EXPLANATION & USE OF RATINGS & SERVICE FACTORS

Explanation And Use Of Ratings And Service Factors.

Gear unit selection is made by comparing actual loads with catalogue ratings. Catalogue ratings are based on a standard set of loading conditions whereas actual load conditions vary according to type of application. Service factors are therefore used to calculate an equivalent load to compare with catalogue ratings.

Mechanical Ratings and Service Factor (F_M)

Mechanical ratings measure capacity in terms of life and/or strength assuming 12 hr/day continuous running under uniform load conditions. Catalogue ratings allow 100% overload at starting, breaking or momentarily during operations up to 12 hours per day.

Table 2 - Mechanical Service Factor (F_M)

Prime mover	Duration of service hrs per day service	Load classification - driven machine		
		Uniform	Moderate Shock	Heavy Shock
Electric motor, steam turbine or hydraulic motor	Under : 3	0.8	1	1.5
	3 to 10	1	1.25	1.75
	Over 10 to 24	1.25	1.5	3
Multi-cylinder internal, combustion engine	Under : 3	1	1.25	1.75
	3 to 10	1.25	1.5	2
	Over 10 to 24	1.5	1.75	2.25
Single cylinder internal, combustion engine combustion	Under : 3	1.25	1.5	2
	3 to 10	1.5	1.75	2.25
	Over 10 to 24	1.75	2	2.5

- ***For Units subject to frequent starts/stops and overloads, also applications where high inertia loads are involved e.g. crane travel drives, slewing motion etc, please contact our application engineers.***

Thermal ratings and Thermal service factor (F_T)

Thermal ratings measure a unit's ability to dissipate heat, if they are not exceeded, the lubricant may overheat and break down resulting in failure of gear unit. Thermal ratings are affected by ambient temperature and not by mechanical considerations such as increased running time and shock loads. Catalogue ratings are given on 20°C ambient temperature allowing for a lubricant temperature rise to 100°C during operation as the unit transmit power and generate heat. Thermal ratings calculated with unit fan cooling. Thermal service factor FT (Table No. 3) is used to modify the actual load according to prevailing ambient temperature.

Table 3 - Thermal Service Factor (F_T)

Ambient Temp °C	10	20	30	40	50	60
factor	0.87	1.00	1.16	1.35	1.62	1.97

If the ambient temperature is other than 20°C, divide the catalogue thermal rating by the factor from Table No. 3

RATINGS

Ratings At Input Speed 1450 RPM

GEAR RATIO	OUTPUT SPEED RPM	CAPACITY	SIZE OF UNIT			
			10	12	14	17
5	300	INPUT MECH. POWER (KW)	123	196	274	*
		OUTPUT MECH. TORQUE (Nm)	3700	5494	8225	*
		INPUT THERMAL POWER (KW)	90	119	162	*
		OUTPUT THERMAL TORQUE (Nm)	2708	3777	4857	*
7.5	200	INPUT MECH. POWER (KW)	92	128	184	*
		OUTPUT MECH. TORQ;UE (Nm)	4129	5700	8280	*
		INPUT THERMAL POWER (KW)	76	109	150	*
		OUTPUT THERMAL TORQUE (Nm)	3411	4807	6675	*
10	150	INPUT MECH. POWER (KW)	65	111	162	320
		OUTPUT MECH. TORQUE (Nm)	3807	6557	9635	19355
		INPUT THERMAL POWER (KW)	62	99	141	200
		OUTPUT THERMAL TORQUE (Nm)	3632	6165	8358	12224
15	100	INPUT MECH. POWER (KW)	58	81	150	249
		OUTPUT MECH. TORQUE (Nm)	4985	7132	13349	21877
		INPUT THERMAL POWER (KW)	56	76	110	177
		OUTPUT THERMAL TORQUE (Nm)	4813	6670	9790	15721
20	75	INPUT MECH. POWER (KW)	55	75	123	216
		OUTPUT MECH. TORQUE (Nm)	6303	8619	14288	25029
		INPUT THERMAL POWER (KW)	48	63	94	160
		OUTPUT THERMAL TORQUE (Nm)	5501	7240	10955	18366
25	60	INPUT MECH. POWER (KW)	45	68	110	172
		OUTPUT MECH. TORQUE (Nm)	6303	9380	14695	24365
		INPUT THERMAL POWER (KW)	39	50	72	135
		OUTPUT THERMAL TORQUE (Nm)	5463	6948	9947	19124
30	50	INPUT MECH. POWER (KW)	40	56	92	158
		OUTPUT MECH. TORQUE (Nm)	6494	9339	14652	26557
		INPUT THERMAL POWER (KW)	32	45	61	121
		OUTPUT THERMAL TORQUE (Nm)	5195	7505	9761	20337
40	37.5	INPUT MECH. POWER (KW)	34	51	76	119
		OUTPUT MECH. TORQUE (Nm)	7360	10830	16137	26063
		INPUT THERMAL POWER (KW)	25	37	48	93
		OUTPUT THERMAL TORQUE (Nm)	5412	7858	10193	20131
50	30	INPUT MECH. POWER (KW)	28	44	62	110
		OUTPUT MECH. TORQUE (Nm)	7131	11404	16457	29064
		INPUT THERMAL POWER (KW)	22	31	40	82
		OUTPUT THERMAL TORQUE (Nm)	5603	8741	10487	21300
60	25	INPUT MECH. POWER (KW)	24	37	55	78
		OUTPUT MECH. TORQUE (Nm)	7243	11092	17521	25327
		INPUT THERMAL POWER (KW)	18	28	34	45
		OUTPUT THERMAL TORQUE (Nm)	5432	8397	10702	17713
70	21.4	INPUT MECH. POWER (KW)	21	32	46	75
		OUTPUT MECH. TORQUE (Nm)	7310	11207	16716	27445
		INPUT THERMAL POWER (KW)	20	23	28	57
		OUTPUT THERMAL TORQUE (Nm)	6962	7880	10320	20457

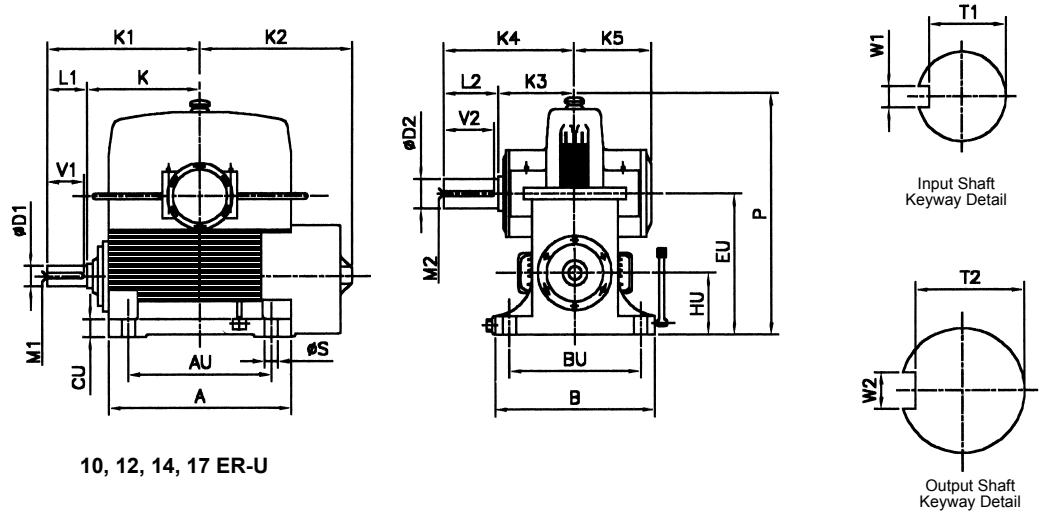
RATINGS

Ratings At Input Speed 960 RPM

GEAR RATIO	OUTPUT SPEED RPM	CAPACITY	SIZE OF UNIT			
			10	12	14	17
5	200	INPUT MECH. POWER (KW)	99	152	223	*
		OUTPUT MECH. TORQUE (Nm)	4570	6835	9717	*
		INPUT THERMAL POWER (KW)	70	100	154	*
		OUTPUT THERMAL TORQUE (Nm)	3209	4450	6710	*
7.5	133	INPUT MECH. POWER (KW)	72	110	152	*
		OUTPUT MECH. TORQ;UE (Nm)	4928	7361	9835	*
		INPUT THERMAL POWER (KW)	57	80	132	*
		OUTPUT THERMAL TORQUE (Nm)	3880	5353	8535	*
10	100	INPUT MECH. POWER (KW)	51	92	134	268
		OUTPUT MECH. TORQUE (Nm)	4481	8187	11301	24310
		INPUT THERMAL POWER (KW)	49	70	111	160
		OUTPUT THERMAL TORQUE (Nm)	4305	6229	9359	14102
15	66.7	INPUT MECH. POWER (KW)	45	68	125	220
		OUTPUT MECH. TORQUE (Nm)	5863	8882	15627	28979
		INPUT THERMAL POWER (KW)	41	60	97	139
		OUTPUT THERMAL TORQUE (Nm)	5342	7838	12076	18349
20	50	INPUT MECH. POWER (KW)	42	62	102	209
		OUTPUT MECH. TORQUE (Nm)	7140	10565	16628	35528
		INPUT THERMAL POWER (KW)	33	49	84	132
		OUTPUT THERMAL TORQUE (Nm)	5610	8358	13298	21430
25	40	INPUT MECH. POWER (KW)	33	53	80	128
		OUTPUT MECH. TORQUE (Nm)	6776	11125	15922	27198
		INPUT THERMAL POWER (KW)	28	40	67	89
		OUTPUT THERMAL TORQUE (Nm)	5749	8530	13361	189114
30	33.4	INPUT MECH. POWER (KW)	30	48	73	120
		OUTPUT MECH. TORQUE (Nm)	7399	11884	17181	30973
		INPUT THERMAL POWER (KW)	24	35	58	80
		OUTPUT THERMAL TORQUE (Nm)	5919	65	13705	20419
40	25	INPUT MECH. POWER (KW)	26	42	60	80
		OUTPUT MECH. TORQUE (Nm)	8442	13381	18953	6282
		INPUT THERMAL POWER (KW)	19	31	36	62
		OUTPUT THERMAL TORQUE (Nm)	6007	9715	12135	20368
50	20	INPUT MECH. POWER (KW)	21	36	49	78
		OUTPUT MECH. TORQUE (Nm)	8244	13489	19281	31286
		INPUT THERMAL POWER (KW)	16	24	35	60
		OUTPUT THERMAL TORQUE (Nm)	6341	8986	13737	23780
60	16.7	INPUT MECH. POWER (KW)	17	30	39	72
		OUTPUT MECH. TORQUE (Nm)	8006	13293	18600	34174
		INPUT THERMAL POWER (KW)	13	22	26	50
		OUTPUT THERMAL TORQUE (Nm)	5947	9751	12302	23446
70	14.3	INPUT MECH. POWER (KW)	15	32	34	62
		OUTPUT MECH. TORQUE (Nm)	7263	11207	17820	33539
		INPUT THERMAL POWER (KW)	12	19	22	43
		OUTPUT THERMAL TORQUE (Nm)	6011	9335	12027	23261

DIMENSIONS

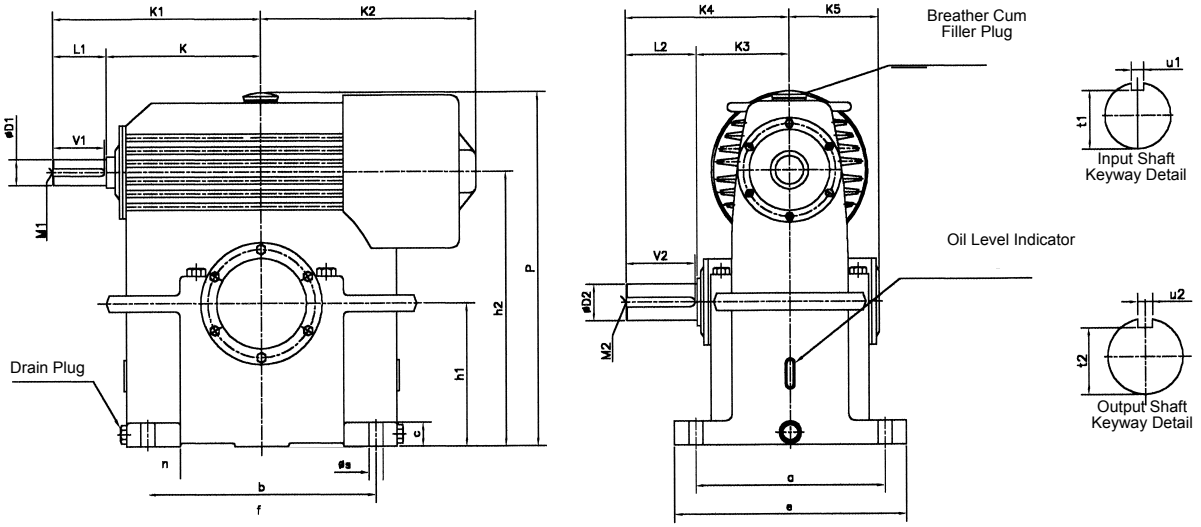
ER-U



10, 12, 14, 17 ER-U

SIZES	MOUNTING DETAILS									INPUT SHAFT DETAILS									OUTPUT SHAFT DETAILS								
	A	AU	B	BU	CU	OS	HU	EU	P	D1	L1	V1	M1	Ti	W1	K	K1	K2	D2	L2	V2	M2	T2	W2	K3	K4	K5
10 ER-U	590	432	430	330	50	33	172	426	730	55.030	90	85	M20	49.0	16	335	425	460	85.035	152	147	M20	76.0	22	223	375	200
										55.011									85.013								
12 ER-U	690	521	540	368	55	33	191	495	860	60.030	124	120	M20	53.0	18	371	495	505	95.035	170	165	M20	86.0	25	243	413	210
										60.011									95.013								
14 ER-U	820	597	560	432	65	33	216	572	970	75.030	149	145	M20	67.5	20	423	572	545	120.035	190	185	M24	109	32	293	483	215
										75.011									120.013								
17 ER-U	920	762	600	508	75	33	254	686	1185	80.030	180	175	M20	71.0	22	520	700	650	140.040	203	200	M30	128	36	343	546	300
										80.011									140.015								

ER-O

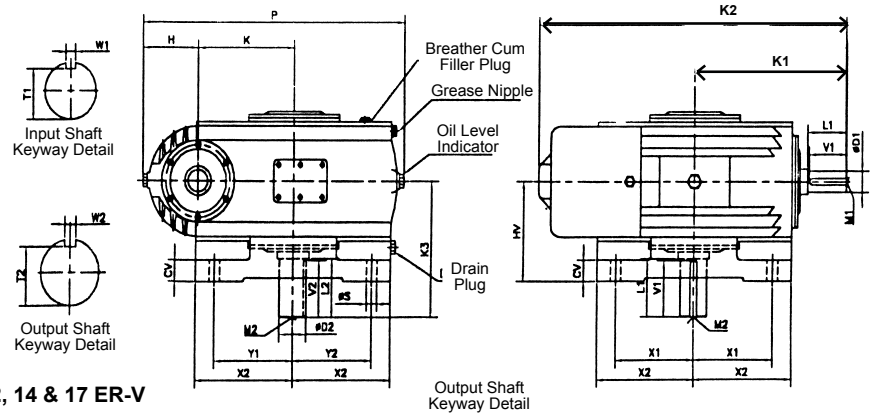


SIZES	MOUNTING DETAILS										INPUT SHAFT DETAILS									OUTPUT SHAFT DETAILS								
	a	b	c	e	f	n	s	h1	h2	P	D1	L1	V1	M1	Ti	W1	K	K1	K2	D2	L2	V2	M2	T2	W2	K3	K4	K5
10 ER-0	330	432	50	430	580	110	33	273	527	730	55.030	90	85	M20	49.0	16	335	425	460	85.035	152	147	M20	76.0	22	223	375	200
											55.011									85.013								
12 ER-0	368	521	55	540	630	125	33	330	635	860	60.030	124	120	M20	53.0	18	371	495	505	95.035	170	165	M20	86.0	25	243	413	210
											60.011									95.013								
14 ER-0	432	597	65	560	770	150	33	381	737	970	75.030	149	145	M20	67.5	20	423	572	545	120.035	190	185	M24	109	32	293	483	215
											75.011									120.013								
17 ER-0	510	750	75	600	920	170	33	460	892	1146	80.030	180	175	M20	71.0	22	520	700	650	140.040	203	200	M30	128	36	343	546	300
											80.011									140.015								

Key & Keyways as per B.S. 46 (part-1)

DIMENSIONS

ER-V



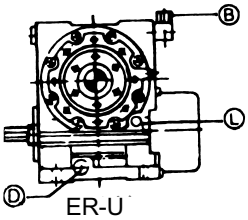
10, 12, 14 & 17 ER-V

SIZES	MOUNTING DETAILS										INPUT SHAFT DETAILS									OUTPUT SHAFT DETAILS						
	X1	X2	Y1	Y2	CV	os	HV	H	K	P	D1	L1	V1	M1	Ti	W1	K	K1	K2	D2	L2	V2	M2	T2	W2	K3
10 ER-V	260	310	260	235	55	33	279	180	254	734	55.030 55.011	90	85	M20	49.0	16	335	425	803	85.035 85.013	152	147	M20	76.0	22	375
12 ER-V	318	310	318	267	60	33	305	175	305	830	60.030 60.011	124	120	M20	53.0	18	371	495	936	95.035 95.013	170	165	M20	86.0	25	413
14 ER-V	356	350	356	305	65	33	330	200	356	975	75.030 75.011	149	145	M20	67.5	20	423	572	1093	120.035 120.013	190	185	M24	109	32	483
17 ER-V	432	500	432	432	75	40	406	238	432	1190	80.030 80.011	180	175	M20	71.0	22	520	699	1328	140.040 140.015	203	200	M30	128	36	546

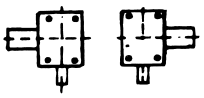
Key & Keyways as per B.S. 46 (part-1)

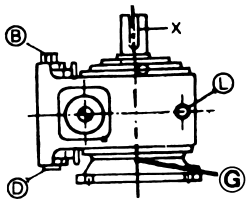
Mounting Positions And Shaft Handing

B - Breather Plug
D - Drain Plug
L - Oil Level Indicator
G - Grease Nipple

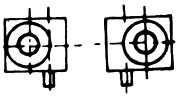


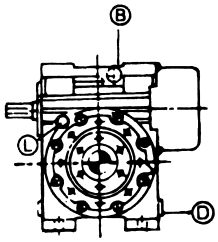
ER-U


ER-U/L ER-U/R

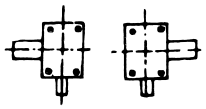


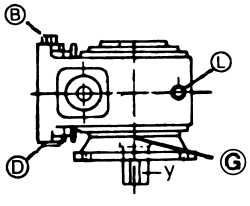
ER-V(X)


ER-V/LX ER-V/RX

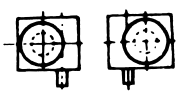


ER-O


ER-O/L ER-O/R



ER-V(Y)


ER-V/LY ER-V/RY

Replace G by plug for ER-V(X), V(Y) in bottom side.

GEAR RATIO

Actual Gear Ratio

Size	5	7.5	10	15	20	25	30	40	50	60	70
10	4.8	7.33	9.75	14.67	19.5	24.5	29.5	40	50	60	70
12	4.9	7.43	9.8	14.67	20.5	24.5	29.5	40	50	60	70
14	5.1	7.57	9.8	14.67	20.33	24.5	30.5	39	49	61	69
17	5.1	7.37	9.8	14.75	19.66	25.5	29.5	40	50	60	71

Overhung Loads :

Whenever a sprocket, gear, sheave or pulley is mounted on the output shaft, a calculation should be made to determine the overhung load in Newtons on the shaft, using the formula:

$$P = \frac{Kw \times 9550 \times K}{N \times R}$$

Where, P = equivalent overhung load in Newtons
KW = power carried by shaft in Kilo Watts
N = r.p.m. of the shaft
R = pitch radius of sprocket, pinion, sheave or pulley in meter
K = factor

Overhung Member	K Factor
Sprocket	1.00
Spur Pinion	1.25
V-belt Sheave	1.50
Flat Belt Pulley	2.00

The calculated equivalent overhung load should be compared with the permissible values given in the table.

Maximum Permissible Overhung Loads (Newtons) At Centre Of Wheel Shaft Extention At 1500 R.P.M. Input Speed.

RATIO	BEARING NEAR SHAFT EXTENSION	SIZE OF UNIT			
		10	12	14	17
5	Standard Bearings	19550	22310	34654	
	Reinforced Bearings	29800	34650	50000	
7.5	Standard Bearings	21000	27000	40500	
	Reinforced Bearings	32000	36650	54975	
10	Standard Bearings	31000	32909	49363	55000
	Reinforced Bearings	33000	46636	69954	99000
15	Standard Bearings	28000	33050	50875	63594
	Reinforced Bearings	40000	55120	87089	130633
20	Standard Bearings	26700	33000	52080	65100
	Reinforced Bearings	42000	57674*	92000*	138000*
25	Standard Bearings	28000	32636	65270	78824
	Reinforced Bearings	47700	57004*	117068*	151025*
30	Standard Bearings	29000	32800	67980	81576
	Reinforced Bearings	51000	57800*	127545*	172185*
40	Standard Bearings	29000	31325	76726	88071
	Reinforced Bearings	50450	63272*	140745*	182968*
50	Standard Bearings	31000	32080	83450	100148
	Reinforced Bearings	52700	63305*	154935*	185922*
60	Standard Bearings	30000	34650	85535	102642
	Reinforced Bearings	53000	67630*	138050*	179465*
70	Standard Bearings	26000	41580	86310	103572
	Reinforced Bearings	56045	70950*	143484*	186530*

* Special Heat Treated Shaft is supplied

TRB = Taper Roller Bearing
CRB = Cylindrical Roller Bearing

LUBRICATION

Weight & Oil Capacity

ER-U

Size	10	12	14	17
Net Weight (kgs.)	450	580	885	1260
Gross Weight (Kgs.)	595	900	1140	1700
Oil Capacity (ltrs.)	20	25	36	60

ER-O

Size	10	12	14	17
Net Weight (kgs.)	480	660	940	1380
Gross Weight (Kgs.)	610	920	1180	1800
Oil Capacity (ltrs.)	22	27	38	95

ER-V

Size	10	12	14	17
Net Weight (kgs.)	440	660	870	1575
Gross Weight (Kgs.)	560	845	1120	2000
Oil Capacity (ltrs.)	20	29	43	106

- First filling of oil is not supplied with the gear unit.
- First change of oil should be made after 500 hrs. of operation
- Subsequent oil change must be made after every 3000 hrs. of operation. This interval should not exceed 12 months.

Recomended Lubricants

Mineral Oil

Brand	Grade
BP International Ltd	CS 320 or GR-XP320
Castro!	Alpha Zn 320 or Alpha Sp-320 or Tribol 1100/320 TGQA
Caltex	Meropa 320
Esso Petroleum	Teresso 320 or Spartan 320
Fuchs	Renolin CKC 320
Mobil Oil Co.	Mobil DTE Oil AA or Mobilgear 632
Shell	Vitera Oil 320 or Omela 320

POLYGLYCOL BASED SYNTHETIC LUBRICANT

Use of polyglycol based synthetic lubricant is also advisable to improve the transmitting capacity (rating) of gear units min. 20% as compared with use of mineral oil at same working temperature. This gear oil shows excellent non-ageing stability with favourable influence on efficiency.

Aproved Synthetic Lubricants

Brand	Grade
Castrol	Tribol 800-220
Fuchs	Renolin PG 220

Special Note : Synthetic Lubricants must not be mixed with any other type of oil. The gear unit must be flushed while changing to or from this lubricant.