REGGIANA RIDUTTORI

HELICAL GEAR UNITS FOR LIFTING

REGGIANA RIDUTTORI

CONTENTS

GENERAL INFORMATION

This series of helical gear units has been expressly designed for application in the lifting field, distinguished by intermittent operation.
The different mechanical and dimensional characteristics have been studied to better adapt to the specific requirements of this field of application.
To select the gear units, the service factor is determined according to the FEM and ISO standards relating to lifting mechanisms, on the basis of the type of operation, the load condition and the requested duration.
Mechanical efficiency η for each size of this series of gear units is 97%.

GEARS AND SHAFTS

The gears are cylindrical, with helical profile ground after heat treatment. They are made of casehardened and tempered steel *20MnCr5, 16NiCr4*, *18CrMo4 UNI EN 10084*.
All the gears have been designed according to *ISO 6336* and *DIN 3990* standards and have been checked according to the *AGMA 2001* standard.
The cylindrical low-speed shafts are made of hardened and tempered steel type *42CrMo4 UNI EN 10083-1* while the hollow low-speed shafts are made of *Fe510 UNI EN 10025*. The high-speed shafts are made of casehardened and tempered steel, or hardened and tempered steel.
The standard version shafts are cylindrical with key according to *UNI 6604-69*. In this case, the fitting of the output coupling on the low-speed shaft must be made with interference. The low-speed shafts can also be made with splined ends for fitting by means of broached flange, while for special applications, a version also exists with hollow low-speed shaft with key seat. The high-speed shafts have been designed with elongated end to allow fitting a brake between motor and gear unit.

BEARINGS

The bearings are top quality and sized on the basis of the duration envisaged by the selected use class.

GEAR CASING

The casings of the gear units are made of grey cast-iron *EN-GJL-250 UNI EN 1561* up to size *93*, while larger sizes are made of electrically-welded and distended steel. On request, these can however be made of electrically-welded and distended steel for all sizes.
All the casings are made in two parts to make gear unit fitting and maintenance easier.
Furthermore, the steel casings feature a further inspection cover.
The configuration of the cast-iron casing allows fitting the gear unit in either horizontal or vertical position.

DESIGNATION

P	C	33	SB	FB	16	B	S	2

Mounting position 1, 2, 3 (page 14)

High-speed shaft
- **S** solid
- **PAM** hollow + motor flange
- **BC** solid + motor flange + elastic coupling

Shaft arrangement
- **A, B, C, D, E, F, G, H, I, L, M, N** (page 14)

Transmission ratio i_N

Broached flange

Low-speed shaft
- **S** solid with key
- **SB** solid splined
- **C** hollow with key seat
- **UB** hollow with shrink disc

Size

No. of stages
- **C** triple reduction

Type
- **P** helical unit

SYMBOLS AND UNIT OF MEASUREMENT

SYMBOL	PARAMETER	UNIT OF MEASUREMENT
f_s	Mechanical service factor	
f_N	Nominal performance corrective factor	
f_a	Ambient correction factor	
i_N	Nominal transmission ratio	
i_r	Actual transmission ratio	
n_1	High speed	rpm
n_2	Low speed	rpm
P_N	Nominal power	kW
P	Absorbed motor power	kW
η	Efficiency	
T	Torque	Nm
T_N	Nominal torque	Nm
t	Temperature	°Celsius
P_t	Thermal capacity	kW
P_{tN}	Nominal thermal capacity	kW
F_{r1}	High-speed shaft overhung load	N
F_{r2}	Low-speed shaft overhung load	N
J_1	High-speed shaft mass moment of inertia	kgm^2

SELECTING THE GEAR UNIT

Table 1 shows the various load states and useful durations for determining the service factor to be adopted to select the gear unit. The service factor stems from the combination of a series of conditions related to duration, overloads, start-up frequencies, type of motorisation, speed and reliability, in accordance with the conditions relating to the classes of lifting mechanisms indicated in the FEM 1.001/III and ISO 4301/1 standards.

Tab. 1 fs		IRREGULAR USE	IRREGULAR USE	IRREGULAR USE	IRREGULAR USE	REGULAR USE	REGULAR USE	REGULAR USE	INTENSIVE USE	INTENSIVE USE	INTENSIVE USE
Duration (2) ⇨		***T 0***	***T 1***	***T 2***	***T 3***	***T 4***	***T 5***	***T 6***	***T 7***	***T 8***	***T 9***
		≤ 200 h	> 200 h ≤ 400 h	> 400 h ≤ 800 h	> 800 h ≤ 1600 h	> 1600 h ≤ 3200 h	> 3200 h ≤ 6300 h	> 6300 h ≤ 12500 h	> 12500 h ≤ 25000 h	> 25000 h ≤ 50000 h	> 50000 h ≤ 100000 h
Load type (1) ⇩		↓	↓	↓	↓	↓	↓	↓	↓	↓	↓
L 1 Light	***fs ≥ class***	***0,8 M 1***	***0,8 M 1***	***0,8 M 1***	***0,8 M 2***	***0,8 M 3***	***0,8 M 4***	***0,8 M 5***	***0,9 M 6***	***1,1 M 7***	***1,3 M 8***
km ≤ 0,125 k ≤ 0,5	Start/hr Service kz ≥	(1 Dm) 90 15% 0,83	(1 Dm) 90 15% 0,83	(1 Dm) 90 15% 0,83	(1 Cm) 120 20% 0,83	(1 Bm) 150 25% 0,83	(1 Am) 180 30% 0,83	(2 m) 240 40% 0,83	(3 m) 300 50% 0,74	(4 m) 360 60% 0,60	(5 m) ≥ 360 60% 0,51
L 2 Moderate	***fs ≥ class***	***0,8 M 1***	***0,8 M 1***	***0,8 M 2***	***0,8 M 3***	***0,8 M 4***	***0,8 M 5***	***0,9 M 6***	***1,1 M 7***	***1,3 M 8***	***1,5 M 8***
0,125 < km ≤ 0,125 0,5 < k ≤ 0,63	Start/hr Service kz ≥	(1 Dm) 90 15% 0,83	(1 Dm) 90 15% 0,83	(1 Cm) 120 20% 0,83	(1 Bm) 150 25% 0,83	(1 Am) 180 30% 0,83	(2 m) 240 40% 0,83	(3 m) 300 50% 0,74	(4 m) 360 60% 0,60	(5 m) ≥ 360 60% 0,51	(5 m) ≥ 360 60% 0,44
L 3 Heavy	***fs ≥ class***	***0,8 M 1***	***0,8 M 2***	***0,8 M 3***	***0,9 M 4***	***0,9 M 5***	***1 M 6***	***1,2 M 7***	***1,4 M 8***	***1,8*** *(4)* ***M 8***	***2,2*** *(4)* ***M 8***
0,25 < km ≤ 0,5 0,63 < k ≤ 0,8	Start/hr Service kz ≥	(1 Dm) 90 15% 0,83	(1 Cm) 120 20% 0,83	(1 Bm) 150 25% 0,83	(1 Am) 180 30% 0,74	(2 m) 240 40% 0,74	(3 m) 300 50% 0,67	(4 m) 360 60% 0,56	(5 m) ≥ 360 60% 0,48	(5 m) ≥ 360 60% 0,44	(5 m) ≥ 360 60% 0,37
L 4 Very heavy	***fs ≥ class***	***0,8 M 2***	***0,8 M 3***	***0,9 M 4***	***0,9 M 5***	***1 M 6***	***1,2 M 7***	***1,4 M 8***	***1,8*** *(4)* ***M 8***	***2,2*** *(4)* ***M 8***	***2,5*** *(4)* ***M 8***
0,5 < km ≤ 1 0,8 < k ≤ 1	Start/hr Service kz ≥	(1 Cm) 120 20% 0,83	(1 Bm) 150 25% 0,83	(1 Am) 180 30% 0,74	(2 m) 240 40% 0,74	(3 m) 300 50% 0,67	(4 m) 360 60% 0,56	(5 m) ≥ 360 60% 0,48	(5 m) ≥ 360 60% 0,44	(5 m) ≥ 360 60% 0,37	(5 m) ≥ 360 60% 0,33

(1) $k = (km)^{1/3} = \left[\sum_{i=1...n} ((Pi/Pmax)^3 \times (ti/T)) \right]^{1/3}$

k : average equivalent spectrum factor
km : spectrum factor
ti : average duration of each load level
T : total use duration
Pi : amplitude of each load level
Pmax : amplitude of maximum load level
L1 : mechanisms usually subject to low loads and rarely to maximum load
L2 : mechanisms usually subject to moderate loads and rarely to maximum load
L3 : mechanisms normally subject to heavy loads and frequently to maximum load
L4 : mechanisms regularly subject to maximum load.

(2) The durations are purely theoretical, they cannot be guaranteed and can be obtained from daily average use, from the number of working days and from the expected years of operation.

(3) The indicated fs service factors are only valid for lifting equipment and take into account the maximum indicated number of starts and a max torque on the gear unit during T2 max start and braking intervals, limited by the kz peak factor.

(4) In the case in which Fr2 ⩽ (Fr2 max/2) it can be considered: for L3-T8, L4-T7 fs ⩾ 1,5; for L3-T9, L4-T8 fs ⩾ 1,8; for L4-T9 fs ⩾ 2.

In the case of speeds different to those indicated in the catalogue, Table 2 shows the nominal performance corrective factors which take into account the input speeds > 1500 rpm

Table 2: Factor f_N

n_1 (min^{-1})	$8 < i_n < 80$		$i_n \geq 80$	
	Tn	Pn	Tn	Pn
1500	1,00	1,00	1,00	1,00
1750	0,97	1,25	1,00	1,28
2000	0,94	1,38	1,00	1,47
2400	0,92	1,62	1,00	1,76
2750	0,90	1,82	1,00	2,02

Besides on the basis of its mechanical performance, the selection of the gear unit must also be verified on the basis of its thermal characteristics. Table 3 shows the nominal thermal capacity relating to the condition of no auxiliary cooling, at a room temperature of 20°C.

Table 3: Nominal thermal capacity

Size	*13*	*23*	*33*	*43*	*53*	*63*	*73*	*83*	*93*	*103*
P_{tN} *[kW]*	31	41	53	67	84	104	130	169	209	253

For different room temperatures, the nominal thermal capacity P_{tN} must be multiplied by the ambient correction factor f_a shown in Table 4.

Table 4: Ambient correction factor f_a

Room temperature	f_a
10 °C	1,14
20 °C	1
30 °C	0,86
40 °C	0,72
50 °C	0,56

$$P_t = P_{tN} \times f_a$$

Checking the thermal capacity is not normally necessary if the period of continuous operation is less than 3 hours and is followed by a period of inactivity long enough to restore room temperature in the gear unit.

NOMINAL POWER RATING P_N (kW)

Sizes

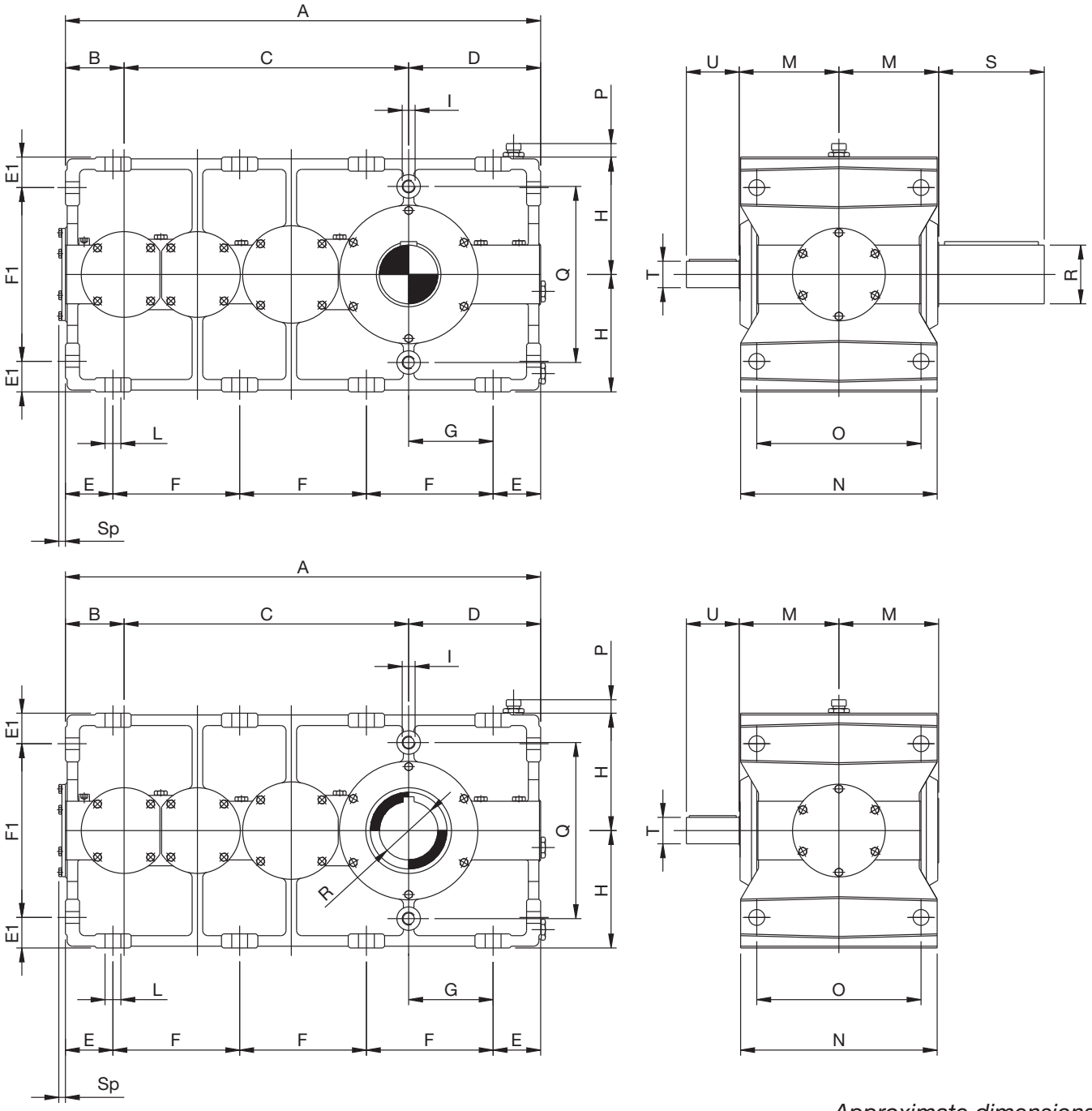
i_N	n_1 min^{-1}	n_2 min^{-1}	13	23	33	43	53	63	73	83	93	103
8	1500 1000 750	211 141 106	85,5 57 43	125 83,5 62,5	167,5 112 84	228 152 114	335 223 167	529 352 264	658 439 329	928 619 464	1310 874 656	1816 1211 908
9	1500 1000 750	188 125 94	82,5 55 41	119,5 79,5 59,5	160 105,5 80	217 145 109	318 212 159	475 317 238	623 415 312	881 588 441	1241 828 621	1698 1132 849
10	1500 1000 750	167 111 83	75,5 50,5 38	112,5 75 56	149 99 74,5	203 135 102	298 199 149	427 285 213	586 391 293	827 552 414	1186 791 593	1601 1068 801
11,2	1500 1000 750	150 100 75	67,5 45 34	101 67 50,5	135 90 67,5	182 121 91	277 185 139	365 243 183	544 363 272	777 518 389	1104 736 552	1466 978 733
12,5	1500 1000 750	134 89 67	62 41,5 31	90,5 60 45	122,5 81,5 61,5	167 111 84	251 168 126	329 219 165	491 327 245	713 475 357	1035 690 518	1364 909 682
14	1500 1000 750	120 80 60	55 37 27,5	80,5 54 40,5	109,5 73 55	151 100 75	225 150 113	310 207 155	439 293 220	641 428 321	932 622 466	1235 823 618
16	1500 1000 750	107 71 54	49 32,5 24,5	69 46 34,5	98,5 66 49,5	134 90 67	191 127 96	264 176 132	391 261 196	540 360 270	791 527 396	1103 736 552
18	1500 1000 750	94 63 47	44 29,5 22	61 40,5 30,5	88,5 59 44,5	121 80,5 60,5	171 114 86	233 155 116	347 231 174	483 322 242	706 471 353	991 660 496
20	1500 1000 750	83 56 42	39,5 26 20	60,5 40,5 30	81,5 54,5 40,5	112,5 75 56	173 116 87	234 156 117	315 210 158	478 319 239	666 444 333	885 590 443
22,5	1500 1000 750	75 50 38	35 23,5 17,5	53 35 26,5	71 47,5 35,5	94,5 63,5 47,5	151 101 76	195 130 98	281 187 141	422 282 211	542 361 271	764 509 382
25	1500 1000 750	67 44 33	32,5 21,5 16	49 29 22	65,5 43,5 33	92 61,5 46	139 93 70	192 128 96	260 173 130	390 260 195	529 353 265	726 484 363
28	1500 1000 750	60 40 30	29 19,5 14,5	44 29 22	59 39,5 29,5	83 55,5 41,5	124,5 83 62,5	172 115 86	233 155 117	350 234 175	477 318 238	656 437 328
31,5	1500 1000 750	54 36 27	26 17,5 13	37 25 18,5	53 35,5 26,5	71,5 47,5 35,5	106 70,5 53	146 98 73	209 139 105	297 198 149	429 286 215	567 378 284
35,5	1500 1000 750	48 32 24	23,5 16 12	34 22,5 17	48,5 32,5 24,5	65 43,5 32,5	97 64,5 48,5	133 89 66,5	189 126 95	270 180 135	372 248 286	515 344 258
40	1500 1000 750	42 28 21	21 14 10,5	30 20 15	43,5 29 22	58,5 39 29	86,5 57,5 43,5	119 79 59,5	168 112 84	241 161 121	333 222 167	463 309 232
45	1500 1000 750	38 25 19	19 12,5 9,5	27 18 13,5	38,5 26 19,5	52,5 35 26	77 51,5 38,5	105 70 50,5	149 100 75	214 143 107	297 198 149	418 279 209
50	1500 1000 750	32 22 17	16,5 11 8,3	25,5 17 13	35 23,5 17,5	47,5 32 24	68,5 48,5 34,5	94,5 63 47,5	134 89 67	204 136 102	268 179 134	373 249 187
56	1500 1000 750	30 20 15	14,5 9,7 7,3	22,5 15 11	30,5 20,5 15,5	42,5 28 21	64,5 43 32,5	88,5 59 44,5	117 78 59	179 120 90	237 158 118	334 223 167
63	1500 1000 750	27 18 13	13,5 9,1 6,8	19,5 13 10	27 18 35,5	37,5 25 18,5	56,5 37,5 28,5	77,5 51,5 39	110 73 55	156 104 78	208 139 104	297 198 149
71	1500 1000 750	24 16 12	11,7 7,8 5,9	17 13,5 8,5	25 17 12,5	32,5 21,5 16,5	49 38,5 24,5	67,5 45 33,5	94,5 63 47,5	135 90 68	194 129 97	262 174 131
80	1500 1000 750	21 14 11	10 6,7 5	15,5 10,5 8	21,5 14,5 11	34,5 20,5 15	42,5 28,5 21	62,5 41,5 31,5	80,5 53,5 40,5	125 83 63	168 112 84	244 163 122
90	1500 1000 750	19 13 0	9,2 6,1 4,6	13 9 6,5	18,5 12,5 9,3	26 17,5 13	39 26 19,5	53,5 35,5 31,5	74 49,5 37	106 71 53	155 104 78	211 141 106
100	1500 1000 750	17 11 0	8,4 5,6 4,2	12,1 8,1 6,1	17 11,4 8,5	24 16 12	35,8 23,8 17,9	49 32,5 24,5	67,5 45 34	97 65 49	131 88 66	196 131 98
112	1500 1000 750	15 10 0	7,6 5,1 3,8	11 7,3 5,5	15,6 10,4 7,8	20,5 13,5 10	32,7 21,8 16,3	44,5 30 22,5	61,5 41 30,5	88 59 44	120 80 60	165 110 83
125	1500 1000 750	13 0 0	6,2 4,1 3,1	8,9 5,9 4,5	13,1 8,7 6,6	17,1 11,4 8,6	27 18 13,5	33 22 16,5	49,5 33 25	72 48 36	101 68 50	151 101 76
140	1500 1000 750	12 8 6	5,5 3,7 2,8	8 5,3 4	11,8 7,9 5,9	15,5 10,3 7,7	24,5 16,3 12,1	29,5 19,5 14,5	44,5 29,5 22,5	64 43 32	91 61 46	137 91 68

OUTPUT TORQUE T_{N2} (Nm)

Sizes

i_N	13	23	33	43	53	63	73	83	93	103
8	4100	6100	8300	10900	15900	24900	31600	43900	62800	87000
9	4400	6300	8800	11500	16800	24900	33300	46400	66000	90000
10	4500	6600	9100	11900	17500	24900	34900	48500	70000	94000
11,2	4500	6600	9200	12500	18100	25100	36200	50800	72500	101000
12,5	4600	6600	9300	12700	18300	25300	36500	52100	75700	104000
14	4600	6600	9300	12800	18300	25300	36700	52500	76000	105000
16	4600	6700	9400	12800	18500	25700	36800	52800	76800	105000
18	4700	6700	9500	12900	18700	25700	37000	53600	77400	106000
20	4800	7100	9900	13600	20200	27600	38400	56600	77700	107000
22,5	4700	7000	9800	13400	20000	27100	37900	55900	76600	108000
25	4850	7200	10050	13700	20400	28100	39000	57500	78800	108000
28	4850	7200	10050	13700	20400	28100	39000	57500	78800	108000
31,5	4850	7200	10050	13700	20400	28100	39000	57500	78800	109000
35,5	4950	7350	10250	13900	20800	28500	39500	58500	80300	110000
40	4950	7350	10250	13900	20800	28500	39500	58500	80300	110000
45	4950	7350	10250	13900	20800	28500	39500	58500	80300	111000
50	5000	7450	10400	14200	21000	28900	40200	59300	81400	111000
56	5000	7450	10400	14200	21000	28900	40200	59300	81400	112000
63	5000	7450	10400	14200	21000	28900	40200	59300	81400	113000
71	5000	7450	10400	14200	21000	28900	40200	59300	81400	114000
80	5000	7450	10400	14200	21000	28900	40200	59300	81400	114000
90	5000	7450	10400	14200	21000	28900	40200	59300	81400	114500
100	5000	7450	10400	14200	21000	28900	40200	59300	81400	115000
112	5000	7450	10400	14200	21000	28900	40200	59300	81400	116200
125	5000	7450	10400	14200	21000	28900	40200	59300	81400	116200
140	5000	7450	10400	14200	21000	28900	40200	59300	81400	116200

DIMENSIONS

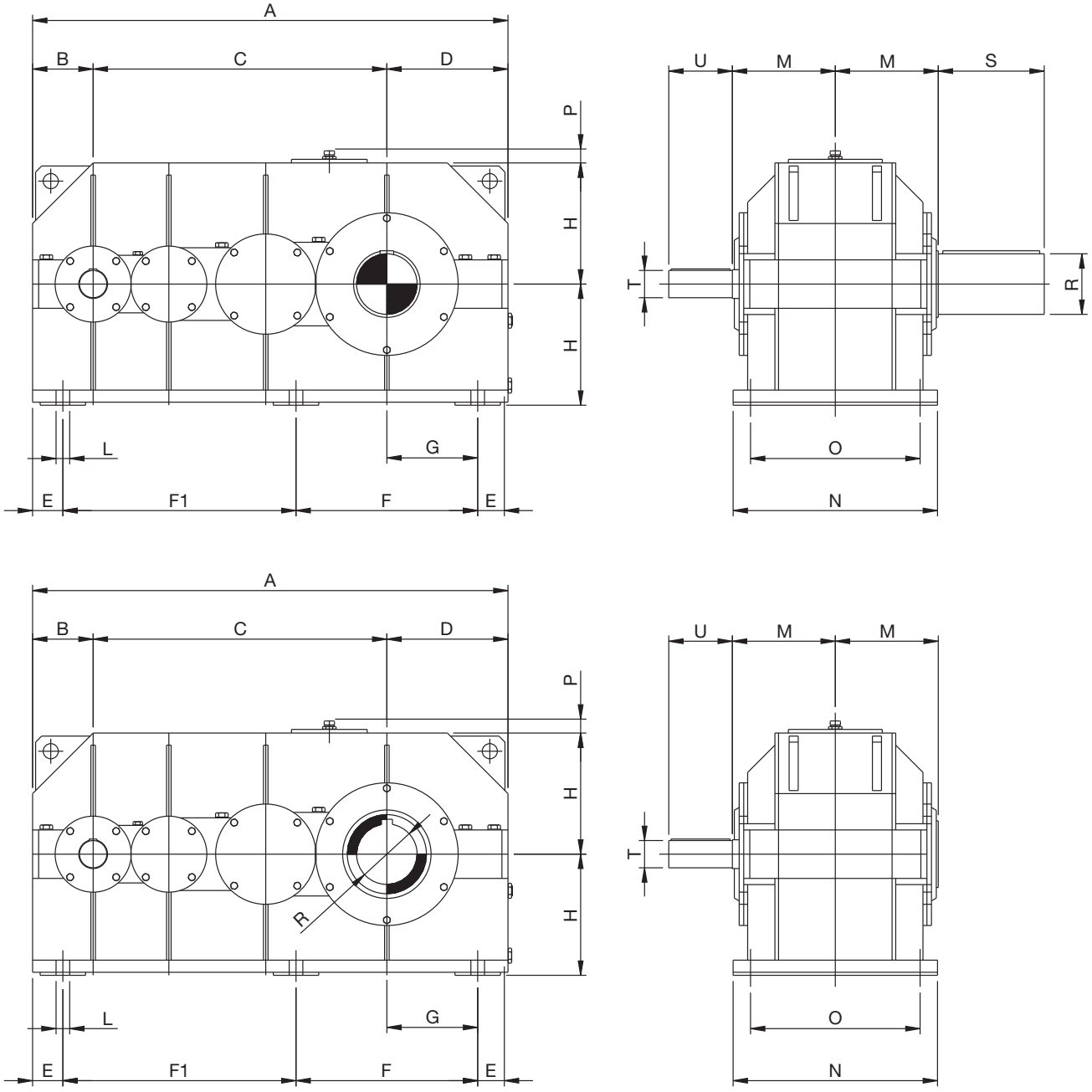


Approximate dimensions

Size	A	B	C	D	E	E1	F	F1	G	H	I	L	M	N	O	P	Q	R	S	T	U	Sp	Weight (kg)	Oil quantity (l)		
																								1*	2*	3*
13	572	70	342	160	56,5	38	153	204	103,5	140	M16	20	121	237	200	20	210	65	110	35	90	11	127	5,5	11	9,2
23	645	80	385	180	63	42	173	236	117	160	M18	22	137	269	225	22	240	80	140	40	100	11	184	7,6	15	13
33	722	90	432	200	70	46	194	268	130	180	M20	25	151	297	250	22	270	90	160	45	115	12	250	11	22	18
43	810	100	485	225	81	52	216	296	144	200	M22	27	170	335	280	22	300	100	180	50	130	13	350	15	32	26
53	907	112	545	250	90,5	57	242	336	159,5	225	M24	30	192	379	315	22	340	110	200	55	140	16	490	21	44	36
63	1015	125	610	280	101	62	271	376	179	250	M27	33	216	427	355	22	380	120	210	60	150	17	695	29	62	50
73	1140	140	685	315	112,5	72	305	416	202,5	280	M30	36	242	479	400	25	430	140	250	65	165	18	959	41	87	71
83	1285	160	770	355	125	80	345	470	230	315	M33	39	273	541	450	25	490	160	280	70	180	22	1343	58	125	102
93	1445	180	865	400	140,5	87	388	536	259,5	355	M36	42	302	599	500	25	560	170	300	75	190	25	1880	81	175	144

* Mounting position page 14

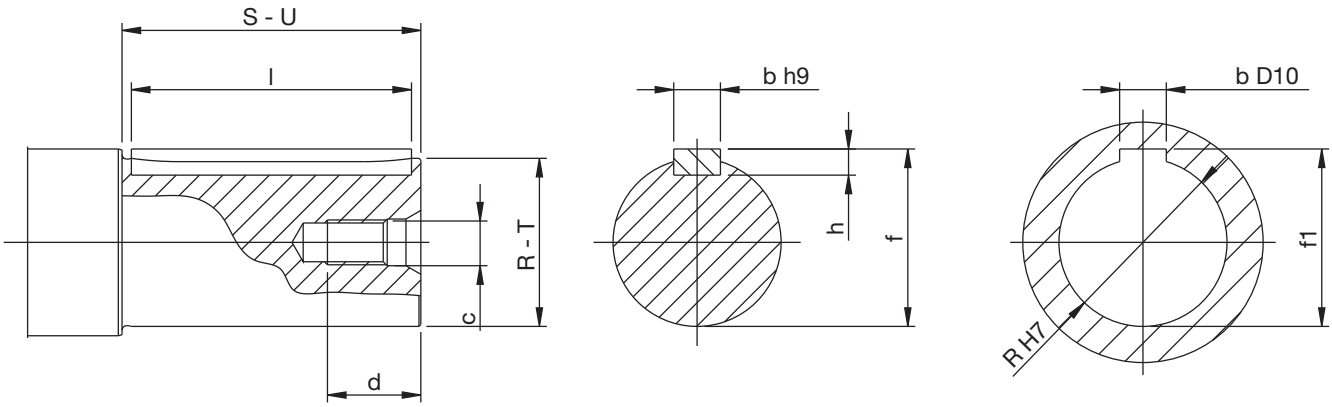
DIMENSIONS



Approximate dimensions

Size	A	B	C	D	E	F	F1	G	H	L	M	N	O	P	R	S	T	U	Weight (kg)	Oil quantity (l)
103	1570	200	970	400	100	600	770	300	400	45	340	675	560	60	200	350	90	180	2560	116

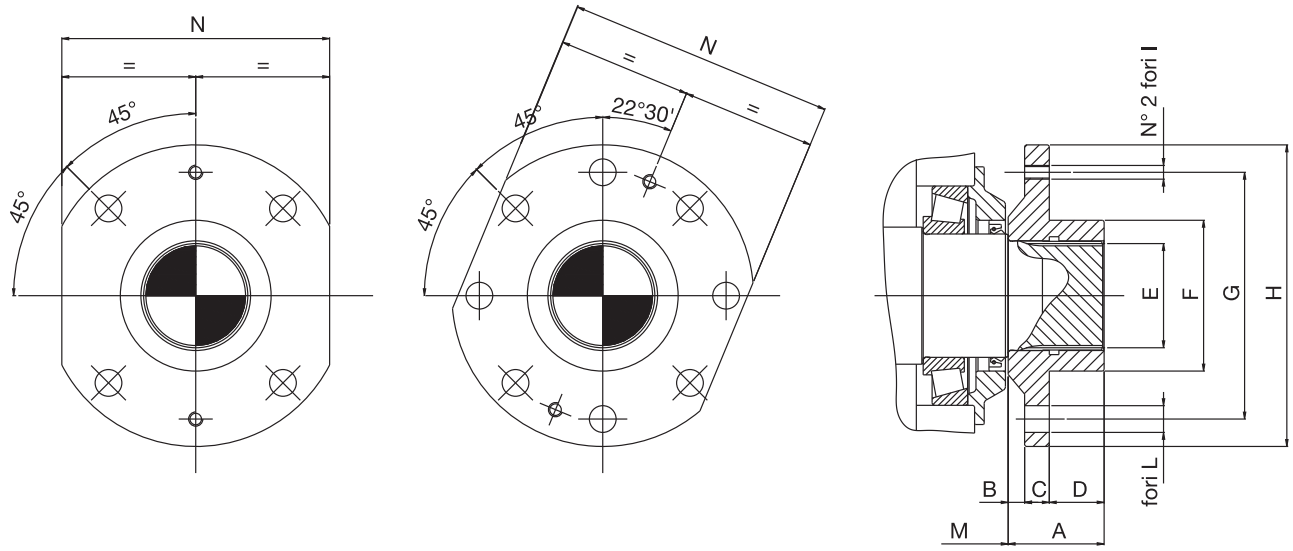
SHAFT ENDING



R-T	S-U a11	c	d	Key			f	f1
				b	h	l		
28 k6	63	M8	19	8	7	56	31	31,3
35 k6	90	M10	22	10	8	80	38	38,3
40 k6	100	M10	22	12	8	90	43	43,3
45 k6	115	M10	22	14	9	100	48,5	48,8
50 k6	130	M12	28	14	9	110	53,5	53,8
55 m6	140	M12	28	16	10	125	59	59,3
60 m6	150	M12	28	18	11	140	64	64,4
65 m6	110	M16	36	18	11	100	69	69,4
65 m6	165	M16	36	18	11	140	69	69,4
70 m6	180	M16	36	20	12	160	74,5	74,9
75 m6	190	M16	36	20	12	180	79,5	79,9
80 m6	140	M16	36	22	14	125	85	85,4
90 m6	160	M16	36	25	14	140	95	95,4
90 m6	180	M16	36	25	14	160	95	95,4
100 m6	180	M20	42	28	16	160	106	106,4
110 m6	200	M20	42	28	16	180	116	116,4
120 m6	210	M20	42	32	18	180	127	127,4
140 m6	250	M24	50	36	20	220	148	148,4
160 m6	280	M24	50	40	22	250	169	169,4
170 m6	300	M24	50	40	22	280	179	179,4
200 m6	350	M30	64	45	25	320	210	210,4

Tapped holes on top according to DIN 332
Keys according to UNI 6604-69

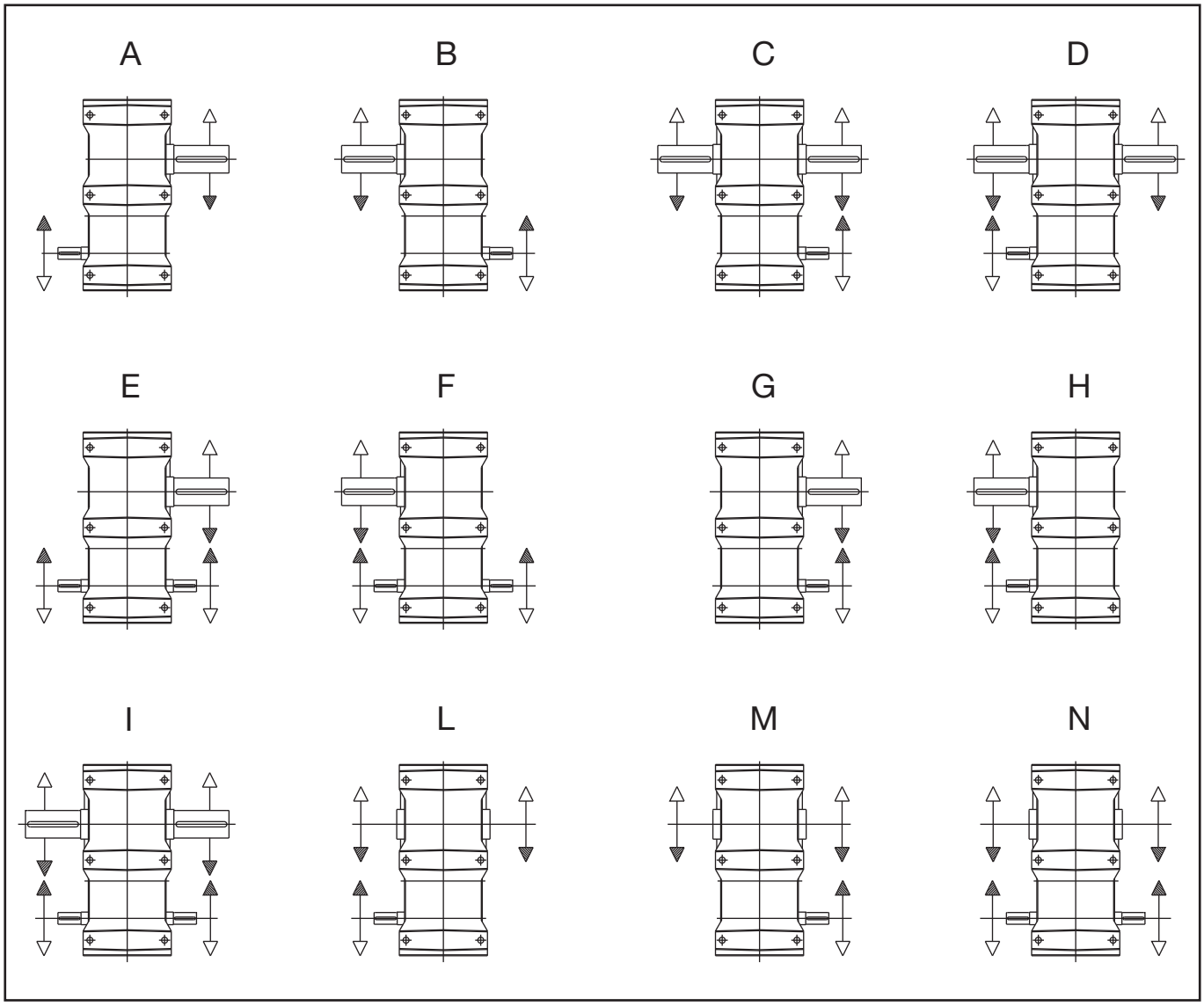
SPLINED LOW-SPEED SHAFT AND BROACHED FLANGE



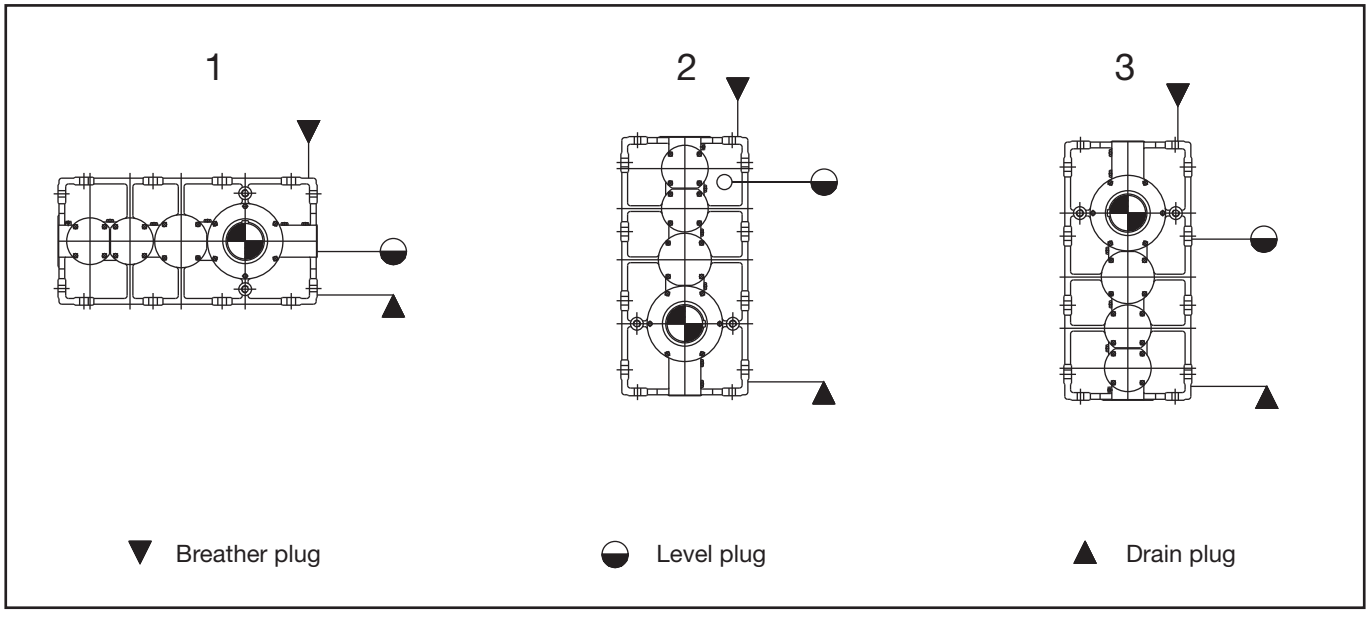
Size	A	B	C	D	E	F f8	G	H	I	L	M	N h9
13	70	11	16	43	70x64 [1]	100	160	200	M 10	N° 4 x Ø 17,5	121	180
23	70	12	18	40	80x74 [1]	110	180	220	M 10	N° 4 x Ø 19,5	137	200
33	75	15	20	40	95x89 [1]	130	190	240	M 10	N° 8 x Ø 19,5	151	220
43	80	20	20	40	105x3x30x34 [2]	145	200	250	M 12	N° 8 x Ø 21,5	170	230
53	95	20	23	52	110x3x30x35 [2]	150	225	280	M 12	N° 8 x Ø 21,5	192	250
63	125	20	25	80	130x5x30x24 [2]	180	280	355	M 14	N° 8 x Ø 23,5	216	315
73	140	22	28	90	140x5x30x26 [2]	200	315	400	M 14	N° 8 x Ø 23,5	242	355
83	160	25	32	103	160x5x30x30 [2]	225	355	450	M 16	N° 8 x Ø 29	273	400
93	180	28	34	118	180x8x30x21 [2]	250	400	500	M 16	N° 8 x Ø 32	302	450
103	200	32	36	132	200x8x30x24 [2]	280	450	560	M 18	N° 8 x Ø 35	340	500

1) Profile splined according to DIN 5482
2) Profile splined according to DIN 5480

SHAFT ARRANGEMENT



MOUNTING POSITION



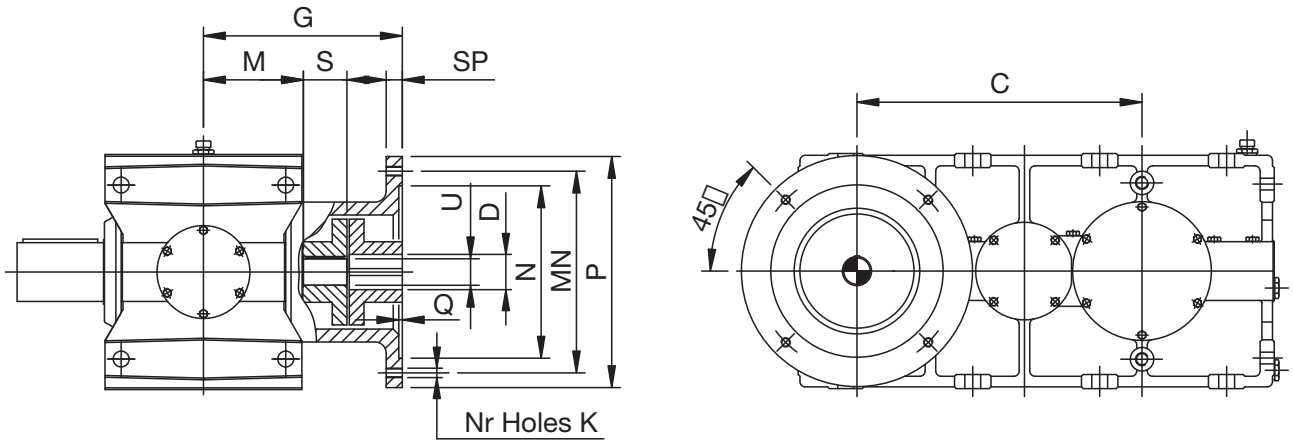
ACTUAL RATIOS

Sizes

i_N	13	23	33	43	53	63	73	83	93	103
8	8,021	8,357	8,263	7,995	7,942	7,865	8,021	7,9	8	7,995
9	8,928	8,815	9,181	8,848	8,825	8,752	8,928	8,791	8,877	8,848
10	9,949	9,812	10,208	9,799	9,811	9,747	9,949	9,79	9,858	9,799
11,2	11,106	10,934	11,362	11,499	10,921	11,487	11,106	10,918	10,962	11,499
12,5	12,428	12,205	12,67	12,732	12,178	12,855	12,428	12,202	12,212	12,732
14	13,953	13,658	14,166	14,198	13,615	13,614	13,953	13,675	13,614	14,198
16	15,733	16,274	15,891	15,89	16,202	16,274	15,733	16,346	16,213	15,89
18	17,837	18,396	17,904	17,863	18,302	18,449	17,837	18,531	18,301	17,863
20	20,361	19,602	20,283	20,196	19,495	19,692	20,361	19,78	19,487	20,196
22,5	22,564	22,121	23,019	23,609	22,125	23,227	22,564	22,121	23,625	23,609
25	25,117	24,615	25,577	24,837	24,583	24,5	25,117	24,615	24,886	24,837
28	27,988	27,413	28,436	27,495	27,331	27,271	27,988	27,413	27,623	27,495
31,5	31,243	32,308	31,651	32,087	32,117	32,099	31,243	32,308	30,692	32,087
35,5	34,962	36,154	35,296	35,643	35,858	35,873	34,962	36,154	36,063	35,643
40	39,254	40,592	39,462	39,688	40,153	40,205	39,254	40,592	40,284	39,688
45	44,26	45,769	44,268	44,333	45,135	45,231	44,26	45,769	45,153	44,333
50	50,178	48,696	49,875	49,722	50,984	51,13	50,178	48,696	50,834	49,722
56	57,278	55,385	56,502	56,047	54,307	54,483	57,278	55,385	57,548	56,047
63	61,389	63,482	64,454	63,577	61,95	62,192	61,389	63,482	65,605	63,577
71	71,062	73,484	69,058	72,692	71,292	71,615	71,062	73,484	70,269	72,692
80	83,314	79,423	79,89	78,01	82,969	77,158	83,314	79,423	81,244	78,01
90	90,752	93,846	93,612	90,638	89,975	90,462	90,752	93,846	87,761	90,638
100	99,335	102,722	101,942	98,215	97,982	98,538	99,335	102,722	103,587	98,215
112	109,349	113,077	111,555	116,867	107,221	107,858	109,349	113,077	113,325	116,867
125	121,183	125,315	122,769	128,524	130,739	131,58	121,183	125,315	124,688	128,524
140	135,385	140	136,023	142,301	146,025	147	135,385	140	138,115	142,301

MOTORIZED GEAR UNITS

1 Connection with elastic coupling



Overall dimensions												1 (1)	
Size	**M**	**S**	**C** a 11	**Motor**	**Ø P**	**Ø MN**	**Ø N**	**Q** G 6	**K**	**Nr Holes**	**SP**	**Ø U**	**G**
13	121	90	342	90	200	165	130	4,5	M 10	4	12	35 k6	265
				100	250	215	180	5	M 12	4	14		275
				112	250	215	180	5	M 12	4	14		275
				132	300	265	230	5	M 12	4	16		295
				160	350	300	250	6	M 16	4	18		325
23	137	100	385	100	250	215	180	5	M 12	4	14	40 k6	301
				112	250	215	180	5	M 12	4	14		301
				132	300	265	230	5	M 12	4	16		321
				160	350	300	250	6	M 16	4	18		351
33	151	115	432	100	250	215	180	5	M 12	4	14	45 k6	330
				112	250	215	180	5	M 12	4	14		330
				132	300	265	230	5	M 12	4	16		350
				160	350	300	250	6	M 16	4	18		380
				180	350	300	250	6	M 16	4	18		380
43	170	130	485	100	250	215	180	5	M 12	4	14	50 k6	364
				112	250	215	180	5	M 12	4	14		364
				132	300	265	230	5	M 12	4	16		384
				160	350	300	250	6	M 16	4	18		414
				180	350	300	250	6	M 16	4	18		414
53	192	140	545	100	250	215	180	5	M 12	4	14	55 m6	396
				112	250	215	180	5	M 12	4	14		396
				132	300	265	230	5	M 12	4	16		416
				160	350	300	250	6	M 16	4	18		446
				180	350	300	250	6	M 16	4	18		446
				200	400	350	300	6	M 16	4	20		446
				225	450	400	350	6	M 16	8	20		476
63	216	150	610	132	300	265	230	5	M 12	4	16	60 m6	450
				160	350	300	250	6	M 16	4	18		480
				180	350	300	250	6	M 16	4	18		480
				200	400	350	300	6	M 16	4	20		480
				225	450	400	350	6	M 16	8	20		510
73	242	165	685	132	300	265	230	5	M 12	4	16	65 m6	491
				160	350	300	250	6	M 16	4	18		521
				180	350	300	250	6	M 16	4	18		521
				200	400	350	300	6	M 16	4	20		521
				225	450	400	350	6	M 16	8	20		551
				250	550	500	450	6	M 16	8	20		551
83	273	180	770	160	350	300	250	6	M 16	4	18	70 m6	567
				180	350	300	250	6	M 16	4	18		567
				200	400	350	300	6	M 16	4	20		567
				225	450	400	350	6	M 16	8	20		597
				250	550	500	450	6	M 16	8	20		597
				280	550	500	450	6	M 16	8	20		597
93	302	190	865	160	350	300	250	6	M 16	4	18	75 m6	606
				180	350	300	250	6	M 16	4	18		606
				200	400	350	300	6	M 16	4	20		606
				225	450	400	350	6	M 16	8	20		636
				250	550	500	450	6	M 16	8	20		636
				280	550	500	450	6	M 16	8	20		636

NOTES:
(1) Flexible coupling supplied by ***Reggiana Riduttori***. If the coupling is not needed, indicate when ordering. It is best to check max Ø of coupling.
– The dimensions G and D relate to the AC motors 4-12 poles IEC-72

OVERHUNG LOADS

In the case of driving parts, which could generate overhung loads on the shafts of the gear unit itself, being connected at either input and output, it is best to make sure the gear unit is able to withstand such loads.
The table shows the max values of the overhung loads on the high-speed shaft F_{r1} and on the low-speed shaft F_{r2} which are acceptable in the event of the load being applied at centre distance of the shaft end (dimensions U and S of the relevant dimensional tables).
Different cases can occur for which the following indications should be taken into account:
a) if acting at 0.25 U or S from the gearbox side, multiply such values by 2.
b) if acting at 0.75 U or S from the gearbox side, multiply such values by 0.67.
In the event of the generated overhung load being below 20% of the values shown on the table, no check need be made.

At the same time as the overhung load, a **thrust load** of 20% of the overhung load is also acceptable.
For higher values, please contact us.

The overhung loads can be calculated approximately, using the following formula:

$$F_r = k \cdot \frac{T}{D}$$

T (Nm) : torque
D (mm) : pitch circle diameter of the keyed component
Where k values are:

1. 2000 for chain drive
2. 2100 for gear drive
3. 3000 for cog belt drive
4. 5000 for V-belt drive

OVERHUNG LOADS F_r (N)

Sizes

i_N			13	23	33	43	53	63	73	83	93	103
8	F_{r1}	N	2000	3100	6000	6900	9600	11500	14700	16900	19800	27000
	F_{r2}	N	16000	21000	38000	48000	53000	63000	75000	88000	150000	188000
9	F_{r1}	N	2000	3100	6000	6900	9600	11500	14700	16900	19800	27000
	F_{r2}	N	16000	21000	38000	48000	53000	63000	75000	88000	150000	188000
10	F_{r1}	N	2000	3100	6000	6900	9600	11500	14700	16900	19800	27000
	F_{r2}	N	16000	21000	38000	48000	53000	63000	75000	88000	150000	188000
11,2	F_{r1}	N	2000	3100	6000	6900	9600	11500	14700	16900	19800	27000
	F_{r2}	N	16000	21000	38000	48000	53000	63000	75000	88000	150000	188000
12,5	F_{r1}	N	2000	3100	6000	6900	9600	11500	14700	16900	19800	27000
	F_{r2}	N	16000	21000	38000	48000	53000	63000	75000	88000	150000	188000
14	F_{r1}	N	2100	3200	6100	7100	9800	11900	15200	17400	20300	28800
	F_{r2}	N	16000	21000	38000	48000	53000	63000	75000	88000	150000	188000
16	F_{r1}	N	2100	3200	6100	7100	9800	11900	15200	17400	20300	28800
	F_{r2}	N	16000	21000	38000	48000	53000	63000	75000	88000	150000	188000
18	F_{r1}	N	2100	3200	6100	7100	9800	11900	15200	17400	20300	28800
	F_{r2}	N	16000	21000	38000	48000	53000	63000	75000	88000	150000	188000
20	F_{r1}	N	2300	3500	6500	7600	10300	12800	16300	18500	21500	30000
	F_{r2}	N	16000	21000	38000	48000	53000	63000	75000	88000	150000	188000
22,5	F_{r1}	N	2300	3500	6500	7600	10300	12800	16300	18500	21500	30000
	F_{r2}	N	16000	21000	38000	48000	53000	63000	75000	88000	150000	188000
25	F_{r1}	N	2400	3600	6800	7800	10500	13000	16500	19000	22000	31000
	F_{r2}	N	16000	21000	38000	48000	53000	63000	75000	88000	150000	188000
28	F_{r1}	N	2400	3600	6800	7800	10500	13000	16500	19000	22000	31000
	F_{r2}	N	16000	21000	38000	48000	53000	63000	75000	88000	150000	188000
31,5	F_{r1}	N	2500	3800	7000	8000	10800	13300	16800	19500	22500	32000
	F_{r2}	N	16000	21000	38000	48000	53000	63000	75000	88000	150000	188000
35,5	F_{r1}	N	2500	3800	7000	8000	10800	13300	16800	19500	22500	32000
	F_{r2}	N	16000	21000	38000	48000	53000	63000	75000	88000	150000	188000
40	F_{r1}	N	2600	4000	7300	8300	11200	13500	17200	20000	23000	33000
	F_{r2}	N	16000	21000	38000	48000	53000	63000	75000	88000	150000	188000
45	F_{r1}	N	2600	4000	7300	8300	11200	13500	17200	20000	23000	33000
	F_{r2}	N	16000	21000	38000	48000	53000	63000	75000	88000	150000	188000
50	F_{r1}	N	2600	4000	7300	8300	11200	13500	17200	20000	23000	33000
	F_{r2}	N	16000	21000	38000	48000	53000	63000	75000	88000	150000	188000
56	F_{r1}	N	2600	4000	7300	8300	11200	13500	17200	20000	23000	33000
	F_{r2}	N	16000	21000	38000	48000	53000	63000	75000	88000	150000	188000
63	F_{r1}	N	2800	4200	7700	8600	11500	13800	17500	21000	24000	34000
	F_{r2}	N	16000	21000	38000	48000	53000	63000	75000	88000	150000	188000
71	F_{r1}	N	2800	4200	7700	8600	11500	13800	17500	21000	24000	34000
	F_{r2}	N	16000	21000	38000	48000	53000	63000	75000	88000	150000	188000
80	F_{r1}	N	2800	4200	7700	8600	11500	13800	17500	21000	24000	34000
	F_{r2}	N	16000	21000	38000	48000	53000	63000	75000	88000	150000	188000.
90	F_{r1}	N	2800	4200	7700	8600	11500	13800	17500	21000	24000	34000
	F_{r2}	N	16000	21000	38000	48000	53000	63000	75000	88000	150000	188000
100	F_{r1}	N	2800	4200	7700	8600	11500	13800	17500	21000	24000	34000
	F_{r2}	N	16000	21000	38000	48000	53000	63000	75000	88000	150000	188000
112	F_{r1}	N	2800	4200	7700	8600	11500	13800	17500	21000	24000	34000
	F_{r2}	N	16000	21000	38000	48000	53000	63000	75000	88000	150000	188000
125	F_{r1}	N	2800	4200	7700	8600	11500	13800	17500	21000	24000	34000
	F_{r2}	N	16000	21000	38000	48000	53000	63000	75000	88000	150000	188000
140	F_{r1}	N	2800	4200	7700	8600	11500	13800	17500	21000	24000	34000
	F_{r2}	N	16000	21000	38000	48000	53000	63000	75000	88000	150000	188000

MASS MOMENTS OF INERTIA J_1 (kgm^2)

Sizes

i_N	13	23	33	43	53	63	73	83	93	103
8	0,001	0,0037	0,0043	0,0126	0,0193	0,0302	0,055	0,0946	0,1785	0,3149
9	0,001	0,0034	0,0041	0,0116	0,0181	0,0285	0,0518	0,0864	0,168	0,2965
10	0,001	0,0032	0,0039	0,0107	0,0169	0,0269	0,0488	0,0845	0,158	0,2791
11,2	0,001	0,0029	0,0038	0,0099	0,0158	0,0254	0,046	0,0798	0,1487	0,2627
12,5	0,001	0,0027	0,0036	0,0092	0,0148	0,024	0,0434	0,0754	0,1399	0,2473
14	0,001	0,0025	0,0035	0,0085	0,0138	0,0226	0,0409	0,0712	0,1316	0,2328
16	0,0009	0,0024	0,0033	0,0078	0,0129	0,0214	0,0385	0,0673	0,1238	0,2191
18	0,0009	0,0022	0,0032	0,0073	0,012	0,0202	0,0363	0,0635	0,1165	0,2063
20	0,0009	0,002	0,0031	0,0067	0,0113	0,019	0,0342	0,06	0,1096	0,1942
22,5	0,0009	0,0019	0,0029	0,0062	0,0105	0,018	0,0322	0,0567	0,1031	0,1828
25	0,0009	0,0017	0,0029	0,0057	0,0098	0,017	0,0304	0,0536	0,097	0,1721
28	0,0008	0,0016	0,0028	0,0053	0,0092	0,016	0,0286	0,0506	0,0913	0,162
31,5	0,0008	0,0015	0,0026	0,0049	0,0086	0,0151	0,027	0,0478	0,0859	0,1525
35,5	0,0008	0,0014	0,0025	0,0046	0,0081	0,0143	0,0254	0,0452	0,0808	0,1436
40	0,0008	0,0013	0,0024	0,0043	0,0076	0,0135	0,024	0,0427	0,076	0,1352
45	0,0007	0,0013	0,0023	0,004	0,0072	0,0127	0,0226	0,0403	0,0716	0,1273
50	0,0007	0,0012	0,0021	0,0038	0,0067	0,012	0,0213	0,0379	0,0674	0,1199
56	0,0006	0,0011	0,002	0,0036	0,0063	0,0113	0,0201	0,0357	0,0634	0,1128
63	0,0006	0,0011	0,0019	0,0034	0,006	0,0107	0,019	0,0337	0,0599	0,1066
71	0,0006	0,001	0,0018	0,0032	0,0057	0,0101	0,0179	0,0319	0,0566	0,1007
80	0,0005	0,001	0,0017	0,0031	0,0054	0,0097	0,0171	0,0305	0,0543	0,0965
90	0,0005	0,0009	0,0017	0,0029	0,0052	0,0093	0,0165	0,0294	0,0523	0,093
100	0,0005	0,0009	0,0015	0,0029	0,0051	0,009	0,016	0,0266	0,0508	0,0904
112	0,0005	0,0009	0,0015	0,0028	0,005	0,0088	0,0157	0,0279	0,0496	0,0882
125	0,0005	0,0009	0,0015	0,0027	0,0048	0,0086	0,0153	0,0272	0,0483	0,0859
140	0,0005	0,0008	0,0015	0,0026	0,0047	0,0084	0,0149	0,0266	0,0474	0,0842

The values shown refer to the high-speed shaft of the gear unit, in the version with a single protrusion. The moment of inertia referring to low-speed axis can be obtained from the following formula:

$J_2 = J_1 \bullet i_r^2$

i_r : actual ratio

LUBRICATION

ISO & AGMA Viscosity grade

Speed n_2 (min^{-1})	*Standard*	*Room temperature range (°C)*		
		from –10 to –15	*from 0 to +30*	*from +10 to +50*
Under 100	ISO - AGMA	VG 68 2 EP	VG 150 4 EP	VG 220 5 EP
Over 100	ISO - AGMA	VG 100 3 EP	VG 220 5 EP	VG 320 6 EP

Recommended Mineral Lubricants

ISO viscosity at 40°C	*BP Energol*	*ESSO Spartan*	*MOBIL Mobilgear*	*SHELL Omala*	*TEXACO Meropa*	*TOTAL Carter*	*AGIP Blasia*
VG 320	GR-XP 320	EP 320	632	320	320	EP 320	320
VG 220	GR-XP 220	EP 220	630	220	220	EP 220	220
VG 150	GR-XP 150	EP 150	629	150	150	EP 150	150
VG 100	GR-XP 100	EP 100	627	100	100	EP 100	100
VG 68	GR-XP 68	EP 68	626	68	68	EP 68	68

Recommended Synthetic Lubricants

ISO viscosity at 40°C	*BP Enersyn*	*CASTROL Tribol*	*MOBIL SHC*	*KLUEBER EG4*
VG 320	EPX 320	1510/320	632	320
VG 220	EPX 220	1510/220	630	220
VG 150	HTX 150	1510/150	629	150
VG 68			626	

Mineral oil: max running temperature 90°C
Synthetic oil: max running temperature 100°C (110°C for short running).
Do not mix up synthetic oil of different brands.

Oil change interval (h)

TYPE	*Oil temperature*		
	65°C	*80°C*	*90°C*
Mineral	8000	4000	2000
Synthetic	20000	15000	10000

SELECTION FORM OF GEAR UNIT FOR LIFTING

REFERENCES

Customer: _____ Date: _____

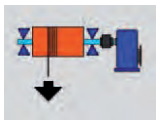
Contact: _____ Tel.: _____

_____ e-mail: _____

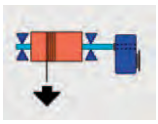
FITTING CHARACTERISTICS

Drum fitting diagram: _____

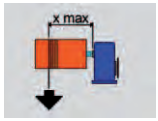
AS1: splined shaft and broached flange



AS4: hollow shaft

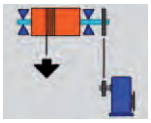


AS2: projecting drum on low-speed shaft



x max [mm]= _____

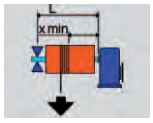
AS5: belt drive on low-speed shaft



Ø driven wheel [mm]= _____

Ø driving wheel [mm]= _____

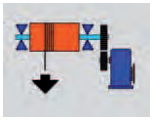
AS3: projecting drum + restraint



L [mm]= _____

x max [mm]= _____

AS6: external gear drive



Ø driven wheel [mm]= _____

Ø driving wheel [mm]= _____

Class FEM (M_): _____ Duration (T_): _____ Load condition (L_):

Weight to be lifted (including drum weight) [kg] _____

Drum diameter [mm] _____

Lifting speed [m/mm] _____

Block external reduction (if fitted)

_Reduction ratio _____

GEAR UNIT CHARACTERISTICS

Input side (male/double extended shaft – motor flange – motor flange and elastic coupling):

Output side (male/splined/double extended/hollow/hollow shaft with shrink disc – output flange):

Special seals (double/in Viton/labyrinth):

Others:

NOTES

DOCUMENTATION:

NOTES:

STATE OF SUPPLY

NOTE: INSPECT THE CONTENTS OF THE INSTALLATION AND MAINTENANCE MANUAL PROVIDED WITH THE GEAR UNITS.

On receipt of goods, check these correspond to those ordered and that no damage has been caused during transport.
Avoid using even only slightly damaged gear units.
The gear units are coated on the outside with epoxy primer and synthetic enamel blue RAL 5017, which permit further finishes with synthetic paints. If the gear units are used in aggressive environments, ask for adequate painting to be provided.
The shaft ends, hollow shafts, centrings and machined connecting surfaces are protected with anti-oxidisation grease.
The gear units are supplied without lubricant, unless otherwise contractually agreed.
If the gear unit features a backstop device or cooling fan, an arrow near the low-speed shaft indicates the direction of free rotation.

STORAGE

The gear units must be stored in dry, clean and vibration-free environments. To avoid damaging bearings and seals have the gears perform one complete revolution by means of the high-speed shaft every six months. For storage periods of over one year, the oil filling cap must be replaced with another without breather valve and the gear unit must be completely filled with oil. Every six months, change the grease in the seals and the protective substance on the machined parts.
The gear unit must be adequately painted if stored in an aggressive environment. Also protect the rotating parts and machined surfaces with water-repellent and anti-oxidising grease. In the case of damp environments or where temperature fluctuations are strong, hygroscopic tablets should be used and all the above inspections made more frequently. Protect the gear unit as best as possible from sunrays and weather conditions. In the latter case, protection is mandatory.
If the gear unit is not used for long periods of time, all the machined parts should be protected. Check and lubricate the various connections, change the old oil with new oil of the same type.
In the case of water-oil heat exchangers, the water supply pipes must be removed and cleaned with compressed air, to remove any water inside the pipes. If the exchanger is of the type that can be inspected, it is best to dismantle the pipe nest.

INSTALLATION

Make sure the structure to which the gear unit is fastened is flat, level and suitably sized to ensure stability and the absence of vibrations. To fasten, use the holes on the 4 sides of the casing and screws of suitable length. For other fastening requirements, contact our Technical Dept.

To lift the gear unit, use the fastening through holes on the casing and try and distribute weight properly. Never lift the gear unit by means of the shaft ends or flanged motors or any accessories fitted to the gear unit.

If cooling fans are fitted, the gear unit must be placed in such a position as to ensure a proper flow of air.

If the gear unit-machine fastening is by means of coupling flanges, it is best to use locking adhesives for the fastening screws.

If backstop devices or cooling fans are fitted, make sure, with the gear unit disconnected, that the direction of motor rotation is correct. If it is not, switch over the motor voltage. Idle start-ups must be gentle with low breakaway currents and reduced stress. If lengthy overloads, knocks or blockage hazards are expected, fit safety hydraulic couplings, control units or other similar devices.

C40-0900-20-300

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