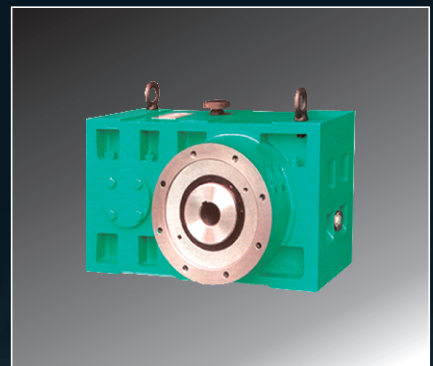
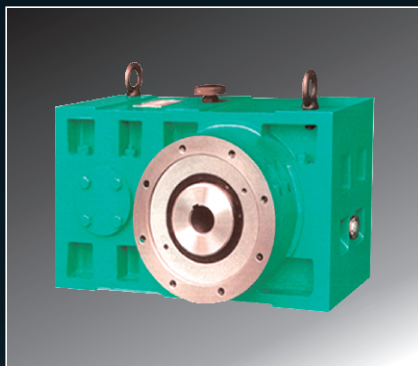
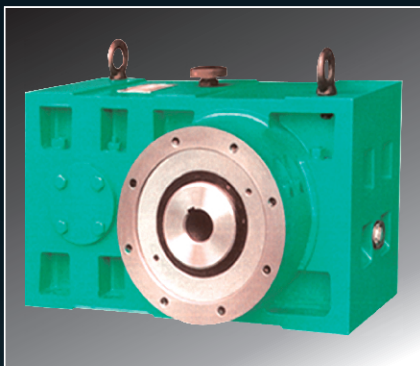


OMEX

Power Transmission Equipments

**DEX
Series**

Extruder Gear Box



Dharam Power Transmission Equipments Pvt. Ltd.

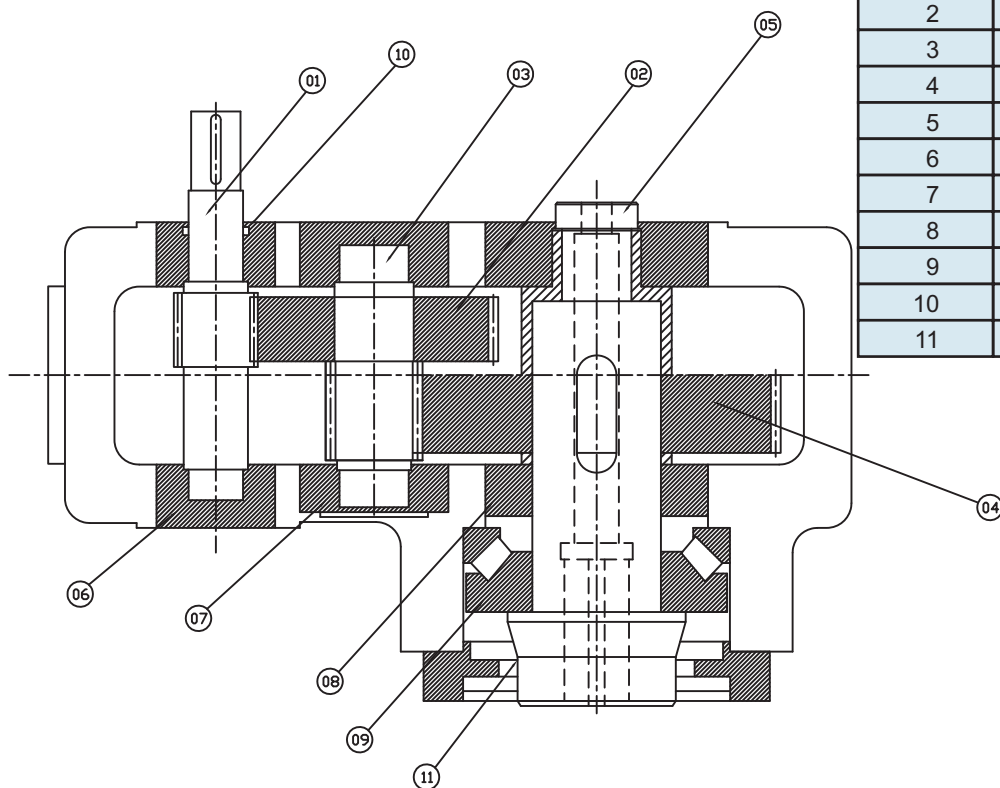
General Description

'Omex' **DEX-Series Extruder** Gearbox in double reduction parallel shaft horizontal and vertical models are intended to satisfy characteristic requirements and conditions encountered in single screw extrusion process. The gear unit are quite capable to transmit the high torque required for pressurizing and plasticising mauling materials. They can also absorb the high axial thrust through built-in spherical roller thrust bearing. A separate critically designed axial bearing housing accommodate thrust bearing of different sizes according to application loads. The hollow output shaft mounted with the different thrust bearings have different bores to accommodate the thrust screw. The units can be offered in Left hand to Right hand configurations with horizontal and vertical mounting to meet specific mounting needs.

The modular design of DEX Series gearboxes offer a great range of flexibility in the interchangeability of parts.

Range:

- 8 sizes of units with ratio coverage ranging from 5.06/1 to 25.6/1
- DEX Series gearboxes are fully metric
- The units sizes upto 160 are in unicast housing and above 160 are in split housing
- Shaft extension keyway are to IS:2048.
- Output bores are provided with single keyway provisions. Double keyway / Splined bores can be provided against customised requirements.
- Optional Cooling Coil provisions for additional cooling.
- The units can be suited to accommodate different thrust bearings.
- LH and RH handing can be provided.
- Horizontal and Vertical mountings are possible.



PARTS LIST		
ITEM NO.	DESCRIPTION	QTY.
1	Input Shaft With Pinion	01
2	1ST Stage Wheel	01
3	Final Pinion Shaft	01
4	Output Wheel	01
5	Hollow Output Shaft	01
6	Input Bearing	02
7	Intermediate Bearing	02
8	Output Bearing	02
9	Thrust Bearing	01
10	Input Oil Seal	01
11	Output Oil Seal	02

Design Feature

Gears and Pinions:

Helical gears and pinions are manufactured from high quality alloy case hardening steel. Case hardened surface with softer core provides improved wear resistance and fatigue strength. Flank ground gears to precision grade ensure high standard of accuracy, long life and quiet running characteristics.

Gear cases:

High quality, uni-cast close-grained cast iron casing accommodates bearings and gear trains. Units are designed in double reduction version with separate thrust bearing housing to carry different spherical thrust bearings. The units upto sizes 160 are in unicast housing and above 160 are in horizontally split housing. Case design has been computer optimised on CAD work station to provide strengthening ribs and minimize vibrations. They have optimal wall thickness in critical load carrying areas. Inspection covers are provided for viewing gear contacts. Oil level / dipsticks, ventilators and drain plugs are fitted.

Bearings:

Renowned roller bearings from major manufacturers are used throughout. The thrust bearing is of self-aligning spherical roller type. The bearings selected 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. Cylindrical seats for bearings, wheels, seals, couplings etc. are finished by precision grinding. Fitment dimensions towards specific screw shaft requirement must be addressed during placement of order.

Shaft seals:

Shaft extensions are fitted with spring-loaded high quality Viton type rubber seals to prevent outflow of oil.

External Dimensions:

Centre Distances are chosen from ISO preferred number series.

Shaft Extensions and hollow output shaft bores are to ISO metric standards.

All fasteners are metric.

Lubrication:

Lubrication of gears and bearings is entirely self-contained by 'Splash', which provides ample and positive flow of oil resulting minimum wear and noise. Cast trays inside the case guide churned lubricants towards the bearings. Holes connecting the thrust bearing housing and 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 oil.

Cooling:

As a standard feature, units have provisions for fitment of cooling water coil at the bottom of oil sump either at front or rear end.

Direction of Rotation:

Units may be operated in either direction of rotation.

Product Quality:

Units are manufactured under a stringent quality system certified to ISO: 9001 guaranteeing uniformly high standard.

Painting :

Casting surfaces are painted with linear epoxy primer both internally and externally. External cast faces are finally finished with alkyde semi-gloss blue paint. It is resistant to dilute acids and alkalis, oils and solvents, sea water and temperatures upto 140°C.

Preservation / Protection

'Omex' Extruder gear units are despatched without oil. Prior to despatch they are test run with a rust preventative oil assuring adequate protection to internal parts for a period of 6 months, covering normal transport and covered storage.

Note: Where gear units are to operate in abnormal conditions or where they are to stand for long period without running e.g. in plant installation, 'DPTE' (Dharam Power Transmission Equipments Pvt. Ltd.) must be notified so that suitable protective arrangement can be made

As improvement in design are being made, this specification is not to be regarded as binding in details and drawings and capacities are subject to alterations without notice. Certified drawing would be sent on request.

Selection Procedure

'Omex' DEX-Series extruder gearing size is determined against rated output torque capacity in consideration with necessary service factor. The thrust bearing size is selected thereafter against its suitability in terms of basic dynamic load rating.

1.0 Selection 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

$$\text{Demand torque (Nm)} = 9550 \times \text{Absorbed power (kW)}^* / \text{Output speed (rpm)}$$
 (* 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.

$$\text{Required output torque (Nm)} = \text{Demand torque (Nm)} \times \text{Service factor}$$
 Also, Required Mechanical Power Capacity = Absorbed Power x Service Factor
- 1.5 From the Mechanical Capacity / Output Torque rating table select a suitable size wherein the rated Output Torque / Mechanical Capacity meets or exceeds the required Power Capacity / Torque under point 1.4 with the predetermined ratio.

2.0 Check for Thermal Rating:

- 2.1 Thermal ratings are listed for:
 Gearbox with auxiliary cooling through 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.

$$\text{Required thermal power (kW)} = \text{Absorbed power (kW)} / \text{Thermal service factor}$$
 (* In absence of Absorbed / Consumed load, take Motor power)
- 2.4 Check the type of cooling by referring to thermal rating table. The required Thermal power must be equal to or less than the Thermal capacity of the gearbox as tabled in Page 11.

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:

$$F_a = ? \times D_s^2 \times P_a / 40000$$
 where, F_a = Thrust load from extruder (kN)
 D_s = Extruder screw diameter (mm)
 P_a = Working pressure (bar)
- 3.3 Calculate the thrust bearing capacity (Ca) on the following basis:

$$C_a = 1.06 \times F_a \times (60 \times L_n \times N_s / 10^6)^{3/10}$$
 where, C_a = Required bearing capacity (kN)
 F_a = Thrust load from extruder (kN)
 L_n = Bearing life expectancy (hrs)
 N_s = Speed of extruder screw (rpm)

Selection Procedure

- 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). If, the value of (C) is not available for a particular type size, select for the next higher bearing available. In absence of next higher bearing, next higher sized gearbox may be required for accommodating a larger thrust bearing to satisfy the dynamic capacity.

Thrust Bearing Data

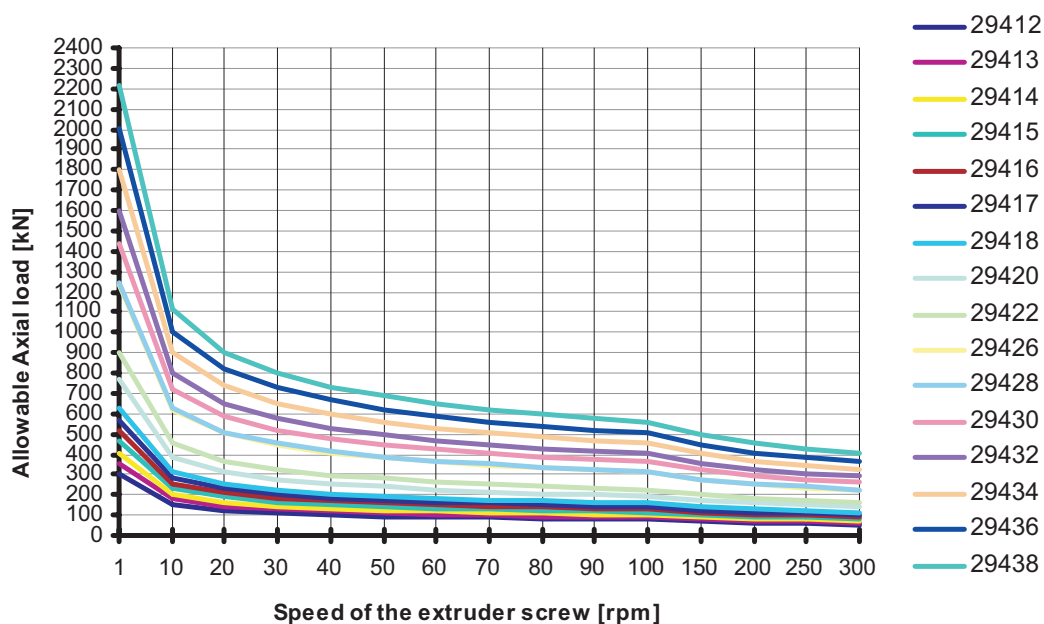
Gearbox Size	Spherical Roller Thrust Bearing (Standardised)	Basic Dynamic Load rating C(kN)	Output Shaft	
			Max. Possible Bore Dia. having Std. Keyway (mm)	Standard Bore Length (mm)
DE-112	29412 E	345	30	90
DE-125	29414 E	449	40	120
DE-140	29416 E	575	45	135
DE-160	29422 E	1010	60	160
DE-180	29426 E	1380	75	200
DE-200	29428 E	1400	80	225
DE-225	29432 E	1790	90	240
DE-250	29436 E	2250	100	260

Approximate Weight and Oil Capacity			
Size	Net Weight (Kgs)	Gross Weight (Kgs)	Oil Qty
DE-112	130	140	6
DE-125	180	200	7
DE-140	250	275	8
DE-160	300	330	12
DE-180	345	380	16
DE-200	395	435	22
DE-225	520	570	30
DE-250	660	720	38

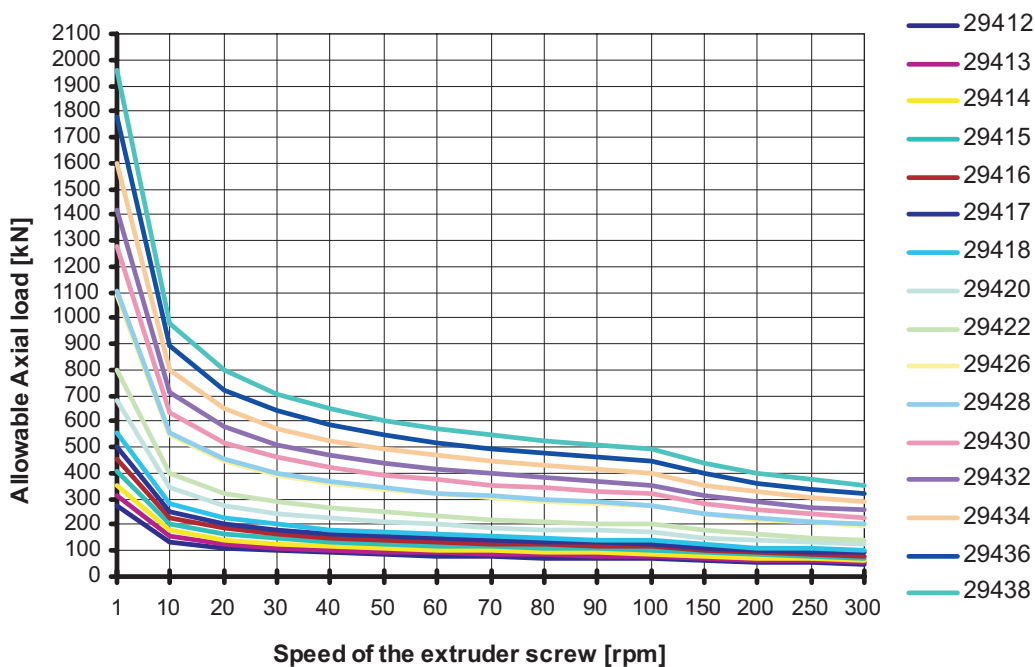
Recommended Lubricant ISO VG320	
Brand	Grade
Balmer Lawrie	Protomac SP 320
Bharat Petroleum	Cabot 320 or Amocam 320
Castrol	Alpha ZN 320
Gulf	Harmony 320
Hindustan Petroleum	Enklo 320
Indian Oil	Servomesh SP320
Veedol	Avalon 320

Thrust Bearing Life, L_{10}

20,000 hrs

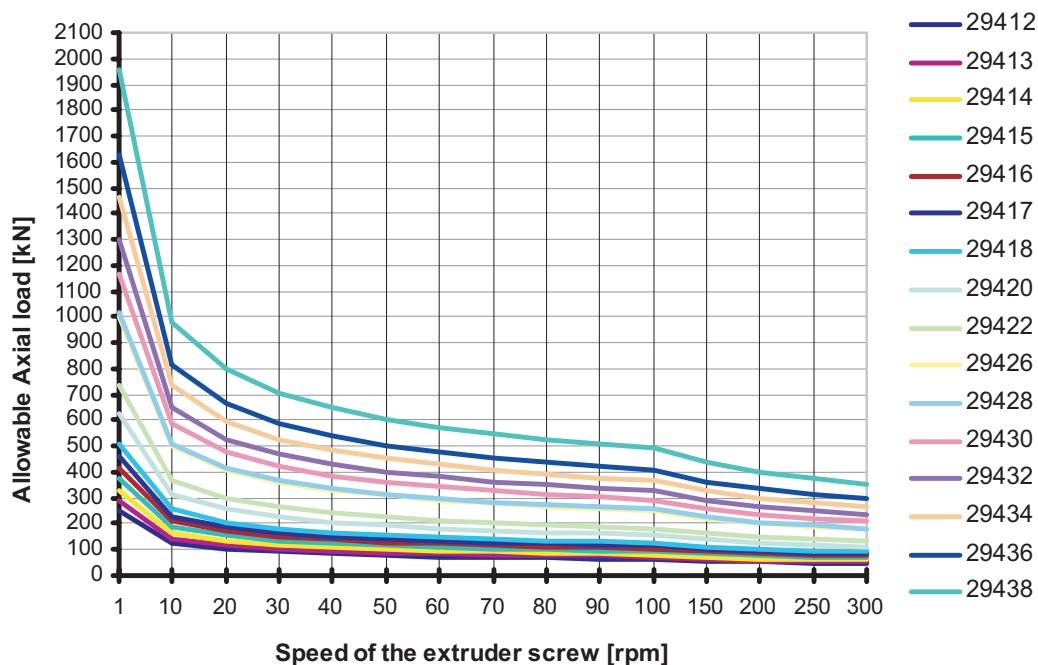


30,000 hrs

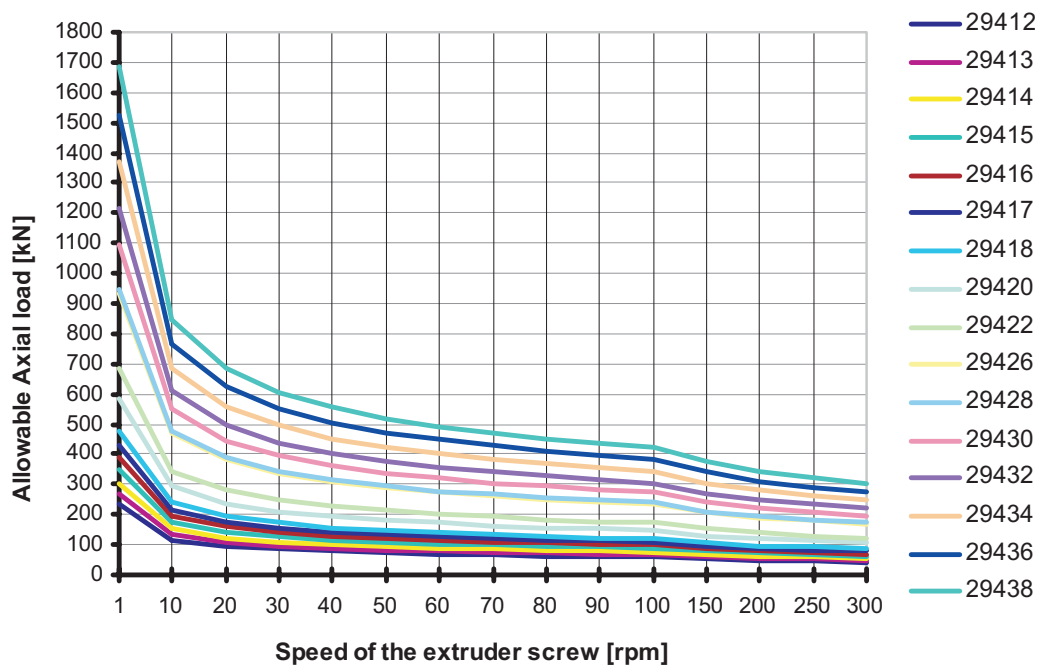


Thrust Bearing Life, L_{10}

40,000 hrs



50,000 hrs



Mechanical Capacity

Mechanical Capacities (kW)			Unit Size							
Nominal Ratio	Input Speed rpm	Nominal Output Speed	112	125	140	160	180	200	225	250
5.6	1500	268	43.8	83.1	82.1	124	156	213	310	383
	1000	179	29.2	55.4	55.1	82.7	104	142	207	274
	750	134	21.9	41.6	41.3	62.1	78.1	107	156	223
6.2	1500	242	43.8	77.1	76.6	117	148	199	283	420
	1000	161	29.2	51.4	51.0	78	98.6	132	190	314
	750	121	21.9	38.5	38.3	58.6	74.0	99.4	142	235
6.86	1500	219	43.8	71.5	76.6	117	148	199	273	400
	1000	146	29.2	47.7	51.0	78	98.6	132	182	300
	750	109	21.9	35.8	38.3	58.6	74.0	99.4	140	224
7.59	1500	198	43.6	64.4	76.3	108	143	189	248	381
	1000	132	29.1	42.9	53.2	74.8	99.1	126	166	270
	750	98.8	21.8	32.2	38.2	53.8	71.4	94.7	127	204
8.4	1500	179	35.3	56.6	66.3	97.6	131	177	247	333
	1000	119	235	37.7	44.2	65.1	87.6	120	181	260
	750	89.3	17.7	28.3	33.1	48.8	65.7	97.4	140	202
9.3	1500	161	35.3	52.5	62.2	91.4	119	162	226	323
	1000	108	23.5	35.0	41.5	60.9	79.3	113	155	247
	750	80.7	17.7	26.3	31.0	45.7	59.5	89.9	127	187
10.3	1500	146	31.6	47.5	53.9	83.1	113	151	212	293
	1000	97.1	21.1	31.7	35.9	55.4	75.2	101	149	235
	750	72.8	15.8	23.8	27.0	41.6	56.4	80	117	180
11.4	1500	132	29.4	43.3	50.6	73.2	105	137	187	280
	1000	87.7	19.6	28.9	33.8	48.9	69.7	97.4	133	204
	750	65.8	14.7	21.7	25.3	36.6	52.2	76.1	101	155
12.6	1500	119	26.3	30.6	43.5	64.5	92.5	123	171	264
	1000	79.4	17.5	20.4	29.1	43.0	61.5	86.9	125	177
	750	59.5	13.2	15.3	21.8	32.8	46.1	64.7	94	137
14	1500	107	24.0	35.0	40.2	52.7	84.0	112	160	243
	1000	71.4	16.0	23.3	26.9	35.1	56.0	79.0	116	171
	750	53.6	12.0	17.5	20.2	26.4	42.0	61.9	90.4	130
15.4	1500	97.4	21.6	32.4	35.1	51.3	77.7	92.9	140	200
	1000	64.9	14.4	21.6	23.8	34.5	51.7	61.1	82.7	129
	750	48.7	10.8	16.2	17.6	25.7	38.9	45.7	69.2	98.6
17.1	1500	87.7	19.4	22.9	32.2	47.5	68.3	91.7	133	200
	1000	58.5	12.9	15.2	21.5	31.7	45.5	61.1	82.7	129
	750	43.9	9.7	11.4	16.1	23.8	34.1	45.7	66.8	98.6
18.9	1500	79.4	17.8	20.6	28.7	42.8	61.5	72.2	108	152
	1000	52.9	11.9	13.7	19.1	28.5	41.0	47.6	70.6	100
	750	39.7	8.9	10.3	14.4	21.4	30.7	35.5	53	74.5
20.9	1500	71.8	10.7	17.5	24.8	39.8	54.1	65.2	87.8	126
	1000	47.8	7.2	11.7	16.6	26.6	36.0	46.5	61	87.5
	750	35.9	5.4	8.8	12.4	19.9	27.0	36.1	45.8	65.7
23.2	1500	64.7	9.6	15.6	22.3	33.0	48.7	59.7	80.2	114
	1000	43.1	6.4	10.4	14.9	22.0	32.5	42.5	54.7	77
	750	32.3	4.8	7.8	11.2	16.5	24.4	32.6	41.1	57.8
25.6	1500	58.6	10.3	15.7	17.4	26.6	37.1	49.0	69.7	95.4
	1000	39.1	6.9	10.4	11.6	14.4	24.8	34.9	49.7	67.9
	750	29.3	5.2	7.8	8.7	13.0	20.4	37.3	38.9	53.2

Output Torque and Exact Ratio

Rated Output Torque (kNm)								
Nominal Ratio	Unit Size							
	112	125	140	160	180	200	225	250
5.6	1.56	2.90	2.93	4.41	5.50	7.58	11.04	13.65
6.2	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
8.4	1.88	3.05	3.54	5.21	6.99	9.44	13.18	17.77
9.3	2.09	3.04	3.67	5.39	7.01	9.61	13.41	19.16
10.3	2.05	3.05	3.53	5.44	7.39	9.88	13.87	19.17
11.4	2.11	3.05	3.66	5.30	7.58	9.91	13.53	20.26
12.6	2.05	2.42	3.49	5.17	7.40	9.87	13.72	21.19
14.0	2.11	3.06	3.59	4.69	7.48	10.00	14.28	21.69
15.4	2.11	3.07	3.44	5.03	7.61	8.96	12.17	18.98
17.1	2.06	2.43	3.50	5.17	7.42	9.94	13.50	21.06
18.9	2.07	2.43	3.45	5.15	7.39	8.54	12.75	17.92
20.9	1.38	2.25	3.30	5.29	7.18	8.67	12.18	17.48
23.2	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 (Actual) Ratio								
Nominal Ratio	Unit Size							
	112	125	140	160	180	200	225	250
5.6	5.689	5.562	5.636	5.648	5.657	5.625	5.670	5.599
6.2	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
8.4	8.500	8.611	8.333	8.362	8.427	8.472	8.500	8.680
9.3	9.444	9.265	9.342	9.449	9.323	9.319	9.390	9.435
10.3	10.389	10.262	10.348	10.489	10.370	10.450	10.434	10.151
11.4	11.479	11.272	11.366	11.522	11.474	11.296	11.522	11.711
12.6	12.511	12.647	12.505	12.802	12.600	12.664	12.750	12.958
14.0	14.081	14.018	14.135	14.167	13.941	14.200	14.167	13.941
15.4	15.678	15.160	15.287	15.441	15.260	15.462	15.512	15.500
17.1	17.088	17.010	16.818	17.197	17.121	17.337	17.236	16.676
18.9	18.638	18.918	18.706	19.003	18.529	19.211	19.111	18.919
20.9	20.595	20.475	20.759	20.759	20.250	20.759	20.531	20.912
23.2	23.018	23.000	23.319	23.066	22.781	23.003	22.765	23.724
25.6	25.757	25.875	25.840	25.575	25.845	25.594	25.575	25.845

Thermal Capacity

Thermal ratings are a measure of the gear units ability to dissipate heat. If they are exceeded the lubricant overheat and breakdown resulting in gear failure. DEX-Series extruder gearboxes have inbuilt cooling coil as its standard fitment.

Cooling coils connections for water inlet and outlet pipes are provided in front and rear ends for water flow in either direction. Cooling coils are suitable for fresh, brackish or sea water with flow in either direction. Connections are therefore interchangeable.

Fittings for cooling coils supplied with gear units are to suit Ø12mm copper pipe which is to be provided by the customers and is not under DPTE's scope of supply.

The ratings mentioned below for cooling coil are based on a cooling water inlet temperature of 20°C.

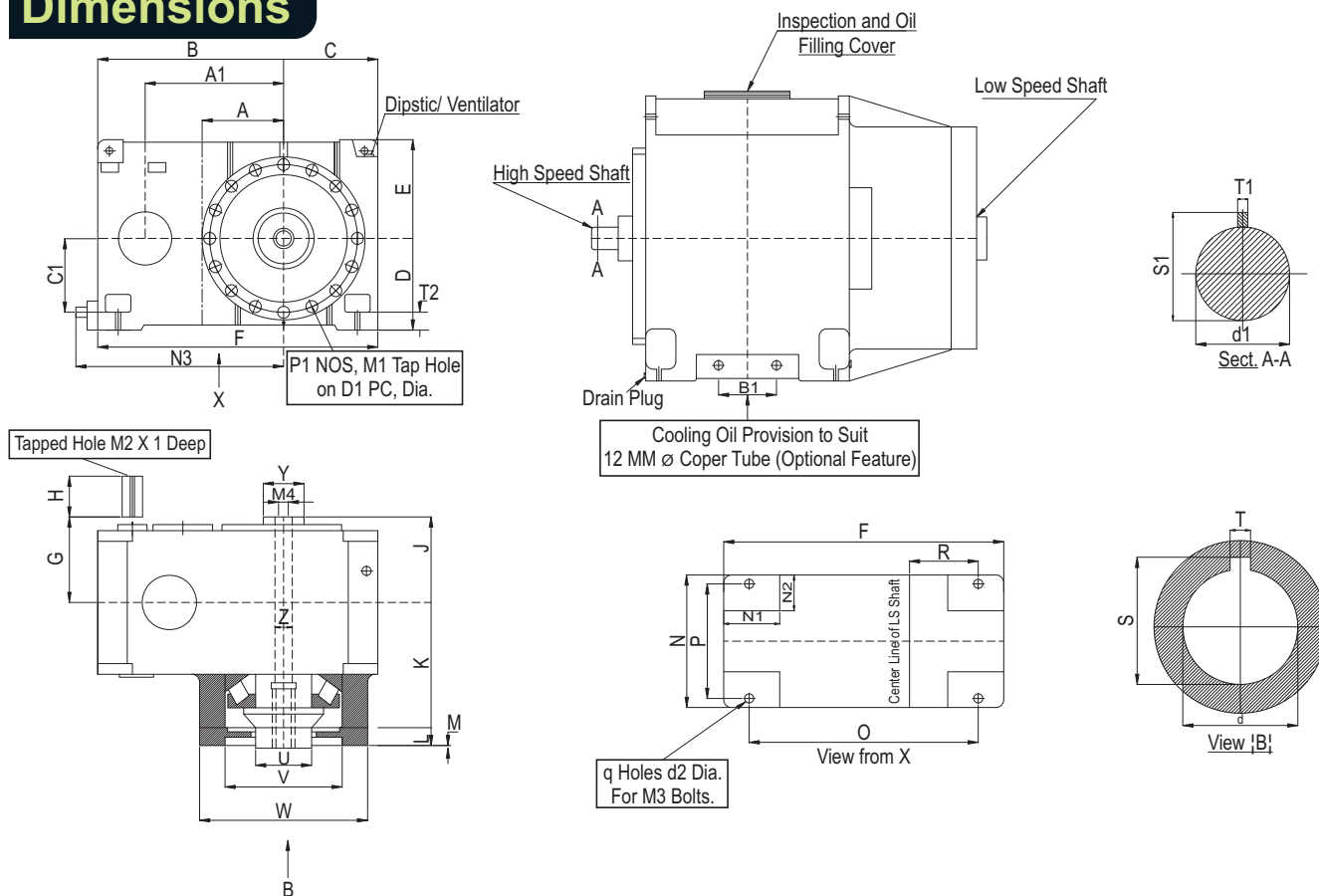
Nominal Ratio	Input Speed rpm	Unit Size							
		112	125	140	160	180	200	225	250
Units with cooling coil									
Nominal Ratio	Input Speed rpm	Unit Size							
		112	125	140	160	180	200	225	250
5.60	1500	88	92	130	139	157	170	192	435
to	1000	87	90	129	139	155	168	188	403
11.4	750	86	90	127	136	152	165	185	385
12.6	1500	81	83	116	123	140	150	177	323
To	1000	80	82	116	122	138	147	174	325
25.6	750	79	82	113	120	135	145	170	326

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

With Cooling Coil:

Ambient Temp. °C	Running Time in any Hour				
	100%	80%	60%	40%	20%
10	1.10	1.32	1.54	1.76	1.98
20	1.00	1.20	1.40	1.60	1.80
30	0.90	1.08	1.26	1.44	1.62
40	0.85	1.02	1.19	1.36	1.53

Dimensions



SIZE	A	A1	B	B1	C	C1	D	D1	d	d1	d2	E	F	G	H	J	K	L	I	L1	M	M1	M2	M3
DE-112	112	192	267	50	135	100	125	160	30.041 30.020	22.009 21.996	14	140	402	112	50	112	160	26	16	90	5	M12	M6	M12
DE-125	125	225	315	60	150	112	140	185	40.050 40.025	25.009 24.996	14	154	465	125	60	125	185	30	16	120	5	M12	M6	M12
DE-140	140	240	330	90	165	127	160	205	45.050 45.025	32.018 32.002	14	174	495	140	80	140	220	30	20	135	5	M16	M8	M12
DE-160	160	272	375	110	185	145	180	290	60.060 60.030	35.018 35.002	18	194	550	160	80	168	246	35	32	160	5	M16	M8	M16
DE-180	180	305	420	110	200	165	200	305	75.060 75.030	38.018 38.002	18	214	610	175	80	180	273	40	32	200	7	M16	M16	M16
DE-200	200	340	465	135	225	185	225	330	80.060 80.030	38.018 38.002	22	239	680	185	80	200	300	40	32	225	8	M16	M16	M20
DE-225	225	385	567	135	250	210	250	370	90.071 90.036	45.018 45.002	22	267	760	205	110	215	335	45	32	240	8	M20	M16	M20
DE-250	250	430	632	150	280	237	280	410	100.071 100.036	55.030 55.011	26	298	850	220	110	235	375	45	50	260	8	M20	M24	M24

SIZE	M4	N	N1	N2	N3	P	P1	Q	Q1	R	S	S1	T	T1	T2	U	V	V1	W	Y	Z
DE-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	60.000 59.954	130.040 130.000	10	190	50.000 49.961	16
DE-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	70.000 69.954	150.040 150.000	12	220	60.000 59.954	20
DE-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	80.000 79.954	170.040 170.000	12	240	70.000 69.954	25
DE-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	110.000 109.946	230.046 230.000	15	330	80.000 79.954	34
DE-180	M30	290	120	85	453	250	8	505	4	147	80.100 79.900	41.000 40.800	20.026 19.974	10.000 9.964	25	130.000 129.937	270.057 270.000	18	340	80.000 79.954	34
DE-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	25	140.000 139.937	280.052 280.000	18	380	90.000 89.946	45
DE-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	30	160.000 159.937	320.057 320.000	20	420	100.000 99.937	45
DE-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	30	180.000 179.937	360.057 360.000	20	460	110.000 109.946	45

FACTORY WORKS :

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