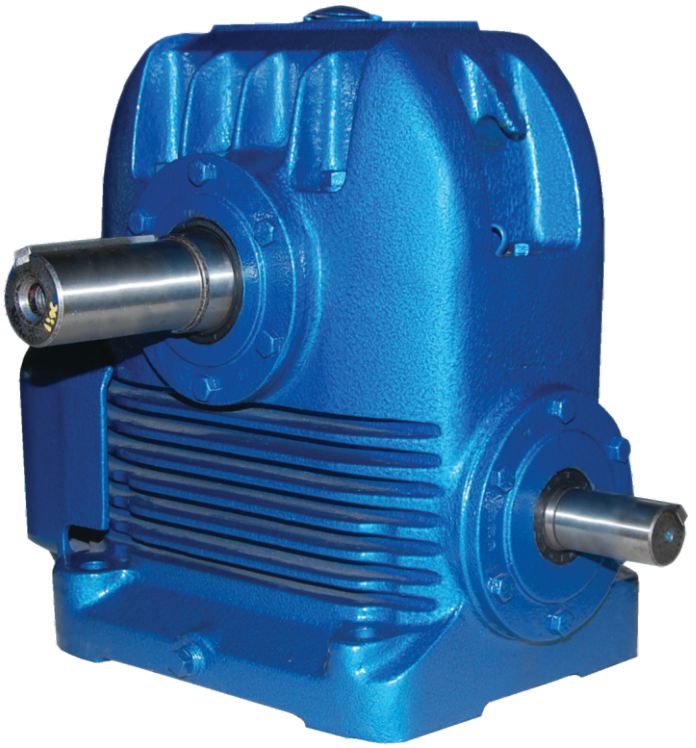
Fenner



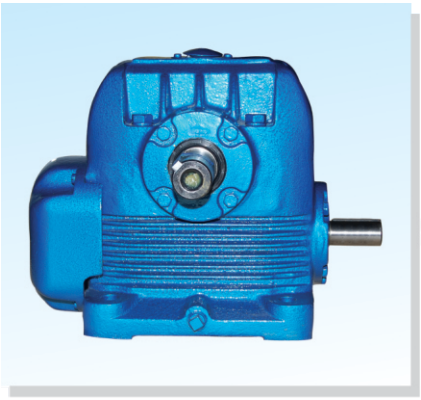
Worm Gear Boxes

12

J.K. Fenner (India) limited forges ahead with the same spirit, enhancing its mechanical power transmission by offering Fenner Worm reduction Gear Boxes for safe & energy efficient power transmission in most severe application. Fenner gear boxes are engineered for giving optimal life even when subjected to run under the most severe applications.

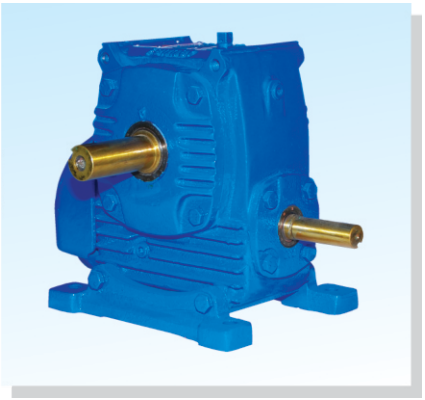
The product design of Fenner gear boxes has been based on reliability engineering & these are manufactured in ISO/TS 16949:2002 certified plant through computerized numerically controlled machines to ensure consistent quality & long life. All Fenner gear boxes are manufactured with in-house design reliability under high precession CNC profile grinding with internal grinding and hobbling facility. The gear boxes are tested for its reliability under stringent conditions and quality control.

Worm Gear Boxes



Horizontal Gear Box

Vertical Gear Box



Adaptable Gear Box

Product Features

- The casing is made of closely grained FG-260 Grade C.I.
- The gear box is provided with amply designed fins with suitable fan for adequate dissipation of heat generated.
- The entire design is based on BS 721: 1963 to accuracy class A.
- The gear box design is such that it is interchangeable with the standard gear boxes.
- The worm shaft is of high quality case hardening steel very accurately generated and ground finished for better performance.
- The worm wheel is made of extremely high quality phosphor bronzes sandwich cast / spin cast with considerably substantial section, rigidly bonded with the hub.
- Both worm and worm wheel shafts are mounted on high quality taper roller / angular contact bearings to take care of axial thrust and overhung loads.
- Subject to the limitation of 90^{0}C temperature, under full load, Fenner gear box will provide minimum gear life of 20,000 Hrs. The gear box requires absolutely no attention, except to check the oil level once every fortnight.
- Fenner worm gear box is available with ratios of 5:1 TO 70:1.

Worm Gear Boxes

Selection Procedure

The selection of gear box is done by comparing the actual transmitted load with the catalogue ratings. However, the actual load condition may vary or fluctuate based on the type of applications and to take care of the same, a service factor must be considered to arrive at Equivalent Load or Design Power. Hence,

Equivalent Load = Actual Load x Service factor

Mechanical Ratings & Service Factors

Mechanical ratings measure capacity in terms of life and / or strength, assuming 10 hrs / day continuous running under uniform load conditions. In case the unit is subjected to operate for more than 10 hrs / day, a Mechanical Service Factor should be chosen based on type of prime mover, running hrs / day and type of applications where the unit is connected and its load characteristics to ensure proper gear Life

The catalogue ratings allow 100% overload at starting, braking or momentarily during operation, upto 10 times per day. The unit so selected should therefore have a catalogue rating at least equal to or greater than half the maximum overload it attains during its operation.

Mechanical Service Factor Table

Type of Prime Mover	Working Hrs / Day	Load Classification of Driven Machine		
		Uniform Shock (U)	Moderate Shock (M)	Heavy Shock (H)
Electric Motor Steam Turbine or Hydraulic Motor	Under 3 hrs / day 3 - 10 hrs / day Over 10 hrs / day	0.80 1.00 1.25	1.00 1.25 1.50	1.50 1.75 2.00
Multi cylinder I.C Engine	Under 3 hrs / day 3 - 10 hrs / day Over 10 hrs / day	1.00 1.25 1.50	1.25 1.50 1.75	1.75 2.00 2.25
Single cylinder I.C Engine	Under 3 hrs / day 3 - 10 hrs / day Over 10 hrs / day	1.25 1.50 1.75	1.50 1.75 2.00	2.00 2.25 2.50

Thermal Ratings & Service Factors

Thermal rating of a gear box is the measure of its ability to dissipate heat. In case the unit becomes overheated, the lubricant may break down which may result in premature failure of gears. Thermal ratings are affected by ambient temperature and not because of mechanical considerations like increased working hours or momentary shock loads. Catalogue ratings assume 20°C ambient temperature. In case the ambient temperature is more than 20°C, the catalogue thermal ratings need to be divided by the factor. For sizes up to 1000, normally the gear box size where the catalogue Rating exceeds Design Power is selected. For bigger units, mechanical service factor should be applied to mechanical ratings and thermal service factor for thermal ratings and based on higher value between these two, a unit should be selected.

Ambient Temp °C	10	20	30	40	50	60
Service Factor	0.87	1	1.16	1.35	1.62	1.97

Load Classification by Applications

Driven Machine	Type of Load
Agitators & Mixers	
Pure Liquid / Semi-Liquid	U
Liquids & Solids Variable Density	M
Liquids with Variable Density	M
Blowers	
Centrifugal, Vane	U
Twin Lobe	M
Brewing & Distilling	
Bottling Machinery	U
Brew Kettle Continuous Duty	U
Cookers, Scale Hopper (Frequent Starts)	M
Can Filling Machinery	U
Cane Knives	M
Clarifiers (Should be Taken 24 hrs Duty)	U
Classifiers	U
Clay Working Machinery	
Brick Press, Briquette Machine	H
Pug Mill, Clay Working Machinery	M
Compressors	
Centrifugal	U
Twin Lobe	M
Reciprocating Multi-Cylinder	M
Reciprocating Single-Cylinder	H
Conveyors - Uniformly Loaded or Fed	
Apron, Belt, Bucket, Screw	U
Conveyors - Heavy Duty - Not Uniformly Loaded	
Apron, Belt, Bucket, Screw	M
Reciprocating and Shakers	M
Cranes	
Main Hoist	M
Crushers	
Ore, Stone	H
Sugar	M
Elevators	
Bucket - Uniform Load	U
Bucket - Heavy Load	M
Bucket - Continuous Load	U
Centrifugal Discharge / Gravity Discharge	U
Fans	
Centrifugal	U
ID Fan	M
Large (Mine, Industrial, etc)	M
Light (Small Diameter)	U
Cooling Towers	H
Feeders	
Apron Feeder / Belt Feeder	M
Disc	U
Reciprocating	H
Screw	M

Driven Machine	Type of Load
Food Industry	
Beef Slicer	M
Cereal Cooker	U
Laundry Machines	
Washers, Tumblers	M
Line Shaft	M
Mills	
Hammers	H
Ball Kilns, Pebbles	M
Rod Tumbling Barrels	H
Cement Kilns	M
Dryers & Coolers	M
Mixers	
Concrete Mixers	M
Sugar Industry	
Cane Knives	M
Crushers	M
Mills	H
Oil Industry	
Chillers	M
Rotary Kilns	M
Paper Mill	
Bleacher, Conveyor, Press, Winder,	M
Calenders, Agigators, Beater, Pulper	M
Pumps	
Centrifugal	U
Reciprocating (3 Or More Cylinders)	M
Gear, Lobe Type	U
Rubber & Plastic Industry	
Crackers	H
Fixing Mills	H
Laboratory Equipment	M
Refiners	M
Sheeters	M
Tubers & Stainers	M
Warming Mills	M
Tyre & Tube Press	M
Sand Mullers, Screens	
Air Washing	U
Rotary - Stone / Gravel	M
Textile Industry	
Batches	M
Calenders	M
Cards/Dry Cans/Dryers/Looms/Mangles	M
Dyeing Machinery	M
Spinners	M
Washers / Winders	M
Wire Drawing / Flattening Machine	M
Wire Winding Machine	M

Worm Gear Boxes

Data Required for Selection

1 Type of prime mover.
2. Prime mover Power and speed.
3. Actual power or Torque require by driven machine.
4. Reduction ratio required or Output speed of gear unit.
5. Speed reduction between prime mover and driven machine by pulley/Sprocket/Gear if any..
6. Configuration of Gear unit ie FA, FU, FO, FV, FUD,FVD, etc.. and shaft handing required,
7. Direction of rotation uni- direction or reverse direction required.
8. Detail of driven machine, nature of load, operation hours per day and duty cycle time..
9. Detail of any external load imposed on the shafts like pulley, sprocket, gear etc..
10. Detail of abnormal operation conditions like humidity, ambient temperature, type of atmosphere, etc.. other than normal condition.

Example:-

A horizontal foot mounted worm reduction gearbox is required to select for Belt Conveyor with non uniform load operating 12 hrs / day, the ambient temperature is 40®C. The Speed required at conveyor Head Drum pulley shaft is 48 RPM. The existing prime mover is an Electric motor of 5 HP /1450 RPM.

Step: 1 Ratio Required = (Input speed/ Output Speed)
= (1450 / 48) = 30.2 rpm
Hence, we select standard nearest Ratio of 30:1

Step :2
Since the type of driven machine is a non-uniformly loaded Conveyor, we select from the load Classification Chart, the type of load is Moderate shock (M) and working 12 hrs/day.

Hence, from Mechanical service factor table, the require service factor is 1.5. and
The Thermal service factor for 40®C is 1.35, we consider the highest service factor only.
Ie mechanical service factor- 1.5

Therefore Design power = Motor power x Service factor
= 5 X 1.5 = 7.5 HP

Step :3
Select from 1500 rpm input speed chart at 30:1ratio, the gearbox size will be FU500 with input power of 8.95 hp which is more than our design power.

Selected Horizontal foot mounted worm gearbox model is FU-500 with Ratio 30:1.

Note:

- Worm Gear box is available with single reduction ratio from 5:1 to 70:1 as standard and other ratio upto 100:1 is possible in single reduction based on design feasibility and typical requirement of customer. Kindly contact Fenner for any non-standard ratio.

- Lubrication is an essential requirement of worm Gear box, Kindly check and verify the correct lubricant is in use with defined quantity.

- Worm Gears are quiet in operation. Worm gears at the higher ratios are inherently self locking. The worm can drive the gear but the gear cannot drive the worm. (In practice a worm should not be used as a braking device for safely linked systems example Hoists, etc..) All Fenner Gearboxes can be provided with Back Stop arrangement against particular requirement.

- All Fenner Gear boxes, the worm wheel is cut with a concave as opposed to a straight width forming single envelop worm gear set with accurate alignment of the Worm wheel to ensure full line tooth contact for better Power Transmission.

Power Rating for Single Reduction Gear Box

1500 rpm Input

Input Speed	Gear Ratio	Output Speed	Capacity	Size Designation													
				112	162	200	237	287	337	300	400	500	600	700	800	900	1000
1500	5:1	300	Input H.P	0.74	1.71	3.39	4.89	7.84	12.8	8.41	16.70	28.20	44.80	64.00	85.10	100.00	112.00
			O/P Torque in Kgf-m	1.60	3.70	7.40	10.90	17.50	28.80	18.90	37.50	64.00	102.00	146.00	195.00	229.00	258.00
1500	7.5:1	200	Input H.P	0.53	1.31	2.35	3.61	5.86	8.71	7.13	12.60	23.10	36.10	56.00	73.30	85.20	105.00
			O/P Torque in Kgf-m	1.70	4.20	7.70	11.80	19.30	29.00	24.50	42.00	78.00	122.00	190.00	250.00	291.00	361.00
1500	10:1	150	Input H.P	0.56	1.31	2.40	3.10	4.88	7.40	6.09	10.90	21.00	30.60	42.10	54.40	76.90	86.20
			O/P Torque in Kgf-m	2.30	5.40	10.20	13.30	21.20	32.50	26.60	48.00	94.00	137.00	189.00	245.00	347.00	390.00
1500	15:1	100	Input H.P	0.39	1.04	1.70	2.34	4.12	6.43	4.45	8.22	14.70	24.30	30.70	47.80	58.40	73.40
			O/P Torque in Kgf-m	2.30	6.30	10.40	14.50	25.80	40.50	28.00	53.00	95.00	159.00	202.00	317.00	390.00	489.00
1500	20:1	75	Input H.P	0.34	0.78	1.58	2.22	3.02	4.63	3.80	7.02	12.00	19.10	27.90	37.60	45.90	58.10
			O/P Torque in Kgf-m	2.40	5.70	12.00	17.20	24.50	38.00	31.20	59.00	102.00	164.00	241.00	326.00	398.00	506.00
1500	25:1	60	Input H.P	0.32	0.69	1.33	1.95	2.83	4.47	3.41	5.98	10.40	16.30	23.20	31.80	39.20	48.90
			O/P Torque in Kgf-m	2.60	6.20	12.20	18.50	27.50	44.00	33.40	61.00	108.00	172.00	245.00	338.00	420.00	524.00
1500	30:1	50	Input H.P	0.27	0.64	1.08	1.54	2.42	4.04	3.07	5.42	8.95	15.10	21.30	28.40	32.90	43.50
			O/P Torque in Kgf-m	2.50	6.40	11.60	17.00	27.40	47.00	34.80	64.00	107.00	183.00	266.00	356.00	418.00	553.00
1500	40:1	37.5	Input H.P	0.19	0.48	0.80	1.24	1.95	3.03	2.39	4.36	6.87	11.50	16.80	22.50	29.10	39.00
			O/P Torque in Kgf-m	2.30	6.30	10.70	17.20	28.40	44.00	34.70	65.00	103.00	179.00	266.00	361.00	469.00	630.00
1500	50:1	30	Input H.P	0.11	0.35	0.63	0.93	1.47	2.18	1.96	3.41	5.91	9.39	13.50	19.50	23.20	30.70
			O/P Torque in Kgf-m	1.60	5.50	10.20	15.50	25.50	38.00	33.70	61.50	110.00	177.00	260.00	377.00	449.00	600.00
1500	60:1	25	Input H.P	0.09	0.26	0.52	0.74	1.17	1.83	1.71	2.91	5.27	7.98	11.90	15.70	19.10	25.80
			O/P Torque in Kgf-m	1.60	4.50	8.90	13.00	23.00	37.00	33.80	60.40	114.00	176.00	265.00	359.00	439.00	596.00
1500	70:1	21.4	Input H.P	0.08	0.24	0.41	0.66	1.04	1.38	1.38	2.50	4.65	6.79	9.77	13.50	15.60	21.50
			O/P Torque in Kgf-m	1.40	4.50	7.70	12.50	20.90	31.70	31.00	58.00	112.00	168.00	245.00	347.00	404.00	560.00

1000 rpm Input

Input Speed	Gear Ratio	Output Speed	Capacity	Size Designation													
				112	162	200	237	287	337	300	400	500	600	700	800	900	1000
1000	5:1	200.0	Input H.P	0.58	1.38	2.66	3.92	6.03	10.00	6.45	13.10	22.20	33.20	48.70	64.30	73.90	87.80
			O/P Torque in Kgf-m	1.90	4.40	8.70	12.90	20.00	33.40	21.50	44.00	75.00	113.00	166.00	220.00	252.00	302.00
1000	7.5:1	133.3	Input H.P	0.42	1.08	1.88	2.89	4.50	7.16	5.63	9.92	18.50	27.40	41.30	55.20	62.80	78.00
			O/P Torque in Kgf-m	2.00	5.10	9.00	13.90	22.00	35.00	27.60	49.00	93.00	138.00	209.00	280.00	320.00	398.00
1000	10:1	100.0	Input H.P	0.43	1.03	1.93	2.42	3.90	5.74	4.77	8.61	16.80	23.90	33.20	42.90	56.60	68.40
			O/P Torque in Kgf-m	2.60	6.20	11.80	15.30	25.00	37.00	30.60	56.10	111.00	159.00	222.00	287.00	380.00	461.00
1000	15:1	66.7	Input H.P	0.30	0.79	1.32	1.82	3.29	5.07	3.54	6.37	11.50	18.10	23.50	34.20	43.30	54.00
			O/P Torque in Kgf-m	2.60	7.00	11.80	16.50	30.00	46.60	32.60	60.20	110.00	177.00	229.00	335.00	430.00	536.00
1000	20:1	50.0	Input H.P	0.27	0.62	1.26	1.78	2.44	3.77	3.05	5.50	8.99	14.40	20.80	26.60	34.70	45.20
			O/P Torque in Kgf-m	2.8	6.50	13.80	19.90	29.00	45.00	36.50	67.30	112.00	184.00	266.00	341.00	445.00	583.00
1000	25:1	40.0	Input H.P	0.25	0.54	1.04	1.57	2.27	3.53	2.80	4.33	7.95	12.30	17.60	24.00	29.30	36.90
			O/P Torque in Kgf-m	3.00	7.00	13.70	21.50	31.80	50.20	39.50	64.00	121.00	191.00	276.00	378.00	465.00	585.00
1000	30:1	33.3	Input H.P	0.21	0.50	0.84	1.22	1.95	3.16	2.45	4.16	6.78	11.10	15.80	21.40	25.60	33.10
			O/P Torque in Kgf-m	2.80	7.30	13.00	19.40	31.70	53.00	39.70	71.00	118.00	196.00	290.00	397.00	480.00	621.00
1000	40:1	25.0	Input H.P	0.15	0.39	0.64	1.02	1.63	2.51	1.97	3.30	5.28	8.61	12.30	16.80	21.50	29.40
			O/P Torque in Kgf-m	2.60	7.20	12.20	20.20	34.00	52.00	40.80	71.00	115.00	196.00	285.00	395.00	510.00	700.00
1000	50:1	20.0	Input H.P	0.09	0.28	0.49	0.72	1.18	1.73	1.63	2.72	4.54	7.17	10.10	14.50	17.60	23.30
			O/P Torque in Kgf-m	1.80	6.10	11.20	17.30	29.00	43.00	39.80	70.00	121.00	195.00	285.00	410.00	500.00	673.00
1000	60:1	16.7	Input H.P	0.08	0.21	0.41	0.56	0.93	1.45	1.46	2.31	4.07	6.17	8.97	11.80	14.90	20.00
			O/P Torque in Kgf-m	1.80	5.10	10.20	14.10	25.70	41.50	40.80	69.00	125.00	195.00	293.00	394.00	498.00	670.00
1000	70:1	14.3	Input H.P	0.06	0.18	0.34	0.51	0.79	1.13	1.08	2.03	3.58	5.11	7.58	9.72	11.40	16.30
			O/P Torque in Kgf-m	1.60	4.90	9.30	13.80	23.50	35.70	34.40	67.00	122.00	182.00	276.00	363.00	432.00	620.00

Worm Gear Boxes

Power Rating for Single Reduction Gear Box

750 rpm Input

Input Speed	Gear Ratio	Output Speed	Capacity	Size Designation													
				112	162	200	237	287	337	300	400	500	600	700	800	900	1000
750	5:1	150	Input H.P	0.48	1.17	2.23	3.35	5.04	8.31	5.37	11.10	17.90	27.10	40.30	54.30	60.80	71.90
			O/P Torque in Kgf-m	2.00	5.00	9.60	14.50	22.00	36.50	23.60	49.00	80.00	122.00	182.00	245.00	275.00	326.00
750	7.5:1	100	Input H.P	0.34	0.90	1.56	2.46	3.82	5.90	4.65	8.09	15.30	22.50	32.90	45.30	15.10	62.50
			O/P Torque in Kgf-m	2.10	5.50	9.90	15.40	24.50	38.00	30.00	53.00	101.00	150.00	220.00	305.00	345.00	423.00
750	10:1	75	Input H.P	0.37	0.84	1.62	2.12	3.27	4.85	3.98	7.05	13.50	19.40	27.20	35.60	46.60	56.40
			O/P Torque in Kgf-m	2.90	6.70	13.00	16.90	27.50	41.00	33.60	60.40	118.00	170.00	240.00	316.00	415.00	504.00
750	15:1	50	Input H.P	0.25	0.65	1.09	1.52	2.76	4.22	2.96	5.28	9.61	14.60	19.40	27.60	34.30	44.40
			O/P Torque in Kgf-m	2.80	7.50	12.80	18.00	33.00	50.50	35.70	65.00	120.00	186.00	250.00	360.00	450.00	585.00
750	20:1	37.5	Input H.P	0.22	0.52	1.05	1.48	2.09	3.08	2.52	4.42	7.35	11.60	16.70	21.90	28.30	37.50
			O/P Torque in Kgf-m	3.00	7.10	14.90	21.40	32.00	48.00	39.50	70.00	120.00	192.00	280.00	370.00	480.00	640.00
750	25:1	30	Input H.P	0.21	0.47	0.86	1.34	1.96	2.92	2.37	3.52	6.55	9.91	14.20	19.40	23.90	30.50
			O/P Torque in Kgf-m	3.20	7.60	14.60	23.50	35.00	54.00	43.50	68.00	130.00	200.00	290.00	400.00	500.00	640.00
750	30:1	25	Input H.P	0.18	0.43	0.70	1.03	1.68	2.64	2.02	3.43	5.51	8.67	12.60	16.70	20.70	27.00
			O/P Torque in Kgf-m	3.00	7.90	13.90	21.00	35.30	57.00	42.50	76.00	124.00	200.00	302.00	406.00	510.00	670.00
750	40:1	18.75	Input H.P	0.12	0.33	0.54	0.89	1.42	2.13	1.67	2.71	4.40	6.91	9.94	14.00	17.70	24.10
			O/P Torque in Kgf-m	2.80	7.80	13.20	22.10	37.80	56.50	45.00	75.00	123.00	202.00	298.00	428.00	551.00	749.00
750	50:1	15	Input H.P	0.08	0.26	0.41	0.61	1.03	1.50	1.39	2.31	3.77	5.88	8.38	12.00	54.40	19.10
			O/P Torque in Kgf-m	2.00	6.60	12.00	18.60	31.60	46.50	43.90	76.50	130.00	205.00	302.00	441.00	535.00	721.00
750	60:1	12.5	Input H.P	0.06	0.19	0.33	0.45	0.78	1.18	1.22	1.98	3.34	4.94	7.68	10.00	12.30	16.90
			O/P Torque in Kgf-m	1.90	5.50	10.70	15.00	27.60	42.50	44.00	75.00	130.00	198.00	319.00	430.00	534.00	740.00
750	70:1	10.7	Input H.P	0.05	0.16	0.29	0.42	0.63	0.96	0.89	1.66	2.90	4.21	6.03	7.93	9.30	13.20
			O/P Torque in Kgf-m	1.70	5.30	10.00	15.00	25.00	39.00	36.60	70.00	126.0	190.0	280.00	379.00	455.00	658.00

500 rpm Input

Input Speed	Gear Ratio	Output Speed	Capacity	Size Designation													
				112	162	200	237	287	337	300	400	500	600	700	800	900	1000
500	5:1	100	Input H.P	0.37	0.91	1.74	2.56	3.79	6.42	4.11	8.68	13.90	20.70	32.70	41.80	46.00	54.60
			O/P Torque in Kgf-m	2.30	5.70	11.00	16.30	24.50	41.70	26.80	57.00	92.00	137.00	218.00	280.00	310.00	369.00
500	7.5:1	66.7	Input H.P	0.27	0.69	1.24	1.92	2.98	4.50	3.51	6.21	11.20	16.60	24.30	33.70	36.90	44.90
			O/P Torque in Kgf-m	2.40	6.20	11.40	17.70	28.20	43.00	33.50	60.00	110.00	164.00	240.00	337.00	370.00	452.00
500	10:1	50	Input H.P	0.28	0.65	1.24	1.60	2.50	3.69	3.03	5.16	10.10	14.40	20.10	27.50	34.90	42.30
			O/P Torque in Kgf-m	3.20	7.40	14.60	19.00	31.00	56.00	37.70	65.00	130.00	187.00	262.00	360.00	459.00	560.00
500	15:1	33.3	Input H.P	0.19	0.49	0.82	1.16	2.10	3.20	2.27	3.96	7.13	10.70	14.70	20.80	25.40	33.70
			O/P Torque in Kgf-m	3.10	8.20	14.00	20.00	36.50	56.00	40.00	72.30	131.00	200.00	277.00	398.00	490.00	655.00
500	20:1	25	Input H.P	0.17	0.40	0.81	1.14	1.60	2.43	1.90	3.30	5.62	8.83	12.20	17.00	21.40	28.60
			O/P Torque in Kgf-m	3.30	7.90	16.60	24.00	36.00	55.00	43.50	77.00	134.00	215.00	300.00	418.00	530.00	718.00
500	25:1	20	Input H.P	0.16	0.37	0.65	1.01	1.47	2.24	1.77	2.74	5.03	7.37	10.90	14.50	18.10	23.10
			O/P Torque in Kgf-m	3.40	8.50	16.00	25.90	38.50	60.00	47.00	77.00	145.00	219.00	324.00	440.00	550.00	710.00
500	30:1	16.7	Input H.P	0.13	0.34	0.53	0.78	1.28	2.01	1.55	2.64	4.29	6.61	9.34	12.00	15.30	20.30
			O/P Torque in Kgf-m	3.20	8.60	15.10	23.00	39.00	63.00	47.00	85.00	140.00	220.00	325.00	425.00	549.00	740.00
500	40:1	12.5	Input H.P	0.10	0.27	0.42	0.70	1.12	1.65	1.29	2.06	3.44	5.19	8.05	10.50	13.50	18.20
			O/P Torque in Kgf-m	3.10	8.60	14.60	25.50	43.00	63.00	50.00	82.00	138.00	220.00	346.00	465.00	601.00	818.00
500	50:1	10	Input H.P	0.06	0.19	0.31	0.47	0.77	1.13	1.03	1.71	2.83	4.49	6.30	9.08	11.00	14.60
			O/P Torque in Kgf-m	2.20	7.30	13.00	20.50	34.50	51.00	46.50	81.00	140.00	225.00	325.00	478.00	580.00	790.00
500	60:1	8.3	Input H.P	0.05	0.14	0.26	0.36	0.58	0.92	0.89	1.50	2.49	3.51	5.86	7.65	9.16	12.80
			O/P Torque in Kgf-m	2.10	6.00	11.40	16.10	29.20	47.00	45.50	81.00	140.00	202.00	350.00	470.00	566.00	817.00
500	70:1	7.1	Input H.P	0.04	0.13	0.22	0.34	0.50	0.78	0.68	1.21	2.11	3.17	4.54	5.83	6.97	9.97
			O/P Torque in Kgf-m	1.90	5.70	10.80	16.80	27.80	43.60	39.50	73.00	131.00	202.00	3.00	403.00	485.00	710.00

Power Rating for Double Reduction Gear Box

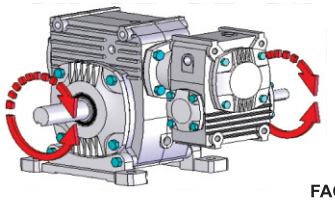
1500 rpm Input

Input Speed	Gear Ratio	Output Speed		Size Designation												
				162	200	237	287	337	300	400	500	600	700	800	900	1000
1500	150:1	10	Input H.P	0.23	0.29	0.60	1.01	1.31	1.17	1.79	3.10	4.88	6.92	9.40	11.20	15.80
			O/P Torque In Kfg - m	10.00	17.70	28.00	47.50	61.20	55.50	90.10	160.00	261.00	380.00	520.00	640.00	900.00
1500	300:1	5	Input H.P	0.16	0.30	0.44	0.59	0.92	0.69	1.17	2.04	3.09	4.19	5.95	7.48	9.93
			O/P Torque In Kfg - m	11.00	22.40	34.00	51.00	79.00	60.00	106.00	192.00	300.00	410.00	597.00	758.00	1020.00
1500	500:1	3	Input H.P	0.12	0.21	0.32	0.51	0.73	0.58	0.87	1.54	2.20	3.10	3.97	4.90	6.83
			O/P Torque In Kfg - m	11.80	21.60	36.20	58.00	85.00	68.00	115.00	211.00	330.00	473.00	633.00	790.00	1100.00
1500	1000:1	1.5	Input H.P	0.08	0.13	0.22	0.33	0.48	0.38	0.59	0.97	1.42	2.13	2.62	3.24	4.00
			O/P Torque In Kfg - m	12.00	21.60	40.80	64.60	93.60	76.40	121.00	207.00	333.00	520.00	682.00	871.00	1090.00
1500	2000:1	0.75	Input H.P	0.04	0.07	0.10	0.17	0.25	0.20	0.35	0.58	0.80	1.30	1.71	2.17	2.700
			O/P Torque In Kfg - m	10.90	18.90	30.60	53.30	79.50	65.70	124.00	214.00	316.00	528.00	721.00	911.00	1170.00
1500	3000:1	0:05	Input H.P	0.02	0.04	0.090	0.10	0.14	0.12	0.24	0.44	0.54	0.97	1.25	1.47	1.89
			O/P Torque In Kfg - m	7.60	13.70	38.60	40.50	61.00	48.40	111.00	221.00	292.00	536.00	735.00	880.00	1130.00

1000 rpm Input

Input Speed	Gear Ratio	Output Speed		Size Designation												
				162	200	237	287	337	300	400	500	600	700	800	900	1000
1000	150:1	6.67	Input H.P	0.17	0.30	0.46	0.78	1.03	0.88	1.39	2.40	3.75	5.36	7.02	8.34	12.20
			O/P Torque In Kfg - m	10.80	19.30	30.60	52.00	68.90	60.00	99.00	177.00	292.00	425.00	566.00	690.00	1020.00
1000	300:1	3.33	Input H.P	0.12	0.23	0.33	0.45	0.69	0.51	0.88	1.58	2.33	3.15	4.51	5.59	7.29
			O/P Torque In Kfg - m	12.00	23.40	36.10	55.70	85.50	64.00	113.00	210.00	325.00	442.00	652.00	822.00	1080.00
1000	500:1	2	Input H.P	0.09	0.16	0.24	0.38	0.56	0.43	0.66	1.15	1.59	2.33	2.82	3.54	5.03
			O/P Torque In Kfg - m	12.00	23.10	38.50	62.00	91.00	71.00	123.00	223.00	342.00	500.00	633.00	810.00	1160.00
1000	1000:1	1	Input H.P	0.10	0.10	0.20	0.20	0.40	0.30	0.40	0.70	1.10	1.60	1.90	2.40	2.90
			O/P Torque In Kfg - m	12.80	22.20	41.80	65.00	101.00	79.30	127.00	217.00	347.00	526.00	694.00	890.00	1100.00
1000	2000:1	0.5	Input H.P	0.03	0.05	0.07	0.12	0.19	0.15	0.26	0.43	0.58	0.94	1.23	1.56	1.93
			O/P Torque In Kfg - m	11.30	20.00	32.20	56.00	84.80	68.00	128.00	221.00	318.00	530.00	725.00	930.00	1190.00
1000	3000:1	0:33	Input H.P	0.02	0.03	0.04	0.07	0.10	0.08	0.17	0.33	0.39	0.70	0.90	1.06	1.36
			O/P Torque In Kfg - m	7.60	13.80	21.00	41.00	61.00	48.00	111.00	230.00	293.00	540.00	745.00	890.00	1130.00

Direction of Rotation



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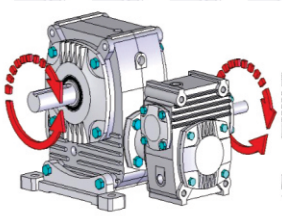

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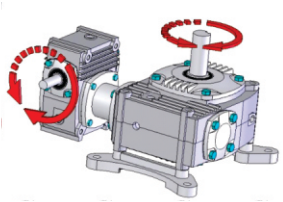

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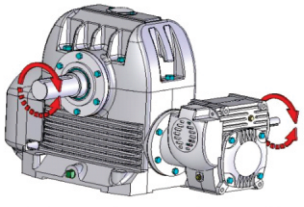

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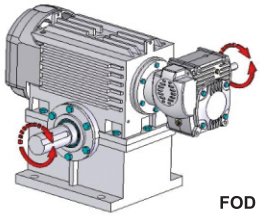

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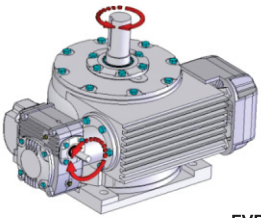
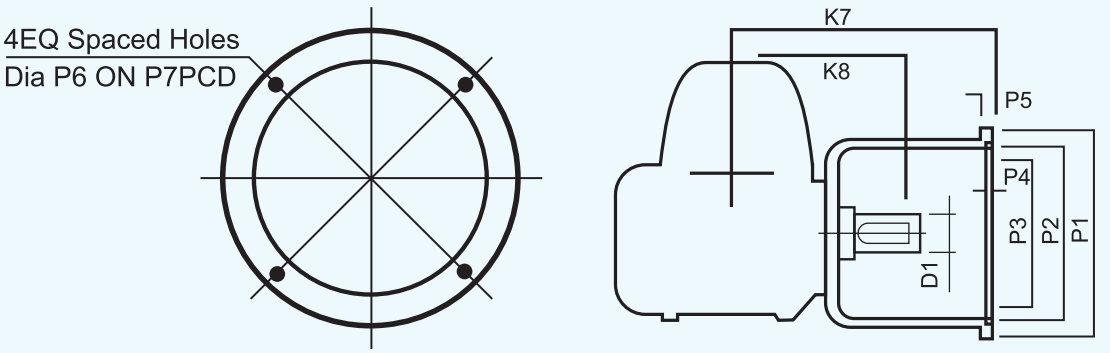


FVD

Worm Gear Boxes

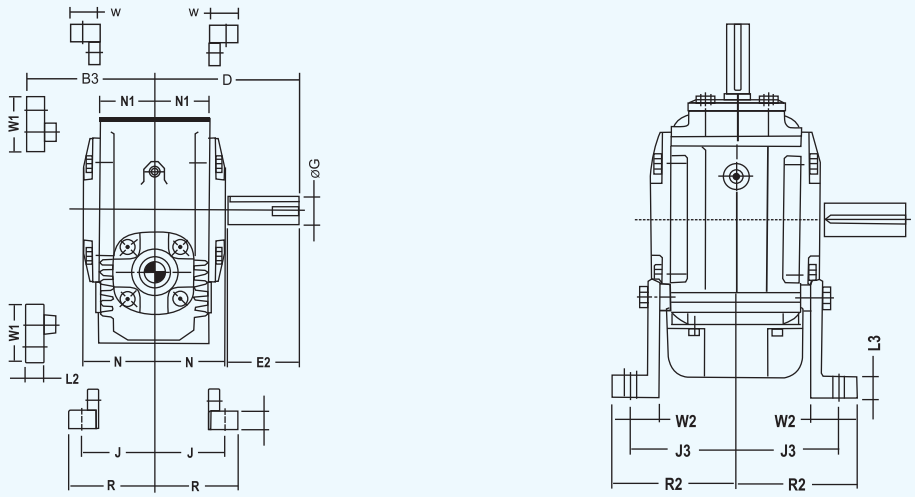
Details of Motor Adaptor and Input Shaft



Unit Size	Motor Frame Size	D 1	K 7	K 8	P 1	P 2	P 3	P 4	P 5	P 6	P 7
FU 112	56	11	147.6	80.5	140	95 H7	75	5	12	10	115.03
FU 162	56	16	167	109.5	140	95 H7	75	5	12	10	115.03
	63		149								
	71		156		160	110 H7	86				130.03
	80,90		175		200	130 H7	120			12	165.03
FU 200	56	16	190.5	133.5	140	95 H7	75	5	12	10	115.03
	63		164								
	71		170		160	110 H7	86				130.03
	80,90		190		200	130 H7	120			12	165.03
FU 237	56	19	215	159	140	95 H7	75	5	12	10	115.03
	63		188								
	71		194		160	110 H7	86				130.03
	80,90		215		200	130 H7	120			12	165.03
FU 287	71	22	227	190	160	110 H7	86	5	12	12	130.03
	80,90		247		200	130 H7	120				165.03
	100		257		250	180 H7	160		15		215.03
	112										
FU 337	80	25	272	219	200	130 H7	120	5	12	12	165.03
	90										
	100		282		250	180 H7	160		15		215.03
	112										
FU 400	100, 112	32	297.5	229	250	180 H7	155	5	15	12	215.03

Adaptable Range of Gear Box

FA Type



SIZE	A	B	C	D	E1	E2	F	G	K	M	M1	N	N1	P	S	T	X	Y1	Y2	Z1	Z2
112	28.58	44	90	79	29	35	11	16	6	41	105	41	30	62	51	81	35	4	5	8.5	13
162	41.28	51	110	98	41	48	16	19	6	48	130	49	37	71	57	89	40	5	6	13	15.5
200	50.8	59	133	117	48	57	16	25	8	60	159	59	43	86	71	111	51	5	8	13	21
237	60.32	68	159	140	57	70	19	28	10	71	187	68	51	98	84	130	60	6	8	15.5	24
287	73.02	78	191	168	70	83	22	32	11	90	225	81	64	119	103	154	76	6	10	18.5	27
337	85.72	90	219	200	83	98	25	38	13	100	260	98	76	133	116	175	86	8	10	21	33

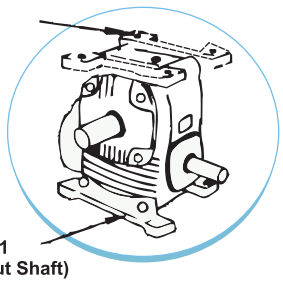
(dimensions in mm)

All dimensions are in mm and they are subject to change for improved design performance.
Keyways are made as per IS : 2048

- Gear boxes are supplied with right hand assembly unless otherwise specified.
- Both input and output shaft extension are provided at extra cost.
- Change of hand after assembly disturbs the setting of worm wheel which should be aligned with shims.
- Mention upward / downward for vertical gear boxes.

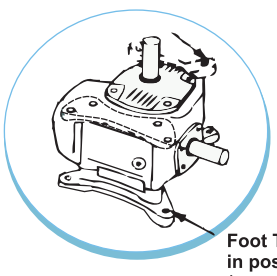
Foot Types and Mounting Positions

Foot Type 1 in position 2
(away from input Shaft)

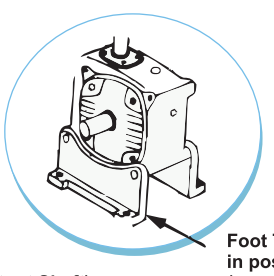


Foot Type 1
in position 1
(near Output Shaft)

Foot Type 2 in position 4
(near Output Shaft)



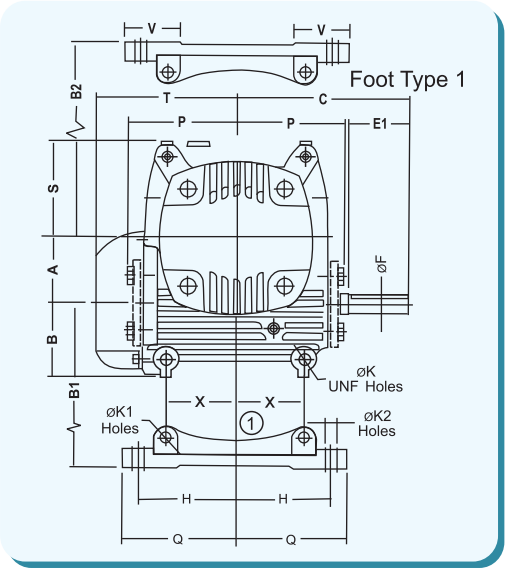
Foot Type 2
in position 3
(away from Output Shaft)



Foot Type 3
in position 5
(away from Input Shaft)

Worm Gear Boxes

Adaptable Range Of Gear Box



Foot Type No.1

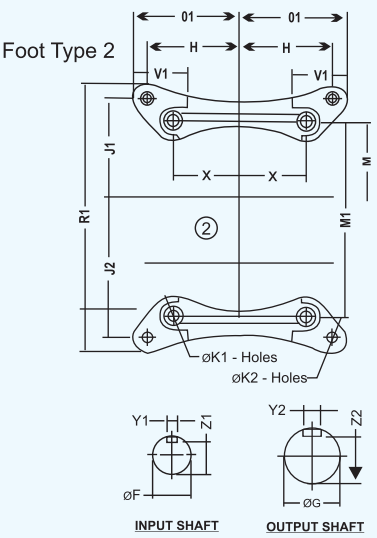
Size	B1	B2	H	J	K1	K2	L	N1	Q	R	V	W	X
112	52	57.5	52	39.0	7	9	13	30	62	52	35	19	35
162	60	67.3	59	45.0	7	10	14	37	70	60	38	22	40
200	70	81.8	76	55.8	9	10	14	43	90	73	49	29	51
237	84	99.3	87	66.0	11	12	17	51	103	85	54	32	60
287	95	123.0	106	82.5	12	13	21	64	124	98	60	35	76
337	110	136.0	119	93.5	13	15	22	76	139	118	67	38	86

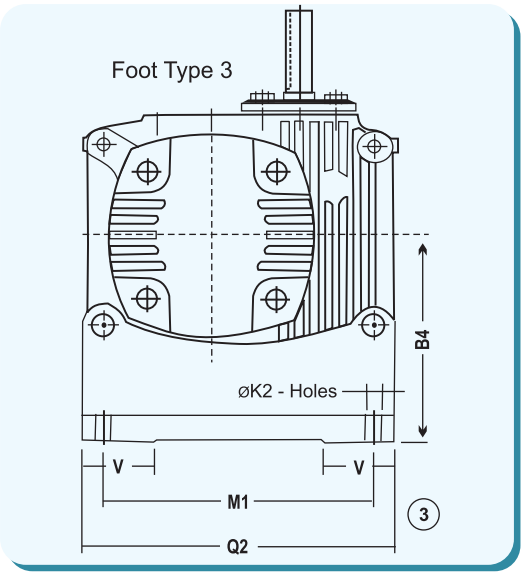
(dimensions in mm)

Foot Type No.2

SIZE	B3	H	J1	J2	K1	K2	L3	M	M1	Q1	R1	V1	W1	X
112	54	52	56.5	79.5	7	9	13	41	105	64	164	37	41	35
162	64	59	65.5	99.5	7	10	14	48	130	71	194	40	46	40
200	70	76	82.5	122.0	9	10	14	60	159	88	228	51	52	51
237	83	87	95.0	140.0	11	12	17	71	187	103	267	57	59	60
287	98	116	161.0	160.5	12	13	21	89	225	124	310	65	65	76
337	114	119	129.0	189.0	13	15	22	100	260	137	360	73	73	86

(dimensions in mm)





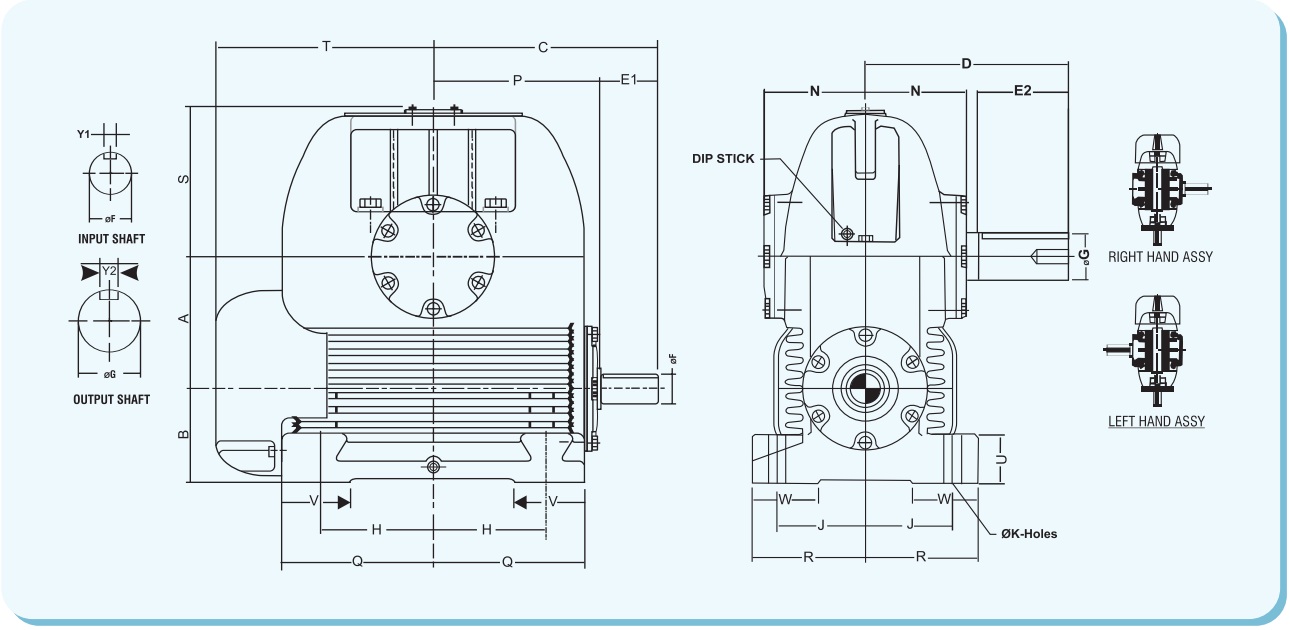
Foot Type No.3

Size	B4	J3	L2	K2	M1	Q2	R2	V	W2
112	94	56	13	9	105	124	65	35	29
162	102	65	14	10	130	150	76	38	32
200	127	75	14	10	159	190	89	49	38
237	146	84	17	12	187	219	100	54	41
287	173	102	21	13	225	260	119	60	48
337	194	116	22	15	260	298	133	67	49

(dimensions in mm)

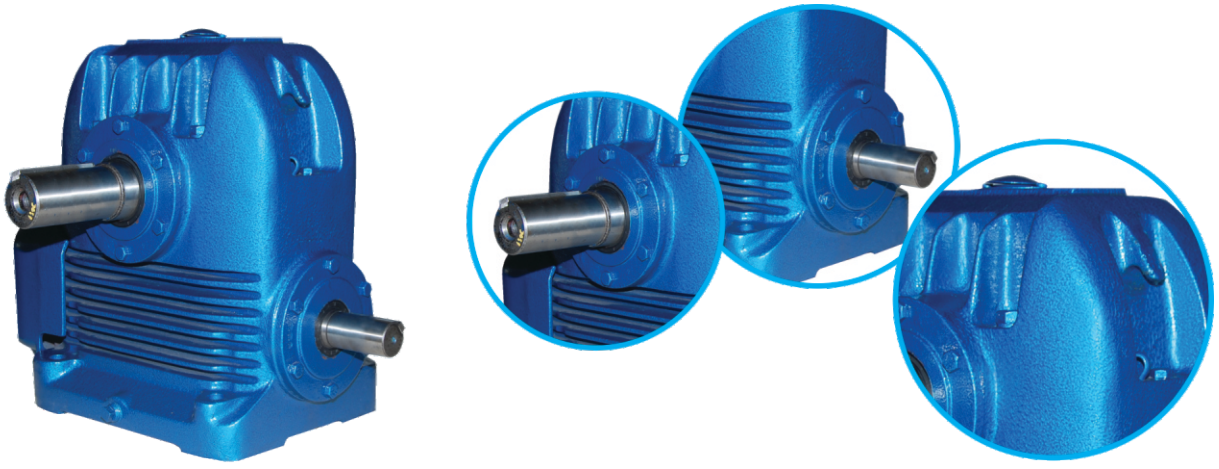
Standard Foot Type Gear Box

FU Type



Size	A	B	C	D	E1	E2	F	G	H	J	K	N	P	Q	R	S	T	U	V	W	Y1	Y2
300	76.2	102	158	186	57	75	25	38	70.0	91.0	14	107	111	102	111	127	160	30	65	65	8	10
400	101.6	108	229	216	67	89	32	45	107.9	101.6	22	121	159	140	127	137	222	44	64	76	10	12
500	127.0	114	260	248	73	102	38	50	123.8	111.1	22	133	184	164	137	159	254	54	70	83	12	14
600	152.4	127	279	273	76	114	40	58	133.4	120.6	22	140	200	179	149	184	270	64	76	89	12	16
700	177.8	146	317	298	86	127	45	65	152.4	133.4	24	151	229	208	162	210	305	70	89	98	14	18
800	203.2	146	343	311	89	140	45	70	171.5	133.4	27	159	251	230	171	235	327	76	102	102	14	20
900	228.6	159	388	342	102	146	50	75	194.0	149.0	27	187	277	254	187.5	267	346	76	112	110	14	20
1000	254.0	175	425	375	111	152	55	85	215.9	165.1	32	194	310	300	200	287	377	76	135	110	16	22

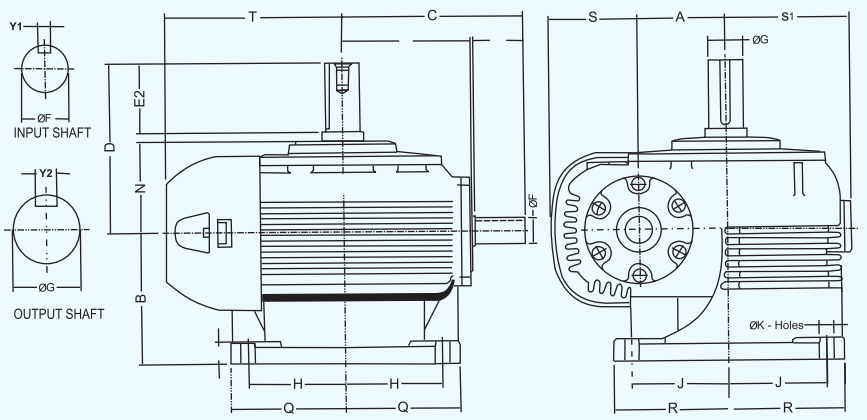
(dimensions in mm)

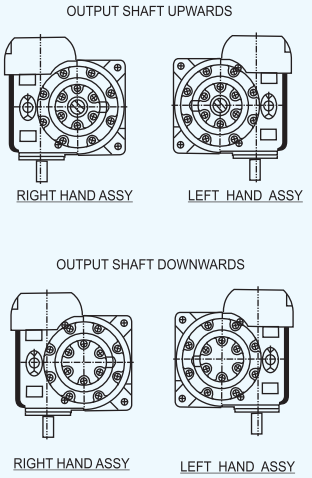


Worm Gear Boxes

Heavy Duty Vertical Gear Box

FV Type





SIZE	A	B	C	D	E1	E 2	F	G	H	J	K	N	P	Q	R	S	S 1	T	U	Y1	Y2
400	101.6	171.4	229	216	67	89	32	45	114.3	114.3	22	121	159	140	140	111	152	222	32	10	12
500	127.0	190.5	260	248	73	102	38	50	139.7	139.7	22	133	184	165	165	124	178	254	32	12	14
600	152.4	210	279	273	76	114	40	58	152.4	152.4	22	140	200	184	184	133	197	270	38	12	16
700	177.8	229	318	298	86	127	45	65	177.8	177.8	24	151	229	210	210	143	222	305	38	14	18
800	203.2	241	343	311	89	140	45	70	203.2	203.2	27	159	251	238	238	149	254	327	44	14	20
900	228.6	254	380	311	100	146	50	75	205	205	26	161	255	245	245	156	272	350	50	14	20
1000	254.0	279.5	425	373	111	152	55	85	260.4	260	32	194	310	311	298	164	367	377	51	16	22

(dimensions in mm)

Actual Gear Ratio for Single Reduction Gear Box

Nominal Ratio	Size Designation													
	112	162	200	237	287	337	300	400	500	600	700	800	900	1000
5:1	4.750	4.750	4.750	5.200	5.200	4.833	4.833	4.833	5.167	4.857	5.125	5.125	5.125	5.125
7.5:1	7.333	7.333	7.333	7.333	7.250	7.250	7.750	7.750	7.600	7.600	7.600	7.167	7.167	7.167
10:1	9.500	9.500	10.500	9.667	9.667	9.667	9.667	9.667	10.250	9.750	9.750	9.750	10.250	10.250
15:1	14.500	15.500	14.500	15.500	14.500	15.500	15.500	14.500	15.500	14.667	14.667	14.667	14.667	14.667
20:1	20.000	19.000	20.000	20.000	19.500	19.500	20.500	19.500	19.500	19.500	19.500	19.500	20.500	19.500
25:1	24.000	24.000	25.000	25.000	25.000	24.000	25.000	24.500	24.500	24.500	24.500	24.500	24.500	25.000
30:1	31.000	30.000	31.000	31.000	30.000	31.000	31.000	30.000	30.000	30.000	29.500	29.500	29.500	30.500
40:1	40.000	40.000	40.000	40.000	40.000	41.000	40.000	40.000	40.000	40.000	39.000	40.000	40.000	40.000
50:1	50.000	50.000	49.000	50.000	50.000	49.000	50.000	50.000	49.000	50.000	50.000	50.000	50.000	50.000
60:1	60.000	59.000	59.000	60.000	60.000	60.000	60.000	60.000	60.000	60.000	60.000	59.000	60.000	60.000
70:1	69.000	69.000	69.000	70.000	70.000	70.000	70.000	70.000	70.000	70.000	70.000	70.000	70.000	70.000

Net Weight of Gear Box

Type	Size Designation													
	112	162	200	237	287	337	300	400	500	600	700	800	900	1000
FA Type	5	7	13	20	31	49								
FU Type	5	7	13	20	31	49	40	68	95	125	170	220	270	320
FV Type	5	7	13	20	31	49	48	80	110	145	200	254	310	370

(Net weight in Kgs.)

There is a continuous improvement in design and this specification should not be regarded as binding.

All dimensions are subjected to alteration without notice.

The above weight is the approximate dry weight of each gear box in kilograms.

Oil Capacity for Fenner Worm Gear Box Units

Quantity in litres

Size	112	162	200	237	287	337
FA Type	0.1	0.3	0.3	0.6	0.9	1.4

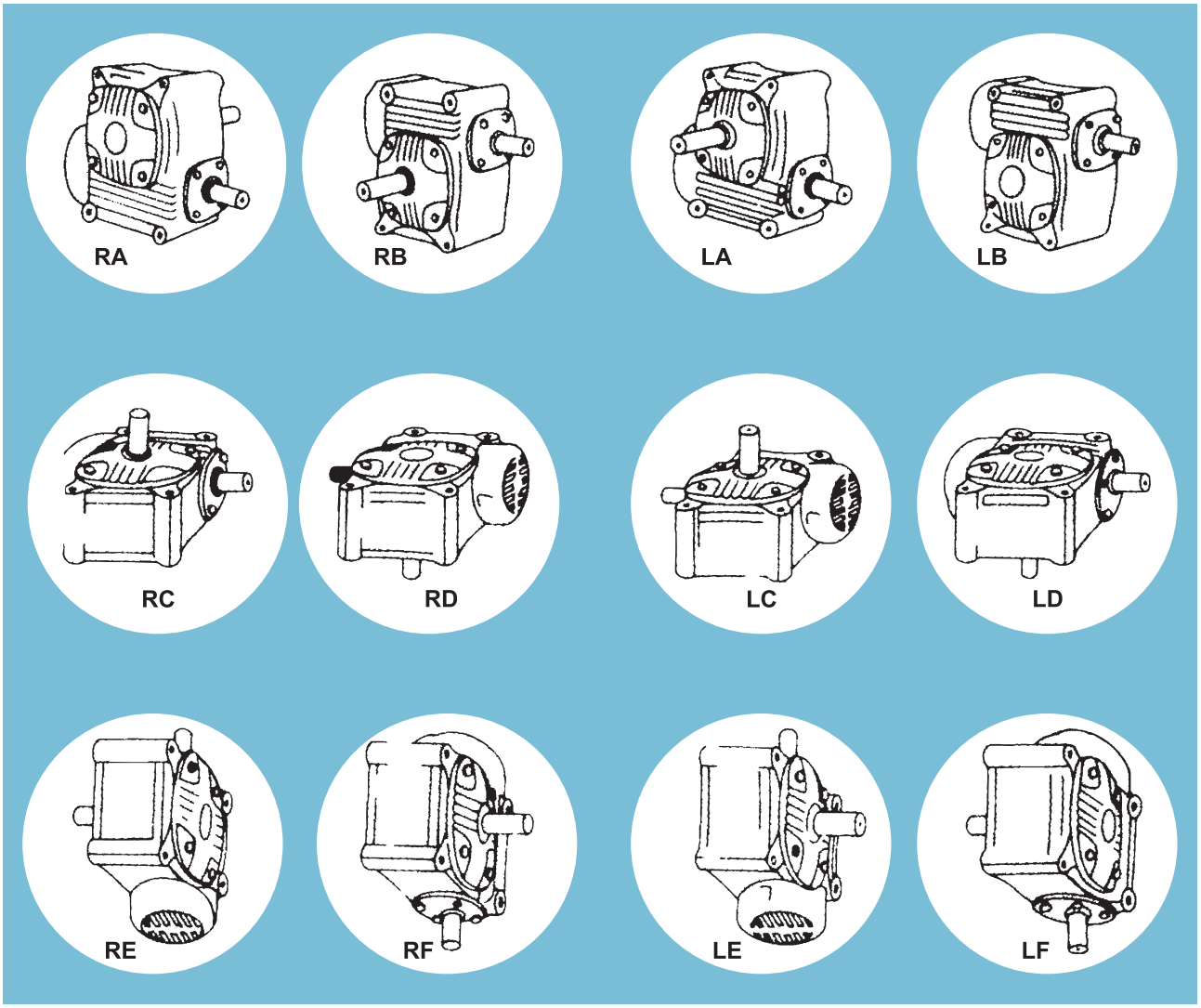
Quantity in litres

Type	Size Designation							
	300	400	500	600	700	800	900	1000
FU Type	2.40	3.00	4.10	6.00	9.00	11.20	14.70	17.30
FO Type	-	2.30	2.80	4.00	5.50	9.00	10.00	11.00
FV Type	-	4.00	5.20	6.20	10.00	12.20	16.80	22.50

(For Single Reduction Gear box)

Worm Gear Boxes

Adaptable Gear Box Mounting Arrangements



Typical Catalogue Number

FA	112	50	LA	1	1
Type Designation	Size Designation	Nominal Ratio	Handing & Space Mounting	Type of Feet	Position of Feet

Full details from the nameplate should be specified for spare parts.

Lubrication

The lubrication system of Fenner Worm Reduction Gear box is self-contained positive and automatic at all speeds of operations and in both directions of rotation. Adaptable units are provided with breather, oil level and drain plugs and it must be ensured that these are correctly positioned as per the attached diagrams. For other units, a dipstick is provided for checking the oil level along with an oil filter cum ventilator plug and a drain plug. These are also shown in the adjoining diagram.

Recommended Lubricant	
Brand	**Grade**
Indian Oil	Servomesh SP320 or Servosystem 320
Bharat Petroleum	Cabol 320 or Amocam 320
Hindustan Petroleum	Enklo 320 or Parthan EP 320
Gulf	Gulf harmony 320 or Gulf EP 320
Castrol	Alfa Zn 320 or Alpha Sp-320 or Tribol 1100/320 TGQA
Veedol	Avalon 320
Fuchs	Renolin CKC 320
Shell	Vitera Oil 320 or Omela 320
Balmer lawrie Fuchs	Renolin CKC 320

All Fenner gear boxes are supplied without oil and it must be filled with to the correct level with the correct grade of lubricant. It is most important to ensure that the gear box is not over filled. Any sort of over filling may result in oil churning resulting in over-heating and oil leakage. It is also important to ensure that the breather plug is clean. Any dust accumulation or unwanted paint over the breather plug will cause pressure to build-up and may result in oil leakage.

Polyglycol based Synthetic Lubricants may also be used to improve the transmission capacity of the gear box. It has been observed that the overall performance of the gear box is improved up to 20% while using Polyglycol based lubricants compared to Mineral Oil at the same working temperature. Such type of gear oil exhibits excellent non-ageing stability resulting in considerable improvement on the overall efficiency of the gear box.

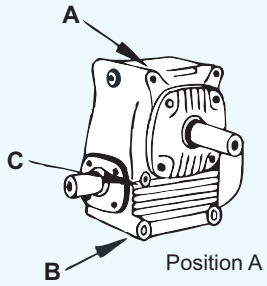
Brand	Grade
Castrol	Tribol 800 - 220
Fuchs	Renolin PG 220

While using synthetic lubricants, the gear box must be properly flushed. Synthetic lubricants should not be mixed with any other type of oil.

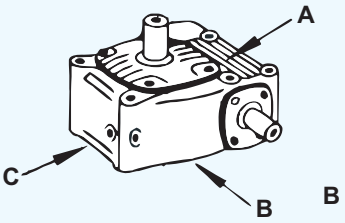
Worm Gear Boxes

Lubrication

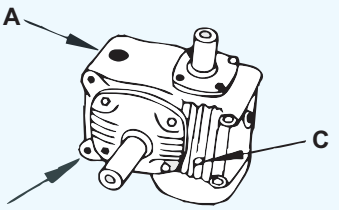
Change of oil :
For the gear box to have a long and trouble free life, periodic change of lubricant is extremely essential. The necessity of change of oil is normally determined by the type of oil used, oil temperature, working environment and also the type of applications. However, to prevent the damage of the gear box due to lubricant breakdown, the oil should be renewed as per the following details.



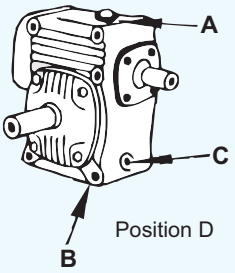
Position A



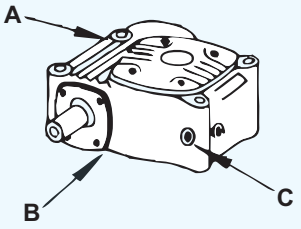
Position B



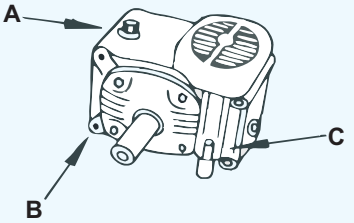
Position C



Position D



Position E



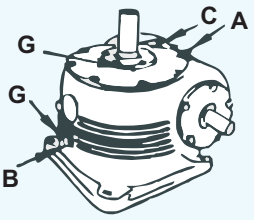
Position F

A - Oil filler - Breather

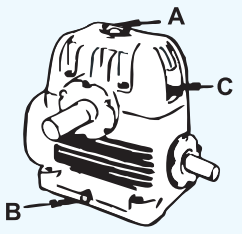
B - Oil Drain

C - Oil Level

G - Grease Point



Type V 400 800



Type U 400 800

Plain Mineral Oils		
Temperature (°C)	**Adaptable Units (FA Type)**	**Other Units (FU / FO / FV Types)**
75° or less	2500 hrs or 6 months whichever is less	5000 hrs or 12months whichever is less
80°	2000 hrs or 6 months whichever is less	3500 hrs or 6 months whichever is less
85°	1500 hrs or 3 months whichever is less	2500 hrs or 6 months whichever is less
90°	1000 hrs or 3 months whichever is less	1000 hrs or 3 months whichever is less

For use of Oils Containing EP Additives		
Temperature (°C)	**Adaptable Units (FA Type)**	**Other Units (FU / FO / FV Types)**
75° or less	2500 hrs or 6 months whichever is less	5000 hrs or 12months whichever is less
80°	1500 hrs or 6 months whichever is less	3000 hrs or 6 months whichever is less
85°	1000 hrs or 3 months whichever is less	2000 hrs or 6 months whichever is less
90°	750 hrs or 3 months whichever is less	750 hrs or 3 months whichever is less

Installation and Maintenance

Installation

Gear boxes are to be rigidly mounted so as to minimize the effect of fluctuating or heavy loads. Always check the alignment has taken place, properly locate the gear by means of dowels at appropriate locations preferably in diagonal direction.

The use of flexible couplings (HRC Couplings / Gear Couplings / Tyre Couplings) are very important for the improved performance of the gearbox. The couplings are to be lined up to avoid the misalignment of angularity and eccentricity.

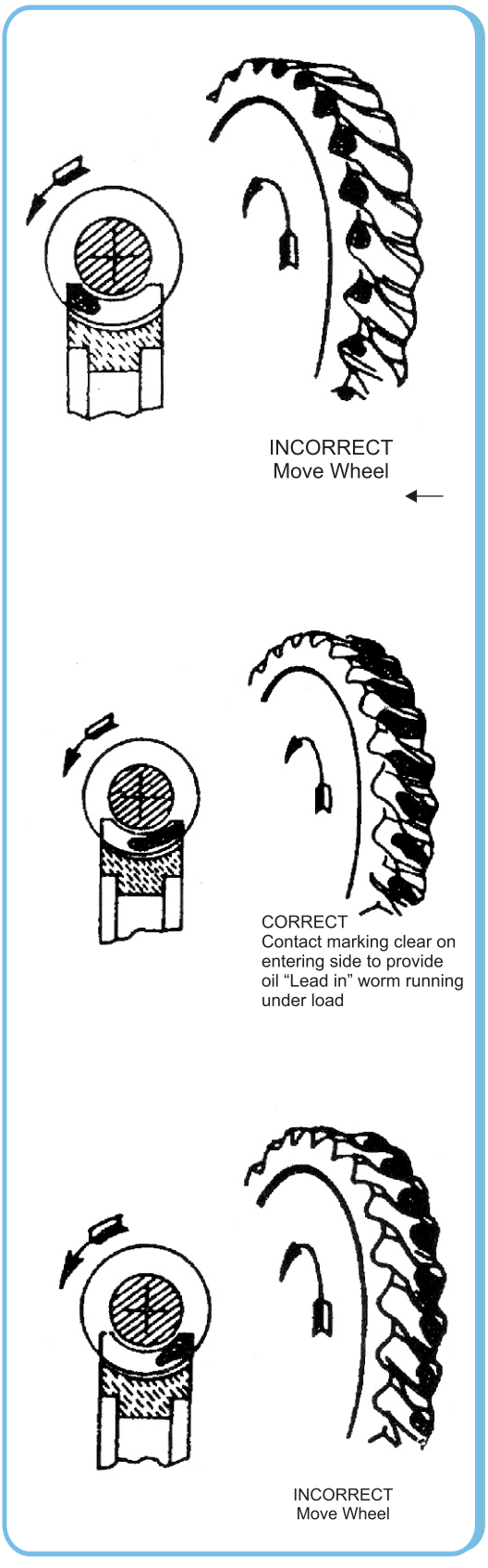
Change of Handling

When changing the handling of the slow shaft extension, the shaft complete with wormwheel, bearings, etc. should be reversed as a unit. It should be appreciated that this has the effect of reversing the offset of the wheel relative to the worm. When changing the slow speed shaft handling of V type units, it should be noted that the position of the wheel relative to the case must not be changed. It is necessary therefore to press the wheel from the shaft and the position of the shaft in relation to the wormwheel must be reversed. The end covers should be located in their respective positions.

It is necessary to check contact markings on the worm wheel teeth and if any axial adjustment of the worm wheel is necessary, it can be effected by means of the shims between covers and bearing housing which should be moved from one side to other. It is essential that the top half of the gear case be replaced in its original position (not applicable for Adaptables).

The contact marking is checked by painting the worm with red lead Prussion Blue and rotating the worm by hand while applying a small breaking pressure to the wheel by hand.

The correct marking should be slightly heavier on the “leaving side” of the teeth, relative to the direction of rotation of the worm. This is to provide “lead in’ for the lubricant and to avoid concentration of pressure on the entering side as this would affect the smoothness of the operation.



Worm Gear Boxes

Trouble Shooting

Symptom	Cause	Remedy
Gear box is getting over heated	• Unsuitable lubricant • Less or more lubricant than required • Gear box is overloaded • Very low speed or very high speed operations • Oil seal is damaged • Clogging of breather plug • Dusty environment	• Use correct grade of oil. • Fill oil to correct level • Check the ratings • Verify the design and suitability of gear box • Replace the oil Seal • Clean breather plug • Use of proper exhaust
Noise in gear box	• Unsuitable or less lubricant • Gear is damaged • Bearing is damaged • Presence of foreign matters	• Replenish or refill lubricant. • Replace gear • Replace bearing • Remove the foreign matter, flush the gear box and replace lubricant.
Vibration	• Damaged worn out bearing • Presence of foreign matter • Loose bolt	• Replace bearing • Remove the foreign matter, flush the gear box and replace lubricant. • Tighten the bolts
Oil leakage	• Oil seal damaged • Packing is damaged • Clogging of breather plug • Overfilling • Abnormal vibration	• Replace oil seal • Replace packing • Clean breather plug • Drain out excess oil • Eliminate the cause of vibration
Gear box does not work	• Bearing is damaged • Gear is damaged • A solid foreign matter	• Replace bearing • Replace gear • Remove the foreign matter, flush the gear box and replace lubricant.

Axial Floats

After re-handling it is essential that the shaft and the floats are correctly set. The recommended axial floats for wormshaft and wheelshaft are as given below. They should be checked preferably using a dial indicator gauge mounted on a magnetic base.

Size	Wormshaft (mm)	Wheelshaft (mm)
112	0.050/0.100	0.025/0.050
162	0.050/0.100	0.025/0.050
200	0.050/0.100	0.025/0.050
237	0.050.0.100	0.025/0.050
287	0.050/0.100	0.025/0.050
337	0.050/0.100	0.025/0.050

Size	Wormshaft (mm)	Wheelshaft (mm)
300	0.5/0.100	0.25/0.05
400	0.050/0.100	0.025/0.050
500	0.050/0.100	0.025/0.050
600	0.050/0.100	0.025/0.050
700	0.075/0.125	0.025/0.075
800	0.075/0.125	0.025/0.075

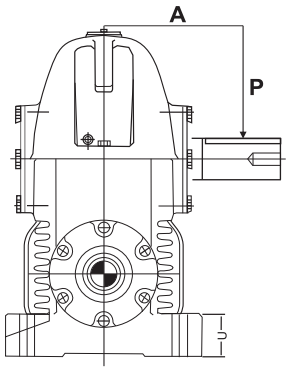
Overhung Loads

All Fenner Worm Gear box are fitted with Taper Roller Bearings amply proportioned to accommodate normal thrust, radial and overhung loads. In case, external additional loads are applied, over and above permissible loads, precautions need to be taken to put higher capacity bearings along with change of materials with higher tensile strength for the wheel shaft to accommodate the additional load. In case of any V-Belt Drive, Flat Transmission Belting, Chain Drive or a pinion is attached on the output shaft of the gear box, we need to calculate the overhung loads on the output shaft to compare with the maximum overhung load table as mentioned below. In case, it exceeds, we recommend that full details of the drive and direction of the overhung load be submitted with enquiry and order so that conditions can be evaluated.

To determine the overhung load in Newtons, following formula can be used:

$$\text{Overhung load (N)} = \frac{\text{KW x 9550 x 1000 x 2 x F}}{\text{D x rpm}}$$

KW = Shaft Power in Kilo Watts
D = Pitch Circle Diameter of Sprocket, pinion, sheave or pulley in mm
F = Overhung drive application factor



Overhung Drive application Factor (F) :

Sprocket : 1.00
Pinion : 1.25
V-Pulley : 1.50
Flat Belt Pulley : 2.00

Permissible Overhung Loads (N) at Centre line of Wheelshaft Keyway (At 1500 rpm Input speed) :

Gear Box Size	Distance A (mm)	Type of Bearing	Nominal Ratio										
			5.1	7.5:1	10:1	15:1	20:1	25:1	30:1	40:1	50:1	60:1	70:1
112	62	Standard	801	801	1060	1070	1060	1060	1060	1070	1050	1000	935
162	75	Standard	2780	2750	2640	2530	2590	2440	2430	2510	2610	2720	2770
200	89	Standard	4400	4380	4180	4120	3900	3910	3960	4030	4150	4320	4430
237	105	Standard	5630	5610	5520	5290	4920	4940	5080	5210	5320	5480	5620
287	127	Standard	5030	4830	4640	3890	3990	3100	3170	3620	3890	4310	4790
337	151	Standard	9120	9520	9330	8720	8810	8370	8170	8470	8820	9020	9400
400	171	Standard	11500	12600	12300	12000	11600	11600	11400	11200	11700	11700	11800
500	197	Standard	14500	16600	17800	17800	16800	17100	16500	16900	16900	16700	17300
600	216	Standard	15000	18600	19400	17400	16800	17600	16200	15500	16000	17100	17600
700	235	Standard	17400	20800	24200	25300	25200	23500	23900	22600	21500	23300	24600
800	241	Standard	17400	21300	25700	28700	28200	25200	26800	25000	23300	23900	26500
1000	298	Standard	19500	24700	30100	32900	30100	30900	30200	29800	29100	28900	25500