AGNEE EXTRUDER GEARBOXES

AGNEE Extruder Gearboxes in double reduction parallel shaft horizontal models are intended to satisfy characteristic requirements and conditions commonly encountered in single screw extrusion process. The gear units are quite capable to transmit the high torque required for materials and also to absorb the high axial thrust load through built-in spherical roller thrust bearing.

The axial bearing housing integrally cast to the to accommodate suitable thrust bearings and corresponding output shafts. This catalogue contains specifications, dimensions and ratings for selection of standard extruder gear drives (covering models EX-112 to EX-250 having ratio range of 5.6/1 to 25.6/1) against usual applications. However, mounting flange and output shaft version may be to suit the special extruder and screw shaft requirements.

SALIENT FEATURES

Gears & Pinions : Gears and pinions are of helical type manufactured from high quality alloy case hardening steel. Case hardened surface with softer core provides improved wear resistance and
fatigue strength. These are subsequently flank ground to precision grade to ensure high standard of accuracy, long life and quiet running characteristics.
Case : The high quality, close-grained cast iron casing horizontally - split in 2 - pieces accommodates the bearings and the gear trains. AGNEE extruder gearboxes are designed in double reduction version with thrust bearing housing integrally cast to horizontally split case. The case design has been computer optimised on CAD work station to provide precisely calculated strengthening ribs and optimal wall thickness in critical load carrying areas. They are provided with easily accessible service ports.
Bearings : Taper roller bearings from major manufacturers are used throughout except the thrust bearing which is of self-aligning spherical roller type. These bearings have ample capacity to support combined radial and thrust loads.
Shafting : Input shaft integral with pinion is machined from case- hardening alloy steel. Direct hardening steel is used for hollow output shaft. The cylindrical seats for bearings, wheel, seal, coupling, fan are finished by precision grinding. Fitment dimensions towards specific screw shaft requirement must be addressed during placement of order.
Shaft Seals : The shaft extensions are fitted with spring-loaded rubber seals to prevent outflow of oil.
Lubrication : Lubrication of gears and bearings is entirely self-contained by automatic 'Splash', which provides ample and positive flow of oil resulting minimum wear and noise. The cast tray inside the top case guides churned lubricants towards the bearings. The core hole connecting the thrust bearing housing and main oil sump ensures continuous circulation of oil flowing through the spherical roller thrust bearing at the output end. Recommended oil is of viscosity grade ISO:VG-320 with EP additives. No special care is required except occasional topping up of the oil. It is not advisable to mix two equivalent brands of lubricating oil.
Cooling : Standard gear units are cooled by normal heat dissipation through convection/radiation from externally exposed surface. All such units have provisions for fitment of cooling water coil at the bottom of oil sump. Built-in cooling coils are provided against specific options.
Direction of Rotation : The units may be operated in either direction of rotation as per requirement.
Product Certification : Being manufactured under a quality system certified to ISO : 9001:2015

Painting : Casting surfaces are painted with linear epoxy primer both internally and externally. External cast faces are finally finished with PU blue Coatings, which is resistantto dilute acids and alkalis, oils and solvents, sea water and temperatures upto 140oC.

Preservation / Protection AGNEE Extruder gear units are despatched without oil. Prior to despatch they are test run with a rust preventative oil assuming adequate protection to internal parts for a period of 6 months, covering normal transport and covered storage.
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NOTE :
As improvements in design are being continuously made, this specification is not to be regarded as binding and is subject to alterations without notice.

SELECTION PROCEDURE

AGNEE Extruder gearbox size is to be determined against rated output torque capacity in consideration with necessary service factor. The thrust bearing size should thereafter be cross-checked against its suitability in terms of basic dynamic load rating.

1.0 Selection Of Size of Reducer :

1.1 Gearbox ratio = Input speed / output speed

1.2 Select the nearest nominal ratio and corresponding actual ratio from the available chart.

1.3 Determine the demand torque at output based on consumed load (*) and output rpm

Required torque (Nm)=9550 x Actual Reducer Power (Absorbed power (kW)*) X service Factor /Ooutput speed (rpm)

(* In absence of consumed load, take motor power)

1.4 Get required output torque of the gearbox by multiplying the demand torque with necessary mechanical service factor. The minimum service factor is recommended to be between 1.5 and 2.0 depending upon the operating duration and loading character.
Required output torque (Nm)=Demand torque (Nm) x service factor

1.5 From the mechanical torque rating table select a suitable size wherein the rated output torque meets or exceeds the required torque under point, 1.4 with the pre-determined ratio.

2.0 Check For Thermal Rating :

2.1 Thermal ratings are listed for following cases:
1. Gearbox without additional cooling (i.e. with natural heat dissipation through connection & radiation)
2. Gearbox fitted with cooling water coil.

2.2 Determine the thermal service factor from table.

2.3 Calculate the required thermal power capacity on the basis of absorbed power (*) and thermal service factor corresponding to specified ambient temperature and running hours.
Required thermal power (kW) = Absorbed power (kW)*/Thermal service factor.
(* In absence of consumed load, take motor power)

2.4 Check the type of cooling (with or without cooling coil) by referring to thermal rating table. The required thermal power must be equal to or less then the thermal capacity of the gearbox as tabled in this catalogue.

3.0 Check for Thrust Bearing :

3.1 The screw diameter, working pressure, screw rpm and thrust bearing life expectancy are to be specified by the extruder manufacturers.

3.2 Calculate the thrust load (Fa) from the following relationship :
$Fa=3.14 \times Ds^2 \times Pa / 4 \times 10000$

Fa=Thrust load from extruder (kN)
Ds=Extruder screw diameter (mm)
Pa=Working pressure (bar)

3.3 Calculate the thrust bearing capacity (Ca) on the following basis :

$Ca=1.06 \times Fa \times (Lh \times 60 \times Ns/10)^{3/10}$

Where, Ca=Required bearing capacity (kN)
Fa=Thrust load from extruder (kN)
Lh=Bearing life expectancy (hrs)
Ns=Speed of extruder screw (rpm)

3.4 Check the basic dynamic load rating (C) from the thrust bearing given below. The calculated capacity (Ca) must be equal to or less than the catalogue rating (C).

Since, AGNEE Extruder gear units are standardised with integrally - cast thrust bearing housing limiting the maximum size of thrust bearing for a particular model of gear reducer, a higher size gearbox may be required for accommodating a larger thrust bearing to satisfy the dynamic capacity.

THRUST BEARING DATA :

(With maximum possible bore in hollow output shaft which may be accommodated in the respective sizes of AGNEE standard double reduction parallel shaft extruder gearboxes in C. I. Case with integral thrust bearing housing).

THRUST BEARING DATA				
SIZE	Spherical Roller Thrust Bearings (Standard Size)	Basic Dynamic Load Rating C (kN)	Out put Shaft	
			Maximum Possible Bore Dia, Having Std. Key Way (mm)	Standard Bore Length (mm)
EX-112	29412 E	335	30	90
EX-125	29414 E	440	40	120
EX-140	29416 E	550	45	135
EX-160	29422 E	950	60	160
EX-180	29426 E	1250	75	200
EX-200	29428 E	1320	80	225
EX-225	29432 E	1700	90	240
EX-250	29436 E	2120	100	260

Example

Example

Driving Machine : Three Phase A.C. Motor.
Motor Power: 20 Hp or 15 KW
Diameter Of Motor Pulley : 5 inch
Diameter of Gear Box pulley: 9 inch
Gear Box Ratio: 12.6
Service Factor 1.5
Ambient Temperature: 30^{o}C
Screw diameter (Ds) 75 mm
WORKING Pressure (Pa)300 bar
Thrust Bearing Life duration: 20000 hrs

Selection:

1. Selection of Reducer

- Input Speed to the gear box = 1440 X5/9 = 800 rpm
- Output speed of Gear box (Extruder screw rpm) = 800/12.6 = 63.6 rpm
- Required Torque (Nm)= 9550 X 15 (20 Hp) X 1.5/ 63.5 = 3383.9 Nm = 3.38 kNM
- From the “Rated output Torque “ table size EX-140 with Rated output Torque 3.49 kN at 12.6 ratio

2. Check for Thermal Rating:

- Let’s assume that the gear box is filled with cooling coil
- Taking the thermal service factor at 30^{o}C & 100% running time as 0.9,
- Require Thermal Power (Kw) = 15/0.9=16.67 Kw
- From “Thermal Capacity” table, Thermal capacity = 116 KW.
- i.e. Thermal Capacity> Required Thermal Power. Hence the selection of the size is correct.

3. Check For thrust Bearings:

- The screw Diameter , working pressure, screw rpm and thrust bearing life expectancy are to be specified by the extruder manufacturer: In this case we have the date.
- Thrust Load (Fa) = 3.14 x $(75)^2$ X 300 / 4 x 10000 = 133 kN
- Thrust Bearing Capacity (Ca) = 1.06 x 133 x (20000 x 60 x 63.5/10000)$^{3/10}$ =516 kN
- From the “ Thrust Bearing Data” table, Dynamic Load Rating © = 550 kN
- i.e C>ca. Hence the selection of bearing is correct.

THERMAL CAPACITIES (kW)

Nominal Ratio	Input Speed rpm	Unit Size							
		EX-112	EX-125	EX-140	EX-160	EX-180	EX-200	EX-225	EX-250
Units without auxiliary cooling									
5.60 to 11.4	1500	18	21	29	36	46	82	102	125
	1000	17	20	27	34	44	82	100	121
	750	16	19	27	33	43	76	96	120
12.6 to 25.6	1500	17	20	28	34	44	77	97	120
	1000	16	19	27	32	42	81	97	115
	750	15	18	26	31	41	76	82	111
Units with cooling coil									
Nominal Ratio	**Input Speed rpm**	**Unit Size**							
		EX-112	**EX-125**	**EX-140**	**EX-160**	**EX-180**	**EX-200**	**EX-225**	**EX-250**
5.60 to 11.4	1500	88	92	130	139	157	170	192	435
	1000	87	90	129	139	155	168	188	403
	750	86	90	127	136	152	165	185	385
12.6 to 25.6	1500	81	83	116	123	140	150	177	323
	1000	80	82	116	122	138	147	174	325
	750	79	82	113	120	135	145	170	326

Thermal Service Factor (Relative ambient temperature and duration of operation)

Type of cooling	Ambient Temperature^{0}C	Running Time in any hour				
		100%	80%	60%	40%	20%
Gearboxes without additional Cooling	10	1.12	1.34	1.57	1.79	2.05
	20	1.0	1.2	1.4	1.6	1.8
	30	0.88	1.06	1.23	1.41	1.58
	40	0.75	0.9	1.05	1.2	1.35
	50	0.63	0.76	0.88	1.01	1.13

Type of cooling	Ambient Temperature^{0}C	Running Time in any hour				
		100%	80%	60%	40%	20%
Gearboxes without additional Cooling	10	1.1	1.32	1.54	1.76	1.98
	20	1.0	1.2	1.4	1.6	1.8
	30	0.9	1.08	1.26	1.44	1.62
	40	0.85	1.02	1.19	1.36	1.53
	50	0.8	0.96	1.12	1.29	1.44

RATED OUTPUT TORQUE

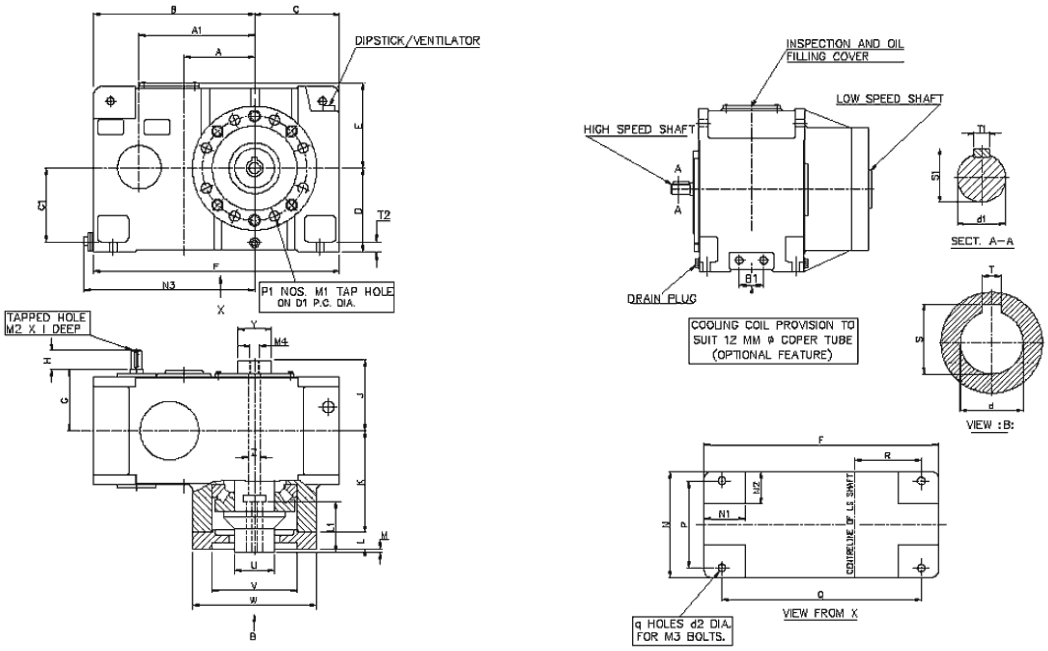
Rated Output torque (kNm)

Nominal Ratio	Unit Size							
	EX-112	EX-125	EX-140	EX-160	EX-180	EX-200	EX-225	EX-250
5.60	1.56	2.90	2.93	4.41	5.5	7.58	11.04	13.65
6.20	1.71	3.03	3.02	4.62	5.84	7.83	11.17	16.57
6.86	1.90	3.02	3.34	5.10	6.45	8.63	11.90	17.44
7.59	2.09	3.03	3.68	5.20	6.90	9.12	11.96	18.38
8.40	1.88	3.05	3.54	5.21	6.99	9.44	13.18	17.77
9.30	2.09	3.04	3.67	5.39	7.01	9.61	13.41	19.16
10.30	2.05	3.05	3.53	5.44	7.39	9.88	13.87	19.17
11.40	2.11	3.05	3.66	5.30	7.58	9.91	13.53	20.26
12.60	2.05	2.42	3.49	5.17	7.40	9.87	13.72	21.19
14.00	2.11	3.06	3.59	4.69	7.48	10.00	14.28	21.69
15.40	2.11	3.07	3.44	5.03	7.61	8.96	12.17	18.98
17.10	2.06	2.43	3.50	5.17	7.42	9.94	13.50	21.06
18.90	2.07	2.43	3.45	5.15	7.39	8.54	12.75	17.92
20.90	1.38	2.25	3.30	5.29	7.18	8.67	12.18	17.48
23.20	1.38	2.25	3.29	4.87	7.19	8.81	11.84	17.06
25.6	1.65	2.53	2.83	4.24	6.05	7.99	11.36	15.55

Exact Ratio

Nominal Ratio	Unit Size							
	EX-112	EX-125	EX-140	EX-160	EX-180	EX-200	EX-225	EX-250
5.60	5.689	5.562	5.636	5.648	5.567	5.625	5.670	5.599
6.20	6.249	6.281	6.078	6.240	6.214	6.250	6.300	6.245
6.86	6.943	6.758	6.814	6.895	6.875	6.905	6.848	6.978
7.59	7.667	7.528	7.590	7.693	7.663	7.595	7.565	7.585
8.40	8.500	8.611	8.333	8.362	8.427	8.472	8.500	8.680
9.30	9.444	9.265	9.342	9.449	9.323	9.319	9.390	9.435
10.30	10.389	10.262	10.348	10.489	10.370	10.450	10.434	10.151
11.40	11.479	11.272	11.366	11.522	11.474	11.296	11.522	11.711
12.60	12.511	12.647	12.505	12.802	12.600	12.664	12.750	12.958
14.00	14.081	14.018	14.135	14.167	13.941	14.200	14.167	13.941
15.40	15.678	15.160	15.287	15.441	15.260	15.462	15.512	15.500
17.10	17.088	17.010	16.818	17.197	17.121	17.337	17.236	16.676
18.90	18.638	18.918	18.706	19.003	18.529	19.211	19.111	18.919
20.90	20.595	20.475	20.759	20.759	20.250	20.759	20.531	20.912
23.20	23.018	23.000	23.319	23.066	22.781	23.003	22.765	23.724
25.6	25.757	25.875	25.840	25.573	25.845	25.594	25.575	25.845

PRINCIPAL DIMENSIONS



Principal Dimensions (Unless specified otherwise all dimensions are in mm)

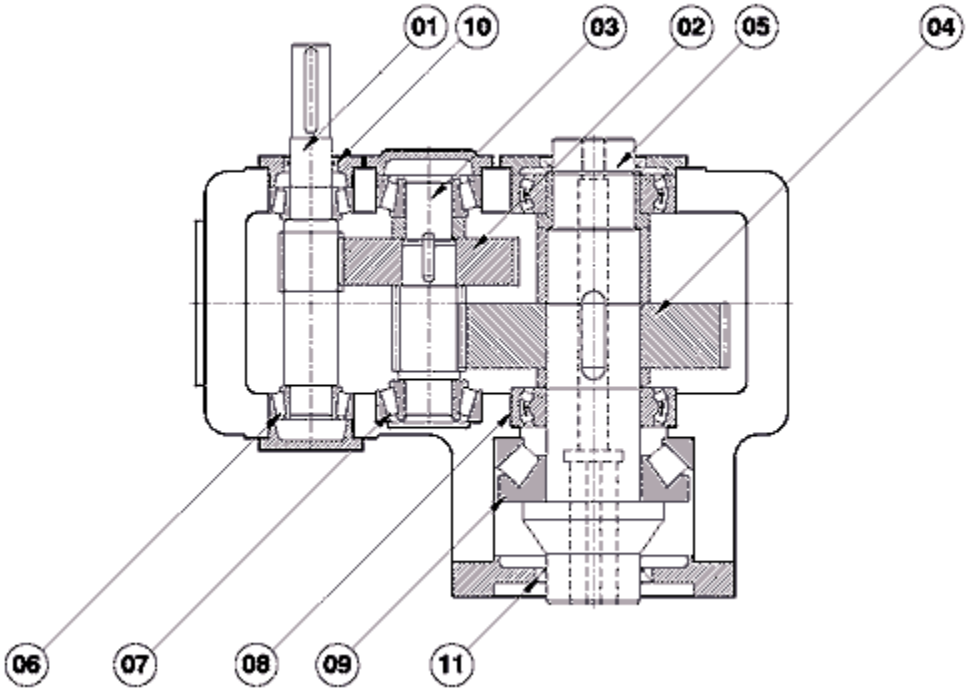
SIZE	A	A1	B	B1	C	C1	D	D1	d	d1	d2	E	F	G	H
EX-112	112	192	267	50	135	100	125	160	30.041 30.020	22.009 21.996	14	140	402	112	50
EX-125	125	225	315	60	150	112	140	185	40.050 40.025	25.009 24.996	14	154	465	125	60
EX-140	140	240	330	90	165	127	160	205	45.050 45.025	32.018 32.002	14	174	495	140	80
EX-160	160	272	375	110	185	145	180	290	60.060 60.030	35.018 35.002	18	194	550	160	80
EX-180	180	305	420	110	200	165	200	305	75.060 75.030	38.018 38.002	18	214	610	175	80
EX-200	200	340	465	135	225	185	225	330	80.060 80.030	38.018 38.002	22	239	680	185	80
EX-225	225	385	567	135	250	210	250	370	90.071 90.036	45.018 45.002	22	267	760	205	110
EX-250	250	430	632	150	280	237	280	410	100.071 100.036	55.030 55.011	26	298	850	220	110

SIZE	J	K	L	I	L1	M	M1	M2	M3
EX-112	112	160	26	16	90	5	M12	M6	M12
EX-125	125	185	30	16	120	5	M12	M6	M12
EX-140	140	220	30	20	135	5	M16	M8	M12
EX-160	168	246	35	32	160	5	M16	M8	M16
EX-180	180	273	40	32	200	7	M16	M16	M16
EX-200	200	300	40	32	225	8	M16	M16	M20
EX-225	215	335	45	32	240	8	M20	M16	M20
EX-250	235	375	45	50	260	8	M20	M24	M24

SIZE	M4	N	N1	N2	N3	P	P1	Q	q	R	S	S1	T	T1	T2
EX-112	M12	174	100	60	308	144	8	322	4	95	33.500 33.300	24.500 24.400	8.018 7.982	6.000 5.970	20
EX-125	M16	194	100	60	356	160	8	375	4	105	43.500 43.300	28.000 27.800	12.022 11.978	8.000 7.964	20
EX-140	M20	224	100	60	371	190	8	405	4	120	49.000 48.800	35.000 34.800	14.022 13.978	10.000 9.964	20
EX-160	M30	260	110	70	408	225	8	450	4	135	64.600 64.400	38.000 37.800	18.022 17.978	10.000 9.964	20
EX-180	M30	290	120	85	453	250	8	505	4	147.5	80.100 79.900	41.000 40.800	20.026 19.974	10.000 9.964	20
EX-200	M36	310	125	90	500	265	8	560	4	165	85.600 85.400	41.000 40.800	22.026 21.974	10.000 9.964	20
EX-225	M36	340	130	95	555	280	8	630	4	185	95.600 95.400	48.500 48.300	25.026 24.974	14.000 13.957	20
EX-250	M36	370	140	115	615	300	8	710	4	210	106.600 106.400	59.000 58.800	28.026 27.974	16.000 15.957	20

SIZE	U	V	W	Y	Z
EX-112	60.000 59.954	130.040 130.000	190	50.000 49.961	16
EX-125	70.000 69.954	150.040 150.000	220	60.000 59.954	20
EX-140	80.000 79.954	170.040 170.000	240	70.000 69.954	25
EX-160	110.000 109.946	230.046 230.000	330	80.000 79.954	34
EX-180	130.000 129.937	270.057 270.000	340	80.000 79.954	34
EX-200	140.000 139.937	280.052 280.000	380	90.000 89.946	45
EX-225	160.000 159.937	320.057 320.000	420	100.000 99.937	45
EX-250	180.000 179.937	360.057 360.000	460	110.000 109.946	45

SECTIONAL ARRANGEMENT

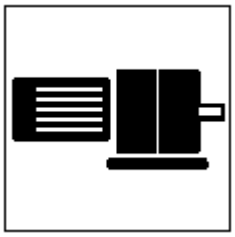
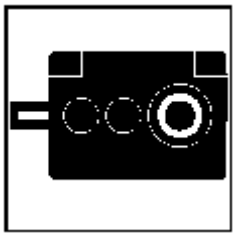
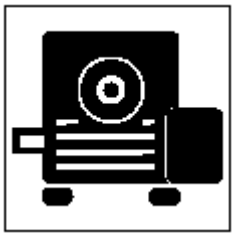
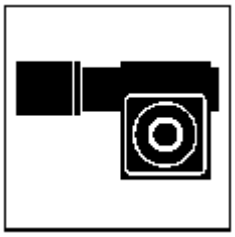
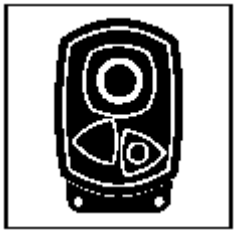
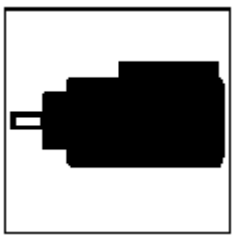
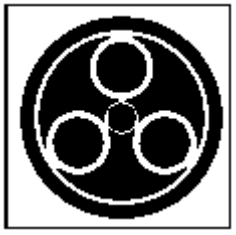
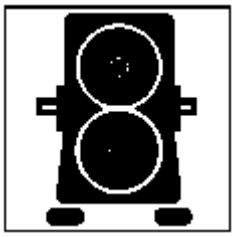
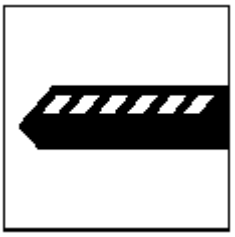


ITEM NO.	DESCRIPTION	QTY
1	INPUT SHAFT WITH PINION	01
2	1 ST STAGE WHEEL	01
3	FINAL PINION SHAFT	01
4	OUTPUT WHEEL	01
5	HOLLOW SHAFT	01
6	INPUT BEARING	02
7	INTERMEDIATE BEARING	02
8	OUTPUT BEARING	02
9	THRUST BEARING	02
10	INPUT OIL SEAL	02
11	OUTPUT OIL SEAL	02

Approximate weight and oil capacity			
SIZE	**Net Weight (kgs)**	**Gross Weight (Kgs)**	**Oil Quantity (lts)**
EX-112	130	140	6
EX-125	180	200	7
EX-140	250	275	8
EX-160	300	330	12
EX-180	345	380	16
EX-200	395	435	22
EX-225	520	570	30
EX-250	660	720	38

Recommended Lubricant ISO VG320	
Brand	**Grade**
Castrol	Alpha Zn 320
Indian Oil	Servomesh SP 320
Balmer Lawrie	Protomac SP 320
Gulf	Harmony 320
Veedol	Avalon 320
Hindustan Petroleum	Enklo 32

AGRICULTURE	AUTOMOTIVE	CEMENT
CHEMICAL	CONSTRUCTION	DEFENCE
ENERGY	FOOD & BEVERAGE	FORESTRY
MARINE	METALS	MINING
PULP & PAPER	QUARRYING	RUBBER & PLASTICS
TEXTILES	TRANSPORTATION	WATER
DREDGING	SUGAR MILLS	STONE PROCESSING

			
Geared Motors	Industrial Reducers	Worm	Precision Products
			
Shaft mount	Horizontal Mill Drives	Vertical Mill Drives	Planetary units
			
Special Drives	Defence Systems	Rail	Couplings