Industries
Media No. 4083

EPS
Slewing Drives

Edition December 2011

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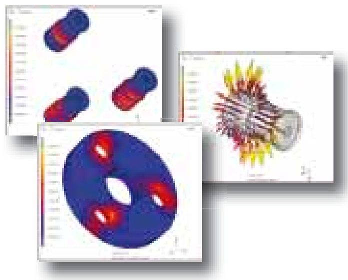
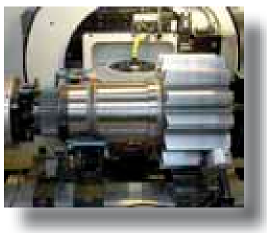
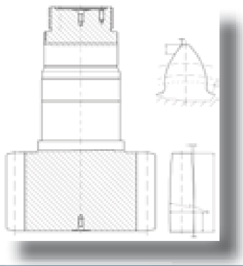
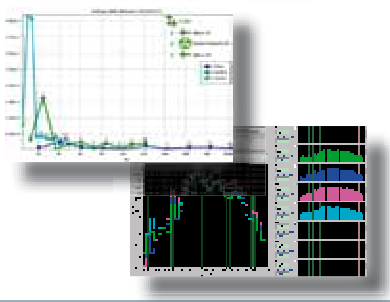
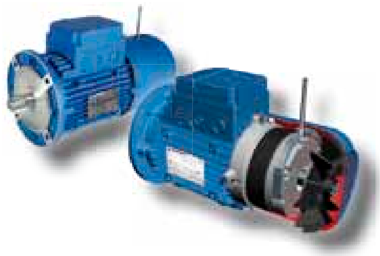
Features and Benefits

• Wide range of planetary gear reducers, from 1 300 to 145 000 N m torque • Modular design concept		→ **Right choice of the drive and cost effective solution for final customer tailored solutions** → **Delivery flexibility and reliability**
• Nodular cast iron housing and planet carrier, full complement needle roller bearings • ISO 12944 class paint on request • Grease and oil lubricant feasibility • Double seal and labyrinth options		→ **Highest standards in construction materials, maximum load strength** → **Assuring the best coating for your drives** → **Suitability for application demand** → **Suitability for the most severe working conditions** → **Easy installation and maintenance**
• Case hardened ground gears designed and rated according to DIN 3990 • Gears with ground finish • Efficient, precise and upgraded machine tools • Cutting edge industrial technology		→ **Clear and reliable performances ratings** → **Performance, reliability, durability, long maintenance intervals** → **Cost effectiveness, precision, low backlash, safety, environment-friendly machining** → **High-quality standards, production flexibility**
• Pinion teeth with full helix modification • Involute profile and helix modification calculated and produced according to the operating load conditions • High quality output pinion gear designed to specifications		→ **Improvement in contact patterns and nominal rating, achieving an optimal ring gear-pinion engagement** → **Best fit following the major ring gear manufacturers recommendation**
• High tech controlling instruments		→ **High quality and reliability standards**
• Low Temperature Environment features • UL compliance certificate		→ **Conformity to most severe demands** → **Conformity to U.S.A. specifications**

Features and Benefits

- IEC electrical yaw brake motor wound and set for the specific application
- Anti-sticking design of the parking brake motor
- Braking torque adjustment
- Customized power supply



→ **Complete one-supplier gearmotor package**

→ **Constant braking performance**

→ **Protection of the drive from external overloads, where as the customized winding protects the drive from motor overloads**

→ **Simple machine design and achievement of more flexibility**

- F.E.M. 1.001 ratings

→ **Easy selection in according to class of mechanism**

- Main certifications available, as:

- ISO 9001 and 14000;
- ATEX;
- UL CSA;
- Germanischer Lloyds.

→ **Flexibility and adaptability to specific project needs**

- Competent assistance and technical support during design/seletion activities

→ **Professional pre-sale service**

→ **Calculation** and **selection tools**

→ **Selection optimization**: performance, reliability, cost-efficiency

- Global service

→ **Direct worldwide sales and service network**

- 3 year warranty

→ **The reliability of a quality product made to last**

→ **3 year warranty since 1997**

Quick selection (L2 T5), $n_2 = 15\ \text{min}^{-1}$

Quick selection

Table 1

Gear reducer size	Torques [N m][1] M_{N2} Dynamic torque (FEM L2 T5)	M_{2stat} Static torque	Radial Loads [N][1) 2)] F_{r2} Dynamic radial load (FEM L2 T5) GR Type	H Type	$F_{r2\ stat}$ Static radial load GR Type	H Type
100	**1 500**	2 200	62 000	25 800	100 000	46 500
200	**2 700**	4 000	62 000	–	100 000	–
300	**4 000**	5 000	56 400	56 400	117 500	117 500
500	**6 500**	10 000	56 400	56 400	117 500	117 500
800	**10 000**	15 000	73 000	77 400	140 000	148 000
1000	**12 000**	20 000	153 000	–	275 000	–
1300	**15 000**	30 000	180 000	180 000	312 500	312 500
2000	**25 000**	40 000	180 000	180 000	312 500	312 500
3000	**30 000**	72 000	298 000	–	700 000	–
4000	**44 000**	83 000	298 000	–	700 000	–
6000	**72 000**	120 000	415 000[3)]	–	910 000[3)]	–
8000	**100 000**	200 000	575 600[3)]	–	1 400 000[3)]	–
10000	**125 000**	250 000	666 200[3)]	–	1 700 000[3)]	–

1) For higher values, contact us.
2) Values according to ISO 281, valid for overhung loads acting in the middle of the pinion facewidth «b» (table 6).
3) See minimum value of dimension «G_1»(table 6).

Actual transmission ratios *i*

Table 2

Train of gear	Nominal transmission ratio i_N	Actual transmission ratio *i* Gear reducer size 100	200	300	500	800	1000	1300	2000	3000	4000	6000	8000	10000
3 stages	**50**	50,5	50,5	50,5	50,5	53,1	53,1	50,1	50,1	55,2	49,1	55,2	54,1	48,1
	60	59,6	59,6	59,6	59,6	62,6	62,6	59,1	59,1	62,0	58,6	65,9	64,6	57,4
	71	70,2	70,2	70,2	70,2	73,7	73,7	69,6	69,6	73,1	69,0	74,0	72,5	68,5
	85	86,6	86,6	86,6	86,6	92,4	92,4	87,2	–	91,6	86,5	85,4	83,7	87,9
	100	102	102	102	102	107	107	101	–	106	100	103	107	113
	125	128	128	128	128	134	134	127	–	123	129	132	129	134
	150	149	149	149	149	156	156	147	–	–	–	156	153	159
	180	179	179	179	179	189	189	178	–	–	–	192	–	–
	212	217	217	211	211	222	222	–	–	–	–	–	–	–
	250	255	255	–	–	–	–	–	–	–	–	–	–	–
	300	301	301	–	–	–	–	–	–	–	–	–	–	–
4 stages	**212**	–	–	–	–	–	–	–	–	–	205	231	226	201
	250	–	–	–	–	258	258	259	–	256	242	259	254	240
	300	–	–	290	290	304	304	301	–	302	285	305	299	282
	355	–	–	357	357	375	375	354	–	378	357	382	375	354
	425	–	–	421	421	442	442	418	418	439	414	444	435	411
	500	–	–	528	528	535	535	523	523	550	519	512	502	527
	600	–	–	613	613	670	670	608	608	638	603	615	644	677
	710	–	–	740	740	778	778	734	734	771	728	743	779	818
	850	–	–	894	894	974	974	887	919	890	934	953	934	970
	1 000	–	–	1 120	1 120	1 177	1 177	1 111	–	1 075	1 129	1 131	1 109	1 151

Nominal output torques according to FEM L2 and T5 condition

Table 3

Train of gear	Nominal gear ratio i_N	Input speed n_1 min^{-1}	Nominal output speed n_{N2} min^{-1}	Grandezza riduttore - Gear reducer size M_{N2} [N m] 100	200	300	500	800	1000	1300	2000	3000	4000	6000	8000	10000
3 stages	50	2 800	56	1 310	2 320	2 970	5 300	6 600	9 430	11 100	14 500	18 400	23 800	35 000	43 600	61 000
		1 400	28	1 420	2 500	3 770	6 130	8 530	11 800	14 200	18 700	23 800	30 800	45 300	56 300	78 900
		900	18	1 490	2 620	3 960	6 440	9 880	12 400	14 900	22 200	28 200	36 600	53 800	66 900	93 700
	60	2 800	47,5	1 340	2 360	3 560	5 790	7 780	11 100	13 100	16 300	20 700	28 400	41 800	52 000	72 800
		1 400	23,6	1 440	2 540	3 840	6 240	9 570	12 000	14 400	21 000	26 700	36 700	54 000	67 200	94 100
		900	15	1 520	2 670	4 030	6 560	10 100	12 600	15 200	24 900	31 700	43 600	64 100	79 800	112 000
	71	2 800	40	1 360	2 400	3 630	5 900	9 060	11 400	13 600	22 800	27 100	40 700	56 500	69 200	104 000
		1 400	20	1 470	2 590	3 910	6 350	9 740	12 200	14 700	24 600	33 200	46 200	68 200	85 500	119 000
		900	12,5	1 550	2 720	4 100	6 680	10 200	12 900	15 500	25 900	34 900	48 600	71 900	98 500	125 000
	85	2 800	33,5	1 390	2 460	3 640	6 040	9 280	11 600	14 000	21 900	27 700	42 600	61 800	70 300	100 000
		1 400	16	1 500	2 650	4 000	6 500	9 980	12 600	15 100	25 200	32 900	47 400	69 300	83 400	119 000
		900	10,6	1 580	2 780	4 200	6 840	10 500	13 200	15 800	26 500	35 700	49 700	73 100	93 600	128 000
	100	2 800	28	1 420	2 500	3 780	6 140	9 430	11 800	14 200	20 000	26 800	38 900	64 500	88 700	117 000
		1 400	14	1 530	2 700	4 070	6 620	10 100	12 800	15 300	22 700	30 600	44 200	70 800	102 000	125 000
		900	9	1 610	2 830	4 270	6 960	10 700	13 400	16 100	24 700	32 200	48 100	74 700	107 000	132 000
	125	2 800	22,4	1 460	2 570	3 870	6 300	9 660	12 100	14 600	23 100	27 800	39 600	66 900	81 100	115 000
		1 400	11,2	1 570	2 760	4 170	6 790	10 400	13 100	15 700	26 100	31 100	44 200	72 900	92 000	128 000
		900	7,1	1 650	2 900	4 380	7 130	10 900	13 800	16 500	27 400	32 700	46 500	76 900	100 000	134 000
	150	2 800	19	1 480	2 610	3 170	5 680	8 790	11 600	13 700	22 200	–	31 400	54 400	74 100	100 000
		1 400	9,5	1 600	2 810	3 500	6 280	9 720	13 300	15 100	24 600	–	34 700	60 200	81 900	110 000
		900	6	1 680	2 950	3 710	6 650	10 300	14 000	16 000	26 000	–	36 800	63 700	86 700	117 000
	180	2 800	16	1 510	2 660	3 280	5 880	9 100	11 900	14 200	23 000	–	32 500	56 500	–	–
		1 400	8	1 630	2 870	3 590	6 430	9 950	13 600	15 500	25 200	–	35 600	61 800	–	–
		900	5	1 710	3 000	3 800	6 810	10 500	14 300	16 400	26 600	–	37 700	65 400	–	–
	212	2 800	13,2	1 540	2 640	3 360	6 030	8 760	12 100	–	–	–	–	–	–	–
		1 400	6,7	1 660	2 910	3 660	6 560	9 940	13 800	–	–	–	–	–	–	–
		900	4,25	1 750	3 000	3 880	6 950	10 800	14 600	–	–	–	–	–	–	–
	250	2 800	11,2	1 570	2 710	–	–	–	–	–	–	–	–	–	–	–
		1 400	5,6	1 700	2 980	–	–	–	–	–	–	–	–	–	–	–
		900	3,55	1 780	3 000	–	–	–	–	–	–	–	–	–	–	–
	300	2 800	9,5	1 600	2 130	–	–	–	–	–	–	–	–	–	–	–
		1 400	4,75	1 730	2 370	–	–	–	–	–	–	–	–	–	–	–
		900	3	1 800	2 550	–	–	–	–	–	–	–	–	–	–	–
4 stages	212	2 800	13,2	–	–	–	–	–	–	–	–	–	38 600	62 100	73 000	105 000
		1 400	6,7	–	–	–	–	–	–	–	–	–	49 900	77 900	94 300	134 000
		900	4,25	–	–	–	–	–	–	–	–	–	54 600	82 100	112 000	140 000
	250	2 800	11,2	–	–	–	–	10 400	13 000	15 800	26 200	30 900	41 600	69 700	82 000	126 000
		1 400	5,6	–	–	–	–	11 200	14 100	17 000	28 300	38 000	52 900	78 900	106 000	136 000
		900	3,55	–	–	–	–	11 700	14 800	17 900	29 800	39 900	55 600	83 300	118 000	143 000
	300	2 800	9,5	–	–	4 230	6 890	10 600	13 300	16 000	26 700	35 900	50 100	74 300	106 000	129 000
		1 400	4,75	–	–	4 560	7 420	11 400	14 300	17 300	28 800	38 700	53 800	80 500	114 000	139 000
		900	3	–	–	4 750	7 750	11 800	15 000	18 000	30 000	40 600	56 000	84 900	118 000	145 000
	355	2 800	8	–	–	4 330	7 050	10 800	13 600	16 300	27 300	36 800	51 300	76 300	109 000	132 000
		1 400	4	–	–	4 660	7 600	11 600	14 700	17 600	29 500	39 600	55 200	82 600	117 000	142 000
		900	2,5	–	–	4 750	7 750	11 800	15 000	18 000	30 000	41 600	56 000	85 000	118 000	145 000
	425	2 800	6,7	–	–	4 410	7 180	11 000	13 900	16 600	27 900	37 400	52 100	77 700	99 100	134 000
		1 400	3,35	–	–	4 750	7 730	11 800	14 900	17 900	30 000	40 300	56 000	84 100	112 000	145 000
		900	2,12	–	–	4 750	7 750	11 800	15 000	18 000	30 000	42 300	56 000	85 000	118 000	145 000
	500	2 800	5,6	–	–	4 520	7 360	11 200	14 100	17 000	28 600	38 300	53 400	79 000	111 000	138 000
		1 400	2,8	–	–	4 750	7 750	11 800	15 000	18 000	30 000	41 200	56 000	85 000	118 000	145 000
		900	1,8	–	–	4 750	7 750	11 800	15 000	18 000	30 000	42 500	56 000	85 000	118 000	145 000
	600	2 800	4,75	–	–	4 590	7 480	11 500	14 500	17 300	29 000	34 900	54 200	80 700	115 000	142 000
		1 400	2,36	–	–	4 750	7 750	11 800	15 000	18 000	30 000	38 600	56 000	85 000	118 000	145 000
		900	1,5	–	–	4 750	7 750	11 800	15 000	18 000	30 000	40 800	56 000	85 000	118 000	145 000
	710	2 800	4	–	–	4 690	7 640	11 700	14 700	17 700	29 700	36 100	55 400	82 500	117 000	145 000
		1 400	2	–	–	4 750	7 750	11 800	15 000	18 000	30 000	39 500	56 000	85 000	118 000	145 000
		900	1,25	–	–	4 750	7 750	11 800	15 000	18 000	30 000	41 800	56 000	85 000	118 000	145 000
	850	2 800	3,35	–	–	4 750	7 750	11 800	15 000	18 000	30 000	35 800	50 900	84 900	117 000	145 000
		1 400	1,6	–	–	4 750	7 750	11 800	15 000	18 000	30 000	38 500	54 800	85 000	118 000	145 000
		900	1,06	–	–	4 750	7 750	11 800	15 000	18 000	30 000	40 400	56 000	85 000	118 000	145 000
	1 000	2 800	2,8	–	–	4 750	7 750	11 800	15 000	18 000	30 000	33 200	52 000	70 800	96 400	130 000
		1 400	1,4	–	–	4 750	7 750	11 800	15 000	18 000	30 000	36 700	55 900	77 100	105 000	141 000
		900	0,9	–	–	4 750	7 750	11 800	15 000	18 000	30 000	39 100	56 000	81 700	111 000	145 000
M_{2max} [N m]				**1 800**	**3 000**	**4 750**	**7 750**	**11 800**	**15 000**	**18 000**	**30 000**	**42 500**	**56 000**	**85 000**	**118 000**	**145 000**

Selection according to FEM 1.001[1)]

Required application data

– Group and class of utilization (see tab. 5 as a guidance) for the mechanism involved.
– Load spectrum of the required torque and speed.
– Running conditions (accelerations-decelerations, frictional forces, wind effect).
– External drive data (pinion and ring-gear number of teeth and module).
– Gear reducer input speed (depending on motor type).

Required torque

Starting from running conditions (accelerations-decelerations, frictional forces, wind effect) and load spectrum determine the maximum load:

$$\boldsymbol{S}_M = \max\,(\boldsymbol{S}_{M\,max\,I};\ \boldsymbol{S}_{M\,max\,II})$$

where:

$$S_{M\,max\,I} = (S_{MF} + S_{MA}) \cdot \gamma_m$$

is the maximum torque (combination of the most unfavourable actual values) during normal service without wind

$$S_{M\,max\,II} = (S_{MF} + S_{MA} + S_{MW8}) \cdot \gamma_m$$

$$S_{M\,max\,II} = (S_{MF} + S_{MW25}) \cdot \gamma_m$$

is the maximum of the two torque values (each one as a combination of the most unfavourable actual values) during normal service with wind

S_{MF} is mean torque generated by friction;
S_{MA} is mean torque generated by acceleration or deceleration;
S_{MW8} is mean torque corresponding to a 80 N/m² wind;
S_{MW25} is mean torque corresponding to a 250 N/m² wind;
γ_m load amplification factor depending to mechanism group according to the following table:

Load amplification factor	Mechanism group							
	M1	M2	M3	M4	M5	M6	M7	M8
γ_m	1	1,04	1,08	1,12	1,16	1,2	1,25	1,3

Determine the gear reducer required output torque, as follows:

$$\boldsymbol{M}_{2\ required} = \boldsymbol{S}_M / (\boldsymbol{i}_e \cdot \eta_e)$$

where:

i_e is the external drive gear ratio (given by z_2 / z_1, being z_1 and and z_2 the number of teeth of the pinion and of the ring gear respectively)

η_e is the the external drive efficiency (approx. 0,85)

Gear reducer size and transmission ratio selection

Select in the selection table (see tab. 6) a gear reducer size (also, the train of gears and the nominal transmission ratio i_N at the same time) on the basis of $n_{2\,max}$, $n_{1\,max}$,such as:

$$\boldsymbol{M}_{N2} \geqslant \boldsymbol{M}_{2\ required} \cdot \boldsymbol{K}_A$$

$$\boldsymbol{i} \geqslant \boldsymbol{i}_{required}$$

where:

M_{N2} [N m] is the gear reducer nominal torque referred to FEM load spectrum class L2 and utilization class T5 (see tab. 3);
K_A is the application factor (see tab. 4) which converts the gear reducer required torque according to the actual class of utilization and load spectrum;
$n_{2\,max}$ [min-1] is the maximum speed required at the gear reducer low speed shaft ($n_{2\ application\ max} \cdot i_e$);
$n_{1\,max}$ [min-1] is the maximum gear reducer input speed (depending on motor type; eg.: for a IEC 4 poles motor, n_1 = 1 400 min^{-1});
$i_{required}$ gear reducer required transmission ratio ($n_{1\,max} / n_{2\,max}$).

Verifications

Radial load

Verify that the radial load on the gear reducer output pinion shaft when adjusted to spectrum class L2 and utilization class T5, is less than the reference value F_{r2} given in tab. 1;

$$\frac{M_{2\ required} \cdot K_A \cdot 2000}{D_p \cdot \cos\alpha} \leqslant F_{r2}$$

where:

D_p [mm] is the permissible pinion pitch diameter;
α [rad] pinion tooth pressure angle;
F_{r2} [N] is the permissible radial load (L2 T5, n_2 = 15 min^{-1}) acting in the middle of the pinion facewidth and without axial load.

Dynamic overloads

Starts on full load (especially for high inertiae and low transmission ratios), brakings, shocks, cases of gear reducers where the low speed shaft becomes motor due to the inertiae of driven machine, usually generate overloads. In these cases it is necessary to verify that the maximum peak torque is always lower than M_{2max} (see tab. 3).

$$M_{2\ start} = \left(\frac{M_{start}}{M_N} \cdot M_{2\ available} - M_{2\ required}\right) \cdot \frac{J}{J + J_0} + M_{2\ required} \leqslant M_{2max}$$

$$M_{2\ brake} = \left(\frac{M_f}{\eta} \cdot i + M_{2\ required}\right) \cdot \frac{J}{J + J_0} - M_{2\ required} \leqslant M_{2max}$$

where:

$M_{2\,max}$ [N m] is maximum dynamic torque;
$M_{2\ available}$ [N m] is output torque due to the motor's nominal power;
M_f [N m] is the braking torque at the gear reducer input shaft
M_{start} / M_N is the ratio of motor peak.
J_0 [kg m²] is the moment of inertia (of mass) of the motor;
J [kg m²] is the external moment of inertia (of mass: coupling, driven machine, ect) referred to the motor shaft,
η is the gear reducer efficiency: ≈ 0,91 (3 stages) or ≈ 0,88 (4 stages).

NOTE: when seeking to verify that starting torque is sufficiently high for starting, take into account starting friction, if any, in evaluating $M_{2\ required}$.

Static load

Verify that the gear reducer static torque and static radial load (see tab.1) are higher than static braking torque, and static overhung load (referred to the gear reducer low speed shaft):

$$M_{2\ stat} \geqslant M_f \cdot i / \eta$$

$$F_{r2\ stat} \geqslant \frac{M_f \cdot i \cdot 2000}{\eta \cdot D_p \cdot \cos\alpha}$$

1) For complete selection please refer to FEM section I 3rd edition.

Designation example:

EPS 1300 H3 - 850 - R xx - 19-200

- 19-200: IEC motor coupling dimensions (Ød-ØP), see pag. 13
- xx: Pinion code (rel. to module, teeth nr.), see pag. 11
- R: Output shaft design (pinion)
- 850: Transmission ratio
- H3: Output flange, nr. of stages
- 1300: Size
- EPS: Planetary gearmotors for slewing drives

Also available, on request:
- right angle shaft gear reducer;
- 5 stages gear reducer.

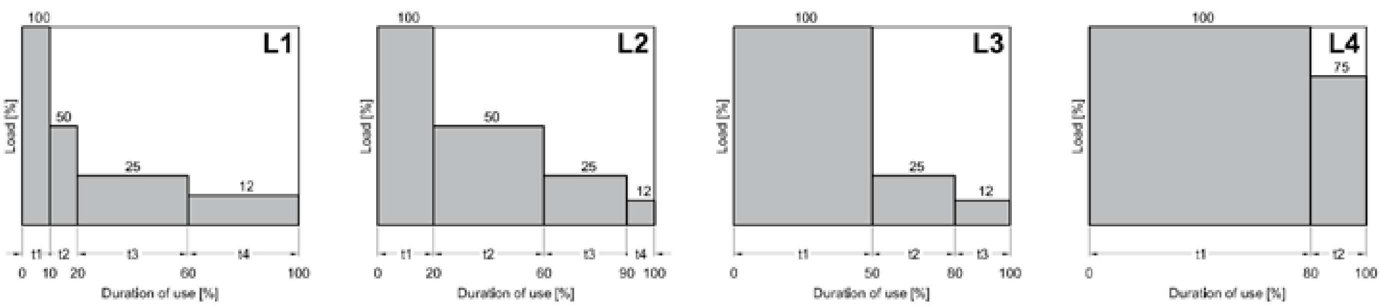
Application factor K_A and classification guidance

Application factors K_A and mechanism groups

Table 4

Class of load spectrum	Class of utilization						
	T2 400h < T2 ≤ 800h	**T3** 800h < T3 ≤ 1 600h	**T4** 1 600h < T4 ≤ 3 200h	**T5** 3 200h < T5 ≤ 6300h	**T6** 6300h < T6 ≤ 12500h	**T7** 12500h < T7 ≤ 25000h	**T8** 25000h < T8 ≤ 50000h
L1 $0 < k_m \leq 0{,}125$	M1 0,75	M2 0,80	M3 0,86	M4 0,93	M5 1,00	M6 1,08	M7 1,16
L2 $0{,}125 < k_m \leq 0{,}25$	M2 0,81	M3 0,87	M4 0,93	M5 **1,00**	M6 1,08	M7 1,16	M8 126
L3 $0{,}25 < k_m \leq 0{,}5$	M3 0,89	M4 0,96	M5 1,03	M6 1,11	M7 1,19	M8 1,29	M8 1,38
L4 $0{,}5 < k_m \leq 1$	M4 0,97	M5 1,04	M6 1,12	M7 1,21	M8 1,30	M8 1,40	M8 1,51

Load spectra (examples)

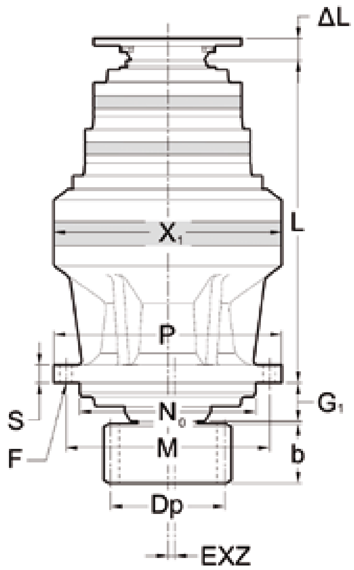


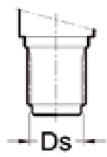
Group classification guidance

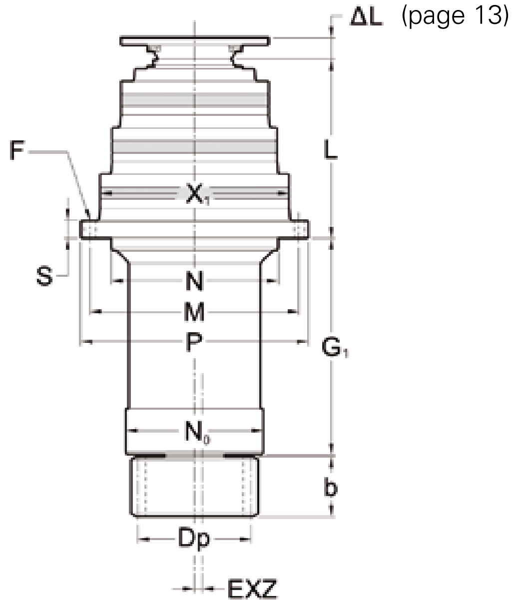
Table 5

Type of appliance Designation	Particulars concerning nature of use	Type of mechanism				
		Slewing	Hoisting	Luffing	Traverse	Travel
Erection cranes	–	**M2 – M3**	M2 – M3	M1 – M2	M1 – M2	M2 – M3
Stocking and reclaiming transporter	Hook duty	**M4**	M5 – M6	–	M4 – M5	M5 – M6
Stocking and reclaiming transporter	Grab or magnet	**M6**	M7 – M8	–	M6 – M7	M7 – M8
Workshop cranes		**M4**	M6	–	M4	M5
Overhead travelling cranes, pigbreaking cranes, scrapyard cranes	Grab or magnet	**M6**	M8	–	M6 – M7	M7 – M8
Bridge cranes for unloading, bridge cranes for containers Other bridge cranes (with crab and/or slewing jib crane)	a) Hook or spreaded duty d) Hook duty	**M5 – M6** **M4 – M5**	M6 – M7 M4 – M5	M3 – M4 –	M6 – M7 M4 – M5	M4 – M5 M4 – M5
Bridge cranes for unloading, bridge cranes (with crab and/or slewing jib crane)	Grab or magnet	**M5 – M6**	M8	M3 – M4	M7 – M8	M4 – M5
Drydock cranes, shipyard jib cranes, jib cranes for dismantling	Hook duty	**M4 – M5**	M5 – M6	M4 – M5	M4 – M5	M5 – M6
Dockside cranes (slewing, on gantry, etc.), floating cranes and pontoon derricks	Hook duty	**M5 – M6**	M6 – M7	M5 – M6	–	M3 – M4
Dockside cranes (slewing, on gantry, etc.), floating cranes and pontoon derricks	–	**M6 – M7**	M7 – M8	M6 – M7	–	M4 – M5
Floating cranes and pontoon derricks for very heavy loads (usually greater than 100t)	–	**M3 – M4**	M3 – M4	M3 – M4	–	
Deck cranes	Hook duty	**M3 – M4**	M4	M3 – M4	M2	M3
Deck cranes	Grab or magnet	**M3 – M4**	M5 – M6	M3 – M4	M4 – M5	M3 – M4
Tower cranes for building	–	**M5**	M4	M4	M3	M3
Derricks	–	**M1 – M2**	M2 – M3	M1 – M2	–	–
Railway cranes allowed to run in train	–	**M2 – M3**	M3 – M4	M2 – M3	–	–
Mobil cranes	Hook	**M2 – M3**	M3 – M4	M2 – M3	–	–

Dimensions







Type H

Front fixing flange output support

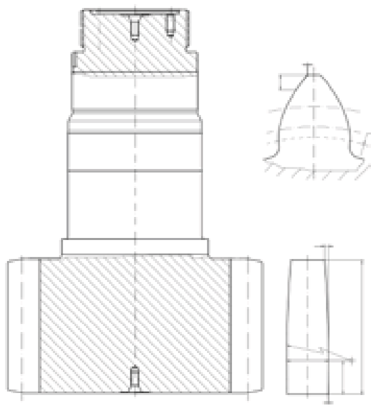
Type GR

Double pilot extended output support

Table 6

EPS Gear reducers		Dimensions											Output pinion shaft			
		D_S	F	G_1	M	N	N_0	P	S	X_1	L			b	Dp_{min}	EXZ
			$\varnothing \times$nr.		$\varnothing$	$\varnothing$	$\varnothing$	$\varnothing$		$\varnothing$	3 stages	4 stages	module	facewidth	$\varnothing$	
size	type		mm		mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm
		DIN 5482 E9														
100	**H**	50×45	$10{,}5_{\times 8}$	6	165	–	110 f7	185	12	200	232	282	5 – 6	56	80	–
100	**GR**	58×53	$10{,}5_{\times 4}$	162	240	160 h6	150 h6	275	32	200	176,5	226,5	5 – 6	68	98	0,5
200	**GR**	58×53	$17{,}5_{\times 4}$	162	240	160 h6	150 h6	275	32	200	188,5	238,5	6 – 8	68	98	0,5
300	**H**	70×64	$12{,}5_{\times 10}$	39	245	–	175 f7	272	20	240	279	329	6 – 8	90	110	–
300	**GR**	70×64	$10{,}5_{\times 8}$	142	224	200 g7	195 g7	244	63	240	176	226	8	90	110	–
500	**H**	70×64	$12{,}5_{\times 10}$	40	245	–	175 f7	272	20	240	306	356	8 – 10	90	120	–
500	**GR**	70×64	$10{,}5_{\times 8}$	142	224	200 g7	195 g7	244	78	240	203	253	8 – 10	90	120	–
800	**H**	80×74	$17_{\times 12}$	40	250	–	200 f7	280	22	280	349	399	10 – 12	90	120	–
800	**GR**	80×74	$12{,}5_{\times 10}$	184	260	240 g7	200 g7	280	80	280	205	255	10 – 12	90	120	–
1000	**GR**	100×94	$17_{\times 16}$	303	350	278 g7	228 g7	380	30	315	205,5	255,5	12	110	160	0,75
1300	**H**	100×94	$16{,}5_{\times 20}$	57	295	–	250 f7	325	30	353	416,5	466,5	12 – 14	110	160	–
1300	**GR**	100×94	$17_{\times 18}$	233	325	290 g7	250 g7	363	96	363	240,5	290,5	12 – 14	110	160	1,5
2000	**H**	100×94	$17_{\times 18}$	57	295	–	250 f7	325	30	353	438,5	488,5	12 – 14 – 16	110	160	—
2000	**GR**	100×94	$17_{\times 18}$	233	325	290 g7	250 g7	363	118	363	262,5	312,5	12 – 14 – 16	110	160	0,5
		DIN 5480 9H														
3000	**GR**	140×5	$22_{\times 24}$	355 min 1 855 max	475	430 h7	340 h7	515	40	428	341	383,5	16 – 18 – 20	150	224	2,5 – 5
4000	**GR**	140×5	$22_{\times 24}$	355 min 1 855 max	475	430 h7	340 h7	515	40	428	362	416,5	16 – 18 – 20	150	224	2,5 – 5
6000	**GR**	160×5	$26_{\times 24}$	355 min 1 855 max	525	465 h7	340 h7	575	45	445	406	460,5	16 – 18 – 20	150	300	2,5 – 5
8000	**GR**	200×5	$26_{\times 24}$	710 min 1 810 max	630	580 h7	510 h7	690	50	542	335,5	403,5	20 – 22	170	300	5
10000	**GR**	200×5	$33_{\times 24}$	730 min 1 830 max	680	630 h7	510 h7	740	50	542	335,5	403,5	20 – 22 – 24	170	300	5

Output pinion



Design features:
- full helix modification
- ground finish
- tip relief
- gear accuracy grade DIN 8
- addendum modification coefficient x = 0,5

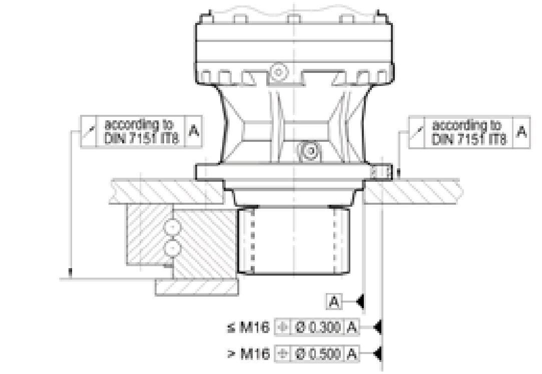
	Module													
	5	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**14**	**16**	**18**	**20**	**22**	**24**
Code for designation	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z

	Nr. of teeth																						
	10	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	**31**	**32**
Code for designation	A	B	C	D	E	F	G	H	I	K	L	M	N	O	P	Q	R	S	T	U	V	W	X

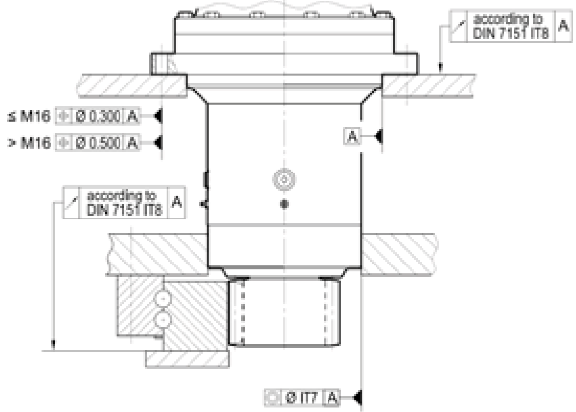
Pinion designation example: R **PC** (pinion with m = 8, z = 12), see also page 8.

Installation

To ensure proper functioning and optimum transfer of power between the gear reducers and the driven gear, the gear reducers requires a rigid connection construction that is resistant to torsion. The form and position tolerances listed below must be met.



Dimension tolerances of the assembly construction for slewing gear reducers



Dimension tolerances of the assembly construction for slewing gear reducers

Lubrication

The main lubricant manufacturers as well as the ISO viscosity grade to be used are stated in the following tables. Use only lubricants with **EP** (extreme pressure) **additives**.

Polyglycol basis synthetic lubricants may **not mixed** with other type's lubricants (mineral and PAO lubricants). Before any lubricant type change, carefully clean the gear reducer.

Never mix different makes of synthetic oil; if oil-change involves switching to a type different from that used hitherto, then give the gear reducer a through clean-out.

Manufacturer	PAO synthetic oil ISO VG 150 ... 460	mineral oil ISO VG 150 ... 460
AGIP	Blasia SX 220 ... 460	Blasia
ARAL	Degol PAS	Degol BG
BP	Enersyn EPX	Energol GR XP
KLÜBER	Klübersynth GEM4	Klüberoil GEM1
MOBIL	Mobilgear SHC XMP	Mobilgear 600 XP Mobilgear XMP
SHELL	Omala HD	Omala
TOTAL	Carter EP SH	Carter EP

ISO viscosity grade
Mean kinematic viscosity [cSt] at 40 °C.

Speed n_2 min^{-1}	Ambient temperature[1] [°C] mineral oil 0 ÷ 20	10 ÷ 40
> 140	150	220
140 ÷ 2,0	220	320
< 2,0	320	460

1) Peaks ± 10°C are acceptable.

Oil temperature [°C]	Oil-charge interval [h] **synthetic oil**	mineral oil
⩽ 65	**12 500**	5 600
65 ÷ 80	**9 000**	2 800
80 ÷ 95	**6 300**	1 400

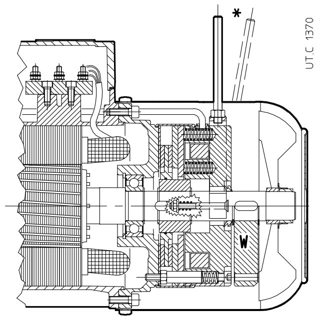
Oil-change intervals assume pollution-free surroundings. When heavy overloads are present, halve the values.

Independently from running times, change the oil as follows:
- every 1 ÷ 2 years, for mineral oil;
- every 2 ÷ 4 years, for synthetic oil.

Electric motor

HBZ

Asynchronous three-phase **brake motor** with **d.c. brake**



Thanks to its high **quietness**, **progressivity** and **dynamic** characteristics, it is specifically suitable for **coupling with gearmotor minimizing the dynamic overloads** deriving from **starting and braking phases** (especially in case of motion reversals) and maintaining a **very good braking torque value**.

The excellent **operation progressivity** - when starting and braking - is assured by the brake anchor which is less quick in the impact (compared to a.c. HBF types) and by the slight quickness of d.c. brakes.

Offering a comprehensive **range of accessories and non-standard designs** in order to satisfy all possible gearmotor application fields (e.g. IP 56, IP 65, flywheel, encoder, independent cooling fan, independent cooling fan and encoder, double extension shaft, integrated motor-inverter, etc.).

* on request.

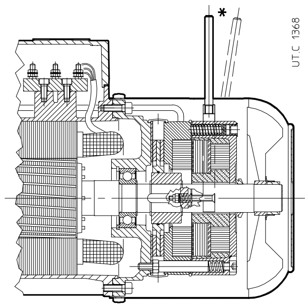
Multi-voltage brake rectifier

Multi-voltage brake rectifier (patent pending) which generates a preset constant output voltage independent from input supply (and from its fluctuations) and, compared to a usual rectifier, reduces the voltage to keep the brake released.

- Possibility to supply the brake at 230, 400 or 460 V a.c. indifferently;
- Higher steadiness of brake characteristics, lower energy consume, lower coil heating and lower braking delay;
- No special brake coil;
- Ready to use in NEMA environment;
- Max availability and stock flexibility.

HBF

Asynchronous three-phase **brake motor** with **a.c. brake**



The **high reactivity** typical of **a.c. brake** and the **high braking capacity** make this brake motor **particularly suitable for heavy duties** requiring **quick brakings** and a **high number of operations** (e.g.: lifts with high frequency of starting, usually for size > 132, and/or for jog operations).

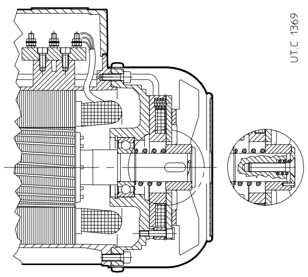
Vice versa, its very **high dynamic characteristics** (rapidity and frequency of starting) **are not advisable for the use** in **gearmotor** coupling, especially when these features are not strictly necessary for the application (avoiding useless overloads on the whole transmission).

Comprehensive **range of accessories and non-standard designs** in order to satisfy all application needs of gearmotors (in particular for HBF: IP 56, IP 65, encoder, independent cooling fan, independent cooling fan and encoder, double extension shaft, integrated motor-inverter, etc.).

* on request.

HBV

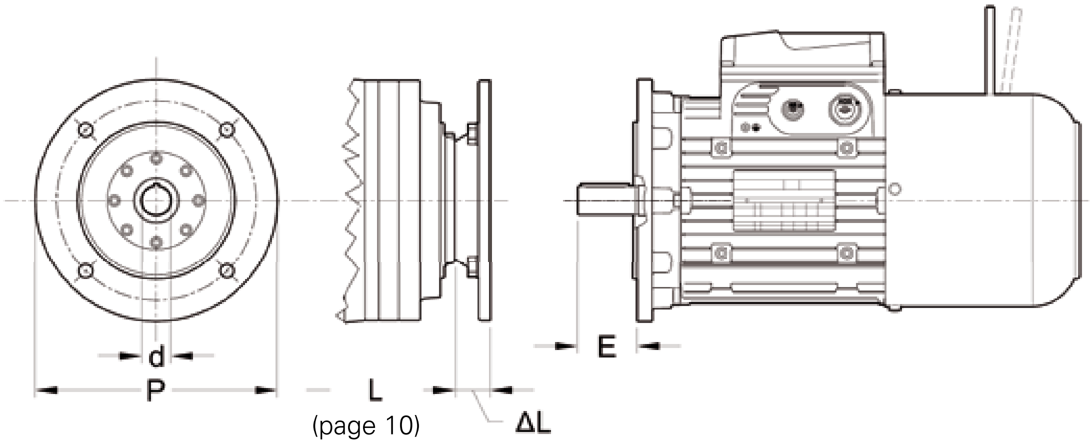
Asynchronous three-phase **brake motor** with **d.c. safety brake**



Featuring **maximum economy**, **very reduced overall dimensions and moderate braking torque**, it is suitable for the coupling with gearmotor and can be applied as brake for **safety or parking stops** (e.g. cutting machines) and for operations at deceleration ramp end **during the running with inverter**.

The standard cast iron fan supplies a flywheel effect increasing the very good progressivity of starting and braking (typical of d.c. brake) being particularly **suitable for** «**light**» **traverse movements**.

Electric motor



Motor size	Main coupling dimensions UNEL 13117-71 (DIN 42677 BI 1.A-65, IEC 72.1) Shaft end Ø d × E	Flange Ø P B5
63	11 × 23	140
71	14 × 30	160
80,90 B5R	19 × 40	200
90, 100 B5R, 112 B5R	24 × 50	200
100, 112, 132 B5R	28 × 60	250
132, 160 B5R	38 × 80	300
160	42 × 110	350
180, 200 B5R	48 × 110	350
200	55 × 110	400
225, 250 B5R	60 × 140	450
250	65 × 140	550
280, 315S B5R	75 × 140	550
315	80 × 170	660

Train of gear	IEC frame size	P Ø	d Ø	Gear reducer size length variation **ΔL** 100	200	300	500	800	1000	1300	2000	3000	4000	6000	8000	10000
3 stages	**56**	120	9	20	–	–	–	–	–	–	–	–	–	–	–	–
	63	140	11	20	20	–	–	–	–	–	–	–	–	–	–	–
	71	160	14	20	20	20	–	–	–	–	–	–	–	–	–	–
	80	200	19	30	30	30	–	–	–	–	–	–	–	–	–	–
	90	200	24	30	30	30	30	30	30	30	48	–	–	–	–	–
	100, 112	250	28	48	48	48	30	48	48	48	61	61	61	–	–	–
	132	300	38	–	–	–	48	61	61	61	127	127	127	–	–	–
	160	350	42	–	–	–	61	127	127	127	127	127	127	–	–	–
	180	350	48	–	–	–				127	–	127	127	–	–	–
	200	400	55	–	–	–	–	–	–	–	–	145	145	198	–	–
	225	450	60	–	–	–	–	–	–	–	–	–	145	198	–	–
	250	550	65	–	–	–	–	–	–	–	–	–	–	198	198	198
4 stages	**56**	120	9	20	20	20	20	–	–	–	–	–	–	–	–	–
	63	140	11	20	20	20	20	20	–	–	20	–	–	–	–	–
	71	160	14	20	20	20	20	20	20	20	30	–	–	–	–	–
	80	200	19	–	30	30	30	30	30	30	30	30	30	–	–	–
	90	200	24	–	–	–	30	30	30	30	48	48	48	48	48	–
	100, 112	250	28	–	–	–		48	48	48	–	61	61	61	61	61
	132	300	38	–	–	–	–	–	–	–	–	127	127	127	127	127
	160	350	42	–	–	–	–	–	–	–	–	–	127	127	127	127
	180	350	48	–	–	–				–	–	–	–	–	127	127
	200	400	55	–	–	–	–	–	–	–	–	–	–	–	145	145
	225	450	60	–	–	–	–	–	–	–	–	–	–	–	–	145
	250	550	65	–	–	–	–	–	–	–	–	–	–	–	–	

Application data template

Customer :

Application description:

***Mechanism* (FEM 1.001 1998.10.01):**

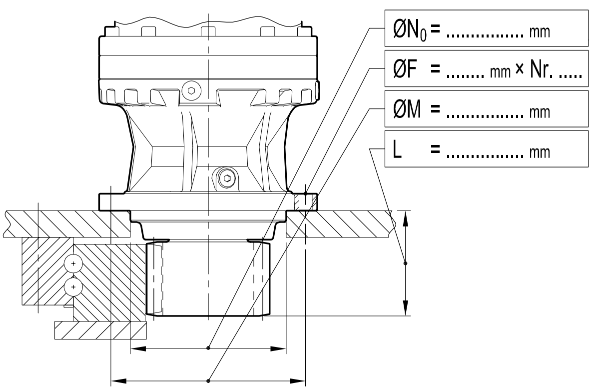
FEM Class:	**M**	____________
Load Spectrum Class:	**L**	____________
Running time Class:	**T**	____________

Torques at pinion:

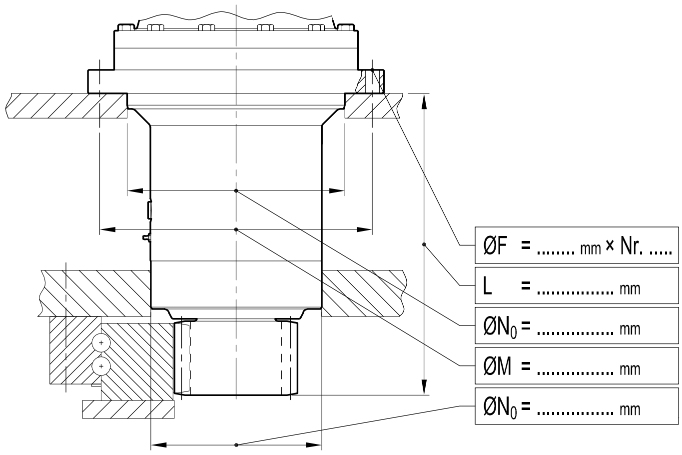
Output torque at pinion	$M_{N2required}$	________________________	[N m]
Has γ_m factor been included in	$M_{N2required}$	yes ☐ no ☐	
Peak / Static torque at pinion	M_{2stat}	________________________	[N m]
Pinion speed	n_2	________________________	[min^{-1}]
Maximum working angle (referrd to gearbox workimg position)		__________	[°]

Relevant Geometry (please fill-out relevant dotted lines):

Type **H** ☐

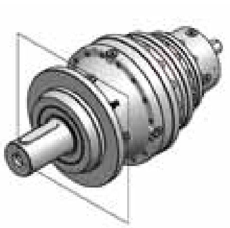


Type **GR** ☐

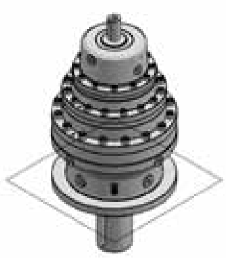


Mounting positions

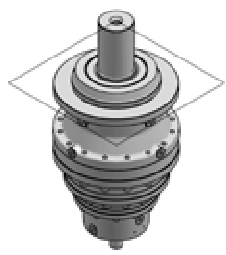
B5 ☐



V1 ☐



V3 ☐



UT.C 1474

Application data template

Slew gears data:

Centre distance (Pinion - Slew Ring) a: _______ [mm]

Pinion
One piece solid ☐
Fitted on splined shaft ☐

Slew Ring (Ring Bearing)
Internal toohing ☐
External toothing ☐

m modulus ______________ [mm]

Z_1 N°. of teeth ______________ [-]

x·m profile correction _______ [mm]

b_1 facewidth ______________ [mm]

Material ______________________________

Heat treatment ______________________________

Hardness ______________________________

m modulus ______________ [mm]

Z_2 N°. of teeth ______________ [-]

x·m profile correction _______ [mm]

b_2 facewidth ______________ [mm]

Material ______________________________

Heat treatment ______________________________

Hardness ______________________________

Electric Motor:

Power: __________ [kW]; Voltage: _________ [V]; Frequency: [Hz]; N° poles:________ [-];

Frequency Control device: yes ☐ no ☐
Motor brake: yes ☐ no ☐

Dynamic braking torque: ____________ [N m] Static braking torque: _______________ [N m]

Hydraulic Brake: yes ☐ no ☐

Dynamic braking torque: ____________ [N m] Static braking torque: _______________ [N m]

Hydraulic Brake:

Brand and type: ________________________ Shaft type: ________________________
Displacement: _______ [cc]; Max pressure: _______ [MPa]; Working pressure: _______ [MPa];

Notes and Remarks: ____

____

____

Notes

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Index of revisions

List of updates (Cat. EPS - Edition April 2011 available on www.rossi-group.com)

Page 6: Updates quick selection table.
Page 14 Updated slewing drive datasheet.

List of updates (Cat. EPS - Edition December 2011 available on www.rossi-group.com)

Pag. 14, 15: Updates application data template.

Solutions in motion...

History and know-how

For more than 50 years, Rossi has been developing its business in the most demanding applications to become one of the world's leading gearmotor manufacturers suitable for critical machines. Even in the toughest environment, Rossi is recognized for providing state of the art technology, solid value, and commitment to its customers.

Whatever gear reducer or gear motor your technology may need, Rossi's qualified staff is at your disposal to provide assistance, support, and innovative solutions during the design phase.

Customer tailored solutions may be found to maximize performance, while, at the same time, minimizing the overall machine cost.

More than:

- **50 years** of experience and success in the **power transmission** field
- **20 years** in **wind industry**
- **100 000 wind drives** installed

enables Rossi to offer Customers a comprehensive product range including helical, bevel, worm, planetary gear reducers and gearmotors; gear reducer for heavy applications, electric motors, servomotors, inverters, servoinverters, and on board inverter drives.

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