46	M8	20	3.55
48/60	-	19	48	-	50	60	105	85	103	140	56	28	3.5	21	45	51	M8	20	4.85
55/70	-	22	55	53	60	70	120	98	118	160	65	30	4	22	52	60	M10	20	7.4
65/75	-	25	65	63	70	75	135	115	133	185	75	35	4.5	26	61	68	M10	20	10.8
75/90	-	30	75	73	80	90	160	135	158	210	85	40	5	30	69	80	M10	25	17.7
90/100	-	-	-	-	45	100	200	-	170	245	100	45	5.5	34	81	100	M10	25	29.6
100/110	-	-	-	-	45	110	225	-	180	270	110	50	6	38	89	113	M12	30	39

Note Weight of min. bored coupling with standard A/B hub combination. All couplings metric bored and keyed as standard.
Consult Power Jacks for standard bore sizes and specials.

Service Factor S = Ft * Fz * Fs

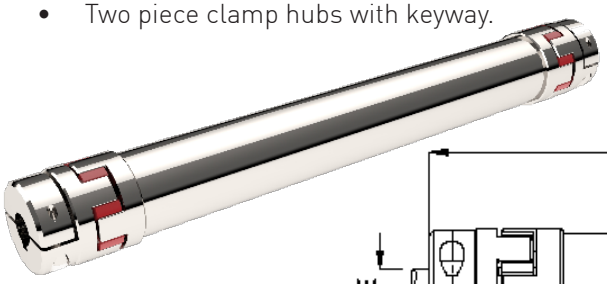
Temperature (°C)	-30°C to +30°C	40°C	60°C	80°C
Temperature Factor (Ft)	1	1.2	1.4	1.8

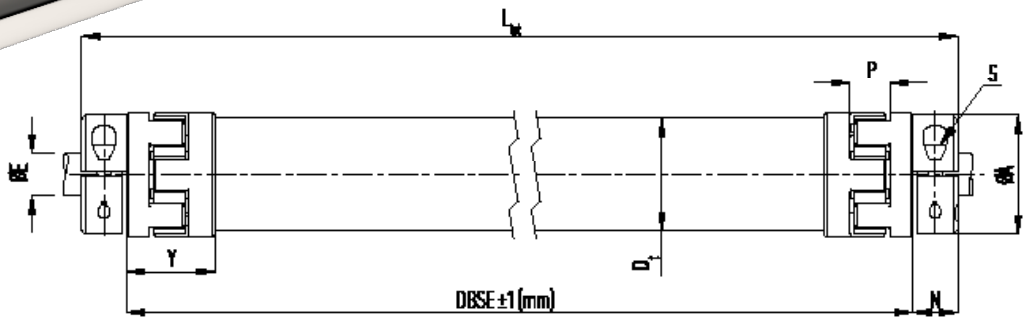
Starts/Day	0 to 10	101 to 200	201 to 400	401 to 800
Temperature Factor (Ft)	1	1.2	1.4	1.8

Shock Type	None	Light	Medium	High
Shock Factor (Fs)	1	1.2	1.8	2.5

Flexible Spacer Couplings (Self-Supporting Drive Shafts)

- Compact, light, robust, long service life.
- Split coupling hubs allow shaft installation after main system components in place. Also allows easy replacement.
- Two identical hubs and one flexible element.
- Hubs of high strength Aluminium.
- Two piece clamp hubs with keyway.
- Compensates for axial, radial and angular misalignment.
- Spider inserts made of "92 Shore A" or "98 Shore A" Polyurethane as standard. "86 Shore D" available on request.
- Operating temperature range: -30°C to +90°C as standard

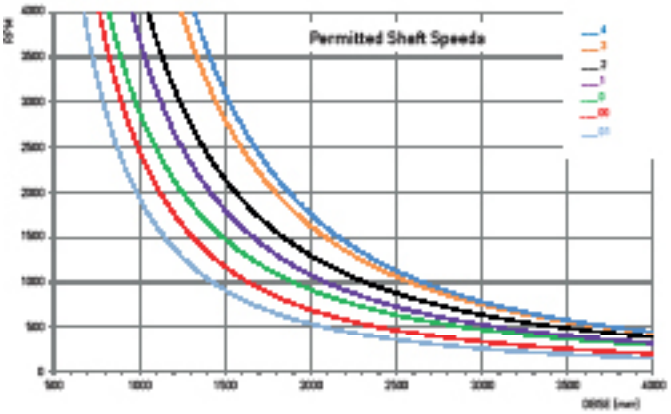




Coupling Performance and Dimensions

Size	Torque[3] (Nm) 92 Sh-A	Torque[3] (Nm) 98 Sh-A	A	ØE (H7)		N	P	Y	ØD$_t$	Spacer		Weight			DBSE min (mm)	Clamp Hubs	
				Min	Max					Inertia[1]	Rigidity[2]	Hub (kg)	Spider (kg)	Weight (kg/m)		S	Tightening Torque (Nm)
01 (14)	7.5	12.5	30	6	15	14	12	20.5	30	0.162	1552	0.02	0.005	1.06	58	M4	3.1
00 (19)	10	17	40	8	20	19	16	30.5	35	0.273	2650	0.07	0.009	1.27	95	M5	6.2
0 (24)	35	60	55	10	30	22	18	37.5	50	0.917	8800	0.13	0.020	1.91	113	M6	10.5
1 (28)	95	160	65	14	35	25	20	41	60	2.184	21150	0.26	0.030	3.34	131	M8	25
2 (38)	190	325	80	15	45	34	24	46	70	4.341	42400	0.46	0.060	5.09	161	M8	25
3 (42)	265	450	95	20	50	39	26	49	80	7.418	66850	0.68	0.098	5.94	170	M10	46
4 (48)	310	525	105	25	60	46	28	49	90	11.021	99300	1.00	0.105	6.78	170	M12	80

Size	Torque Transmitted (Nm) Corresponding to Ø Finished Bore Size (mm)																											
	6	8	9	10	11	12	14	15	16	18	19	20	22	24	25	28	30	32	35	38	40	42	45	48	50	55	60	
01 (14)	6	8	9	10	11	12	14	15	16*																			
00 (19)		14	16	17	19	21	24	26	28	31	33	35	33*	36*														
0 (24)				20	22	24	28	30	32	36	38	40	44	48	50	57	61											
1 (28)							55	59	63	71	75	79	86	94	98	110	118	126	137	128*								
2 (38)								59	63	71	75	79	86	94	98	110	118	126	137	149	157	165	177					
3 (42)												121	133	146	152	170	182	194	212	230	243	255	273	291	303			
4 (48)															217	243	260	277	303	329	346	364	390	416	433	476	520	



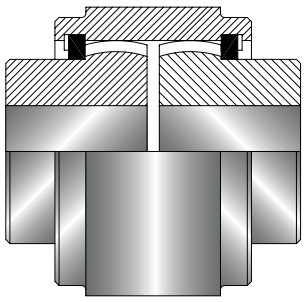
Note

1. Inertia values 10^{-3} kgm^2/m (with max bore)
2. Rigidity values Nm/(Rad.m)
3. Nominal Transmittable Torque Values.
4. Max (Peak) Torque = 2 x Nominal Torque
5. Total Weight (with min bore) = (2xHub Weight) + (Spacer Weight x (DBSE-2Y))
6. Total Length (L_{tot}) = DBSE+(2xN)
7. *On Request
8. All dimension in millimetres unless otherwise stated.
9. Designs subject to change without notice.

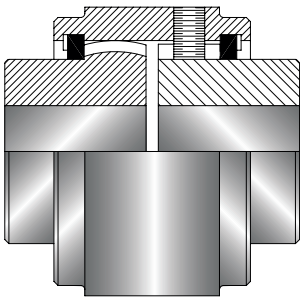
Steel Gear Couplings

Continuous Sleeve Steel Gear Coupling

- Vari-crown tooth form for improved torque transmission and longer life.
- Strong compact design.
- High transmittable torque ratings.
- Low inertia and high maximum speeds.
- Steel reinforced high misalignment seals.
- Spacer couplings available on request.



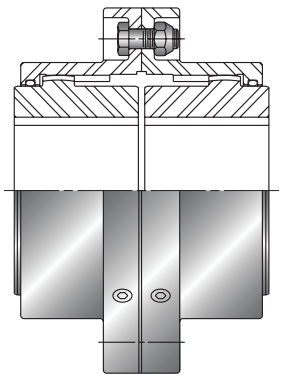
Full-Flex Gear Coupling
Two flexible hubs and sleeve assembly. Accommodates angular, parallel and axial misalignments.



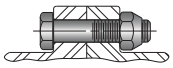
Flex-Rigid Gear Coupling
Flexible and rigid hub assembly. The flexible hub is standard and the rigid hub is splined into the sleeve. Accommodates angular and axial misalignment only.

Flanged Sleeve Steel Gear Coupling

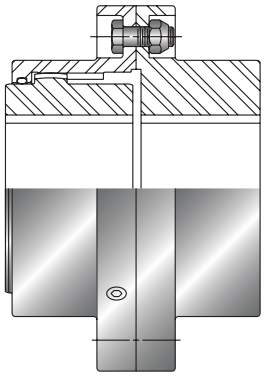
- High transmittable torque ratings and high maximum speeds.
- Accommodates angular, parallel and axial misalignment.
- Strong forged steel hubs and sleeves
- Vari-crown tooth from improved torque transmission and longer life.
- Several mounting options available by reversing th hubs.
- Spacer gear couplings available. Consult Power Jacks



Full-Flex Gear Coupling
Two flexible hubs and sleeve assembly. Accommodates angular, parallel and axial misalignments.



Exposed bolt design also available.



Flex-Rigid Gear Coupling
Flexible and rigid hub assembly. Accommodates angular and axial misalignment only.

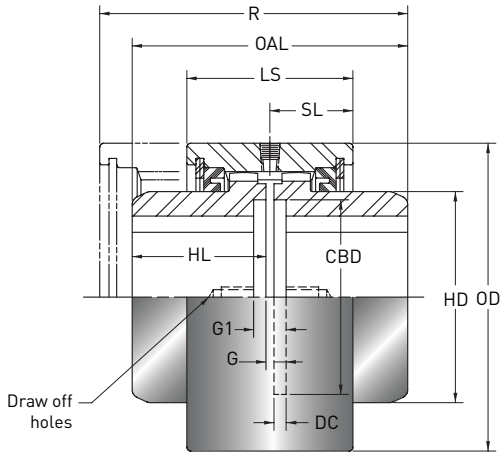
Service Factors for Gear Couplings

Nature of Load on Unit	Uniform	Light Shock	Medium Shock	Heavy Shock
Service Factor, S	1.0	1.25	1.5	2.0

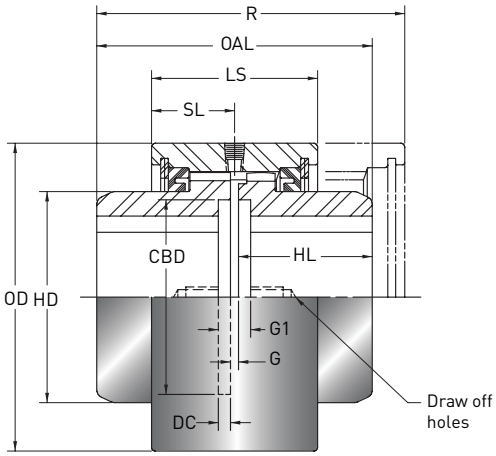
Note

1. All dimensions in millimetres.
2. These couplings are designed for grease lubrication. A list of suggested lubricants and quantities is detailed in the installation manual supplied with each full coupling.
3. Where a coupling is exposed to sustained temperatures above 100°C (212°F) a coupling with high temperature seals must be used, consult Power Jacks Ltd.

Steel Gear Couplings - Continuous Sleeve



Full-Flex Gear Coupling



Flex-Rigid Gear Coupling

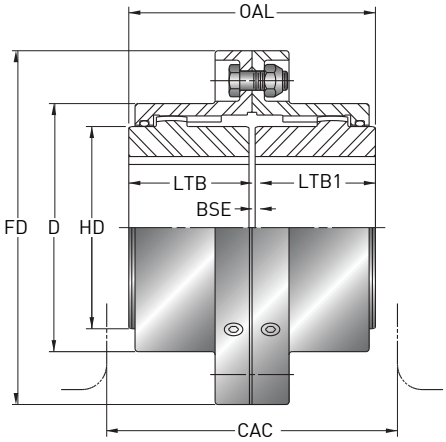
Coupling Size and Type		Full-Flex	CFF022	CFF038	CFF050	CFF065	CFF075	CFF090	CFF100	CFF115
		Flex-Rigid	CFR022	CFR038	CFR050	CFR065	CFR075	CFR090	CFR100	CFR115
Rated Torque (Nm)			285	854	2278	3417	5695	9967	14238	20787
Rated Power (kW/100 rpm)			3	8.9	23.8	35.8	59.6	104.4	149	217.7
Maximum Speed Unbalanced * (rpm)			6000	5000	4200	3750	3000	2800	2400	2200
Full Flex	Maximum Misalignment	Parallel	0.13	0.18	0.18	0.25	0.30	0.30	0.18	0.18
		Angular	1°	1°	1°	1°	1°	1°	1°	1°
		Axial (+/-)	0.3	0.3	0.3	0.6	0.6	0.6	0.6	0.6
Flex Rigid	Maximum Misalignment	Parallel	0.5°	0.5°	0.5°	0.5°	0.5°	0.5°	0.5°	0.5°
		Angular	0.3	0.3	0.3	0.6	0.6	0.6	0.6	0.6
Inertia		(kg m^2)	0.002	0.004	0.010	0.022	0.053	0.112	0.225	0.376
Weight (Rough Bore)		(kg)	2.3	3.6	5.9	9.1	15	29	41	57
Maximum	Bore		31	42	56	70	84	97	111	130
	Keyway	(b x h)	8 x7	12 x 8	16 x 10	20 x 12	22 x 14	28 x 16	28 x 16	32 x 18
Rough Bore			11	15	18	22	30	32	44	60
DD			84	95	121	140	168	191	222	241
HD			51	60	83	100	121	137	159	184
HL			38	46	52	57	67	108	111	127
G			3	3	3	6	6	6	6	6
G1			10	13	13	19	19	19	19	19
OAL			80	95	108	121	140	222	229	260
R			95	117	124	145	175	235	241	264
LS			51	64	65	78	95	102	118	124
DC			3	5	5	6	6	6	6	6
CBD			49	57	76	95	121	140	165	184
SL			25	32	33	39	48	51	59	62

Note *Balanced speed approximately 3 times higher. Draw off holes are optional, consult Power Jacks.
All dimensions in millimetres.

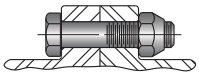
Note

1. Dimension 'R 'and 'CAC' are the clearance required to align the coupling when installing.

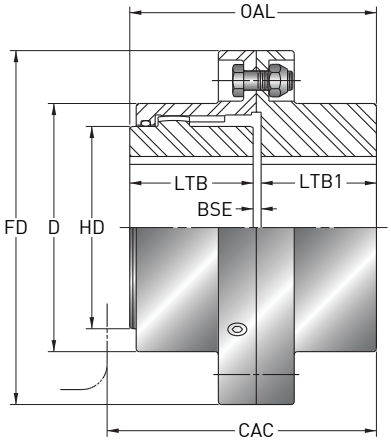
Steel Gear Couplings - Flanged Sleeve



Full-Flex Gear Coupling



Exposed bolt design also available.



Flex-Rigid Gear Coupling

Coupling Size and Type			Full-Flex	FFF022	FFF038	FFF050	FFF065	FFF075	FFF090	FFF100
			Full-Rigid	FFR022	FFR038	FFR050	FFR065	FFR075	FFR090	FFR100
Rated Torque (Nm)				859	2136	3560	6407	10679	17086	24917
Rated Power (kW/100 rpm)				8.9	22.3	37.3	67.1	111.9	179	261
Maximum Speed Unbalanced * (rpm)				6000	5500	5000	4400	4000	3500	3000
Full Flex	Maximum Misalignment		Parallel	1.4	1.5	2.2	2.7	2.9	3.3	3.8
			Angular	3°	3°	3°	3°	3°	3°	3°
			Axial (per hub)	1.5	1.5	1.5	2.2	2.2	2.2	3.3
Full Rigid	Maximum Misalignment		Angular	1.5°	1.5°	1.5°	1.5°	1.5°	1.5°	1.5°
			Axial (per hub)	1.5	1.5	1.5	2.2	2.2	2.2	3.3
Inertia (kg m^2)			Full Flex	0.006	0.019	0.044	0.100	0.192	0.435	0.80
			Flex Rigid	0.006	0.020	0.044	0.106	0.203	0.446	0.831
Weight (Rough Bore) (kg)			Full Flex	4	9	15	25	36	59	86
			Flex Rigid	4	8	15	25	39	61	89
Maximum (Flexible Ends)	Bore			42	56	73	88	107	124	147
	Keyway	(b x h)		12 x 8	16 x 10	20 x 12	25 x 14	28 x 16	32 x 18	36 x 20
Maximum (Rigid Ends)	Bore			56	76	95	114	134	150	176
	Keyway	(b x h)		16 x 10	20 x 12	25 x 14	32 x 18	36 x 20	36 x 20	45 x 25
Rough Bore			FFF	11	18	24	22	37	46	62
			FFR	Solid with Centre						
OAL				89	102	127	159	187	219	248
FD				116	152	178	213	240	279	318
D				78	101	125	150	176	201	235
HD				59	76	102	118	143	165	191
LBT				43	49	62	77	91	106	121
LTB 1				40	47	58	74	87	101	113
BSE			FFF	3	3	3	5	5	6	6
			FFR	4	4	4	5	5	6	8
OAL			FFF	89	102	127	159	187	219	248
			FFR	87	100	124	156	183	213	241
CAC			FFF	106	121	152	181	207	238	260
			FFR	95	109	137	167	192	222	248
Flange Thickness per Hub				14	19	19	22.5	22.5	29	29

Note *Balanced speed approximately 3 times higher. Draw off holes are optional, consult Power Jacks.
All dimensions in millimetres.

Solid Drive Shafts



There are three standard drive shaft sizes offered by Power Jacks with ends machined to suit screw jack system couplings however drive shafts can be supplied to customer sizes with specific end designs

Standard Drive Shafts	Rated Torque (Nm)	Rated Angle of Twist per Metre (Degrees)
20mm Diameter	85	4
30mm Diameter	285	2.6
40mm Diameter	675	2

Note

1. For other drive shaft types and sizes consult Power Jacks Ltd.
2. For detailed analysis consult Power Jacks Ltd.
3. Dimensions subject to change without notice.

Select Drive Shaft Diameter

Select a standard drive shaft from the drive shaft table and check its torque rating and angle of twist rating against the application requirements.

If Transmitted Torque (Nm) < Maximum Drive Shaft Torque (Nm)
&
If Acceptable Angle of Twist (Deg.) for shaft length < Rated Angle of Twist for Drive Shaft (Deg.)
Then drive shaft diameter selected is acceptable.

Shaft Check Drive Shaft Critical Speed

For the unsupported shaft length calculate the drive shaft critical speed for the support conditions required.
If Shaft Speed (rpm) < Drive Shaft Critical Speed (rpm) then drive shaft selection and configuration is acceptable.

Plummer Block Selection

If the drive shaft selected is not suitable due to the critical speed reduce the unsupported drive shaft length using plummer blocks. e.g. one plummer block at each end of the drive shaft and one in the middle, reducing the unsupported length to half the total drive shaft length.
Select a plummer block from the table relating to the appropriate shaft diameter size.
Re-calculate the critical speed for the new unsupported length and check for acceptability.
If space constraints restrict the number of plummer blocks and the drive shaft fails on the critical speed try increasing the shaft diameter to the next size up or consult Power Jacks for detailed analysis.

Note

1. For other shaft and plummer block sizes and styles consult Power Jacks Ltd.
2. For detailed shaft analysis and selection consult Power Jacks Ltd.

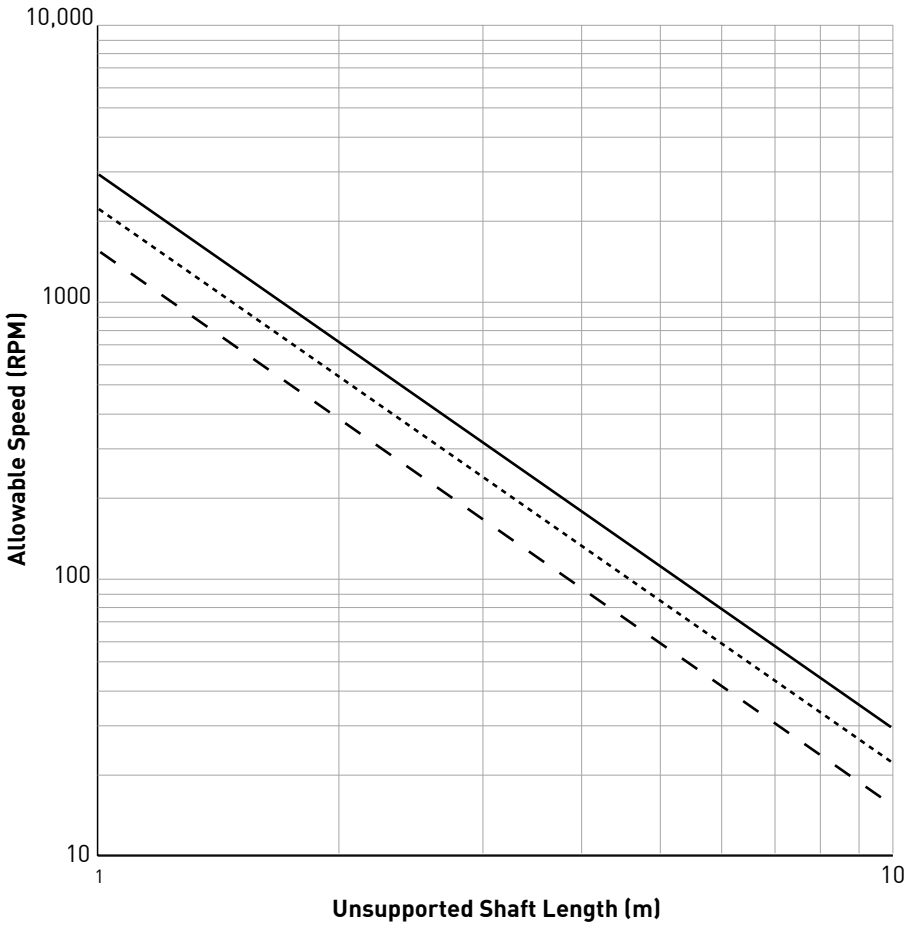
Solid Drive Shafts

Drive Shaft Critical Speed Factors, F_{dcs}



$$\text{Allowable Drive Shaft Speed (rpm)} = \frac{\text{Critical Speed (rpm) for}}{\text{Unsupported Length "L" (from chart below)}} \times F_{dcs}$$

Drive Shaft Critical Speed Graph
(Shaft Whirling)

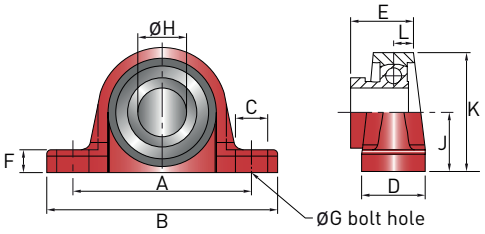


Based on simply supported both ends and 70% of the critical speed.
(The factor of safety allows for couplings and slight misalignment)

20mm Diameter 30 mm Diameter 40 mm Diameter

Plummer Blocks

One Piece Housing Plummer Block



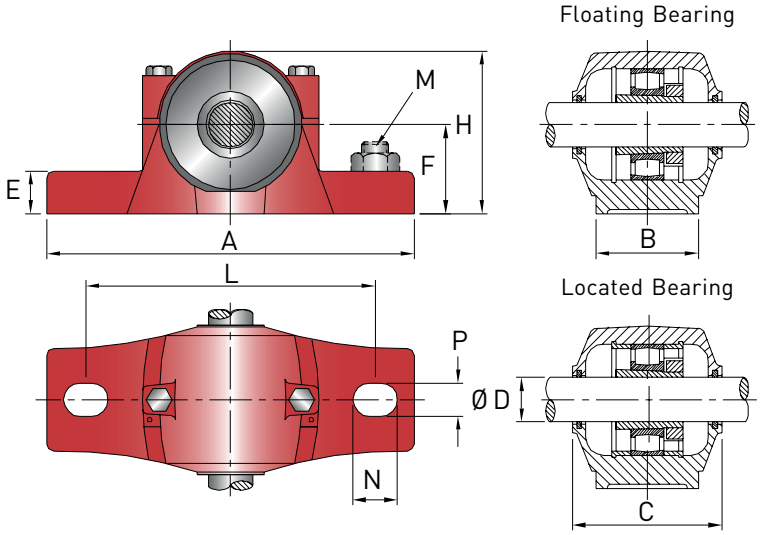
Model	A	B	C	D	E	F	G	H	J	K	L	Weight (kg)
PB1-20	96	127	20.5	32	34	14	10	20	33.33	65	10.5	0.6
PB1-30	121	152	23.5	40	39.2	17	12	30	42.9	82.5	12.5	1.1
PB1-40	136	175	24.5	48	47.7	19	12	40	49.2	99	15	1.9
PB1-50	159	203	26	54	49.7	22	16	50	57.2	115	17	2.8
PB1-60	186	240	29.5	60	60.5	26.5	16	60	69.9	138	21	4.5

Note

1. All dimensions in mm.
2. Bore diameter tolerances: (H6+H7)/2.
3. Material: Cast Iron housing with eccentric locking ring.
4. Dimensions are subject to change without notice.
5. For other styles and sizes of Plummer Blocks consult Power Jacks Ltd.

Split Housing Plummer Block

Plummer blocks are to DIN736 with anti-friction bearings with tapered bores and adapter sleeve. The housings are made of cast iron and are sealed with felt strips on both sides. The housings are designed to allow floating or located bearings (bearing position set with one or two locating rings). It is recommended when arranging drive systems only one plummer block with located bearing is used in one drive line, to avoid distortion of the drive.

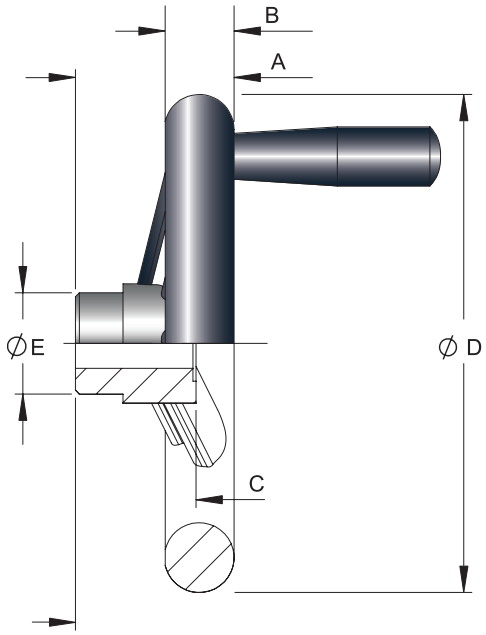


Model	ØD	A	B	C	E	F	H	L	M	N	P	Weight (kg)
PB-20	20	165	46	67	19	40	72	130	M12	20	15	1.4
PB-30	30	185	52	80	22	50	92	150	M12	20	15	2
PB-40	40	205	60	82	25	60	109	170	M12	20	15	2.9

Note

1. All dimensions in mm.
2. For other styles and sizes of Plummer Blocks consult Power Jacks Ltd.
3. Dimensions are subject to change without notice.

Hand Wheels

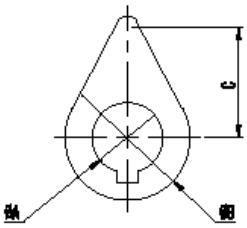


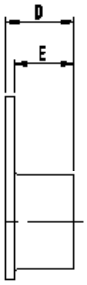
Model	A	B	C	D	E	H7 Bore
HW 005	40	14	36	98	24	Ø10
HW 010	50	22	38	157	32	Ø14
HW 025	56	24	43	198	40	Ø16
HW 050	56	24	43	198	40	Ø19
HW 100	66	30	44	247	49	Ø25
HW 200	78	32	56	288	58	Ø28
HW 300	108	40	77	375	58	Ø35
HW 500	108	40	77	375	58	Ø40

Notes:
1. Material: Polished aluminium casting and rotating handle
2. Bored and keyed to BS4235 Part 1
3. All dimensions in millimetres unless otherwise stated
4. Other types of hand wheels are available on request. Consult Power Jacks.

Rotation Indicators



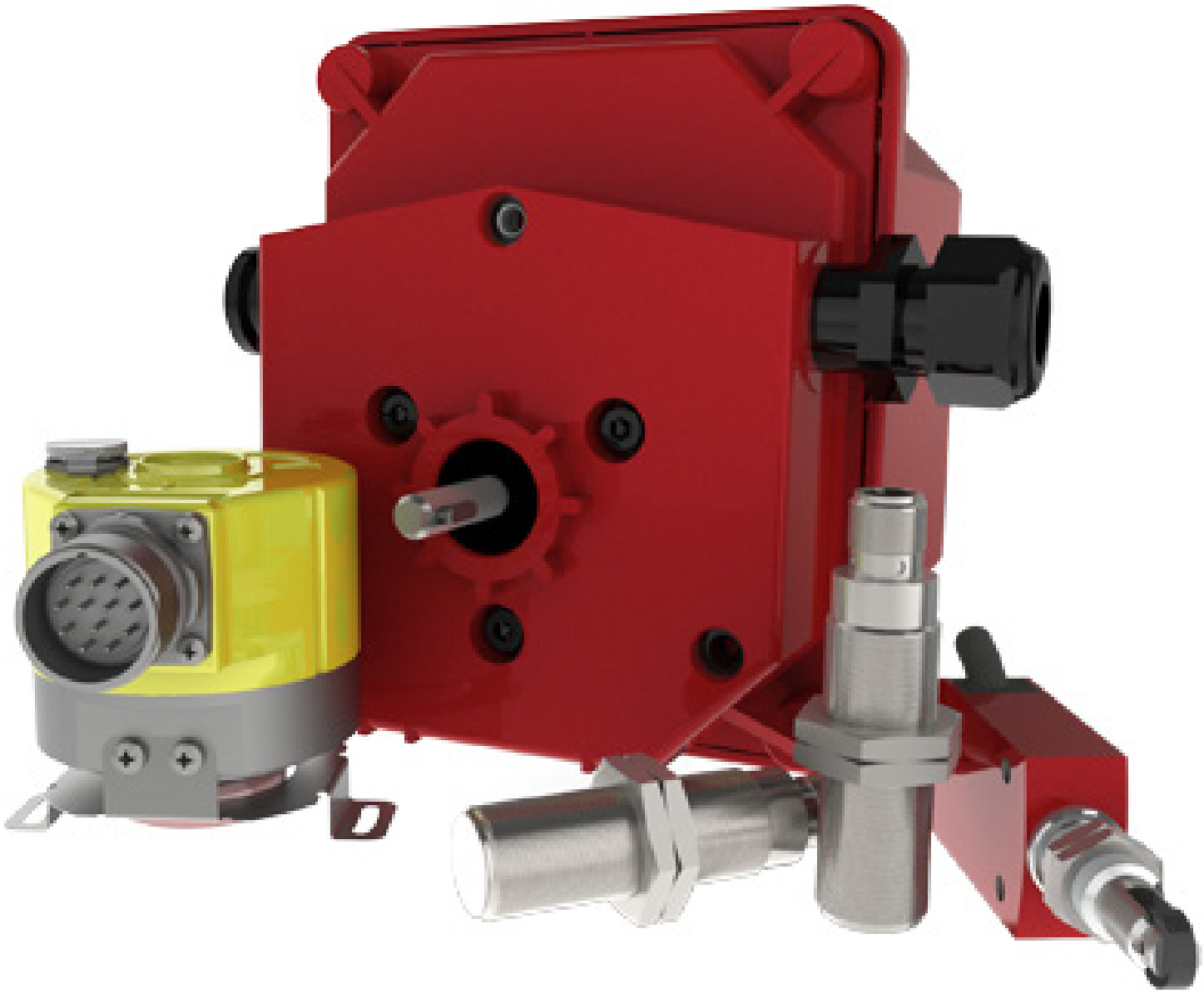




Model	ØA	ØB	C	D	E
RI 010	14	25	20	14	13
RI 025	16	29	26	16	14
RI 050	19	32	27	16	14
RI 100	25	50	40	21	19
RI 200	28	50	45	25	22

Notes:
1. Rotation Indicators RI010, RI025, RI050, RI100, RI200 are suitable for fitment to screw jack worm shafts with the corresponding bore size.
2. Material: Composite Plastic
3. Bored (H7) and keyed to BS4235 Part 1
4. All dimensions in millimetres unless otherwise stated
5. Other types of rotation indicators are available on request. Consult Power Jacks.

OUR RANGE OF MOTION CONTROL DEVICES ALLOWS YOU TO SAFEGUARD THE OPERATION OF YOUR SCREW JACK SYSTEM AND ENSURES IT OPERATES WITHIN THE SPECIFIED PARAMETERS



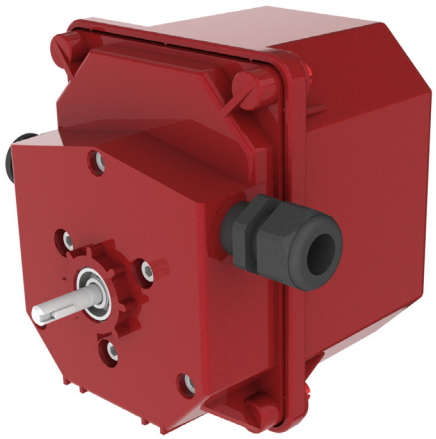
RLS-51 Geared Cam Limit Switches

Rotary CAM Limit Switches allow a set of limit switches to be fitted to translating o rotating screw jacks by mounting them directly to the screw jacks worm shaft or in-directly via connecting shafts or gearboxes linking to the screw jacks worm shaft. These limit switches are fully adjustable for position over the entire length of the screw jacks stroke. RLS-51 limit switch features include:-

- Usable revolutions from 4.1 to 16,000
- 2 to 8 position limit switch units
- Enclosure IP66 as standard
- Mounting options for B5 Flange, B14 Face and B3 Foot mounted
- Available in three voltages 250V AC, 24V DC & 80V DC
- Modular design to allow a variety of options
- Operating Temperature: -40°C to +80°C

Illustrated Examples

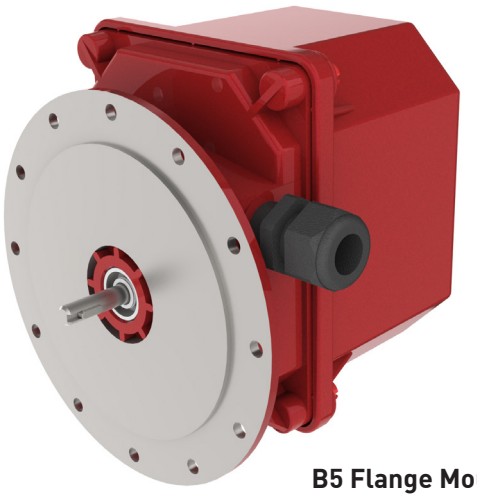
All units shown are of the 2 limit switch type.



B14 Face Mount



B3 Foot Mount



B5 Flange Mount

RLS-51 Features

The RLS-51 geared cam limit switches are universal mechanical switching devices that have been designed for use in conjunction with cam discs based on a specific angle of rotation for indication of a large number of shaft revolutions. These cam discs serve to operate mechanical contacts.

Design features include:-

Low friction planetary gearing with irreversible, self-locking worm adjustment of the cam discs.

Fixed cam adjustment in the housing. The adjusting worms of the cam discs are arranged so that they can be accessed from the same direction as the contact connections for optimal accessibility in confined conditions. Adjustment is possible during operation. The simplicity and accuracy of the cam adjustment is unsurpassed.

Block adjustment of all switching contacts jointly is made possible by a single adjusting worm (black) without the switching points of the individual switching contacts being altered with respect to each other.

Large cam disc diameter for good adjustability and high switching point repeat accuracy.

Reinforced polycarbonate housing as standard with IP66 protection and a wide operating temperature range.

Modular design allows adaptation to suit individual requirements via intermediate pieces.

Options

- Position indicating plate for block adjustment.
- Potentiometer feedback drives (2 available) to suit single and multi-turn potentiometers
- Pulse transmitter with 50 pulses per revolution.
- Anti-condensation heater to prevent condensation and excessively low temperatures in the switches.
- Motor driven contact block adjuster.
- Mounting for encoders (incremental or absolute).
- Extended drive shaft for feedback devices.
- Aluminium housing for harsh environments and the fitment of large and heavy encoders, IP65 enclosure.
- Cam discs with a 40° cam angle can be provided at no extra cost. Other angles can be manufactured at extra cost on request.
- Stage technology tested unit can be provided to V8G 70 with test certificates.

RLS-51 Performance

Gear size	Usable rev's. selected	Usable rev's. theoretical with 15° cam disc's	Gear Ratio	Input/output stage	No of interim stages	1 rev. of the drive shaft - corresp. to an ang. motion of cam disc = °	Change - over contact reset rev. at driving shaft	max drive speed (rpm)	min drive shaft speed (only for change - over contact)
1	4.1	4.16	4.285	-	1 x 4.285	84	0.00714	1000	0.67
	6.5	6.88	7.083	1.653	1 x 4.285	50.8	0.0118	1200	1.1
	11	11.23	11.56	2.698	1 x 4.285	31.14	0.0193	1500	1.8
2	17.5	17.84	18.361	-	2 x 4.285	19.6	0.0306	1800	2.9
	29.0	29.5	30.35	1.653	2 x 4.285	11.86	0.0505	1800	4.7
	48	48.13	49.538	2.698	2 x 4.285	7.27	0.0825	1800	7.7
3	75	76.45	78.678	-	3 x 4.285	4.57	0.131	1800	12.2
	125	126.39	130.054	1.653	3 x 4.285	2.77	0.2166	1800	20.2
	205	206.26	212.272	2.698	3 x 4.285	1.69	0.3536	1800	33
4	323	327.6	337.135	-	4 x 4.285	1.06	0.5616	1800	52
	540	541.5	557.284	1.653	4 x 4.285	0.65	0.9284	18 00	87
	880	883.8	909.59	2.698	4 x 4.285	0.4	1.515	1800	141
5	1384	1403.7	1444.62	-	5 x 4.285	0.25	2.406	1800	224
	2288	2320.2	2387.96	1.653	5 x 4.285	0.15	3.978	1800	371
	3735	3787.1	3897.58	2.698	5 x 4.285	0.09	6.493	1800	606
6	5900	6014.77	6190.204	-	6 x 4.285	0.06	10.313	1800	*
	9800	9942.2	10232.407	1.653	6 x 4.285	0.04	17.047	1800	*
	16000	16227.6	16701.17	2.698	6 x 4.285	0.02	27.824	1800	*

*__Caution!__ Due to the slow actuation speed of the switching contacts caused by the high gear reductions, the change-over behaviour of the contacts is affected negatively. From gear size 6 it is therefore recommended to use only the normally - closed contacts of the switches. Before using analog feedback systems (eg. potentiometer) please consult our technical department.

Note: Maximum permissible relative humidity 60%

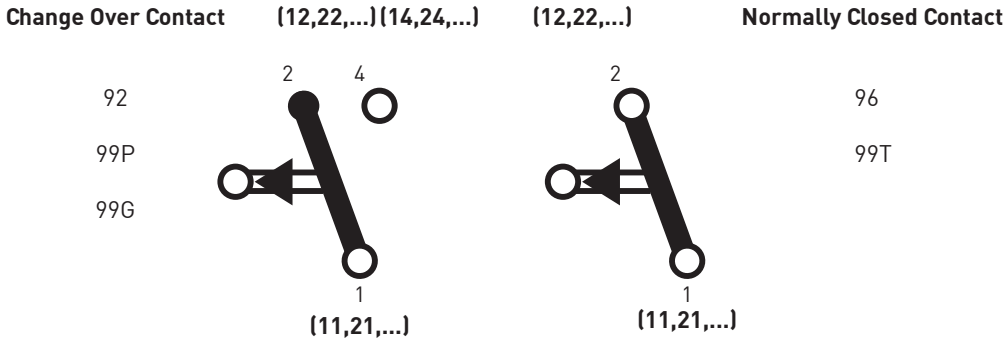
RLS-51 Switching Contacts

The contacts can either be connected through screw terminals for a cable cross section of 0.75mm² to 1.5mm² or through flat plugs 6.3 x 0.8mm or through a printed card with cage tension spring terminals for a cross section of 0.14 to 2.5mm². For contacts with flat - plug connection, insulated flat - plug receptacles must be used at voltages above 25V AC and 60V DC.

Contact Designation	Contact Type	Contact Material	Switch Actuation	Type of Connection	Electrical Data				Mechanical life in millions of switching operations
					AC - 15		DC - 13		
					A	V	A	V	
99[1]	Change-Over	Silver	Snap Action	Screw Terminal	1.5	230	0.5	60	10
99P[1]	Change-Over	Silver	Snap Action	Flat plug 6.3					
99G[1] [3]	Change-Over	Gold	Snap Action	Screw Terminal					
92[2]	Change-Over	Silver	Snap Action	Screw Terminal			-	-	
97[2] [3]	Change-Over	Gold	Snap Action	Screw Terminal					
96[2]	Normally Closed Contact	Silver	Push Action	Screw Terminal					
99T[4]							0.5	60	

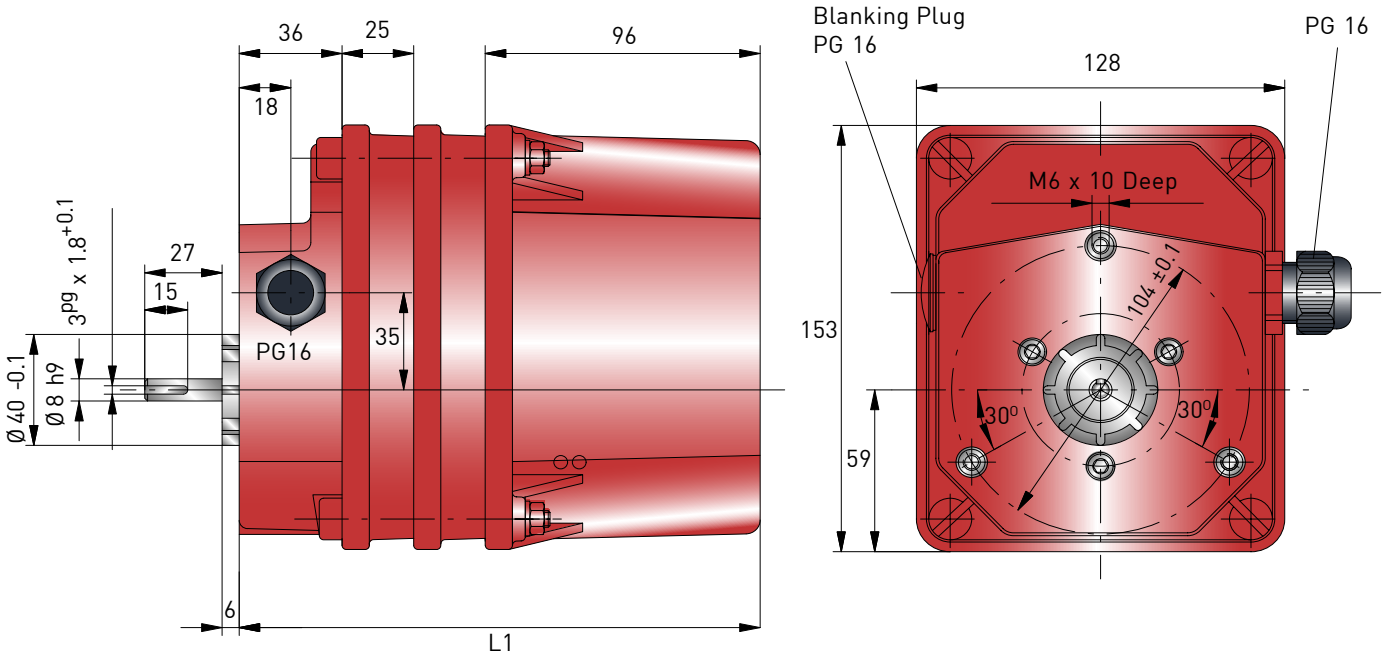
Note

1. Thermal permanent current Ith = 10A; Reference insulation voltage Ui = 250V at pollution degree 3
2. Thermal permanent current Ith = 6A; Reference insulation voltage Ui = 250V at pollution degree 3
3. Contacts 99G and 97 for PLC applications (gold contacts)
4. For screw terminal admissible cable cross section AWG 22 - 16
5. Positive opening to EN60947T5 - 1 & IEC947 - 5 - 1

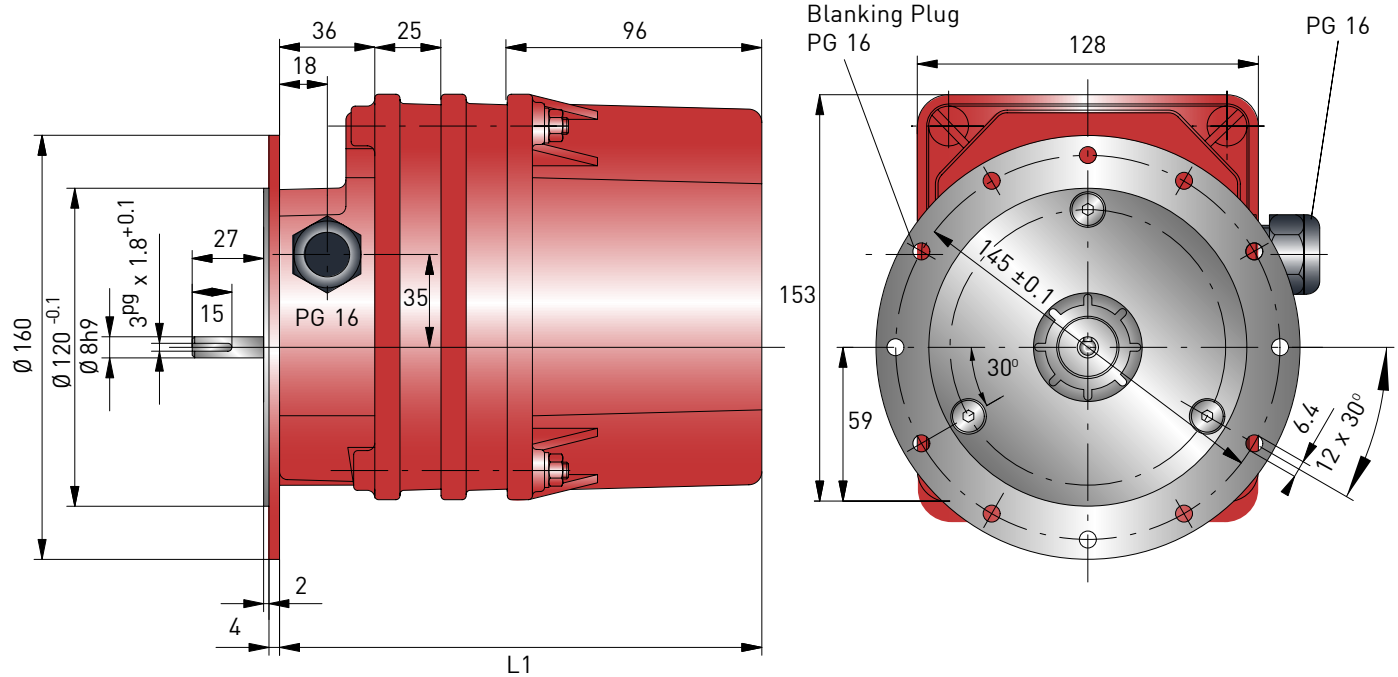


RLS-51 Dimensions

B14, Face Mount

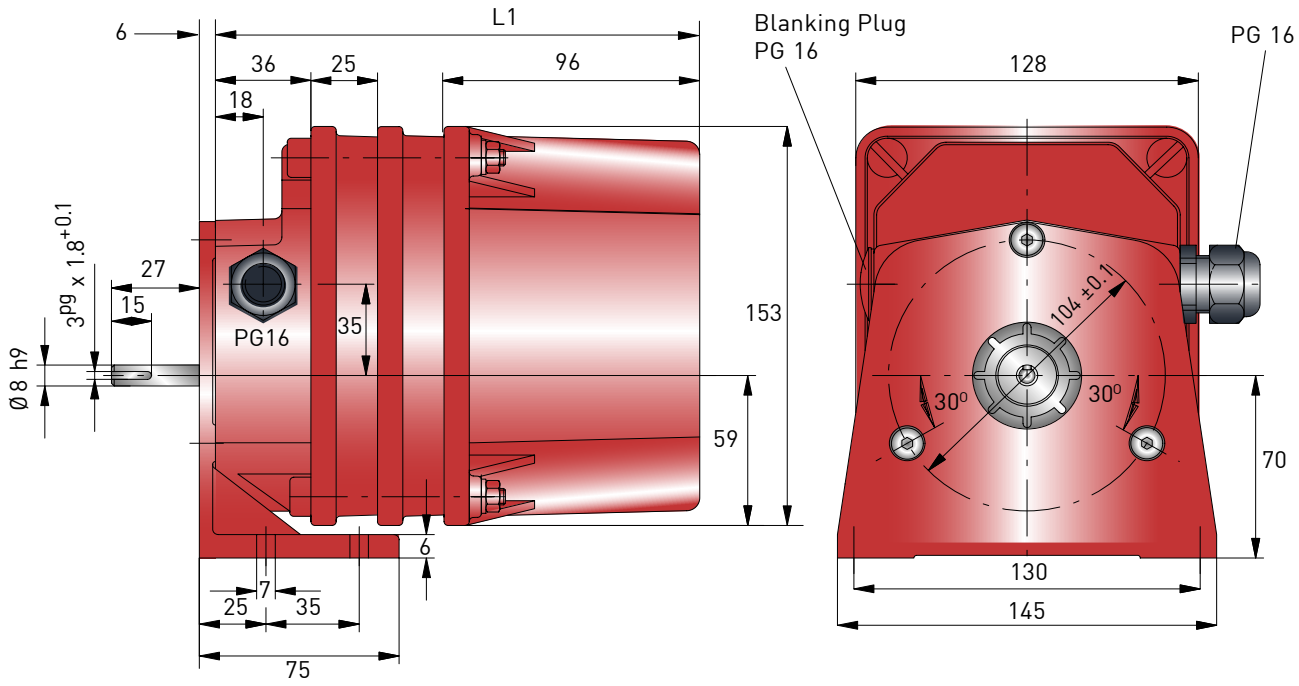


B5, Flange Mount



RLS-51 Dimensions

B3, Foot Mount



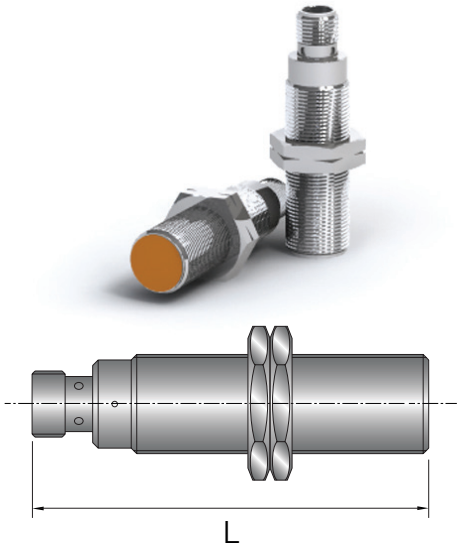
Features:
Housing made of glass fibre reinforced polycarbonate with IP66 degree of protection Modular design enables optimal space utilisation. Overall length can be extended as required with 25mm wide intermediate pieces.

Gear Size	Usable Revs	2 Contacts		4 Contacts		6 Contacts		8 Contacts	
		L1 (mm)	No of intermediate pieces	L1 (mm)	No of intermediate pieces	L1 (mm)	No of intermediate pieces	L1 (mm)	No of intermediate pieces
1	4.1 6.5 11	132	0	132	0	157	1	157	1
2	17.5 29 48	132	0	132	0	157	1	182	2
3	75 125 205	132	0	132	0	157	1	182	2
4	323 540 880	132	0	157	1	182	2	207	2
5	1384 2288 3735	132	0	157	1	182	2	207	3
6	5900 9800 16000	157	1	157	1	182	2	207	3

More than 8 contacts on request
Dimensions with more than 8 contacts and with special executions, eg. potentiometer, on request. For any further intermediate piece add 25mm to L1

Proximity Sensors

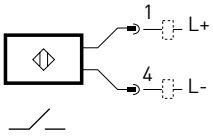
- Inductive Proximity Sensors.
- Non-contact, so no wearing parts.
- 2 Wire sensor for either Normally Closed (NC) or Normally Open (NO) switching.
- Long sensing range.
- Rugged one-piece Metal housing.
- Optical setting aid with 2 LED colour settings:-
  Red LED indicates just in sensing range.
  Yellow LED only indicates within 80% safe sensing range.
- M12 Plug in connection for fast change-ability.
- M12 sockets available straight or angled with 5 m cable.
- Full 360° visibility for switching with 4 yellow LED's at 90° offset.
- Flush face as standard, non-flush available.
- Housing plated brass, Stainless Steel available on request.
- Operating voltage 10 to 30 VDC.
- Enclosure IP67.
- Operating temperature -25°C to +70°C
- Other types available on request. Consult power Jacks.
- Ideal for screw jack end of travel limit switches.

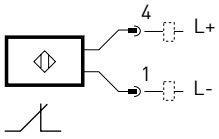


Sensor	M8	M12	M18	M30
Sensing Range (flush)	1mm	4mm	8mm	15mm
Overall Length, L	69mm	62mm	72mm	72mm

Model	M8	M12	M18	M30
Electrical Design	DC PNP/NPN			
Output	normally open/closed	normally open/closed programmable		
Operating Voltage (V)	5 to 36 VDC	10 to 36 VDC		
Current Rating (mA)	200mA	100 mA		400 mA
Minimum Load Current (mA)	4	4		
Short-circuit Protection	No	Pulsed		
Reverse Polarity Protection	No	Yes		
Overload Protection	No	Yes		
Voltage Drop (V)	< 4.6			
Leakage Current (mA)	< 0.8	< 1		< 0.5
Operating Distance (mm)	0 to 0.8	0 to 3.25	0 to 6.48	0 to 12.1
Switch-point Drift (%/Sr)	-10 to 10			
Hysteresis (%/Sr)	1 to 15	1 to 20		3 to 20
Switching Frequency (Hz)	2700	700	400	200
Correction Factors (approx.)				
Mild Steel	1	1	1	1
Stainless Steel	0.7	0.7	0.7	0.7
Brass	0.4	0.5	0.5	0.5
Aluminium	0.3	0.5	0.4	0.5
Copper	0.2	0.4	0.3	0.4
Function Display				
Switching Status LED	1 x yellow	yellow (4 x 90)		
Setting Aid LED	None	red		
Operating Temperature (°C)	-25 / +80	-25 / +70		
Protection	IP 67	IP 67	IP 67	IP 67
Housing Material	brass; special coated; CO-PC			brass white bronze coated; face CO-PC
Connection	M12 connector			



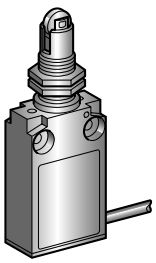




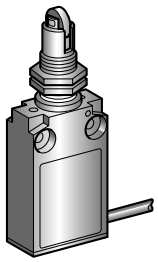
Compact Electro-Mechanical Contact Limit Switches

Compact Contact Limit Switch Overview

- Compact electro-mechanical limit switch.
- Sturdy metal enclosure
- Pre-cabled unit.
- High end enclosure protection IP67.
- Available with plug-in connector.
- Other sizes and actuation heads are available on request. Consult Power Jacks.
- Ideal for screw jack end of travel limit switches.

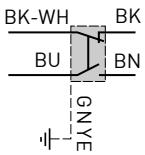


CLS-RPTL
(a)

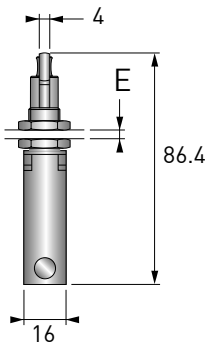


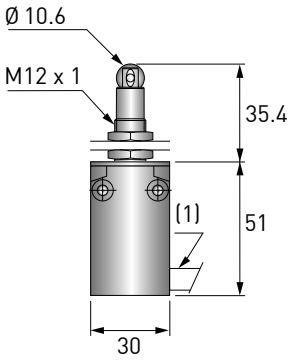
CLS-RPTT
(b)

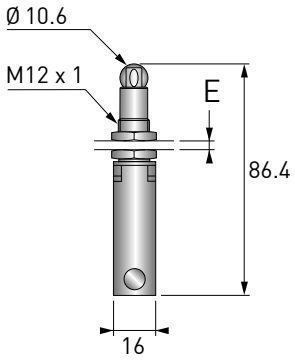
Item	Description
Housing	Metal, compact housing, totally enclosed and sealed
Pre-cabled	2m PVC cable 5 x 0.75mm² (other cable lengths available on request)
Switch type	Single pole, 1 change-over, snap action
Switch actuation	Steel Roller Plunger a Lateral Cam Approach CSL-RPTL b Travers Cam Approach CSL-RPTT
Max actuation speed	0.5 m/s
Mechanical durability	10 million operating cycles
Ambient temperature Operation Storage	 -25°C to +77 °C -40°C to +70 °C
Product conformity	IEC947-5-1
Enclosure	IP67
Operating characteristics	AC - 15; B300 (UE = 240V, Ie = 1.5A) DC - 13; R300 (UE = 240V, Ie = 0.1A)
Insulation voltage	Ui = 300V

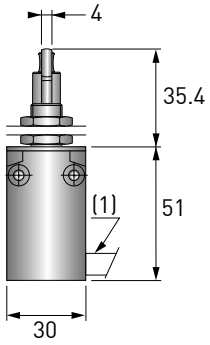


Compact Contact Limit Switch Dimensions









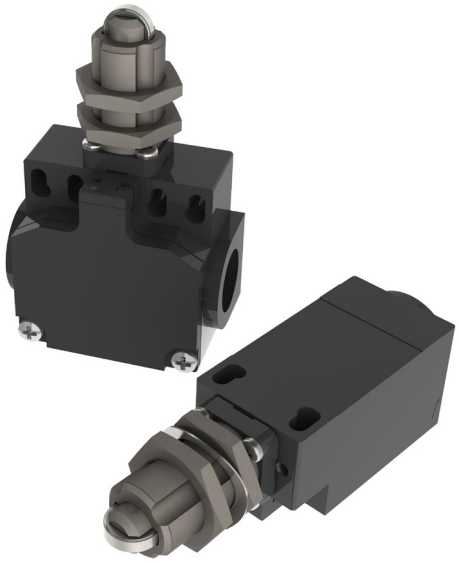
Note

1. All dimensions in mm unless otherwise stated.
2. Dimensions subject to change without notice.
3. For dimensions of other switches consult Power Jacks.
4. For a full switch data sheet consult Power Jacks.

E = 8 mm Max, Clearance Diameter Ø12.5 mm
(1) = Ø8 mm Cable

Safety Related Electro-Mechanical Contact Limit Switches

Safety Related Contact Limit Switch Overview



- Positive break Normally Closed contacts - will not stick or weld shut.
- Watertight design to IP67 washdown requirements.
- Rugged corrosion resistant housing tolerates hostile environments.
- Safety system approved.
- Thermoplastic enclosure. Double insulated.
- Snap action with positive-break Normally Closed contact, approved for use in safety systems.
- Alternative actuators heads are available on request. Consult Power Jacks.
- Actuator heads can be repositioned in steps 4 x 90°
- Good resistance to oil and petroleum spirit.
- Actuating force: Min. 9 N.
- Positive break force: 19 N.
- Actuating speed with actuating angle 30° to switch axis. Snap action: Min. 20 mm/min, max. 1 m/s.
- Cable entry: Long Body - 1 cable entry, at end. Short Body - 2 cable entries from sides.
- Ideal for screw jack end of travel limit switches.

Safety Related Contact Limit Switch Specification

Feature	Description
Standards	IEC/EN 60947-5-1; EN 1088; BG-GS-ET-15
Design	EN 50047
Enclosure material	Glass-fibre reinforced thermoplastic, self-extinguishing
Protection class	IP 67 to IEC/EN 60529/DIN VDE 0470-1
Contact material	Silver
Contact type	Change-over with double break Zb, NC contacts with positive break
Switching system	A IEC 60947-5-1; B BG-GS-ET-15; snap action, NC contacts with positive break
Termination	Screw terminals for max. 2.5 mm^2 cables (including conductor ferrules)
Rated impulse withstand voltage U imp	6 kV
Rated insulation voltage U i	500 V
Thermal test current I th	10 A
Utilisation category	AC-15; DC-13
Rated operating current/voltage Ie/Ue	4 A/230 VAC; 2.5 A/400 VAC; 1 A/500 VAC; 1 A/24 VDC
Max. fuse rating	10 A (slow blow); 16 A (quick blow), 6 A (slow blow) as positive break position switch
Ambient temperature	-30 °C to +80 °C
Mechanical life	20 million operations
Switching frequency	Max. 5,000/h
Switching point accuracy	-
Actuating speed **	Min. 10 mm/min
Contact break for complete stroke	2 x 2 mm
Bounce duration	< 3 ms
Switchover time	> 5.5 ms

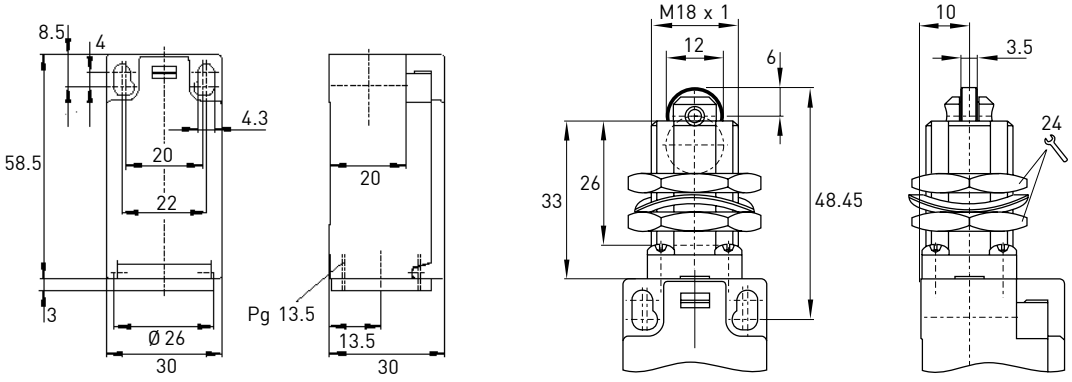
** For the switch plunger.

Note

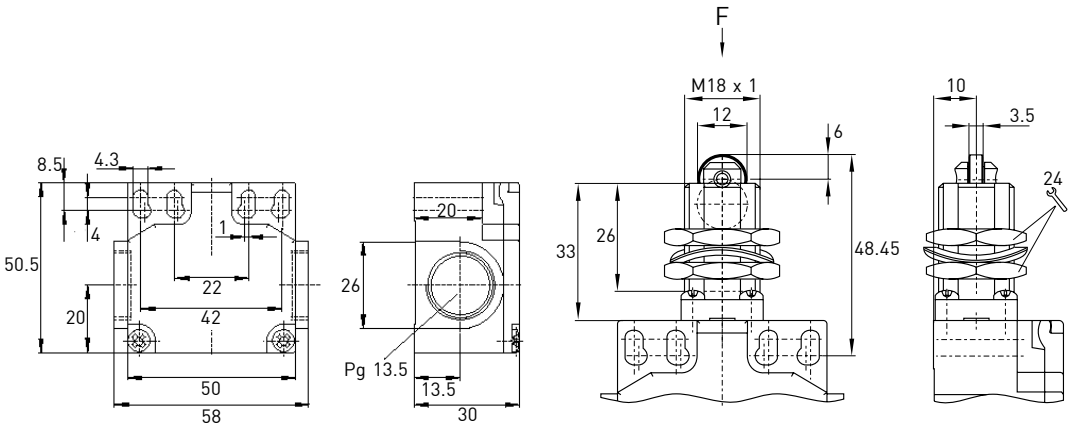
1. Technical Data subject to change without notice.
2. For a full set of limit switch details consult Power Jacks.

Safety Related Contact Limit Switch Dimensions

Long Body

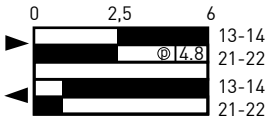


Short Body



Switch Contacts/Travel

Snap Action	1 NO	13 ● 14
	1 NC	21 ● 22

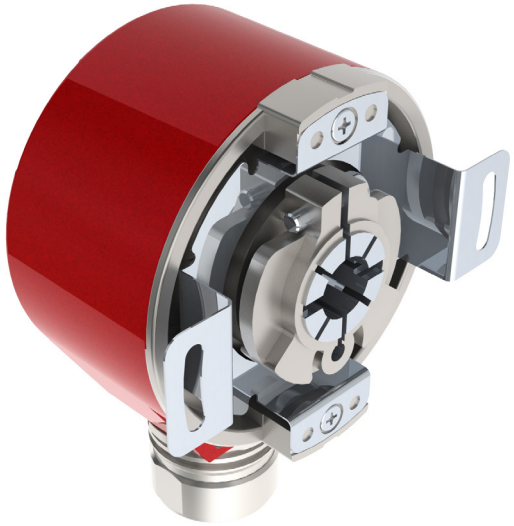


Note

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3. For dimensions of other switches consult Power Jacks.
4. For a full switch data sheet consult Power Jacks.

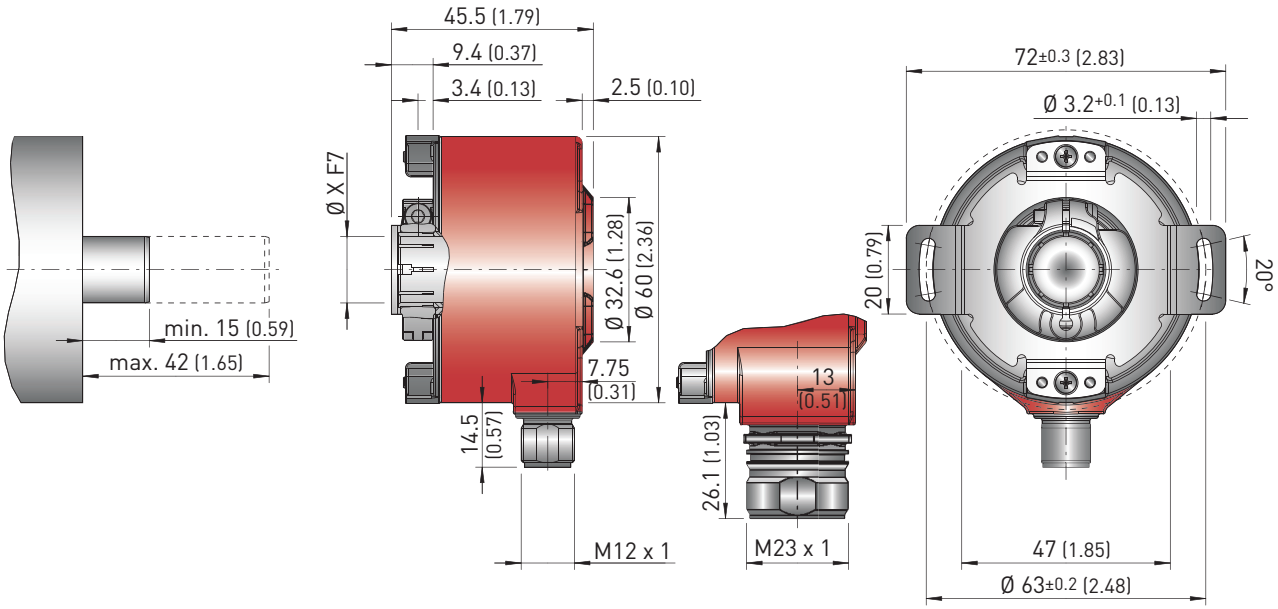
Incremental Encoders

The DFS60 is a high-resolution incremental encoder in a 60 mm design. The encoder is ideally suited for industrial applications including those with harsh environments due to its high enclosure rating, the large temperature range and robust ball bearing mounts.



- Compact Ø 60 mm design
- High-resolution incremental encoder up to 16 bit
- Programming of output voltage level by customer, zero pulse position, zero pulse width and number of lines from 1 to 65536
- Programming using programming tool or machine controller (RS485)
- Plug-in cable output, radial or axial.
- M23 and M12 connector designs, available axial and radial.
- Designs with face mount or servo flange, blind or through hollow shaft.
- Hollow shaft designs up to Ø15 mm.
- Insulated design available for through hollow shaft.
- Remote zero setting.
- Electrical Interface options include:
  - 4.5 to 5.5 V, TTL/RS422
  - 10 to 32 V, TTL/RS422
  - 10 to 32 V, HTL/push pull
  - 4.5 to 5.5 V, TTL/RS422, with 0-set function on the M23 connector
  - 10 to 32 V, TTL/RS422, with 0-set function on the M23 connector
  - 10 to 32 V, HTL/push pull, with 0-set function on the M23 connector
  - 4.5 to 32 V, TTL/HTL programmable
  - 4.5 to 32 V, TTL/HTL programmable with 0-set function on the M23 connector
- Ambient Temperature Range:
  - Working Temperature – Standard: 0 to +85°C, Optional -30°C to +100°C
  - Working Temperature – Standard: -40°C to +100°C
- Enclosure Rating: IP65 on Shaft and IP67 on housing & connector.
- Standard Shaft Sizes:
  - Blind hollow shaft sizes = 6, 8, 10, 12, 14, 15mm
  - Through hollow shaft sizes = 6, 8, 10, 12, 14, 15mm
  - Solid shaft with flange mount = Ø10 mm
  - Solid shaft with servo flange mount = Ø6 mm

Dimensions – Hollow Blind Shaft



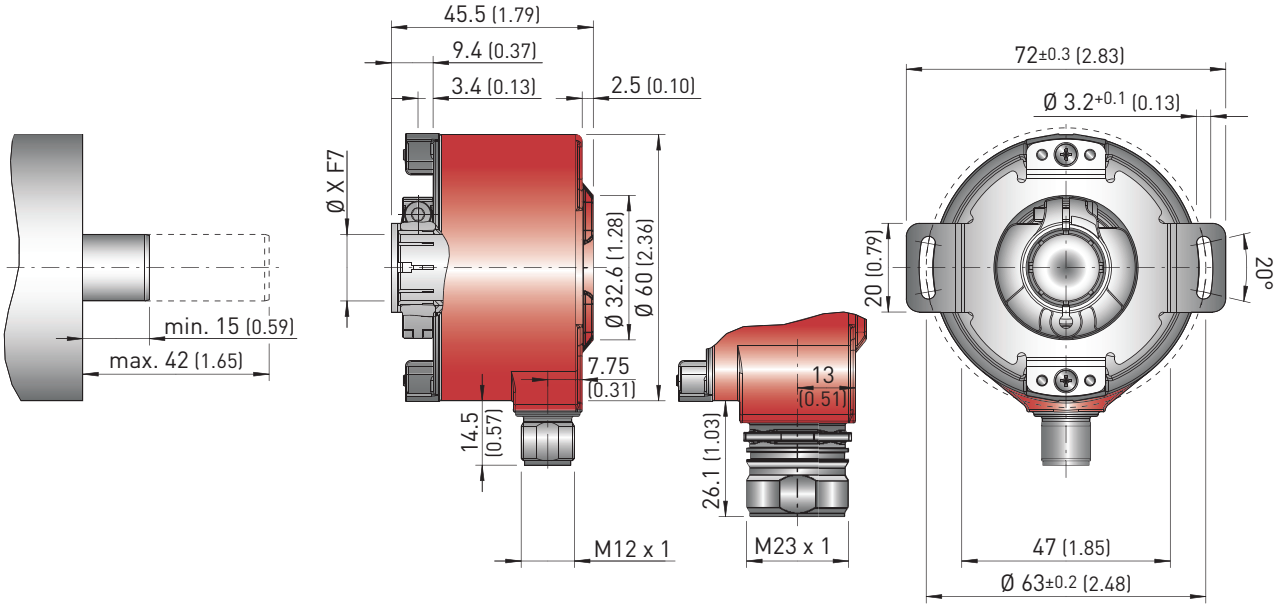
Absolute Encoders

The AFM60 is a high-resolution multi-turn absolute encoder in a 60mm housing design shared with its incremental counterpart. Ideally suited for industrial applications including those with harsh environments due to its high IP enclosure rating, large temperature range and robust ball bearing mounts. The absolute encoders' use the SSI interface as standard but can also be supplied with combined incremental or Sin/Cos interfaces.

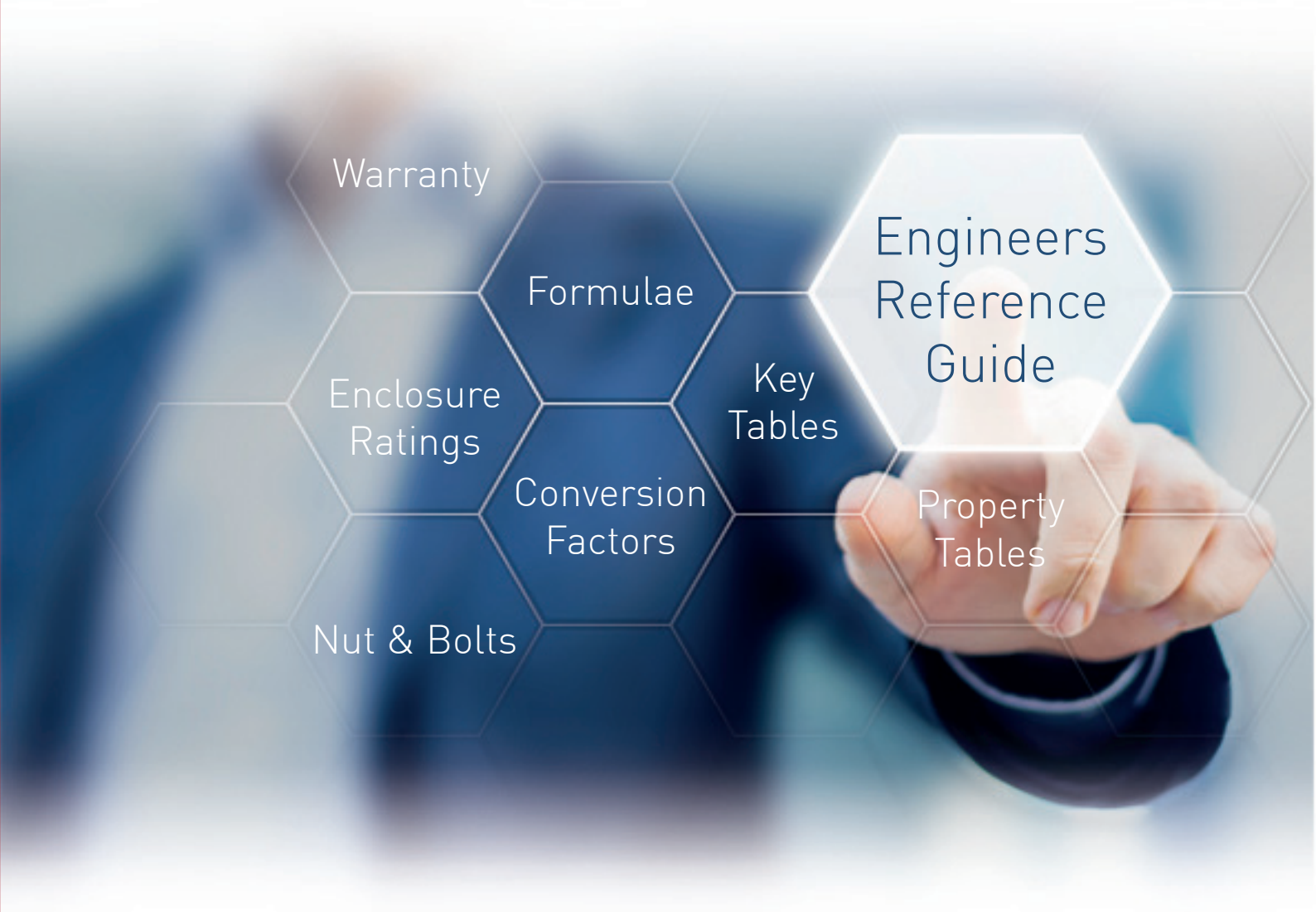


- Compact Ø 60 mm design
- High-resolution absolute encoder up to 30 bit
- Up to 262144 steps per revolution
- Up to 4096 revolutions
- SSI / Gray code.
- Programmable resolution and offset (depends on type).
- Programming using programming tool or machine controller.
- Matched programming cable adapter for M12 & M23 connector available.
- Plug-in cable output, radial or axial.
- M23 and M12 connector designs, available axial and radial.
- Designs with face mount or servo flange, blind or through hollow shaft.
- Hollow shaft designs up to Ø15 mm.
- Operating Voltage 4.5 to 32 V
- Ambient Temperature Range:
  - Working Temperature – Standard: 0 to +85°C, Optional -30°C to +100°C
  - Working Temperature – Standard: -40°C to +100°C
- Enclosure Rating: IP65 on Shaft and IP67 on housing & connector.
- Standard Shaft Sizes:
  - Blind hollow shaft sizes = 8, 10, 12, 14, 15mm
  - Through hollow shaft sizes = 8, 10, 12, 14, 15mm
  - Solid shaft with flange mount = Ø10 mm
  - Solid shaft with servo flange mount = Ø6 mm

Dimensions – Hollow Blind Shaft



USEFUL INFORMATION FOR ENGINEERS


Warranty
Formulae
Engineers Reference Guide
Enclosure Ratings
Key Tables
Conversion Factors
Property Tables
Nut & Bolts

Length	m	mm	inch	ft
1 m	1	1000	8mm	3.2808
1 mm	0.001	1	0.03937	32.8×10^{-3}
1 inch	0.0254	25.4	1	0.0833
1 ft	0.3048	304.8	12	1

Mass	kg	Tonne	lb	Ton (Short)	Ton
1 kg	1	0.001	2.2046	1.1023×10^{-3}	9.842×10^{-4}
1 Tonne	1000	1	2204.6	1.1023	0.9842
1 lb	0.45355937	4.536×10^{-4}	1	5×10^{-4}	4.464×10^{-4}
1 Tonne (Short)	907.185	0.907185	2000	1	0.8929
1 Ton	1016.05	1.016	2240	1.120	1

Force / Weight	N	kgf	kp	lbf
1 N	1	0.1019716	0.120	0.224809
1 kgf	9.80665	1	1	2.2046
1 kp	9.80665	1	1	2.2046
1 lbf	4.44822	0.45359237	0.4536	1

Speed	N	mm/s	ft/s	in/s
1 m/s	1	1000	3.2808	39.37
1 mm/s	0.001	1	3.28×10^{-3}	0.03937
1 ft/s	0.3048	304.8	1	12
1 in/s	0.0254	25.4	0.0833	1

Torque / Work	Nm	kgf.cm	lbf.in	lbf.ft
1 Nm	1	10.19716	8.8507	0.73756
1 kfg.cm	9.80665×10^{-2}	1	0.8679	0.07233
1 lbf.in	0.1129848	1.1521	1	0.08333
1 lbf.ft	1.35582	13.825	12	1

Power	kW	Nm/min	kgf.m/s	hp	lbf.ft/min
1 kW	1	60000	10.20	1.34	44220
1 Nm/min	1.667×10^{-4}	1	1.699×10^{-3}	2.235×10^{-5}	0.7374
1 kgf.m/s	9.807×10^{-3}	588.6	1	0.01315	433.73
1 hp	0.7457	44741	76.04	1	33000
1 lbf.ft/min	2.261×10^{-5}	1.3566	2.3056×10^{-3}	3.03×10^{-5}	1

Inertia	kg.m² (mr²)	kpms²	lbf.ft2 (WK²)	lbf.in2 (WK²)
kg.m² (mr²)	1	0.10197	23.73	3417.2
1 kpms²	9.807	1	232.6	33488
1 lbf.ft2 (WK²)	0.0421	4.30×10^{-3}	1	144
1 lbf.in2 (WK²)	2.9264×10^{-4}	0.6192	6.944×10^{-3}	1

Stress / Pressure	MPa (N/mm²)	N/m²	kg/cm²	lbf/inch²	lbf/ft²
1 MPa (N/mm2)	1	1×10^{-6}	10.2	145.039	20885.6
1 N/m²	1×10^{-6}	1	10.2×10^{-6}	145×10^{-6}	20.88×10^{-6}
1 kg/cm²	9.807×10^{-2}	9.81×10^{3}	1	14.2233	2.05×10^{3}
1 lbf/inch²	9.8947×10^{-3}	6.89×10^{3}	0.070307	1	144
1 lbg/ft²	4.7879×10^{-5}	47.88026	0.488×10^{-3}	6.94×10^{-3}	1

Temperature	
T °F	(T °C x 1.8) + 32°
T °C	(T °F -32) / 1.8

IEC Ratings

1st Digit : Solid Ingress		2nd Digit : Liquid Ingress	
0	No special protection	0	No special protection
1	A large surface of the body, such as hand (but no protection against deliberate acces.) Solid objects >50 mm diameter.	1	Dripping water (vertically falling drops).
2	Fingers or similar objects not exceeding 80mm in length. Solid objects >12mm in diameter.	2	Vertically dripping water when the enclosure is tilted at any angle up to 15º from its normal position.
3	Tools, wires, etc. of diameter or thickness >2.5mm. Solid objects >1mm diameter.	3	Water falling as a spray at an angle of 60º from the vertical.
4	Wires or strips of thickness >1mm. Solid objects >1mm diameter.	4	Water splashed against the enclosure from any direction.
5	Ingress of dust is not totally prevented, but dust does not enter in sufficient quantity to interfere with satisfactory operation of the equipment.	5	Water projected by a nozzle against the enclosure.
6	No ingress of dust.	6	Water from heavy seas or projected in powerful jets.
		7	Ingress of water in a harmful quantity not possible when the enclosure is immersed under defined conditions of pressure and time.
		8	Submersible under defined conditions of pressure and time.

NEMA and IEC Equivalent Enclosures

Since the IEC degree of protection for enclosed equipment is defined differently from NEMA type enclosure protection, and methods of test are different, exact correlation between IEC IP-type designations and NEMA types is not possible. It is possible to make rough comparisons, which may result in certain applications.The common NEMA type designations compare with IEC designations as follows:

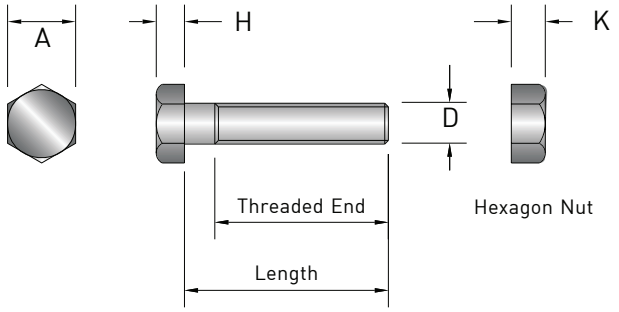
NEMA Type		Nearest IEC Equivalent	
NEMA 1	General protection of people from live parts. Protection against falling dirt. Test: 1/8" to 1/2" (3.175 to 12.7mm) rod entry test and rust resistance tests.	IP2X (1)	Protected against solid objects greater than 12mm. Test: Metallic test finger and 12mm sphere tests. No IEC rust resistance test.
NEMA 3	Dust-tight and sleet resistant. Test: Rain, dust, external icing and rust resistance test.	IP54	Dust protected. Protected against splashing water. Test: Dust and oscillating sprinkler tests. No IEC rust resistance test.
NEMA 3R	Rain-proof and sleet resitant. Test: Rod entry 1/8" to 1/4" (3.175 to 6.35mm), rain, external icing and rust resistance tests.	IP34	Protected against solid objects greater than 2.5mm. Protected against splashing water. Test: 2.5mm rod and oscillating sprinkler tests. No IEC rust resistance or icing tests.
NEMA 4	Water-tight and dust-tight. Test: Hosedown, rust-resistance and external icing tests.	IP65	Dust-tight and protected against water jets. Test: Dust and spray nozzle tests. no rust resistance or external icing test.
NEMA 4X	Water-tight, dust-tight and corrosion resistance. Test: Hosedown, corrosion resistance and external icing tests.	IPW65 (2)	Dust-tight and protected against water jets. Test: Dust and spray nozzle tests. No rust resistance or external icing test.
NEMA 7	Hazardous gas.	-	No IEC equivalent.
NEMA 9	Hardous dust.	-	No IEC equivalent.
NEMA 12	Dust-tight and drip-tight. Test: Drip, dust and rust resistance tests.	IP61	Dust-tight and protected against dripping water. Test: Dust and rain simulator tests. No IEC rust resistance test.
NEMA 18	Oil tight and dust tight. Test: Oil-tightness and rust-resistance tests.	IP6X (1)	Dust-tight. Test: Dust test. No IEC oil-tightness or rust resistance tests.

Note

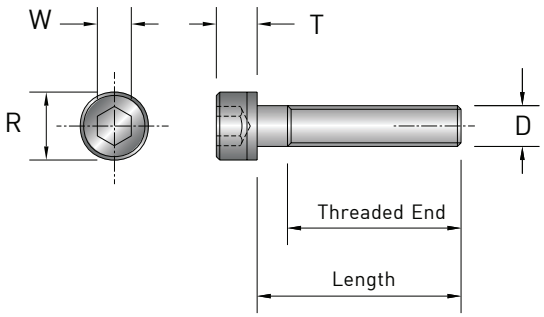
1. When only one characteristic numeral is used the second numeral is replaced by an 'X'.
2. 'W' inserted after the 'IP' indicates suitable for a specified weather condition (conditions and features specified by manufacturer.

Thread Size	Pitch	Hexagon Bolts & Nuts			Sockets Head Cap Screw		
D		A	H	K	R	T	W
M3	0.50	5.5	2.125	2.4	5.5	3.0	2.5
M4	0.70	7.0	2.925	3.2	7.0	4.0	3.0
M5	0.80	8.0	3.650	4.0	8.5	5.00	4.0
M6	1.00	10.0	4.150	5.0	10.0	6.0	5.0
M8	1.25	13.0	5.650	6.5	13.0	8.0	6.0
M10	1.50	17.0	7.180	8.0	16.0	10.0	8.0
M12	1.75	19.0	8.180	10.0	18.0	12.0	10.0
(M14)	2.00	22.0	9.180	11.0	21.0	14.0	12.0
M16	2.00	24.0	10.180	13.0	24.0	16.0	14.0
(M18)	2.50	27.0	12.215	15.0	27.0	18.0	14.0
M20	2.50	30.0	13.215	16.0	30.0	20.0	17.0
(M22)	2.50	32.0	14.215	18.0	33.0	22.0	17.0
M24	3.00	36.0	15.215	19.0	36.0	24.0	19.0
(M27)	3.00	41.0	17.215	22.0	40.0	27.0	19.0
M30	3.50	46.0	19.620	24.0	45.0	30.0	22.0
(M33)	3.50	50.0	21.260	26.0	50.0	33.0	24.0
M36	4.00	55.0	23.260	29.0	54.0	36.0	27.0
(M39)	4.00	60.0	25.260	31.0	-	-	-
M42	4.50	65.0	26.260	34.0	63.0	42.0	32.0

Hexagon Bolt



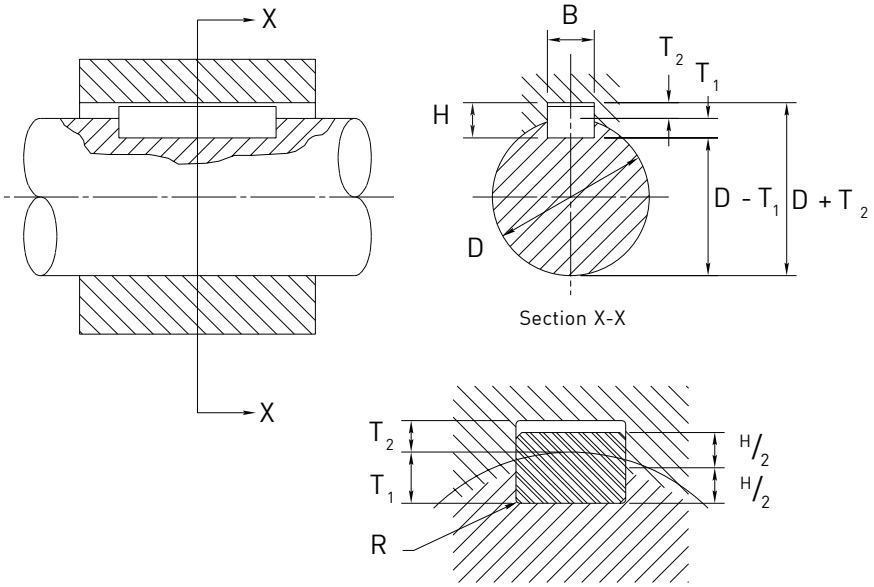
Socket Head Cap Screw



Note

1. All dimensions in millimetres.
2. Sizes in brackets are non-preferrred standards.
3. All dimensions are maximum sizes.

Enlarged Detail of Key and Keyways



Symbol		Key	Keyway										
Nominal Diameter D		B x H width x thick-ness	Width, B					Depth				Radius, R	
			Nom	Tolerance for class of fit									
				Free		Normal		Close and Interference	Shaft, T1		Hub, T2			
Over	Incl			Shaft (H9)	Hub (D10)	Shaft (N9)	Hub (Js9)	Shaft and Hub (P9)	Nom.	Tol.	Nom.	Tol.	Max.	Min.
6	8	2 x 2	2	+0.025	+0.060	-0.004	+0.012	-0.006	1.2	+0.1	1.0	+0.1	0.16	0.08
8	10	3 x 3	3	0	+0.020	-0.029	-0.012	-0.031	1.8	0	1.4	0		
10	12	4 x 4	4	+0.030	+0.078	0	+0.015	-0.012	2.5		1.8			
12	17	5 x 5	5	0	+0.080	-0.030	-0.015	-0.042	3.0		2.3		0.25	0.16
17	22	6 x 6	6						3.5		2.8			
22	30	8 x 7	8	+0.036	+0.095	0	+0.018	-0.015	4.0	+0.2	3.3	+0.2		
30	38	10 x 8	10	0	+0.040	-0.036	-0.018	-0.051	5.0	0	3.3	0	0.40	0.25
38	44	12 x 8	12						5.0		3.3			
44	50	14 x 9	14	+0.043	+0.120	0	+0.021	-0.018	5.5		3.8			
50	58	16 x 10	16	0	+0.050	-0.043	-0.021	-0.061	6.0		4.3			
58	65	18 x 11	18						7.0		4.4			
65	75	20 x 12	20						7.5		4.9		0.60	0.40
75	85	22 x 14	22	+0.052	+0.149	0	+0.026	-0.022	9.0		5.4			
85	95	25 x 14	25	0	+0.065	-0.052	-0.026	-0.074	9.0		5.4			
95	110	28 x 16	28						10.0		6.4			
110	130	32 x 18	32						11.0		7.4			
130	150	36 x 20	36	+0.062	+0.180	0	+0.031	-0.022	12.0	+0.3	8.4	+0.3	1.00	0.70
150	170	40 x 22	40	0	+0.080	-0.062	-0.031	-0.088	13.0	0	9.4	0		
170	200	45 x 25	45						13.0		10.4			

Note

For full range and further informtion refer BS 4235: Pt 1: 1972

Physical Property Values, at 20°C

Material	Carbon Steel	Aluminium Alloys	Brass 65/35	Copper	Stainless Steel
Density, ρ (kg/m^3)	7860	2710	8450	8910	7750
Young's Modulus, E (GN/m^2)	207	710	105	119	190
Shear Modulus, G (GN/m^2)	79.3	26.2	38	44.7	73.1
Bulk Modulus, K (GN/m^2)	172	57.5	115	130	178
Poisson's Ratio, ν	0.292	0.334	0.35	0.326	0.305
Coefficient of Thermal Expansion x 10^{-6}/K	12	22	19	17	14
Specific Heat J/kg K	460	920	420	420	460

Note

Values given are representative. Exact values may vary with composition and processing, sometimes greatly.

Standard SI Prefixes * †

Name	System	Factor
exa	E	1 000 000 000 000 000 000 = 10^{18}
peta	P	1 000 000 000 000 000 = 10^{15}
tera	T	1 000 000 000 000 = 10^{12}
giga	G	1 000 000 000 = 10^{9}
mega	M	1 000 000 = 10^{6}
kilo	k	1 000 = 10^{3}
hecto ‡	h	100 = 10^{2}
deca ‡	da	10 = 10^{1}
deci ‡	d	0.1 = 10^{-1}
centi ‡	c	0.01 = 10^{-2}
milli	m	0.001 = 10^{-3}
micro	μ	0.000 001 = 10^{-6}
nano	n	0.000 000 001 = 10^{-9}
pico	p	0.000 000 000 001 = 10^{-12}
femto	f	0.000 000 000 000 001 = 10^{-15}
atto	a	0.000 000 000 000 000 001 = 10^{-18}

* If possible use multiple and submultiple prefixes in steps of 1000.
† Spaces are used in SI instead of commas to group numbers to avoid confusion with the practise in some European countries of using commas for decimal points.
‡ Not recommened but sometimes encountered.

Limitation of Responsibility

The ratings given in this catalogue were compiled using standard engineering procedures. The ratings are designed to guide the customer in the selection of a unit. We do not guarantee the ratings in specific applications. Prototype testing of every application is recommended before production. Our engineering facilities are available for consultation at all times. Please ask us for assistance with linear motion and drive application problems. This catalogue is designed to assist in the selection of a suitable linear motion or power transmission product for economical, long and trouble free service.

Due to Power Jacks policy of continuous improvement designs may be subject to change without notice. Please ask for certified drawings.

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

Warranty Definitions

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.

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